DAVID Y. IGE GOVERNOR STATE OF HAWAII

JOSH GREEN LT GOVERNOR STATE OF HAWAII



WILLIAM J. AILA, JR CHAIRMAN HAWAIJAN HOMES COMMISSION

TY'LER I. GOMES DEPUTY TO THE CHAIRMAN

STATE OF HAWAII DEPARTMENT OF HAWAIIAN HOME LANDS

P O BOX 1879 HONOLULU, HAWAII 96805

December 20, 2021

Ref.: PO-21-377

MEMORANDUM

- TO: Mary Alice Evans, Director Environmental Review Program Office of Planning and Sustainable Development Department of Business, Economic Development and Tourism
- FROM: William J. Ailā Jr., Chairman Mawaijan Homes Commission

SUBJECT: Final Environmental Assessment and Finding of No Significant Impact for the Barbers Point Solar Project, Kalaeloa, 'Ewa, Island of O'ahu TMKs: 9-1-013:038 (por.), 9-1-013:040 (por.), and 9-1-016:027 (por.)

Our agency has determined after review of comments on the draft environmental assessment and finding of no significant impact (DEA-AFONSI) for the proposed project that there will be no significant impacts in the context of Title 11, Chapter 200.1-13. Department of Hawaiian Home Lands (DHHL) has included copies of the public comments and the corresponding responses from the applicant that were received during the 30-day public comment period on DEA-AFONSI. These are included in Appendix L of the FEA.

DHHL hereby transmits the final environmental assessment (FEA) and finding of no significant impact (FONSI) for the Barbers Point Solar Project (Project) for publication in the next available edition of The Environmental Notice.

The information and files required for publication, including an electronic copy of the FEA, have been provided via the Environmental Review Program's online submission platform.

If there are any questions, please contact DHHL Planning Office via email at: DHHL.Planning@hawaii.gov or by phone at 808-620-9480.

From:	webmaster@hawaii.gov		
То:	DBEDT OPSD Environmental Review Program		
Subject:	New online submission for The Environmental Notice		
Date:	Thursday, December 30, 2021 4:17:43 PM		

Action Name

Barbers Point Solar Project

Type of Document/Determination

Final environmental assessment and finding of no significant impact (FEA-FONSI)

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, Oʻahu

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

(1) 9-1-013:038; (1) 9-1-013:040; and (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 Permit to Perform Work Upon State Highways, 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

Applicant

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Was this submittal prepared by a consultant?

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737 Bishop Street, Suite 2340 Honolulu, Hawaii 96813-3201 United States <u>Map It</u>

Action summary

The proposal 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, O'ahu. 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 a 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

The Department of Hawaiian Home Lands has determined after review of comments on the draft

environmental assessment and anticipated finding of no significant impact (DEA-AFONSI) for the proposed project, that there will be no significant impacts in the context of Title 11, Chapter 200.1-13. 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 Final EA.

Attached documents (signed agency letter & EA/EIS)

- ERP-DBEDT-FEA_FONSIBarbers-Pt.-Solar-Project-122021.pdf
- <u>BarbersPoint_FEA_Vol_1.pdf</u>
- <u>BarbersPoint_FEA_Vol_3.pdf</u>
- <u>BarbersPoint_FEA_Vol_2.pdf</u>
- BarbersPoint_FEA_Vol_11.pdf

Shapefile

• The location map for this Final EA is the same as the location map for the associated Draft EA.

Authorized individual

Leslie McClain

Authorization

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

Final Environmental Assessment

Volume 1 of 3

For the proposed

Barbers Point Solar Project

Department of Hawaiian Home Lands Property

'Ewa District, Oʻahu, Hawaiʻi

Prepared for:

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

Prepared by:



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

December 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 photo 60 MW-hour (MWh) battery energy storage system (BESS)			
Location:	Kalaeloa, 'Ewa District, Oʻahu, Hawaiʻi		
	South of 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	TMK 9-1-013:038: Transect Zone T2 – Rural/Open Space Zone (portion) and		
Development District (Land Use	Transect Zone T3 – General Urban Zone (portion)		
Designations):	TMK 9-1-013:040: Transect Zone T2 – Rural/Open Space Zone		
HCDA Kalaeloa	TMK 9-1-013:038: Eco-Industrial (Open Space Overlay) (portion) and		
Master Plan (Land	Recreation/Cultural (portion).		
Use Designations):	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	'Ewa Development Plan		
(Land Use Classification):	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	Federal		
and Approvals:	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		
	• City and County of Honolulu Movement of Oversize and/or Overweight Vehicles and Loads permit		
	A		

 Hawai'i Department of Transportation Permit for the Occupancy and Use State Highway Right-of-Way, Permit to Perform Work Upon State Highway Weekly Lane Closure Form, Permit to Operate or Transport Oversize and Overweight Vehicle and Loads. 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 Reg (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, LLC888 Dunsmuir Street, Suite 1100Vancouver, BC V6C3K4 CanadaAttn: Julia MancinelliJMancinelli@innergex.conApproving Agency:Department of Hawaiian Home LandsP.O. Box 1879Honolulu, Hawai'i 96805Attn: Andrew H. Choyandrew.h.choy@hawaii.govAgent:Tetra Tech737 Bishop Street, Suite 2340 Mauka TowerHonolulu, Hawai'i 96813-3201Attn: Leslie McClainLeslie.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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- D Correspondence from U.S. Fish and Wildlife Service and State of Hawai'i Department of Land and Natural Resources Division of Forestry
- E Cultural Impact Assessment
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- H Traffic Impact Analysis Report
- I Community Outreach and Engagement Report
- J Pre-Assessment Scoping Letter
- K Pre-Assessment Scoping Comments and Responses
- L Draft EA 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 Hawai'i 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	Hawai'i Community Development Authority
HCEI	Hawai'i's Clean Energy Initiative
HDOT	Hawai'i Department of Transportation
HRS	Hawai'i 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 'Ewa	Marine Corps Air Station 'Ewa

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		
РРА	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		
ТМК	Тах Мар Кеу		
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, '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 ESS) as well as ancillary support infrastructure. The Project area encompasses approximately 163-acres¹ 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 Hawai'i 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 Ho'omaluō 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 Charter² 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 O'ahu 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 Hawai'i 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 O'ahu 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

Hawai'i 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 Hawai'i 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 Hawai'i 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 Hawai'i (DBEDT 2019). In 2015, as part of the HCEI, the State increased the RPS³ to require electric utility companies that sell electricity for consumption in Hawai'i 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. Hawai'i 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 Hawai'i'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 O'ahu, 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 O'ahu* (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 Hawai'i 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 Hawai'i Public Utilities Commission (PUC). The Barbers Point Solar Project was one of the six O'ahu-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 O'ahu.

The HCEI and Hawai'i'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 O'ahu (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). See Section 3.1 for more information on the Project's reduction in greenhouse gas emissions.

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 PPA⁴. The Project will also put downward pressure on electricity rates through its fixed, long-term price for 25 years and, as a locally produced energy source, will help Hawai'i to avoid the negative economic effects of volatile oil prices and increase the state of Hawai'i'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 Ho'omaluō Energy Policy (DHHL 2009). As noted earlier, the two DHHL owned Project parcels are designated "Industrial" in DHHL's O'ahu 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 ahupua'a of Honouliuli in the 'Ewa District on the island of O'ahu. 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-B⁵) and one privately owned parcel (TMK 9-

⁴ The unit price for the Project is \$ 111.849570 per MWh of Net Energy Potential as stated in the Project's PPA Exhibit 1 page 183 of 381, and \$0.11184957 per kWh as stated in Exhibit 4 page 7 of 13. Per the Project's PPA Application, the Project is expected to provide bill savings to Hawaiian Electric's customers over the contract term. It is estimated that a typical residential Hawaiian Electric customer consuming 500 kilowatthours ("kWh") per month could save approximately \$0.25 per month on average over the course of the contract term.

⁵ The Applicant originally understood Roadway Lot 13083-B to be owned by HCDA. However, during the preassessment scoping process (see Section 7.2) it was clarified that Roadway Lot 13083-B is owned by HDOT.

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.

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 46-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

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

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 hardpacked 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 Historic 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 Program⁶ 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.

⁶ Formally called the Office of Environmental Quality Control

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 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 Hawai'i-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 vehicles⁷ and truck deliveries⁸) 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

⁷ 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).

⁸ The traffic analysis assumes eight average daily truck deliveries.

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. 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, endangered plants (including the endangered 'akoko) 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. For more details on avoidance and minimization measures that will be employed to avoid and minimize impacts to listed species, see Section 3.4.2.
- 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 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.

- Per the requirements of the Project's lease agreement with DHHL, Barbers Point Solar is required to post, maintain, and deliver a surety bond or similar financial instrument on or prior to the 20th operational year of the Project in order to secure the funding of decommissioning activities.
- 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. If panels or other equipment require replacement during Project operations, these materials will be stored on island until there is a sufficient number to transport them to the mainland for recycling. 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.⁹

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.

⁹ 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.

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
Estimated dates are subject to Interconnectiv	n Deguingen ente Ctuder

Table 2-1. Estimated Construction Milestone Dates

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 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 Hawai'i 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 O'ahu, dry weather is prevalent, with the exception of sporadic trade wind showers and short-duration storms. According to the Online Rainfall Atlas of Hawai'i (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 Hawai'i, total GHG emissions increased approximately 13 percent from 1990 to 2007 but have been declining since that time. In 2007, the state of Hawai'i 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 2018, the State of Hawai'i passed Act 15 to establish Hawai'i's zero emission clean economy target. This act is codified in HRS Section 225P-5 which sets a statewide target to sequester more atmospheric carbon and GHG than emitted within the state as quickly as practicable, but no later than 2045.

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. On behalf of Hawaiian Electric, Ramboll US Corporation (Ramboll) conducted an analysis to estimate the projected Project GHG emissions and compare the Project GHG emissions with those that would result from fossil fueled plants if the Project is not approved by the PUC and therefore not built (i.e. Avoided GHG emissions) (Hawaiian Electric 2020c). Ramboll also provided the estimated Net GHG Emissions impact from operation of the Project and the Net Lifecycle GHG Emissions impact and defines Net GHG emissions reduction as Avoided GHG emissions minus Project GHG emissions (i.e. Net GHG Emissions Reduction). The Net GHG Emission Reduction analysis is designed to provide the PUC with the information needed to give express consideration to the reduction of GHG emissions in its decision-making, consistent with HRS § 269-6(b), and to evaluate both the potential GHG emissions directly attributable to energy generation at the Project facility, as well as the GHG emissions that may be produced at earlier lifecycle stages in the production process, such as component production and transportation. In addition, this analysis evaluated the potential GHG emissions related to the Project's downstream processes, such as decommissioning and disposal. Thus, this analysis evaluated upstream, downstream, and operations GHG emissions that would result from the Project for the duration of the Project Lifetime.

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 O'ahu was formed by two ancient shield volcanoes that erupted between 1.3 and 2.2 million years ago: the Wai'anae volcano in the west, and the Ko'olau volcano in the east. Over millennia, erosion of the Ko'olau and Wai'anae volcanoes created the existing Wai'anae and Ko'olau 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 Wai'anae Mountains on the 'Ewa Plain, which formed when the lavas from the two volcanoes merged. The coastal portion of the 'Ewa 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 Kalo'i Gulch watershed, which encompasses roughly 10.9 square miles (Parham et al. 2008). Hydrology in this area of O'ahu is influenced by low rainfall (see Section 3.1 above) and high evapotranspiration rates.

Groundwater

Groundwater resources on O'ahu 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 Pu'uloa aquifer system, one of several aquifer systems in the Pearl Harbor hydrologic unit. The Pu'uloa aquifer system is also located in the 'Ewa Caprock Aquifer System Area. In this area of O'ahu, groundwater generally flows to the ocean through volcanic material, but is impeded by the 'Ewa caprock. This caprock consists of a thick wedge of marine and terrestrial sediments that were deposited on the flanks of the Ko'olau and Wai'anae 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 'Akoko 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 O'ahu but are more abundant on other Hawaiian Islands. It is considered a keystone species in lowland dry forests and is culturally important to Native 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 'akoko that occurs outside the Project area are provided in the subsection below.

Common/Hawaiian Name	Scientific Name	Status
'ānunu	Sicyos pachycarpus	Е
hoary abutilon	Abutilon incanum	Ι
ʻiliahiʻaloʻe	Santalum ellipticum	Е
ʻilieʻe	Plumbago zeylanica	Ι
ʻilima	Sida fallax	Ι
kauna'oa pehu	Cassytha filiformis	Ι
kīpūkai, seaside heliotrope	Heliotropium curassavicum	Ι
pā'ū-o-Hi'iaka	Jacquemontia sandwicensis	Е
pololei	Ophioglossum polyphyllum	Ι
pōpolo	Solanum americanum	Ι
wiliwili	Erythrina sandwicensis	Е
ʻuhaloa	Waltheria indica	Ι

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

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 'opiuma (*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 common. 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 (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 '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 (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 Hawai'i 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 'akoko (*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 'akoko plants in TMK 9-1-013:039 are considered to be the largest and last known existing wild population of the species (Department of Navy and Isle Botanica 2012). The April 2021 survey by Tetra Tech and LeGrande Biological Surveys Inc. recorded a total of 36 'akoko 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 'akoko 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 'akoko 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 O'ahu Lowland Dry – Unit 11, is occupied by the endangered 'akoko, 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 whiteeye (*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 ae'o or Hawaiian stilt (*Himantopus mexicanus knudseni*)¹⁰ and the state listed pueo—were recorded within the Project area. In addition, endangered 'alae ke'oke'o 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).

Common/Hawaiian Name	Scientific Name	Status
Birds		
'Alae ke'oke'o, Hawaiian coot**	Fulica alai	Е
Ae'o, Hawaiian stilt**	Himantopus mexicanus knudseni	Е
Pacific-golden plover	Pluvialis fulva	М
Pueo, Hawaiian short-eared owl*	Asio flammeus sandwichensis	Е
Invertebrates		
Globe skimmer	Pantala flavescens	Ι
Green darner	Anax junis	Ι
Status: E = Endemic (native only to the Hawaiian Islands and elsewhere); M	he Hawaiian Islands); I = Indigenous (nati = Migrant.	ve to the
· · · · · · · · · · · · · · · · · · ·	n or heard immediately outside of the Pro	iect area.

Table 3-2. Native Wildlife Species Recorded in th	he Project Area During the Surveys
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*= 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.

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

¹⁰ USFWS (2021) recently proposed to reclassify the Hawaiian stilt from an endangered species to a threatened species.

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 'ōpe'ape'a or Hawaiian hoary bat (*Lasiurus cinereus semotus*), 'ua'u or Hawaiian petrel (*Pterodroma sandwichensis*), 'ake'ake or band-rumped storm petrel (*Oceanodroma castro*), 'a'o or Newell's shearwater (*Puffinis auricularis newelli*), and 'alea 'ula 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 Hawai'i only for the island of O'ahu. 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 O'ahu, 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 O'ahu include the Hawaiian stilt, Hawaiian coot, and Hawaiian common gallinule (collectively referred to as listed waterbirds).¹¹ Listed Hawaiian waterbirds are

¹¹ The Hawaiian duck is not included in this discussion because genetic studies indicate that the O'ahu 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).

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 Project 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 Hawai'i include the Hawaiian petrel, bandrumped 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 Kaua'i, Maui, Hawai'i, Lāna'i, and possibly Moloka'i and Kaho'olawe (Pyle and Pyle 2017). Although previously thought to be extirpated from O'ahu, this species was recently detected at Mt. Ka'ala and Poamoho (Young et al. 2019) and appear to be regularly prospecting for nesting sites and potentially breeding on O'ahu (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 Hawai'i, 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 Hawai'i, the breeding population is believed to be very small with scarce breeding sites, including remote cliff locations on Kaua'i and Lehua Island, and steep cliffs and high-elevation lava fields on Hawai'i Island (KESRP 2019a; USFWS 2016). Although historically known from O'ahu, no known breeding population occurs on O'ahu and observations of band-rumped storm petrels on O'ahu are very rare (USFWS 2016; Price 2020).

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, 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 hydroseeded areas, temporary applications of water during the initial establishment period following hydroseeding will likely be provided via water trucks. Water irrigation is not anticipated to occur at the Project site during operations.

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. 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).

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.

- Vegetation clearing and temporary watering following hydroseeding in the portions of the Project area adjacent to the 'akoko critical habitat has the potential to create more suitable habitat for 'akoko. In addition to the environmental education and observation program (described above), a post-construction 'akoko survey will be conducted during the first wet season following end of construction. The post-construction 'akoko survey would be limited to the portion of the Project area located within 200 feet (60 meters) north of San Juacinto Road (which is north of the critical habitat) in areas with suitable 'akoko habitat. This distance is based on historical locations of 'akoko on TMK 9-1-013:039, the likely dispersal ability of the species, and buffer recommendations from USFWS.
- If 'akoko were to establish in the Project area, re-initiation of consultation with DOFAW and USFWS would be necessary. If 'akoko is found in the Project area during construction, all ground disturbing activities would cease within 328 feet (100 meters) of the plant(s) until further consultation with USFWS and DOFAW is coordinated. Further specifics would be determined in consultation with the relevant agencies depending on the location. If 'akoko is found in the Project area during operations, vegetation control activities would follow the recommended buffer distances by USFWS (2018)until further consultation with USFWS and DOFAW occurs (e.g., no mowing would occur within 20 feet [6 m] of 'akoko plants, and no hand application of herbicide would occur within 10 feet [3 m] of 'akoko plants).
- 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 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 Hawai'i; 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 Hawai'i.

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 Hawai'i have not been documented to collide with PV arrays. Hawai'i currently has over 1,000 MW of installed solar (HECO 2020; KIUC 2021) and utility-scale solar has existed in Hawai'i since 2008; yet there are no public records indicating endangered birds are colliding with solar panel arrays in Hawai'i. 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 Hawai'i or information to indicate listed birds are colliding with solar panel arrays in Hawai'i.

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. See the following section "Impact Avoidance and Minimization Measures" for a description of these measures.

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 Hawai'i, particularly on Kaua'i 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 'akoko, 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 which is anticipated to be 500 feet by 250 feet for a total of 1,500 feet of fencing. Typical security fencing includes three strands of barbed wire within a 1-foot vertical area at the top of the 6-foot chain link fence.

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 Hawai'i State Historic Preservation Division (SHPD). Historic documents, maps, and reference volumes were found in the Hawai'i State Archives, the University of Hawai'i Library system, Bishop Museum Archives, and private collections. Online sources of information included the United States Department of Agriculture, the State of Hawai'i Department of Accounting and General Services, the Office of Hawaiian Affairs Kīpuka and Papakilo Databases, the Hawai'i Office of Planning Statewide Geographic Information System Program, Waihona 'Āina, 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 Ahupua'a, in the 'Ewa District. The traditional name for Barbers Point is Kalaeloa. Honouliuli is the largest ahupua'a on the island of O'ahu and forms a portion of the 'Ewa Plain. In general, an ahupua'a 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 included important spiritual realms, and was populated and traversed. This is further shown by the many kuleana land claims¹² that were submitted during the Māhele¹³ by the residents who were living on and cultivating the land. During the post-Contact period, as Western influence in the islands grew, Honouliuli Ahupua'a was utilized for agricultural purposes 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 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. During the years that followed the 1941 attack, 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.

¹² 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.

¹³ 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 ali'i [royalty] and konohiki [landlords]), and maka'āinana (common people) lands.

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
-	T-08	4	MCAS 'Ewa 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 era 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 'Ewa 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 Hawai'i 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 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.

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 Draft AIS Report (Appendix A) provides the significance assessment and recommended treatment for features documented during the AIS.

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 / No Further Work
XXXX (T-10)	d	location, setting, materials, feeling, and association	Data Recovery
XXXX (T-11)	d	location, setting, materials, feeling, and association	Data Recovery
XXXX (T-12)	d	location, setting, materials, feeling, and association	Data Recovery

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

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 makahiki¹⁴, 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 "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. Four historic properties will be completely avoided and preserved (see Table 3-4) while features included in eight additional historic properties will also be avoided and preserved. Properties/features recommended for

¹⁴ 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).

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-09.

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 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 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 kanaka maoli (Native Hawaiian) and/or kūpuna (elders) participating in formal interviews, as follows:

- Mr. Shad Kane member of Kapolei Hawaiian Civic Club, Chair of the O'ahu Council of Hawaiian Civic Clubs Committee on the Preservation of Historic Sites and Cultural Properties, Ali'i 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- kama'āina knowledgeable about 'Ewa
- Mr. Mana Caceres- 'Ewa representative on the O'ahu 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 O'ahu 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 ahupua'a 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 O'ahu's Pre- and Post-Contact history. Archival research indicated that a major feature of pre-Contact and early Contact Honouliuli, the Kualaka'i Trail, passed near to the Project area. This prominent trail once connected Honouliuli Village to the coastal settlements of One'ula and Kualaka'i, and would have been crucial to life on the 'Ewa 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 mo'olelo (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 Native 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 Pa'akai 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 'Ewa Plain in the Ahupua'a 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 lā'au lapa'au 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 'Ewa Plain and Honouliuli Ahupua'a hold much significance for Native Hawaiians, as demonstrated by ethnographic data as well as the archaeological record. Numerous mo'olelo attest to the traditional and historic significance of the region, including spiritual realms relating to the *leina a ka'uhane* (leaping place of spirits) and the Plain of Kaupe'a. 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 *ahupua'a* 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 mana'o (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 O'ahu 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 Historic District and a portion of the Project area is located within the 'Ewa Battlefield Historic 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 O'ahu 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 O'ahu 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 Ho'omaluō 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 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.

<u>HCDA</u>

In July 2002, 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 (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), O'ahu Island Plan (DHHL 2014), Kapolei Regional Plan (DHHL 2010) and Ho'omaluō 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 Wai'anae Mountains and is surrounded by the 'Ewa Plain, which is an expansive plain extending from the base of the Wai'anae 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 Wai'anae Mountains and the Pacific Ocean. Important public views and vistas in this region are identified in Table 3.2 of the 'Ewa Development Plan¹⁵ (City and County of Honolulu 2020). These include:

- Views 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 Wai'anae Development Plan Area;
- Views of the Wai'anae Range from H-1 Freeway between Kunia Road and Kalo'i Gulch and from Kunia Road;
- Views of Nā Pu'u at Kapolei, Pālailai, and Makakilo;
- Mauka and makai views; and
- Views of central Honolulu and Diamond Head, particularly from Pu'u O Kapolei, Pu'u Pālailai, and Pu'u Makakilo.

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

¹⁵ The 'Ewa 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 'Ewa region and guides public policy, infrastructure investment and land use decision making over a 25-year planning horizon.

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 environment¹⁶. 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 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).

¹⁶ See BLM Visual Resource Management System (BLM 1986).

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 criteria¹⁷ 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.

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

¹⁷ 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.

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.¹⁸ 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 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.

¹⁸ 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.

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.

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

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

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 pollutants¹⁹ (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.

		Ambient Air Quality Standards			
Air Pollutant	Averaging Time	Hawai`i State Standard (ppm)	Federal Primary Standard (ppm)	Federal Secondary Standard	
Carbon Manavida (CO)	1-hour	9 ppm	35 ppm		
Carbon Monoxide (CO)	8-hour	4.4 ppm	9 ppm		
Nitra con Disuida (NO.)	1-hour		0.1 ppm		
Nitrogen Dioxide (NO ₂)	Annual	0.04 ppm	0.053 ppm	0.053 ppm	
DM	24-hour	150 μg/m ³	150 μg/m ³		
PM10	Annual	50 μg/m ³			
DM	24-hour		35 μg/m ³	35 μg/m ³	
PM _{2.5}	Annual		12 μg/m ³	15 μg/m ³	
Ozone (O ₃)	8-hour	0.08 ppm	0.07 ppm	0.07 ppm	
Sulfur Dioxide (SO2)	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/m ³	0.15 μg/m ³	0.15 μg/m ³	
Hydrogen Sulfide	1-hour	0.025 ppm			

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

ppm = parts per million by volume; $\mu g/m^3$ = 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).

¹⁹ Air quality monitoring stations near Kilauea on the Island of Hawai'i often measure exceedances in the NAAQS for SO₂ 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 Historic 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.

	Maximum Permissible Sound Level (dBA)		
Receiving Zoning District	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	

Table 3-7. Hawai'i Noise Standards

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 Historic 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.

Phase	Duration	Equipment Type	Model (Recommended)	L _{max} @ 50 feet (dBA, slow)
Construction Startup	Month 1-3 of	Water Truck	-	84
	Construction	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

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

Phase	Duration	Equipment Type	Model (Recommended)	L _{max} @ 50 feet (dBA, slow)
Construction Excavation	Month 2-7 of	Trencher	Vermeer	82
	Construction	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	Water Truck	-	84
	Construction	JLG	G10-55a	80
		Skid Steer	Cat 259b3	80
		Crane	RT 60	85
		Pile Driver	Vermeer PD10	84
		Flat Deck Truck	-	85
Cleanup/Commissioning/	Month 10-12 of	Grader	Cat 14H	85
Demobilization	Construction	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 Historic 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, 'Ewa, 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).

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

Table 3-9. Level of Service Values

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 Kualaka'i 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 O'ahu 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 Kualaka'i Parkway), and a bike lane and shared used path extending from H-1 Freeway south along Kualaka'i 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 Hawai'i, 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 O'ahu. Several military airfields are located outside the Project area vicinity on O'ahu, including Wheeler Army Airfield, Hickam Air Force Base, and Marine Corps Base Hawai'i 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, all movements at the studied intersections would operate at a LOS of D or better; however, some individual movements at the studied intersections (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 with-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 same LOS under both with-Project and without Project future conditions 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 O'ahu 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 Hawai'i 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, Hawai'i Emergency Management Agency identify the hazard risk associated with tsunami inundation throughout Hawai'i (DEM 2015). These maps define both the tsunami and extreme tsunami evacuation zones. Tsunami evacuation zones are based on tsunami events that have impacted Hawai'i 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.

Figure 3-14 also shows the areas the City and County of Honolulu, Hawai'i Emergency Management Agency has identified as subject to sea level rise. Only 3,317 square feet of the 3.2-feet sea level rise projection area is within the Project area and is located along the eastern boundary of TMK 9-1-013:040 adjacent to Ordy Pond. This area will not have project solar facilities or associated equipment sited within it. The preliminary design shown in Figure 2-1d shows a proposed detention berm for stormwater control in the 3,317 square foot sea level rise area. The final design will ensure that no Project infrastructure including stormwater facilities are sited in the sea level rise area.

Wildfires occur throughout Hawai'i 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. Hawai'i'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 2021a).

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 Hawai'i 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 O'ahu, 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 (induced²⁰) benefits elsewhere in the regional economy. During construction, an estimated average of 70 people will be employed for the Project, with an estimated

²⁰ Induced economic benefits are generated by household spending (e.g., use of worker incomes to purchase groceries and other household goods and services).

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.

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 through its fixed, long-term price for 25-years and, as a locally produced energy source, will help Hawai'i 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 Hawaiians²¹. 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 Hawai'i 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 Hawai'i'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 Hawai'i, and no adverse economic effect is anticipated as a result of the Project's construction, operations and maintenance, or decommissioning.

²¹ The term "native Hawaiians" (vs. Native Hawaiians) refers to individuals that meet the blood quantum requirement of 50% Hawaiian ancestry. The term "Native Hawaiians" refers to the broader group of individuals with Hawaiian ancestry.

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 Hawai'i 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 'Ewa 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 'Ewa 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 Hawai'i (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 Hawai'i West O'ahu 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 cleanerburning 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 O'ahu 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 O'ahu, 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 O'ahu 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 Hawai'i 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 O'ahu, and it is not currently a feasible alternative for renewable energy development (Hawai'i 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 (Hawai'i 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 O'ahu 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 Hawai'i State Planning Act, Chapter 226, HRS

The Hawai'i 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 Hawai'i 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 Hawai'i 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 Hawai'i, 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.

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:	The Project would be consistent with the stated objectives and policies of HRS § 226-6, particularly the following policies:
(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	(7) Expand existing markets and penetrate new markets for Hawai'i's products and services.
time stimulating the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands	(12) Encourage innovative activities that may not be labor-intensive, but may otherwise contribute to the economy of Hawai'i.
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 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.

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
226-9. 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 Hawaiʻi'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 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. <i>Physical Environment - Land-based, Shoreline, and Marine Resources: Planning for the State's physical environment with regard to land-based, shoreline, and marine resources</i>	The Project would be consistent with the stated objectives and policies of HRS § 226-11, particularly the following policies:
shall be directed towards achievement of the following objectives:	(1) Exercise an overall conservation ethic in the use of Hawai'i's natural resources.
(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.	(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
 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. 	 more detailed discussion of the Project's benefits to the state's energy system. 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. 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 profine sufficient's generating units and reduce net lifecycle greenhouse gase missions by approximately 455,598 metric tons of carbon dioxide equivalents over its lifecycle. Furthermore, it is estimated that the renewable energy supplied by the PUcject will potentially save Hawaiian Electric's energy supplied by the PDiject will potentially save Hawaiian Electric section 1.2 for a more detailed disc
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: 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:	This objective is not applicable, as the Project would not have an effect on health.
(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.	
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:	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.
(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.	
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:	This objective is not applicable, as the Project would not have any effect on government.
(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.	

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.
(b) Priority guidelines to promote the economic health and quality of the visitor industry.	See Section 7.1 for a summary of the community outreach efforts conducted to date. 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.

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

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 Gu	uidelines
(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	see section s. The more more more mation regarding the troject's protection of sensitive environmental resources.
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:
	 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)(I): Expand upon the existing 20 kW photovoltaic utility-scale application²²

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 Ho'omaluō Energy Policy) and Island Plans (such as the O'ahu 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).

²² 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.

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. Objectives: Provide space for and designate a mixture of appropriate land uses, economic opportunities, and community services in a native Hawaiian- friendly environment. 	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.
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,
 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. 	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. 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.

Table 5-3. Project Consistency DHHL General Plan

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

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

- Objective 1. Mālama 'āina: Respect and protect our native home lands.
- Objective 2. Ko'o: 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. Ho'ona'auao: Prepare and equip beneficiaries to promote a green, energy efficient lifestyle in and around communities.

The Project will directly support Objective 2 of the Ho'omaluō Energy Policy through the leasing of DHHL lands for production of solar energy. Furthermore, in support of DHHL's Ho'omaluō 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 Ho'omaluō Energy Policy, DHHL issued a public notice for disposition of Hawaiian Home Lands by general leases for renewable energy projects on O'ahu 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 O'ahu Island Plan (DHHL 2014) provides recommendations for the future uses of the lands owned by DHHL on O'ahu to meet beneficiary and department needs over a 20-year planning period. The O'ahu 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 O'ahu Island Plan (see Figure 3-5, DHHL 2014). The O'ahu 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

mission.

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.

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 Hawai'i 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 Hawai'i 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 Hawai'i 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 Hawai'i. Table 5-5 summarizes the Project's consistency with the specific guidelines identified in HRS Chapter 344.

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; 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.	The Project would not have any effect on population.
Land, Water, Mineral, Visual, Air, and Other Natural Re	sources
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.

Table 5-5. Project Consistency with Hawai'i State Environmental P	olicy
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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 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	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.

Guideline	Assessment of Consistency
Economic Development Guidelines	
Encourage industries in Hawai'i which would be in harmony with our environment Promote and foster the agricultural industry of the State; and preserve and conserve productive agricultural lands; Encourage federal activities in Hawai'i 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.	The Project would contribute to the growing renewable energy industry in Hawai'i by providing solar energy for the island of O'ahu, 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.
Transportation Guidelines	
Encourage transportation systems in harmony with the lifestyle of the people and environment of the State 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	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.
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 Hawai'i through the design and maintenance of neighborhoods which reflect the culture and mores of the community 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	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
Encourage the reduction of environmental pollution	generation (DHHL 2014). DHHL will use revenues developed
which may degrade a community Foster safe, sanitary, and decent homes	from industrial leasing of these available lands in east Kalaeloa to develop new homesteads in suitable residential areas
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	 throughout the state. The Project would benefit community life by generating of renewable energy to replace a portion of electricity that i currently generated by burning fossil fuels, thus reducing greenhouse gas emissions and other forms of pollution the detrimental to the environment and human health. The P would represent Hawaii's commitment to achieving of 10 percent renewable energy sources by 2045.
Education and Culture Guidelines	
Foster culture and the arts and promote their linkage to the enhancement of the environment Encourage both formal and informal environmental education to all age groups	The Project would not affect existing or future educational or cultural programs.

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 Hawai'i 2050 sustainability plan serves as the State's climate and sustainability action plan to determine future actions guiding the coordination and implementation of Hawai'i'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 Hawai'i 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 Hawai'i 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
 - o 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 O'ahu (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 Hawai'i Clean Energy Initiative

The HCEI was launched in 2008 when the State of Hawai'i and U.S. Department of Energy signed a Memorandum of Understanding to collaborate on the reduction of Hawai'i'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 Hawai'i'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 O'ahu, Maui, Molokai, Lanai and Hawai'i 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 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 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 Hawai'i 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 Hawai'i'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 an industrial land use 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 notes that "Parcels 1G, 1H and 2A were previously designed as regional open space, and there remains potential that all or part of these areas may be accepted by the City and County of Honolulu as a regional park" (HCDA 2006). A portion of TMK 9-1-013:038, including most of solar array Area 1

overlaps with Parcels 1G and 1H. However, this overlay conflicts with DHHL's intended use for the parcel per DHHL's Kapolei Regional Plan which envisions this parcel as mixed use intended for revenue generation. 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. Therefore, DHHL's chosen use of this parcel is not required to meet the land use designation of the Kalaeloa Master Plan. However, if DHHL were amenable to a regional park being built on TMK 9-1-013:038, the timing of implementation of such a facility would likely be delayed due to the delay in transferring the ownership of the other potential park parcels north and east of TMK 9-1-013:038 from the Navy to City and County of Honolulu and due to the potential impacts those Navy owned parcels may have with the 'Ewa Battlefield Historic District (which was officially listed on the NRHP in 2016). Therefore, Barbers Point Solar LLC anticipates that the Project's operational period would conclude prior to the potential implementation of a regional park project in the "Eco-Industrial (Open Space Overlay)" land use district in the Kalaeloa Master Plan. 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, and open space land use designation. The Recreation/Cultural 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. As the Project will be decommissioned at the end of its useful life and as many cultural sites will be avoided and preserved in the portions of the Project designated as Open Space/Recreation/Cultural, future use for passive open space would not be excluded and therefore the Project is compatible with this land use designation in the Kalaeloa Master Plan.

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. 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. Although DHHL lands are not required to be consistent with the Kalaeloa Master Plan and its implementing rules under HAR §15-215, an evaluation of the Project's consistency with these rules is provided below.

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 Historic 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 (see Fig. 1.10 Preferred Plant Species of HAR 15-215-44). Landscaping will have automatic irrigation system.
- Per HAR §15-215-46, all parcels in the district shall provide a minimum of 20% of the lot as open space, one third of this requirement to be provided at-grade.
- 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. Regarding the open space requirement, the Project's site plan in Figure 2-1 conforms with this open space requirement by providing a minimum of 9.8 acres of open space on TMK 9-1-013:040 and 19.4 acres on TMK 9-1-013:038, all at grade.

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

The current General Plan for the City and County of Honolulu was amended and adopted by resolution in October 2002 (Resolution 02-205). This revised edition of the General Plan is a policy guidance document that presents the long-range objectives for the island of O'ahu (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 O'ahu.

A proposed revised General Plan dated December 2017 was transmitted from the Planning Commission to the City Council on April 20, 2018. The proposed revised General Plan is pending adoption by the City Council per Council Resolution 21-23 (City and County of Honolulu 2021b).

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. Although DHHL lands are not required to be consistent with the City and County of Honolulu's General Plan, an evaluation of the Project's consistency with the current and proposed revised General Plan is provided below.

Overall, the proposed Project is consistent with the various objectives and policies contained in the current and 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 current and proposed revised City and County of Honolulu General Plan described below.

Economy

Current General Plan	Proposed Revised General Plan
Objective A To promote employment opportunities that will enable all the people of O'ahu to attain a decent standard or living.	Objective A To promote economic opportunities that enable all the people of O'ahu to attain meaningful employment and a decent standard or living.
Policy 1 Encourage the growth and diversification of Oahu's economic base.	Policy 1 Support a strong, diverse and dynamic economic base resilient to changes in global conditions.
Policy 3 Encourage the development in appropriate locations on Oahu of trade, communications, and other industries of a nonpolluting nature.	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 O'ahu's long-term environmental, economic, and social sustainability.

Discussion: 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.

Natural Environmental and Resource Stewardship
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Current General Plan	Proposed Revised General Plan
Objective A To protect and preserve the natural environment.	Objective A To protect and preserve the natural environment.
Policy 1 Protect O'ahu's natural environment, especially the shoreline, valleys, and ridges from incompatible development.	Policy 1 Protect O'ahu'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 such as slope, flood and erosion hazards, water-recharge areas, distinctive landforms, and existing vegetation.	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 surface drainage and flood-control systems in a manner which will help preserve their natural settings.	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 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 the Island of O'ahu.	Policy 8 Protect plants, birds, and other animals that are unique to the State of Hawai'i and O'ahu, and protect their habitats.
(No Policy 12)	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 monuments and scenic views of O'ahu for the benefit of both residents and visitors.	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 ell-known resources: its mountains and craters; forests and watershed areas; marshes, rivers, and streams; shorelines, fishponds, and bays; and reefs and offshore islands.	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 2 Protect O'ahu'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 sea.	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

Current General Plan	Proposed Revised General Plan	
Objective A To maintain an adequate, dependable, and economical supply of energy for O'ahu residents.	Objective A To increase energy self-sufficiency and maintain an efficient, reliable, resilient, and cost-efficient energy system.	
Policy 1 Develop and maintain a comprehensive plan to guide and coordinate energy conservation and alternative energy development and utilization programs on O'ahu.	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 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.	
(No Policy 7)	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.	
(No Policy 9)	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.	Objective B To conserve energy through the more efficient management of its use and through more energy-efficient technologies.	
(No Policy 5)	Policy 5 Encourage the implementation of an adaptable and reliable electrical grid, energy transmission, energy storage, and energy generation technologies.	
Objective C To fully utilize proven alternative sources of energy.	Objective C To foster an ethic of energy conservation that inspires residents to engage in sustainable practices.	
(No Policy 4)	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

Current General Plan	Proposed Revised General Plan	
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.	Objective A To coordinate changes in the physical environment of O'ahu to ensure that all new development are timely, well-designed, and appropriate for the areas in which they will be located.	
Policy 10 Exclude from residential areas, uses which are major sources of noise, and air pollution.	Policy 10 Discourage uses which are major sources of noise, air, and light pollution.	
Policy 11 Establish danger zones to exclude incompatible uses from hazardous areas surrounding airfields, electromagnetic-radiation sources, and storage places for fuel and explosives.	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.	
(No Policy 13)	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. As detailed in Section 3.12.2, the Project received no hazard determinations from the FAA for each of the solar arrays and for the substation. 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

Current General Plan	Proposed Revised General Plan
Objective B To protect, preserve, and enhance O'ahu's cultural, historic, architectural, and archaeological resources.	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.	Policy 2 Identify and, to the extent possible, preserve and restore buildings, sites, and areas of social, cultural, historic, architectural, and archaeological significance.
(No Policy 7)	Policy 7 Encourage the protection of areas that are historically important to Native Hawaiian cultural practices and to the cultural practices of other ethnicities, in order to further preserve and continue these practices for future generations.

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, four will be completely avoided and preserved. Features included in eight additional historic properties will also be avoided and preserved. In total, 348 of the features documented during this study are recommended for preservation, and a preservation plan will be developed and approved by SHPD prior to Project construction to ensure that significant historic properties are protected during the construction of the Project as well as for future generations.

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). In 2002, the State Legislature transferred redevelopment responsibility for Kalaeloa to the HCDA. 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. Approval for 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. However, 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. Although DHHL lands are not required to be consistent with the 'Ewa Development Plan, the Kalaeloa Master Plan, and KCDD regulation, DHHL has requested that the Applicant evaluate the Project's consistency with the 'Ewa Development Plan.

Section 3.13 of the 'Ewa Development Plan provides policies and guidelines for the Kalaeloa Special Area. These polices and guidelines are provided below along with a discussion of the Project's consistency with these policies and guidelines.

3.13.1 General Policies

- Use Kalaeloa's redevelopment as an opportunity to integrate the circulation system and land use pattern of the 'Ewa Plain.
- Develop a major new regional public park, and provide continuous lateral public access along the shoreline at Kalaeloa.
- Create a continuous pedestrian route along most of the 'Ewa Coast by reserving the entire shoreline of Kalaeloa for public access and recreation, and linking to adjacent pathways in Ocean Pointe/Hoakalei and Campbell Industrial Park.
- Require building setbacks from the shoreline.
- Integrate the road network within Kalaeloa with the regional circulation system for all of 'Ewa to provide additional ways for residents and workers to cross 'Ewa from east to west and north to south.
- Provide ample lands within Kalaeloa devoted to uses that will create long term jobs for 'Ewa's residents.

3.13.2 Guidelines

The following guidelines suggest how the general policies for Kalaeloa should be implemented:

 Develop a major regional park at Kalaeloa that provides beach recreation and support facilities near the shoreline, other active recreation facilities in mauka areas, and preserves for archaeological and cultural resources, wildlife habitat, wetlands, and endangered plant colonies.

Coastal Environment

- Require a minimum building setback of 60 feet and a lateral public access easement along the entire shoreline, with the entry point at the former military beach recreation center. Where possible, the setback should be expanded to 150 feet where justified by historic or adopted projections of shoreline erosion rates.
- Connect the Kalaeloa shoreline access easement to shoreline access easements at the Barbers Point Industrial Area to the west and to public pedestrian pathways at Ocean Pointe/Hoakalei to the east.

Separation of Use Areas

• Design the road pattern and use landscape buffers to separate and distinguish military support housing, airport/industrial facilities, and recreation/wildlife areas from one another.

Appropriate Scale

• Use site planning and landscaping to minimize the visibility of large building volumes and elements from residential areas, commercia land civic districts, and public rights-of-way and parks.

Circulation System and Transportation Facilities

- Design the circulation system to include major roadways connecting the City of Kapolei to the shoreline recreation center and Ocean Pointe/Hoakalei.
- Upgrade the road system to allow bus stop facilities to be provided at the airport, military housing area, and shoreline recreation area.

Landscape Treatment

- The visibility of parking, storage, and airport/industrial operations from the street should be minimized through the planting of a landscape screen, consisting of trees and hedges, along street frontages.
- Require streets connecting the City of Kapolei to Ocean Pointe/Hoakalei and the shoreline recreation areas to receive special landscape treatment.
- Use xeriscaping (the use of native landscape materials with low water demand), non-potable water for irrigation, and efficient irrigation systems wherever possible to conserve groundwater resources.

Discussion:

The Project is consistent with these general policies as it doesn't preclude the City and County of Honolulu or HCDA from achieving the concepts described in these policies over the long term. The Project is not located on the shoreline and will not block public access to the shoreline. Regarding the establishment of a new regional park, the Project is proposed on DHHL property (TMKs 9-1-013:038 and :040) which is classified in the 'Ewa Development Plan's Urban Land Use Map as Industrial Use and the envisioned use of the DHHL properties in Kalaeloa is "leases for commercial and industrial use" (see DHHL lands listed in Table 3.6, page 3-76 of the 'Ewa Development Plan). The Navy properties north of the Project area are designated for Park.

The 'Ewa Development Plan maps show a future extension of an arterial south from Roosevelt Avenue through a portion of the Project area on TMK 9-1-013:038, connecting to Keoneula Boulevard. This alignment is similar to the envisioned Kualakai Parkway extension shown in the KCDD Rules (HCDA 2012) Thoroughfare Plan (see Figure 5-1). 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 Historic 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.

The Project will be consistent with the 'Ewa Development Plan's landscape guidelines as the Project will implement landscaping along Coral Sea Road and Tripoli Road as required by HCDA (HAR §15-215-44) and intends to plant drought tolerant species that will not require irrigation once established.

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.

5.10.4 Impact Fees for Traffic and Roadway Improvements in 'Ewa

The City and County of Honolulu's Impact Fees for Traffic and Roadway Improvements in 'Ewa Ordinance (Revised Ordinances of Honolulu Chapter 33A) regulates assessment and collection of impact fees to be borne on a pro-rata share basis by landowners, developers, home builders, and others who directly contribute to expanding the population and increasing economic activity in the 'Ewa region through new land development activities. This includes an applicant who applies to the City and County of Honolulu for a building permit.

'Ewa highway master plan impact fees are charged and assessed for all new land development activities that require a building permit in the 'Ewa region, except as otherwise provided in Section 33A-1.10(a). Per Section 33A-1.10 (a) (4), uses that are exempt from payment of the 'Ewa highway master plan impact fee include facilities that are part of electrical system infrastructure and that do not attract or

produce vehicular trips. This includes but is not limited to utility installations, as defined in Section 21-10.1, that do not have regular on-site employees; these utility installations can be publicly or privately owned. The Project will be part of the electrical system infrastructure and will not have regular on-site employees.

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 building permits from City and County of Honolulu DPP.

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.

Permit/Approval	Regulating Agency	Status
HRS Chapter 343 Compliance	DHHL	Final EA/FONSI published January 8,
The senapter 545 compliance	(approving agency)	2022
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 report 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
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
Permit for the Occupancy and Use of State Highway Right-of-Way	HDOT	To be obtained prior to construction, as applicable
Permit to Perform Work Upon State Highways ¹	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	Department of	To be obtained prior to construction, as
Vehicles and Loads Permit	Transportation Services	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	Federal Aviation	To be submitted within 5 days after

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

¹ The application includes the review and approval of construction drawings and a Traffic Management Plan.

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, four will be completely avoided and preserved. Features included in eight 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 agreed upon 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 Historic 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'omaluō 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 Hawai'i 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 'Ewa 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 O'ahu 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 'akoko 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 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, DHHL issued a Finding of No Significant Impact (FONSI) in accordance with HRS Chapter 343. This determination 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.

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-on-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 O'ahu residents and stakeholders. Attendees included residents of O'ahu, 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 – Malu'ohai, Kaupe'a, Kauluokaha'i 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).

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
	Public Meeting	October 20, 2021	Virtual Public Open House during Draft EA Comment Period
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	October to present	Meetings with HCDA to provide project updates and request input on Project
	Authority	June 10, 2021	Participated in HCDA Kalaeloa Stakeholders meeting
		July 14, 2021	Attended HCDA Master Plan & Rules Update meeting
		August 12, 2021	Participated in HCDA Kalaeloa Stakeholders meeting
		September 9, 2021	Participated in HCDA Kalaeloa Stakeholders meeting
		October 14, 2021	Participated in HCDA Kalaeloa Stakeholders meeting
	State Historic Preservation Division	May 26, 2020	Meeting with DHHL & SHPD Staff

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

Local Community Type	Stakeholder	Date	Description of Engagement
		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
		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)
		November 19, 2021	Meeting with DHHL & SHPD staff
	Department of Land & Natural	October 30, 2020	Meeting with DOFAW and USFWS staff
	Resources- Division of Forestry and Wildlife (DOFAW)	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	Kapolei Community Development	October 18, 2018	Community meeting with President of KCDC
Adjacent Property Owners/Lessees	Corporation (KCDC) (KCDC Board consists of community	March 1, 2019	Community meeting with President of KCDC
Uwiters/Lessees	leaders from the Kapolei homestead	August 21, 2019	Meeting with President and Board Members of KDCD
	communities – Malu'ohai, Kaupe'a, Kauluokaha'i and Kānehili)	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

Local Community Type	Stakeholder	Date	Description of Engagement
			Meeting with KCDC President
		November 18, 2021	Meeting with KCDC board representatives
	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
	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 'Aha Moku 'Ewa Representative / Kalaeloa Heritage Park & Legacy Foundation, Director
Environmental and	Earth Justice	August 18, 2020	Meeting with Managing Attorney, Earth Justice
Conservation Groups	Sierra Club	August 18, 2020	Meeting with Chapter Director, Sierra Club
Other Community and	Council for Native Hawaiian	September 23 – 24, 2019	Meeting with staff and convention
Business Organizations	Advancement (CNHA)	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, Progra Manager

Local Community Type	Stakeholder	Date	Description of Engagement
		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, 'Ahahui Siwila Hawai'i 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
	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	Aha Moku 'Ewa Representative Shad	November 9, 2020	Interview for CIA; shared project design and AIS findings
Leaders	Kane	June 17, 2021	Site visit with 'Aha Moku 'Ewa Representative/ Kalaeloa Heritage Park and Legacy Foundation Director, Shad Kane, and other CIA participants
		October 25, 2021	Site visit with 'Aha Moku 'Ewa Representative/ Kalaeloa Heritage Park and Legacy Foundation Director, Shad Kane, and Kapolei Community Development Corporation and Kapolei Homestead Association members
	Oʻahu 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	September 24-27, 2020	Correspondences with Cultural Descendant Carolyn Keala Norman
	Descendant	June 17, 2021	Site visit with Cultural Impact Assessment participants Carolyn Keala Norman, Mana Caceres, and Shad Kane
Historical Groups	Mr. John Bond, MCAS Ewa Field	July 15, 2019	Meeting
	Historian	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

Local Community Type	Stakeholder	Date	Description of Engagement
	Kanehili Cultural Hui (Save Ewa Field) Hawaiian Cultural	December 21, 2020	Site visit with John Bond, Kanehili Cultural Hui; Daniel Martinez, Pearl Harbor National Memorial, and staff
	Consultants	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
		October 4, 2021	Meeting with Executive Director, Kirsten Faulkner and Virginia Murison, 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
	Mr. Jan Becket	September 30, 2021	Meeting
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 Oʻahu	August 3, 2020	Instructor – Facilities Management Program, University of Hawaii West Oʻahu
		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 Ho'omaluō Energy Policy (DHHL 2009) and the State's RPS 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 O'ahu. 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 O'ahu'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, O'ahu 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 O'ahu'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 Wai'anae Gold to generate local food opportunities. Innergex has partnered with Wai'anae 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 'Aina Bars. To watch a video where Wai'anae Gold's Vince Kana'i 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, Draft EA public review process and distribution of the Final EA 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.

Stakeholder		Pre-Assessment Scoping Letter		Draft EA	
Stakenolder	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	•		•		•

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

Stakeholder		sessment ng Letter	Draft EA		Final EA	
Stakenolder	Letter Sent ¹	Comment Received ¹	Notice of Availability	Comment Received	Notice of Availability	
State Agencies						
Department of Agriculture	•		•		•	
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	•	•	•	•	•	
Hawaiʻi 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	3		3	
UH Environmental Center	•	•3	3		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 •		1	•		•	
Department of Facilities Maintenance		•	•	•	•	
Honolulu Fire Department	•	•	•		•	
Department of Community Services	•	•	•		•	
Department of Accounting and General Services	•	•	•	•	•	
Department of Planning and Permitting	•	•	•	•	•	

Stakeholder		sessment ng Letter	Draft EA		Final EA	
Stakenoluer	Letter Sent ¹	Comment Received ¹	Notice of Availability	Comment Received	Notice of Availability	
Department of Parks and Recreation	•	•4	4		4	
Honolulu Police Department	•	•	•		•	
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	•	1	•		•	
State Senator Mike Gabbard	•	1	•	•	•	
State Representative Maile S.L. Shimabukuro	•	1	•		•	
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 'Ewa Representative Shad Kane •		•	•		•	
Council for Native Hawaiian Advancement (CNHA)	•		•		•	
Rotary Club of Kapolei	•		•		•	
Historic Hawaii Foundation	•	•	•	•	•	
Kalaeloa Heritage Park & Legacy Foundation	•	Ì	•		•	

Stakeholder		sessment ng Letter	Draft EA		Final EA	
Stakenolder	Letter Sent ¹	Comment Received ¹	Notice of Availability	Comment Received	Notice of Availability	
Sierra Club	•		•		•	
Earth Justice	•		•		•	
Ewa by Gentry Community Association	•	1	•		•	
Pacific War Memorial Association	•5	1			5	
Kapolei Community Development Corporation	•		•		•	
Sovereign Council of Hawaiian Homestead Associations (SCHHA)			•		•	
Kaupe'a 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	•	1	•		•	
Jan Becket	•	•	•	•	•	
Manuel Kuloloio	•		•		•	
Leina'ala Vedder	•		•		•	
Keona Mark	•		•		•	
Daniel Martinez	•		•		•	
McD Philpotts	•		•		•	
Hawaii Wildfire Management Organization			•		•	
Tracy Anduha				•	•	
Pacific Resource Partnership Organization				•	•	
Ahahu'i o Ka'uluokaha'i				•	•	
Kenneth Takasaki				•	•	
Professor Trenchard				•	•	
Peter Rucci				•	•	
Jacob Ledesma				•	•	
Libraries						
Hawai'i State Library, Hawai'i Documents Center			•		•	
Kapolei Public Library			•		•	
UH West Oʻahu James & Abigail Campbell Library			•		•	
Legislative Reference Bureau Library			•		•	
Kapolei High School		1	•	ĺ	•	
Kapolei Charter School			•		•	
Island Pacific Academy		İ	•		•	
Kapolei Middle School			•		•	

Stakeholder		Pre-Assessment Scoping Letter		Draft EA	
Stakenoluer	Letter Sent ¹	Comment Received ¹	Notice of Availability	Comment Received	Notice of Availability
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			•		•
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.

⁴City 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.

⁵Pre-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.

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	 Where will the main electrical facilities, batteries, etc. be located. Is there now no plan to use any part of the 1941-42 MCAS Ewa Field properties? Will the project use any part of the 1942 aircraft revetments? Will the project use any part of the 1944-1965 Navy SeaBee Camp and Navy interim housing facility? Are there specific diagrams of solar arrays? How will the historic and cultural sites be protected? 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 Hawai'i 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	 Recommends surveys for endangered plant species and buffer zones if they occur. 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. Recommend coordinating with Hawai'i Wildfire Management Organization on wildfire prevention. 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. Recommends avoidance of removing or disturbing woody vegetation during the birthing and pupping season and avoidance of installation of barbed wire. 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. Recommends minimizing the movement of plant or soil material between werkerites, such as in fill 				
Board of Water Supply	Letter dated June 15, 2021	between worksites, such as in fill. 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.				

Table 7-3. Summary of Comments Received in Respo	onse to Scoping Request
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Commenting Party	Date of Comment	Summary of Comments
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	 The Project will require a development permit and the contested case public hearing process. The Project may require variances regarding fencing, landscaping, irrigation, frontages and setbacks. HAR 15-215, Kalaeloa Rules require new electrical infrastructure to be underground unless it will be installed on the existing electrical poles.
State of Hawai'i Department of Transportation	Letter dated June 16, 2021	 Airports Division Project should read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. Project requires the submittal of FAA Form 7460-1 Notice of Proposed Construction or alteration. A glint and glare analysis must be attached to the PV submittal of FAA Form 7460-1. Owner of the PV system shall be prepared to immediately mitigate the RFI hazard upon notification by the HOOT-A and/or FAA. Due to the proximity to the airport, the developer should be aware of potential noise and air pollution from aircraft operations Project shall have sufficient firefighting/fire suppressant ability to prevent potential smoke obstruction in the protected air space. Highways Division 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 O'ahu District for review and approval. The HOOT-HWY ROW Branch review and consultation of proposed changes to the existing Innergex Use and Occupancy Permit required. Include a discussion of potential construction-phase and decommission-phase impacts on regional traffic. 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. Describe other proposed Kalaeloa Master Plan development sharing the project's access driveways or require additional access driveways on Coral Sea Road. HDOT-HWY encourages joint-use, single-pole construction at locations where more than one utility or type of facility is involved. Recommend consulting with the USCG on the status of their project, and opportunities for co-location of overhead facilities. Describe the existing utility infrastructure, and project consistency with Kalaeloa Master Pl
City and County of Honolulu Dept. of Design and Construction	Letter dated June 24, 2021	permitted No comment at this time

Commenting Party	Date of Comment	Summary of Comments
State of Hawai'i 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 Hawai'i Registers of Historic Places. 2. Portions of TMK: 9-1-013:038, Area 1 is contained within the 'Ewa Plain Battlefield.
		3. 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).
		4. 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.
		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
		'Ewa 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
Harrali Chaka En anora	Lattan data d Iuna 20	which Native Hawaiians attach religious and cultural significance. HSEO recommends the DEA
Hawaii State Energy Office	Letter dated June 30, 2021	1. state how the Project would contribute to the State's and O'ahu's
onice	2021	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 Hawai'i 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;
		 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;
		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;
City and County of	Lattan data d Iuna 20	7. identify how the Project will directly benefit DHHL beneficiaries.
City and County of Honolulu Department of Transportation	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.
Services		2. A street usage permit from the Department of Transportation
501 11005		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,	The owner of the project property and/or their representative is
	2021	responsible to research the Flood Hazard Zone designation for the project and comply with applicable rules and regulations related to
		flood hazards.

Commenting Party	Date of Comment	Summary of Comments
DLNR Division of Forestry and Wildlife	Letter dated July 15, 2021	 If any <i>Euphorbia skottsbergii</i> var. <i>Skottsbergii</i> 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. Recommend coordinating with Hawai'i Wildfire Management Organization on wildfire prevention. Avoid and do not damage any Wiliwili (<i>Erythrina sanwichensis</i>) trees. 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.
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. A public information meeting was held October 20th from 5:30 pm to 7:00 pm Hawaii Standard Time. The meeting was held via the WebEx platform due to COVID-19 restrictions.

A total of 12 participates attended the public meeting and a total of 5 comments were submitted during the question-and-answer portion of the meeting. Eighteen comment letters were received during the 30-day public review period. Three comment letters were also received on the Draft EA prior to the start of the 30-day review period as the Draft EA was made available on the project's website prior to the publication in *The Environmental Notice*. In total, 26 commenting parties provided comments on the Draft EA. See Table 7-4.

All comments received on the Draft EA are summarized in Table 7-4, with copies of the comment letters and emails received and the responses provided in Appendix L. Appendix L includes a table listing all comments received, responses to each comment, and corresponding edits in the Final EA or technical appendix (if applicable). In accordance with HAR §11-200.1-20, comments received on the Draft EA were considered and incorporated into this Final EA, as appropriate.

C	ommenting Party	Date of Comment	Summary of Comments
1.	John Bond, Kanehili Cultural Hui	9/24/2021	Reports don't address 1943-45 US Navy SeaBee camp facility, Leina a ka uhane documented as part of the HART rail project. Reports did not use extensive documentation provided.
	Ross W. Stephenson, PhD/Hawaii Railway Society	9/26/2021	There is a potential for unknown and/or underground historic and cultural resources on the project site. There is no discussion of Leina a ka uhane.
2.			Revenues should be provided to the general Kapolei community.
			Approach to HNL runway depends on prevailing winds.
			Do the transfer covenants of navy lands require a Section 106?
			Potential makai extension of Kaualakai Parkway and Ewa extension of Geiger Road across Marine Corps Station Ewa Field are opposed by large sections of the Ewa community.
3.	Jan Becket	9/29/2021	Requests clarification on several archeological features.
4.	Roger Babcock, Jr., Ph. D., P.E./City and County of Honolulu Department of Facility Maintenance	10/13/2021	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.
5.	Lindsy Asman/U.S. Fish and Wildlife	10/14/2021	 EA should: Describe 'akoko on adjacent parcel and potential for 'akoko on project site Describe avoidance & minimization measures for potential 'akoko on project site if the listed plant is found on the development site in the future Elaborate on Project risks to listed waterbirds. Replace nighttime lighting measure to avoid seabird fallout Elaborate on use of barbed wire at substation.
6.	Tracy Anduha	10/20/2021 (Comment received at Open House)	If this project is being developed on Hawaiian Homelands, why isn't it only benefiting Native Hawaiians?
7.	Christopher Delaunay/ Pacific Resource Partnership Organization	10/20/2021 (Comment received at Open House)	We need more of these types of projects that will generate clean energy helping Hawaii reach its goal of 100% renewable energy by 2045.
8.	Meg Turner/Community Liaison for Hawaii State Senator Mike Gabbard	10/20/2021 (Comment received at Open House)	Is this considered a CBRE [Community Based Renewable Energy] project?
9.	Kimo Palakiko/ Ahahu'i o Ka'uluokaha'i Interim President	10/20/2021 (Comment received at Open House)	How will materials be supplied with so many projects going on simultaneously?
10	Tracy Anduha	10/20/2021	How many DHHL residents will benefit verses non residents?

C	ommenting Party	Date of Comment	Summary of Comments
11.	John Bond/Kanehili Cultural Hui	10/21/2021	There are numerous errors in the draft EA about the military history. Requests schematic information on the type of solar PV technology to be used. Will heavy equipment bulldozing be required?
12.	John Bond/Kanehili Cultural Hui	10/21/2021	Will there be a Programmatic Agreement to protect native Hawaiian and historic WW-II National Register sites? Will equipment and cleaning agents impact groundwater?
13.	Kenneth Takasaki	10/25/2021	Require all new homes and business to have solar panels. Select a different location instead of infringing on the cultural and historic areas.
14.	Professor Trenchard	10/25/2021	GSA rules were not adhered to when the DHHL properties were transferred from the Navy.
15.	Peter Rucci	10/25/2021	The solar farm proposal would upgrade the land and have a positive impact toward zero emissions and long-term sustainability.
16.	Jacob Ledesma	10/26/2021	Can energy independence be coupled to also address food security concerns?
17.	Jade T. Butay/State of Hawaii Department of Transportation	11/01/2021	Draft EA sufficiently addresses HDOT-A's prior concerns with the project. HDOT-HWY concurs with Draft EA traffic impact analysis and recommends traffic construction management. Information to be included in the Final EA includes clarification on ownership of Roadway Lot 13083-B and addition of HDOT-HWY approvals and status.
18.	Christine L. Kinimaka/ State of Hawaii Department of Accounting and General Services	10/15/2021	No comments as the proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities.
19.	Lisa M.M. Wallace/ Environmental Health Office, Clean Air Branch	11/5/2021	Comments regarding Air Pollution Control Permits, activities that involve asbestos, and fugitive dust.
20.	Kirsten Baumgart Turner/Hawai'i State Energy Office	11/8/2021	Requests additional information including: expanding on PPA agreement; include estimated bill savings; provide additional analysis on economic impacts; provide brief discussion on the methodology of the GHG analysis; discuss impacts related to sea level rise; expand on decommissioning funding and recycling during operation and decommissioning.
21.	21. Carty S. Chang/DLNR Engineering Division	11/2/21	No additional comments
22.	Kiersten Faulkner/Historic Hawaii Foundation	11/8/21	 HHF agrees to the finding of effects and proposed mitigations as detailed in the Draft AIS and proposes that DHHL/Innergex develop and nominate the identified historic properties in Site T-02, Aircraft Revetments, to be listed on the Hawai'i and National Registers of Historic Places. HHF requests to be a participant and consulting party in the development of that Preservation Plan.
23.	Dean Uchida/City and County of Honolulu Department of	11/3/21	Requests clarifications to: consistency with Kalaeloa Master Plan, Oahu General Plan, Ewa Development Plan, and ROH Chapter 33A and; use of vegetative screening.

C	commenting Party	Date of Comment	Summary of Comments
	Planning and Permitting		
24.	Deepak Neupane, P.E., AIA/ Hawaii Community Development Authority	11/5/21	Requests clarifications regrading: ride share assumptions; use of R-1 water; akoko shrub location; traffic hazards; Eco-Industrial Open Space overlay land use; Open Space Requirement; Preferred Plant Species, and; allowable fence heights. Project required CUP approval, SHPD concurrence letter, and FAA/DOT Glare and Glint report approval.
25.	John Bond/Kanehili Cultural Hui – Save Ewa Field	11/8/21	Provides several documents commenting on: DHHL deed covenants; Project site historical assessment and impacts to historic resources; pollution of underground water ways; impacts to native wildlife.
26.	David G. Smith/ Department of Land and Natural Resources, Division of Forestry and Wildlife	11/9/21	Provides additional avoidance and minimization measures.

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FIGURES

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Figure 1-1 Project Vicinity

CITY AND COUNTY OF HONOLULU

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

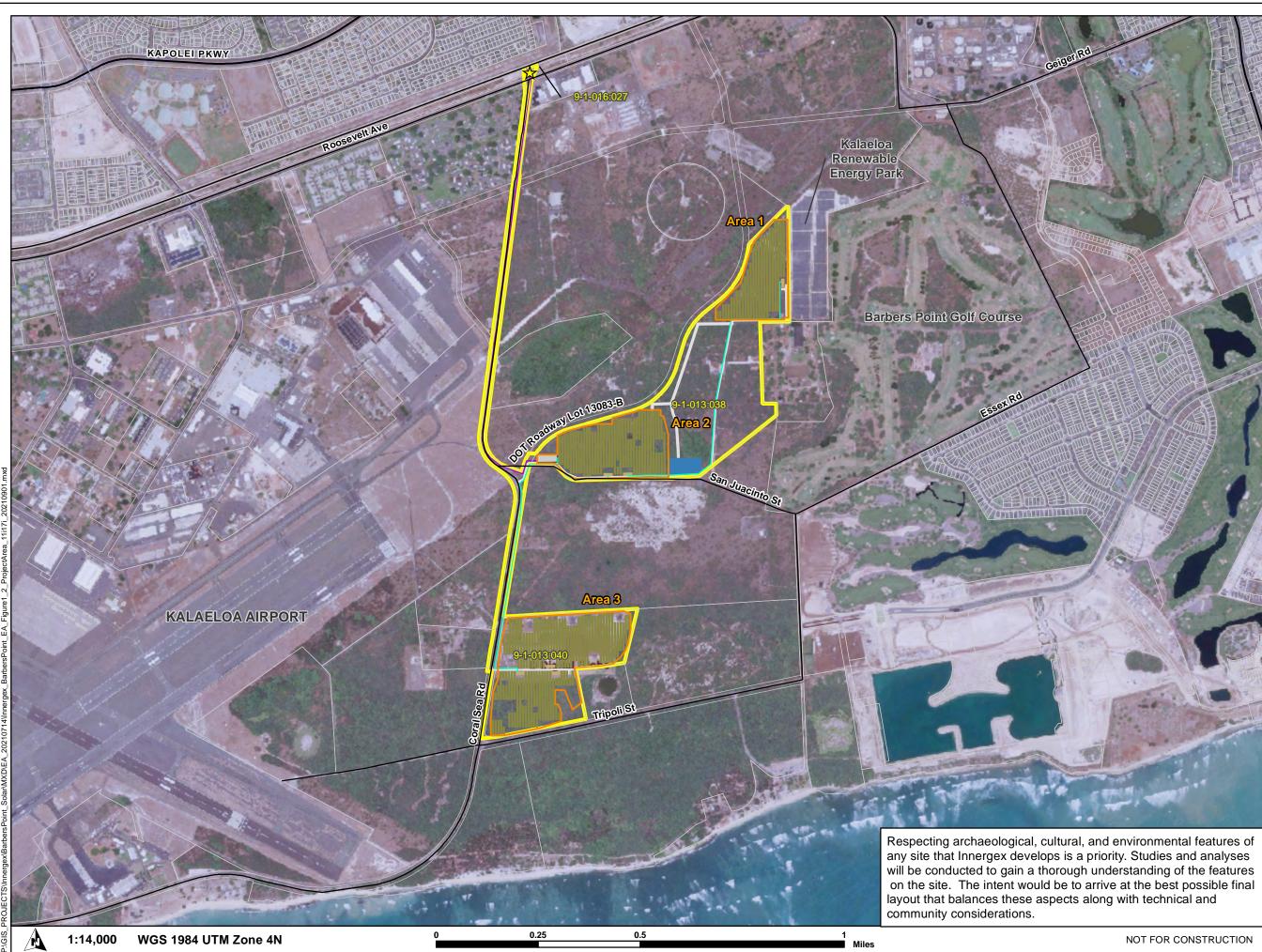
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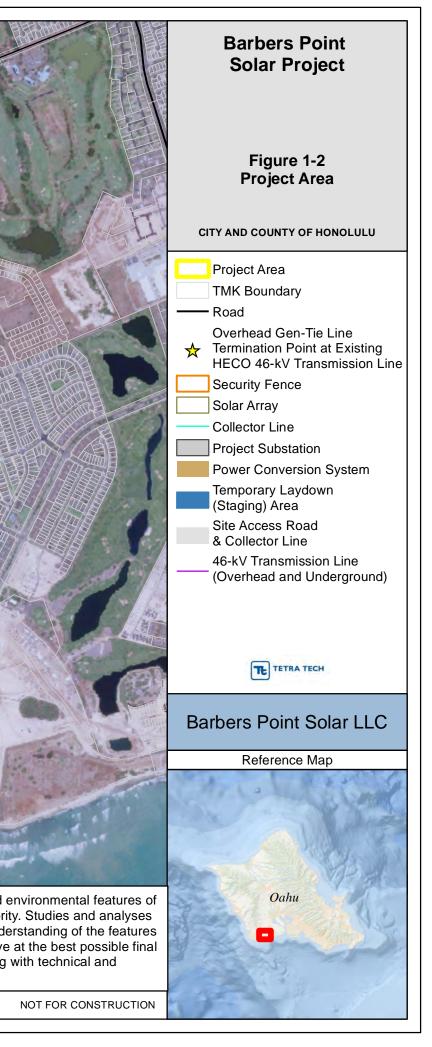
Barbers Point Solar LLC

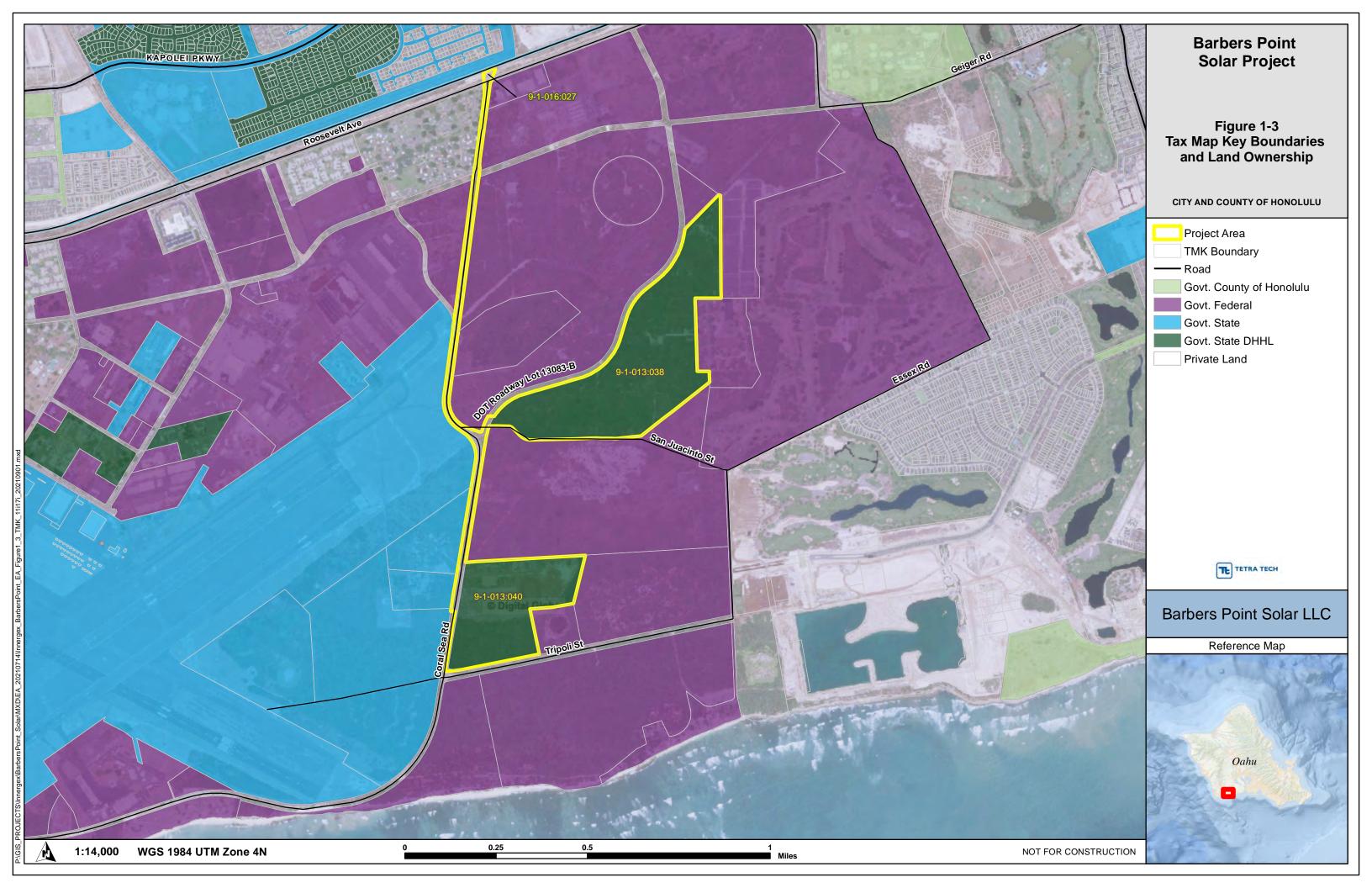
Reference Map

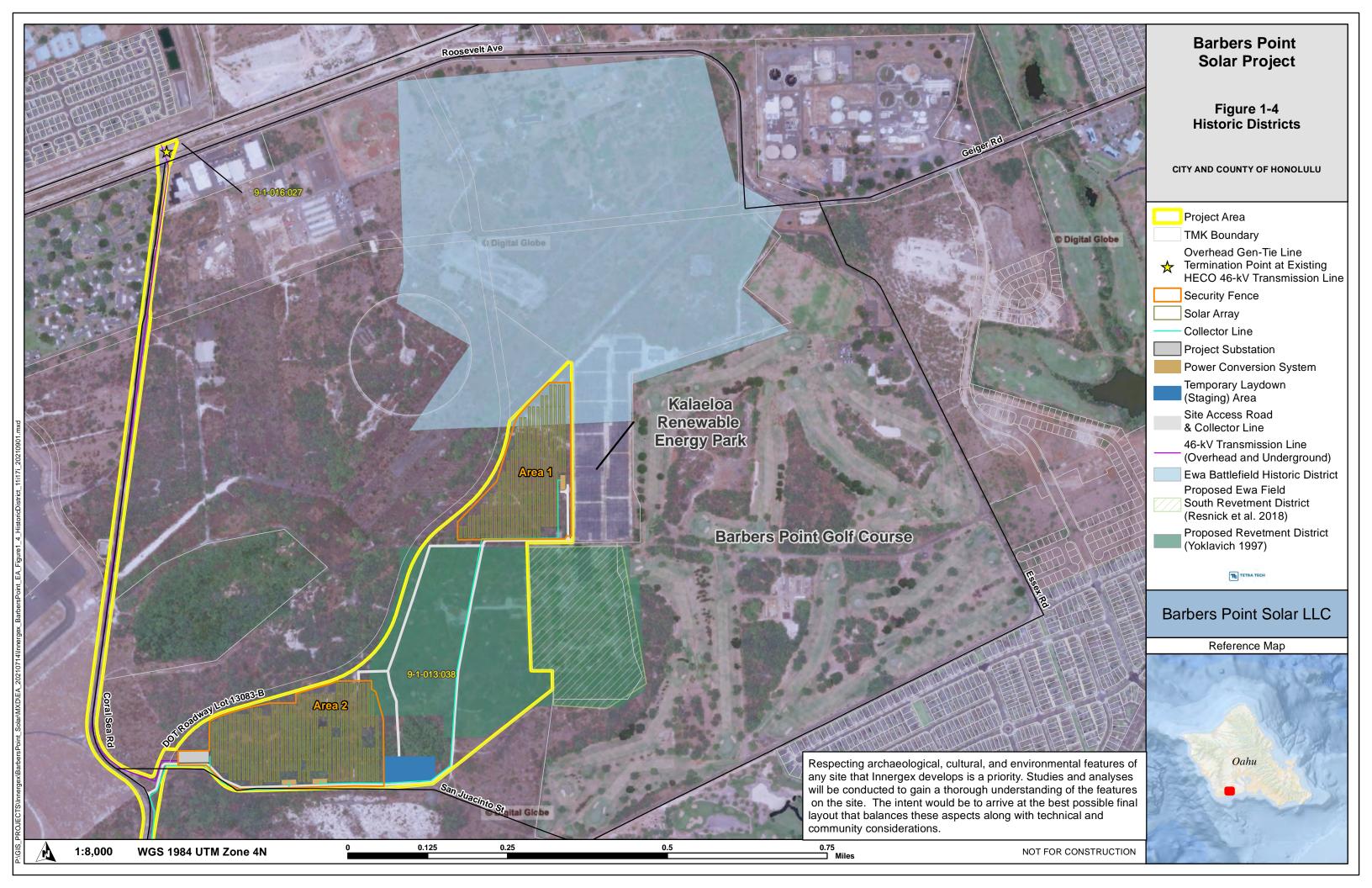
Oahu

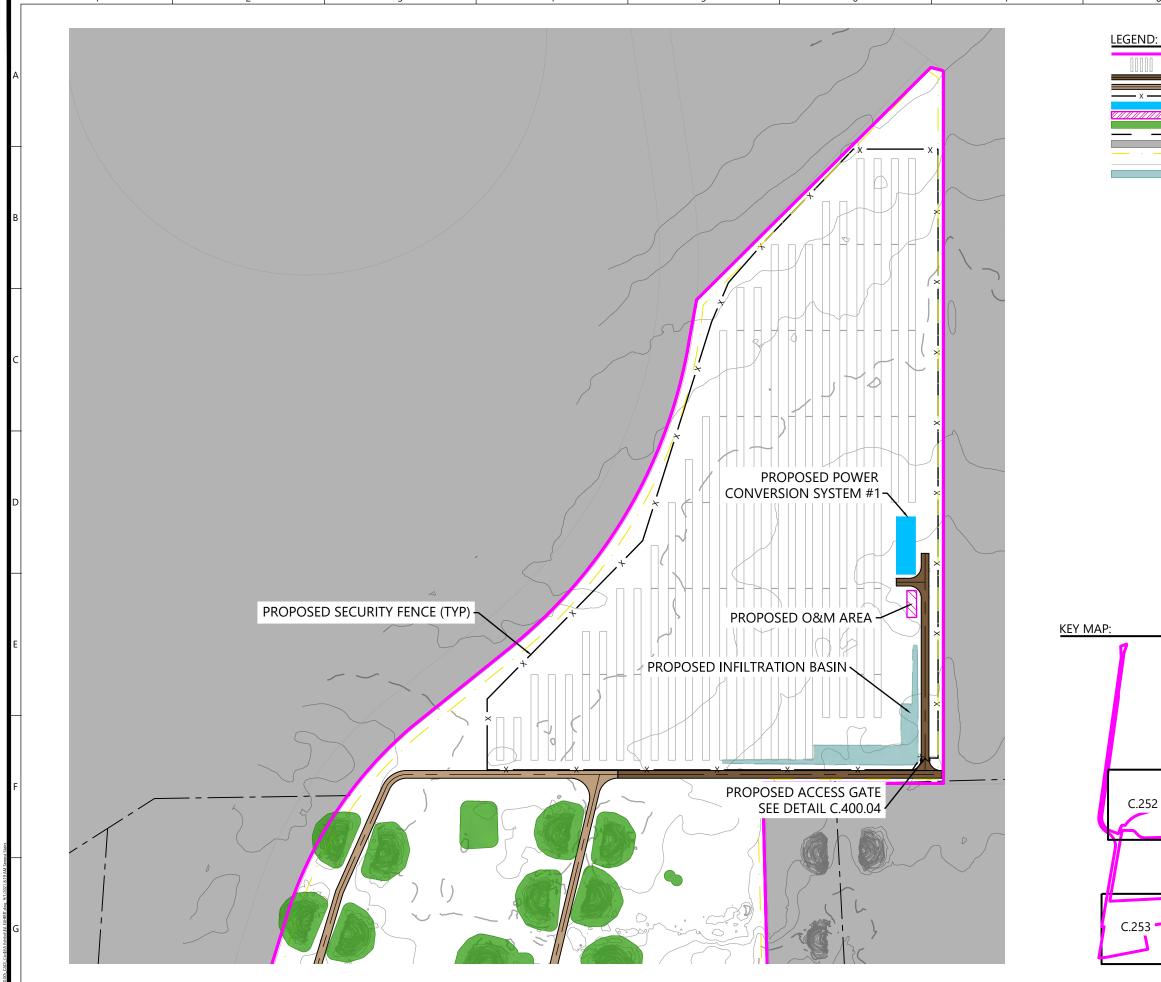
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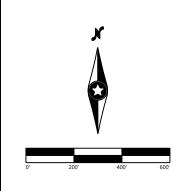


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 # DATE COMMENT

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Barbers Point Solar Project

O'ahu, Hawaii

Figure 2-1a: Site Plan

ISSUED FOR PERMIT

DATE:

08/31/2021

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C.001

C.250 C.251



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



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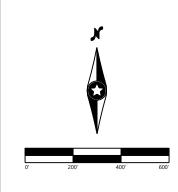
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Barbers Point Solar Project

O'ahu, Hawaii

Figure 2-1b: Site Plan

ISSUED FOR PERMIT

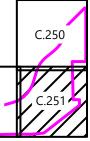
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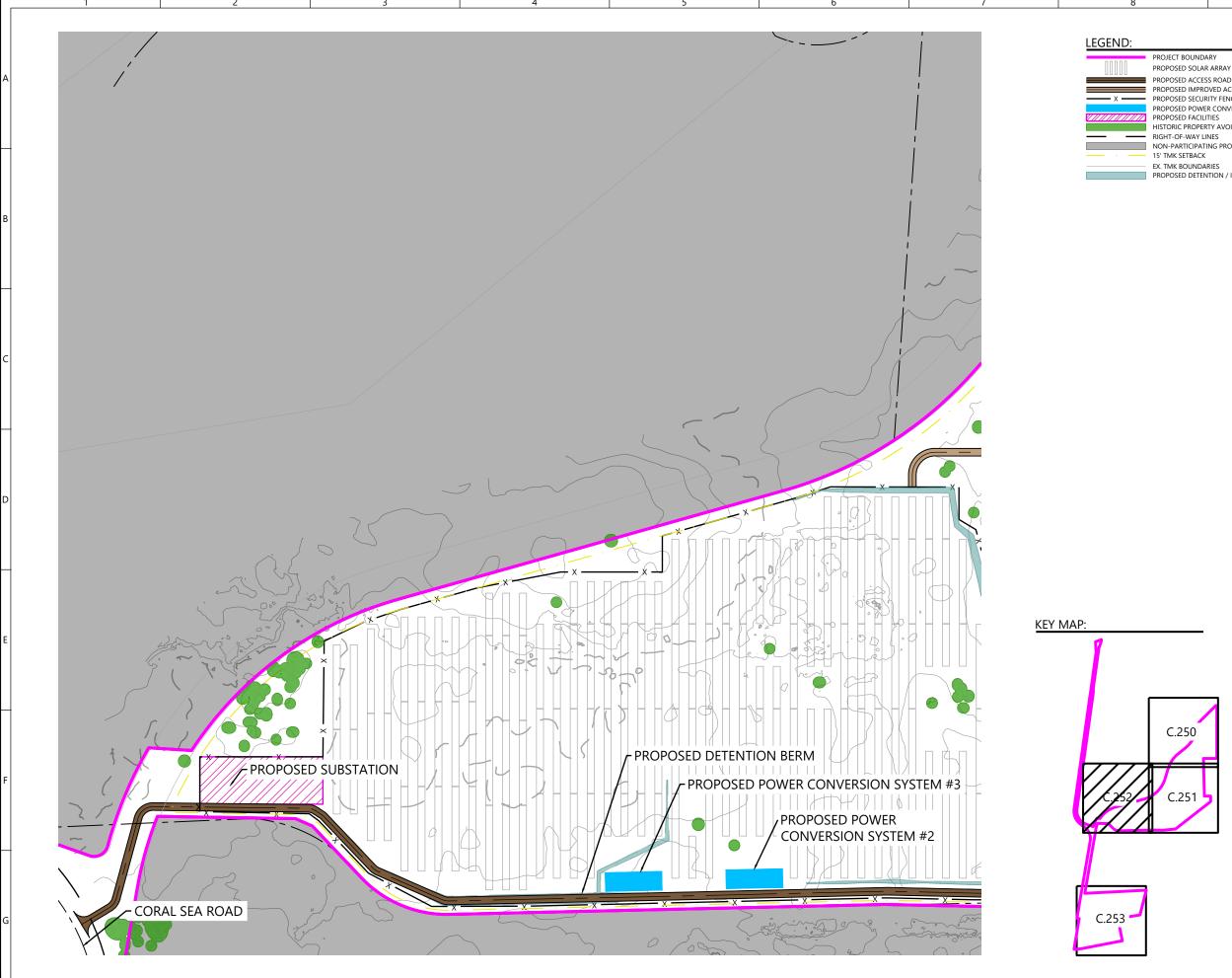
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PROJECT BOUNDARY
 PROPOSED SOLAR ARRAY
 PROPOSED ACCESS ROAD
 PROPOSED IMPROVED ACCESS ROAD AND COLLECTOR LINE
 PROPOSED SECURITY FENCE
 PROPOSED FACILITIES
 HISTORIC PROPERTY AVOIDANCE AREA
 RIGHT-OF-WAY LINES
 NON-PARTICIPATING PROPERTY
 15' TMK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



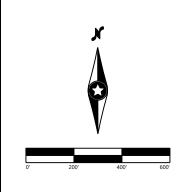


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REVISIONS: # DATE COMMENT A 08/31/2021 Issued for Permit



Barbers Point Solar Project

O'ahu, Hawaii

Figure 2-1c: Site Plan

ISSUED FOR PERMIT

DATE:

08/31/2021

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C.003

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



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Westwood Professional Services, Inc.

PREPARED FOR

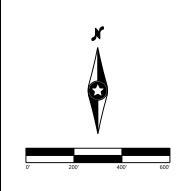


1225 rue Saint-Charles Ouest 10e étage, Québec J4K 0B9

 REVISIONS:

 # DATE COMMENT

 A 08/31/2021 Issued for Permit



Barbers Point Solar Project

O'ahu, Hawaii

Figure 2-1d: Site Plan

ISSUED FOR PERMIT

DATE:

08/31/2021

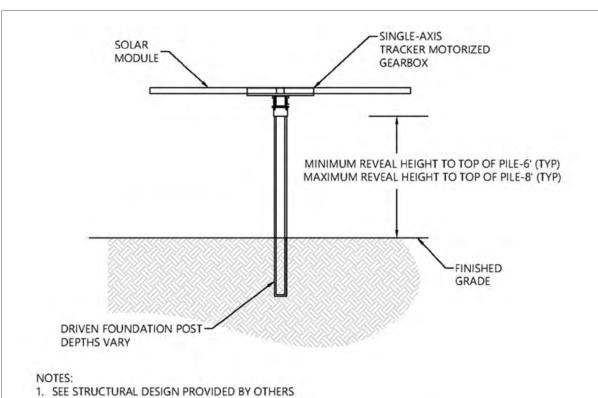
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PROJECT BOUNDARY PROPOSED SOLAR ARRAY PROPOSED ACCESS ROAD PROPOSED IMPROVED ACCESS ROAD AND COLLECTOR LINE PROPOSED SECURITY FENCE PROPOSED FACILITIES PROPOSED FACILITIES HISTORIC PROPERTY AVOIDANCE AREA RIGHT-OF-WAY LINES NON-PARTICIPATING PROPERTY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



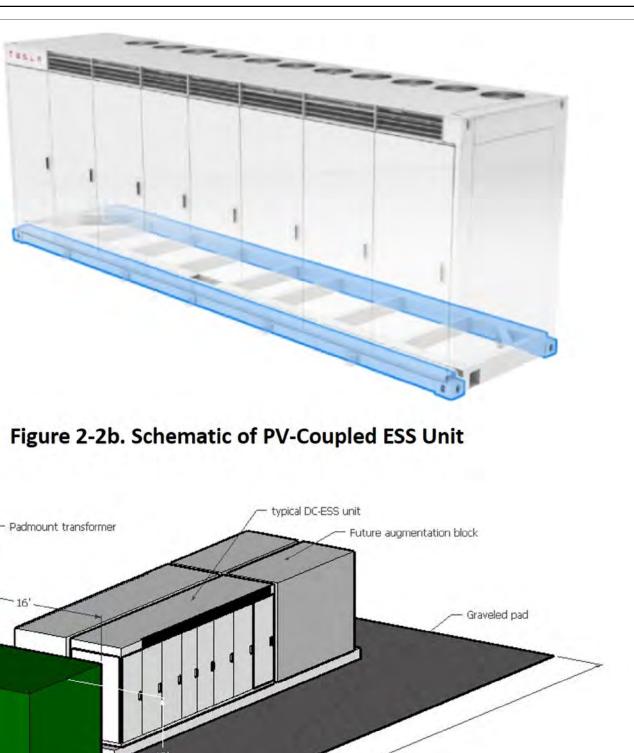
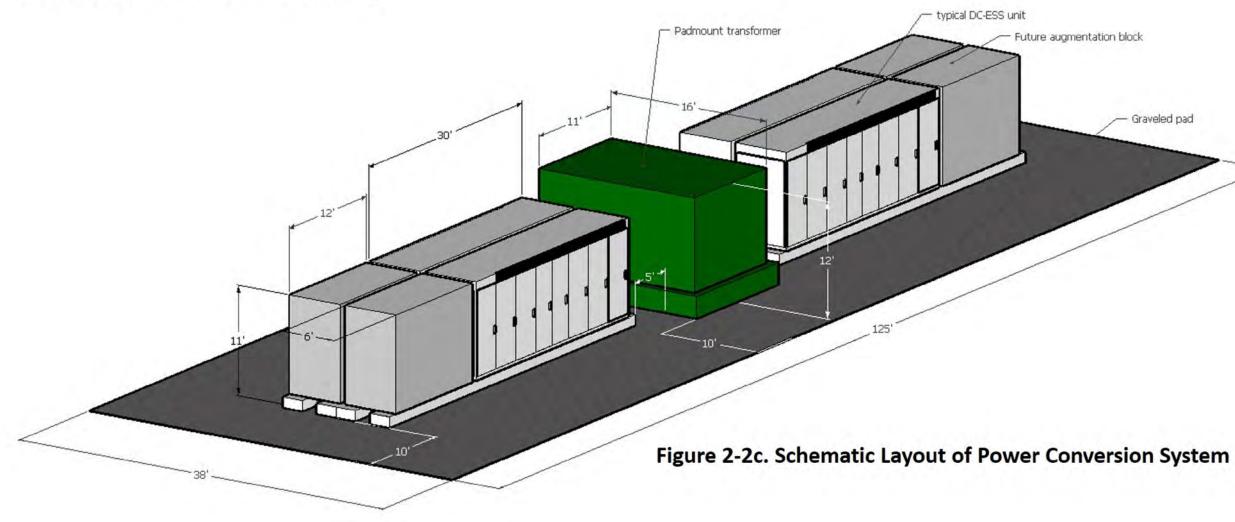
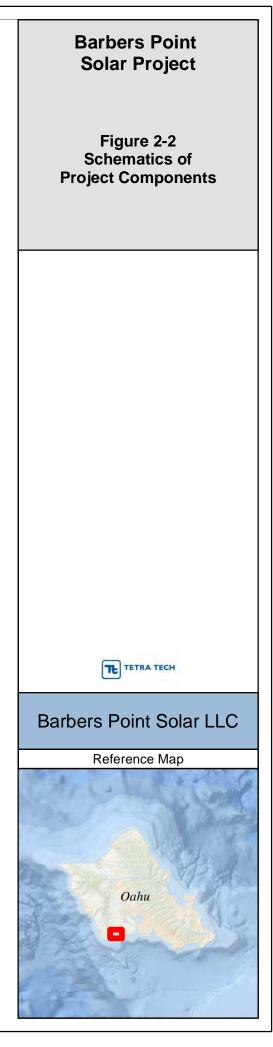
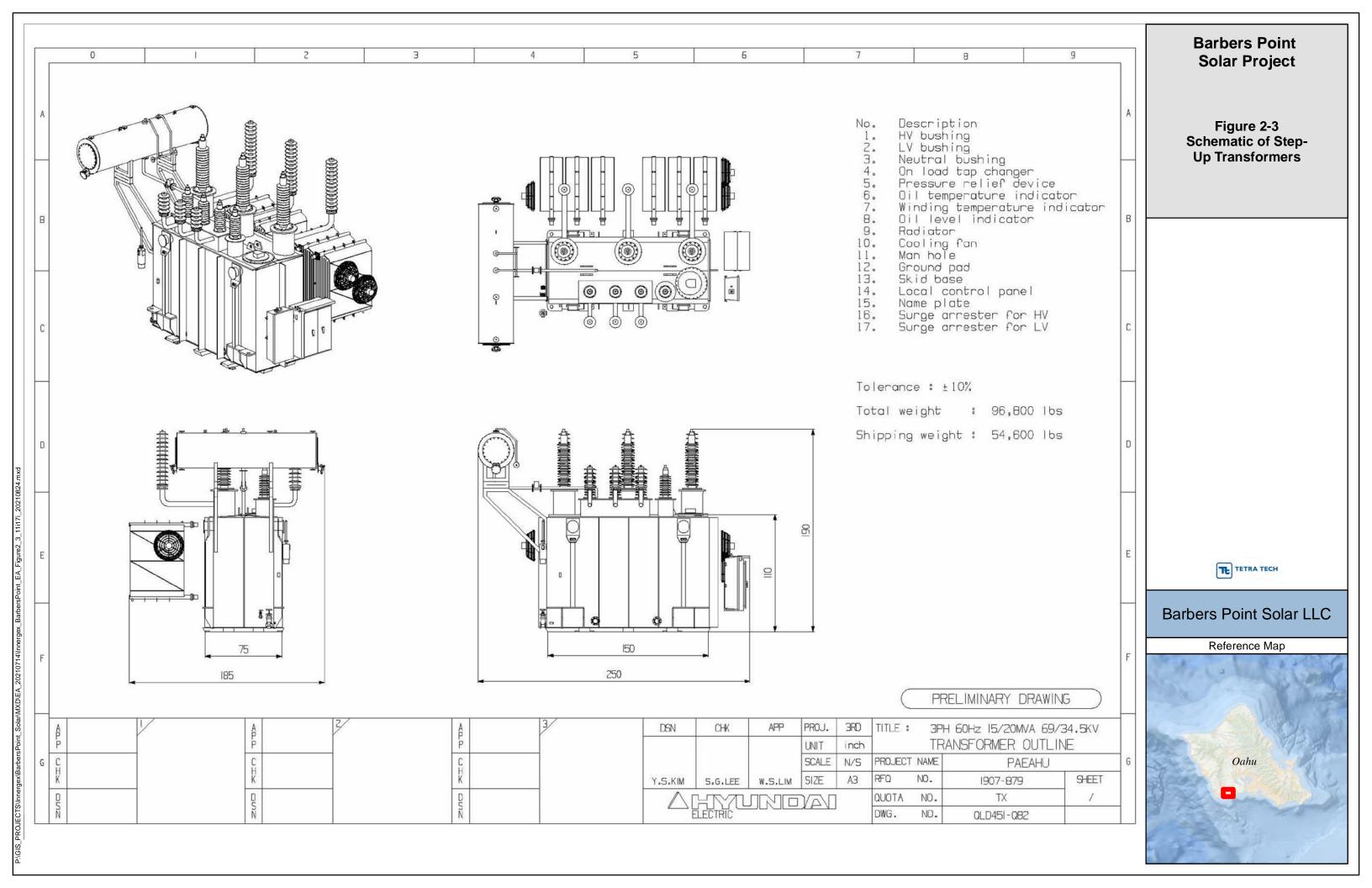


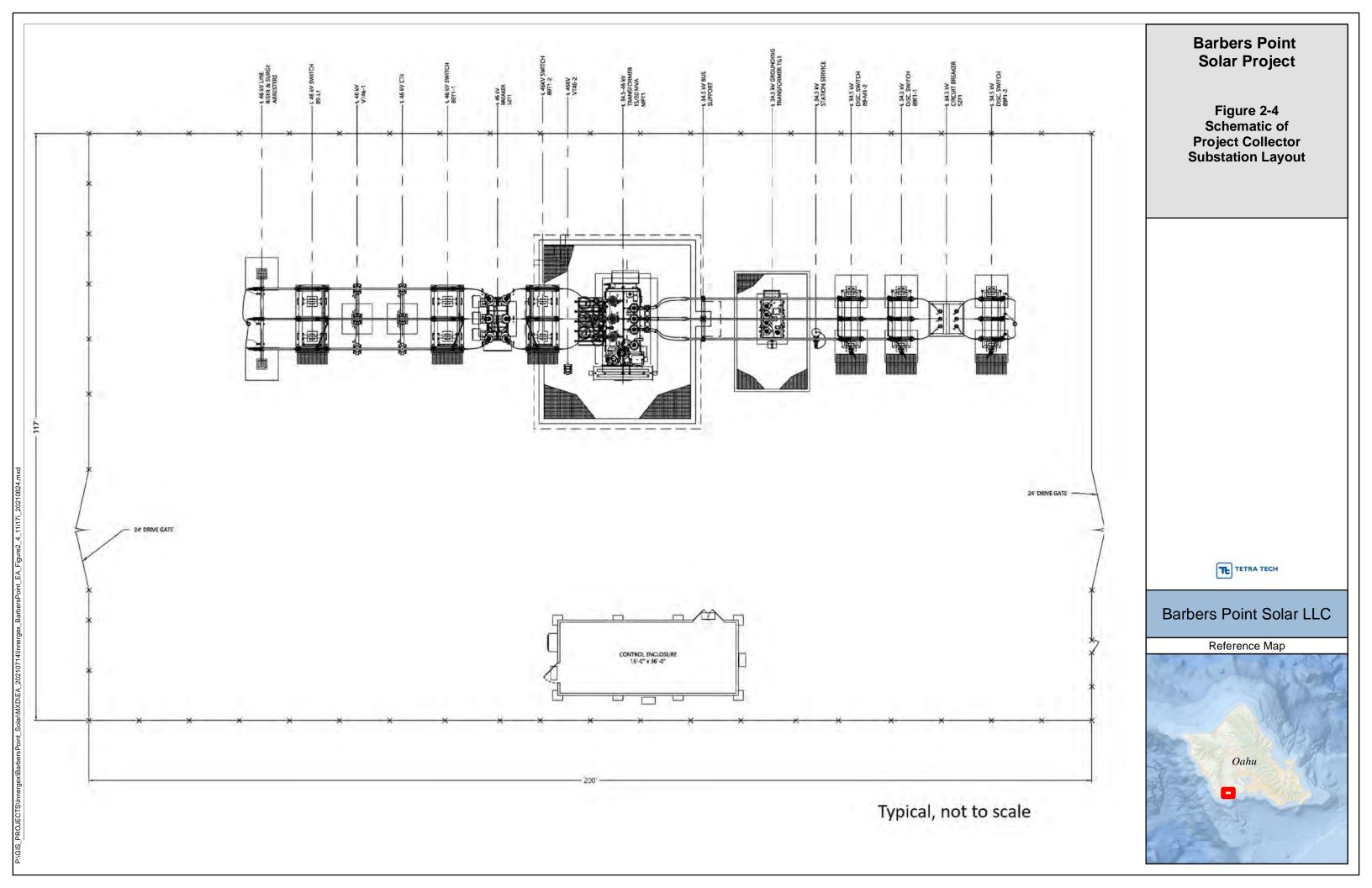
Figure 2-2a. Schematic of Solar PV Module and Racking System (typical, not to scale)

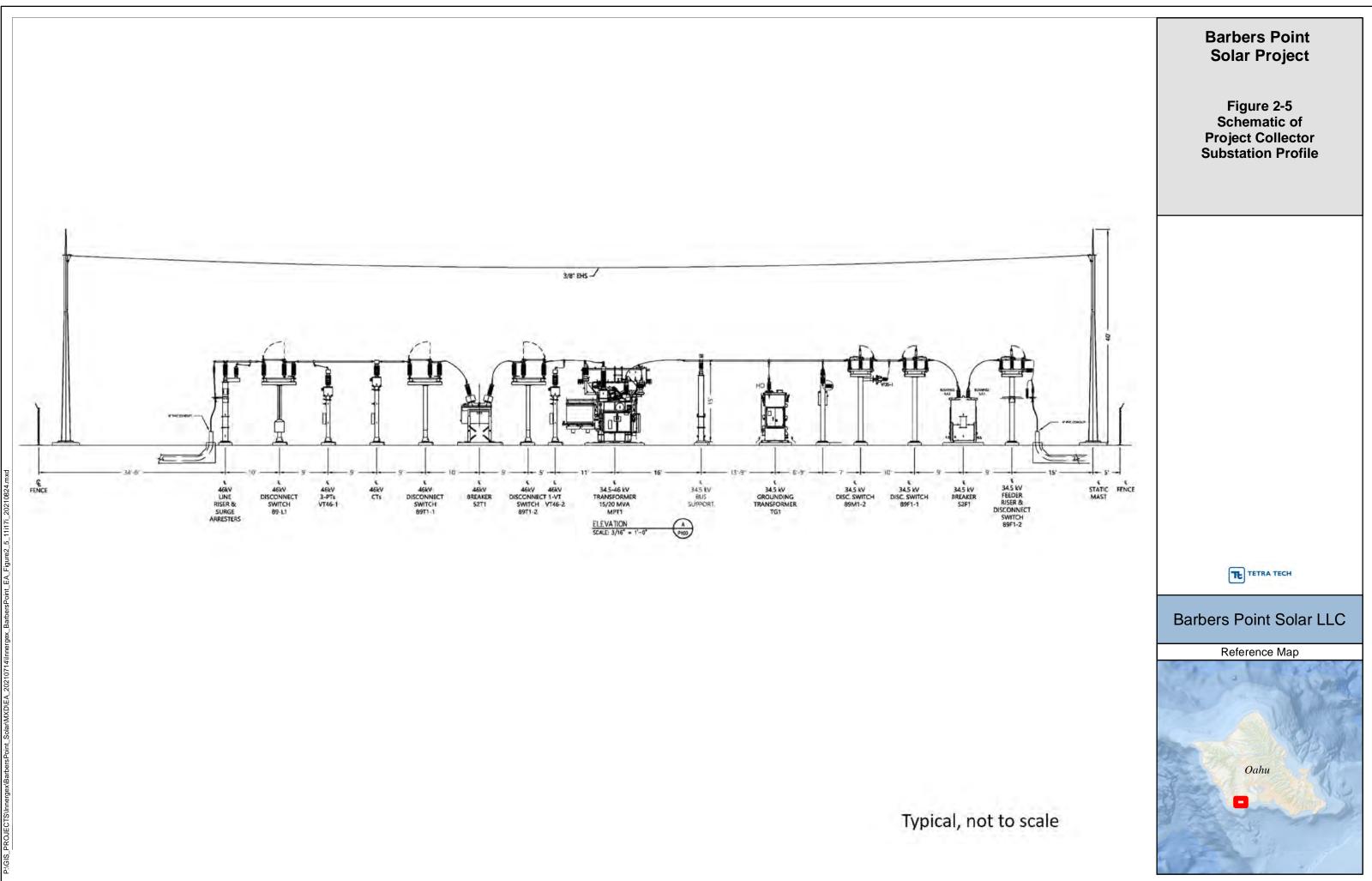












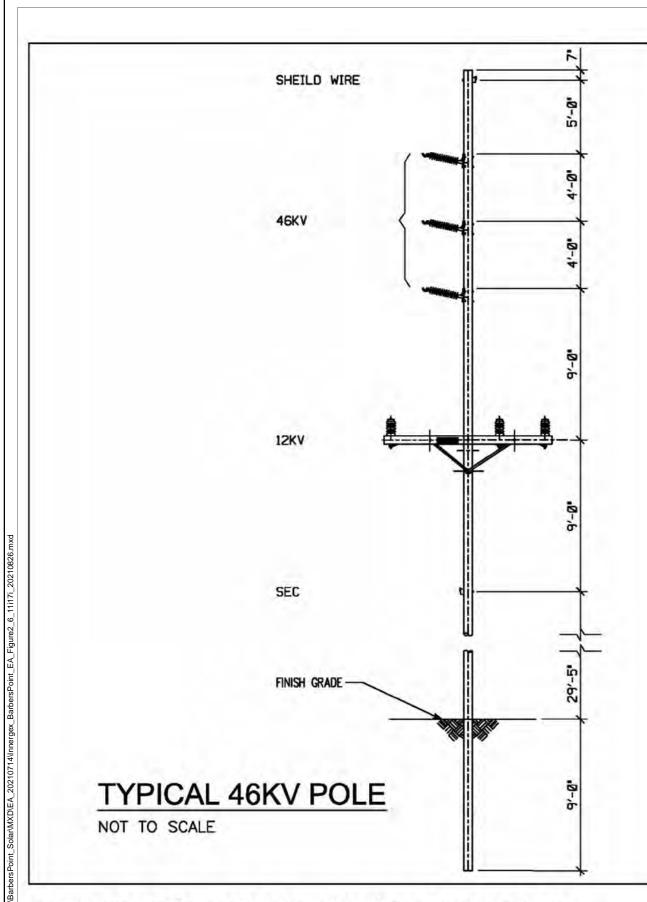
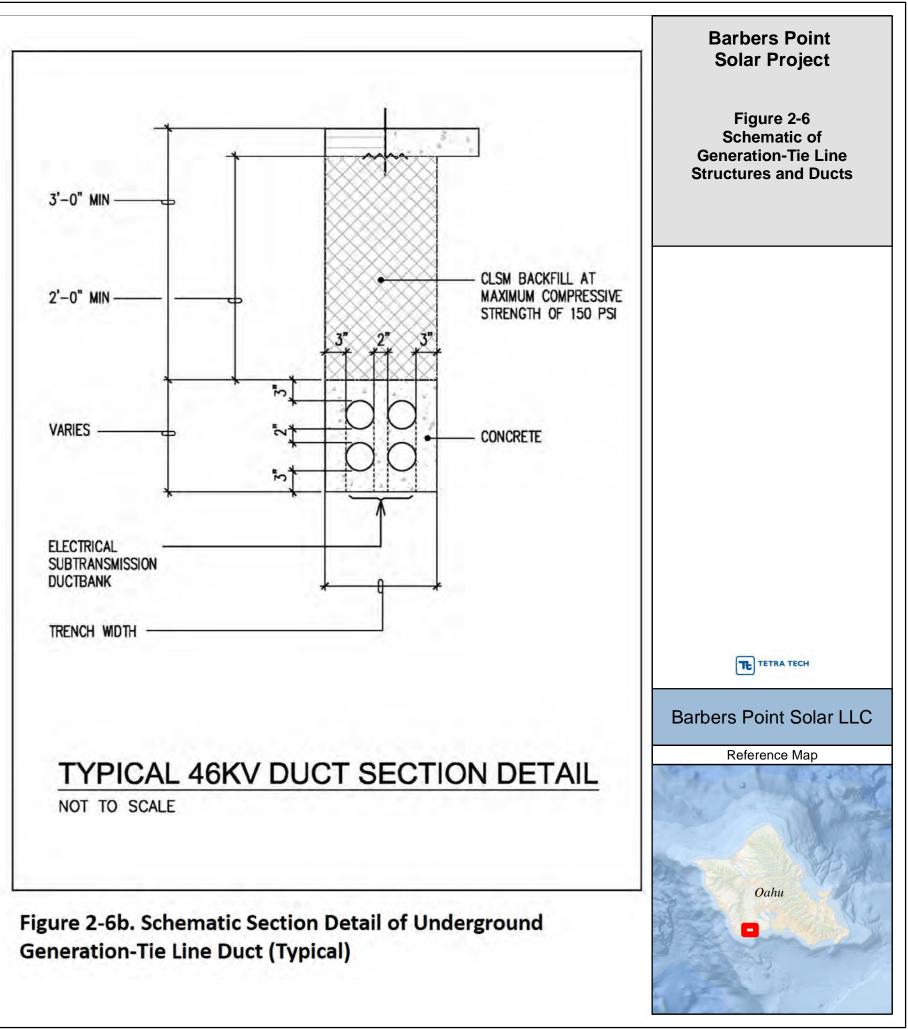
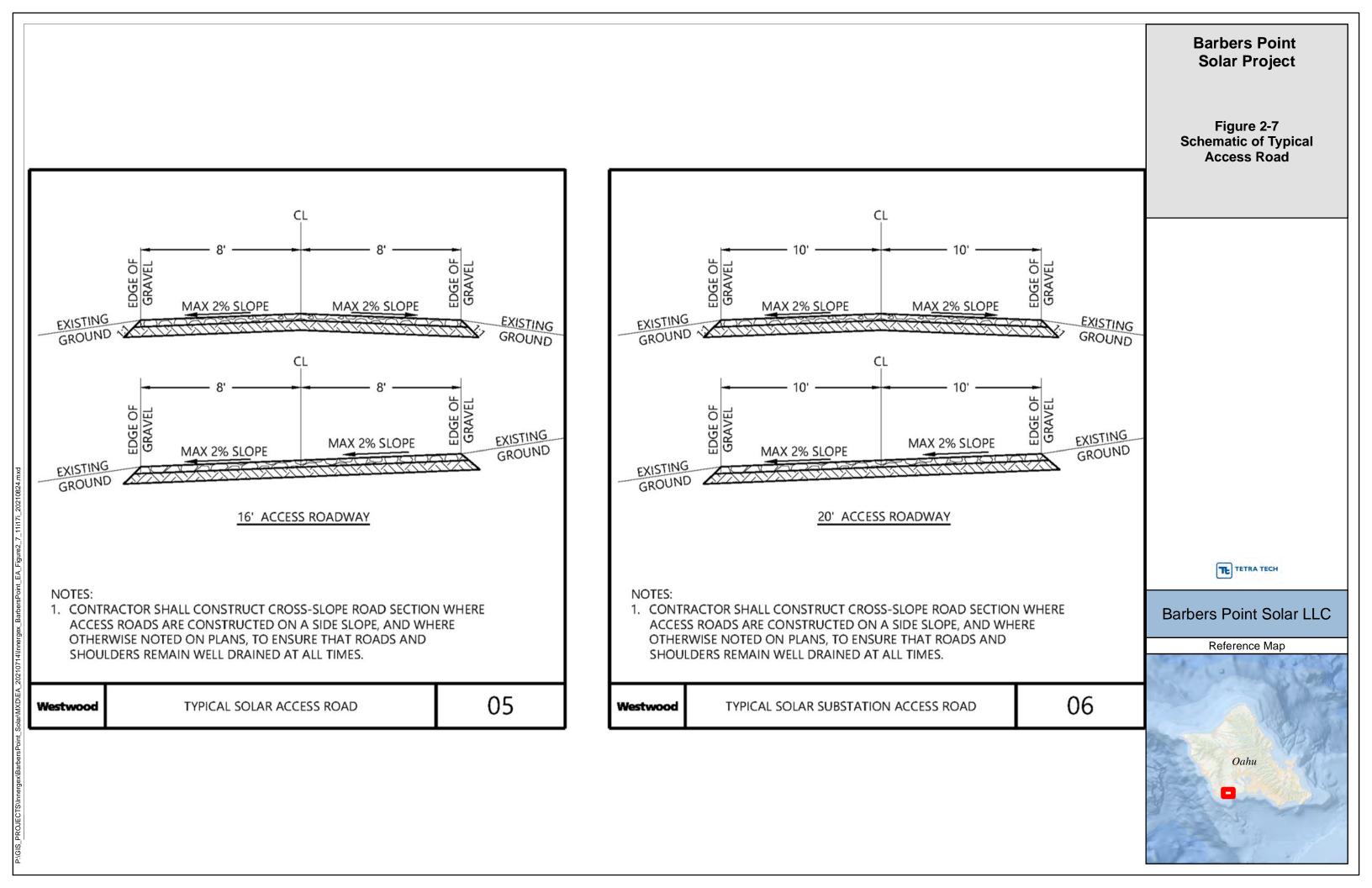
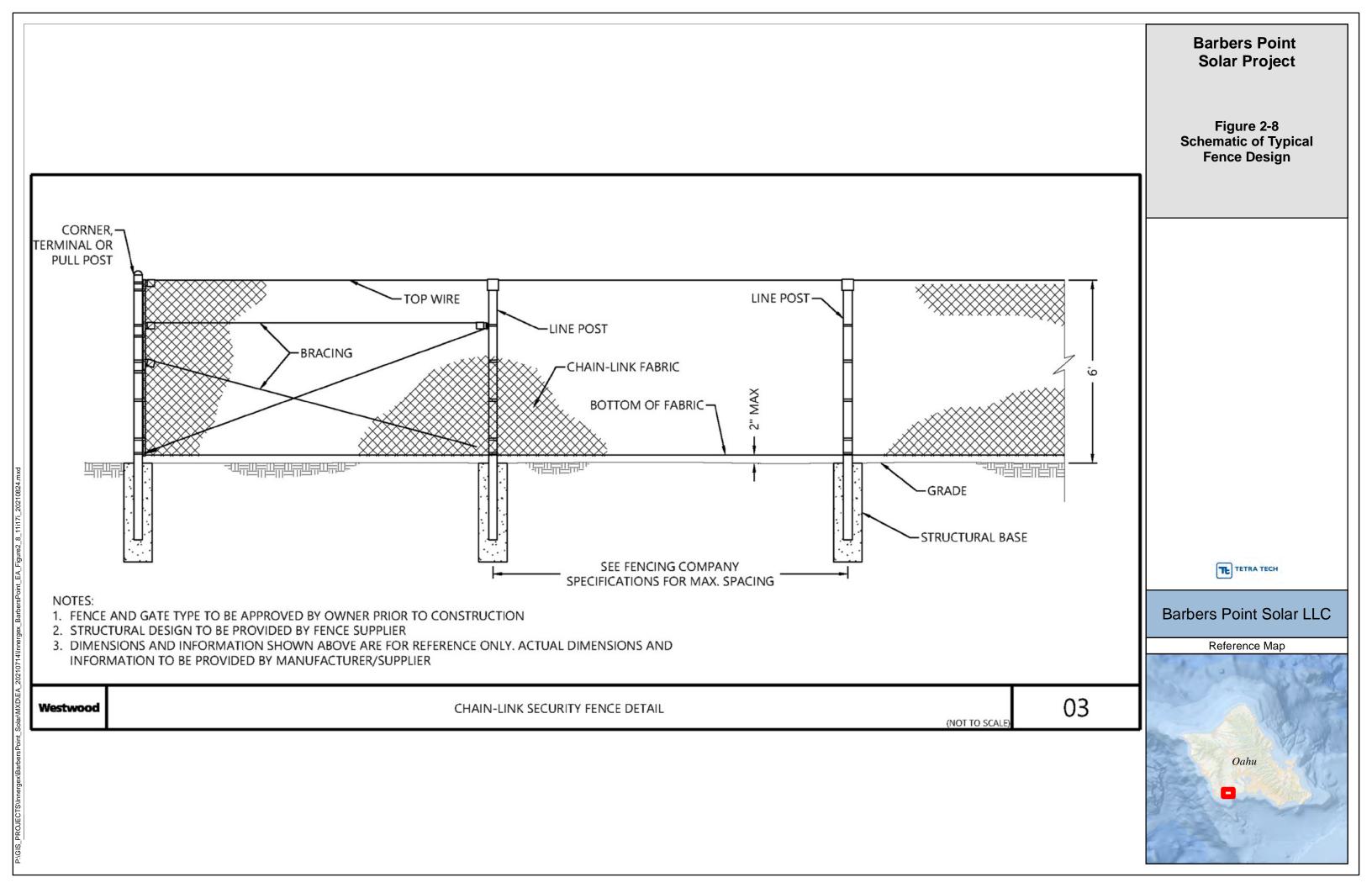


Figure 2-6a. Schematic of Overhead Generation-Tie Line Mono-Pole Structure (Typical)







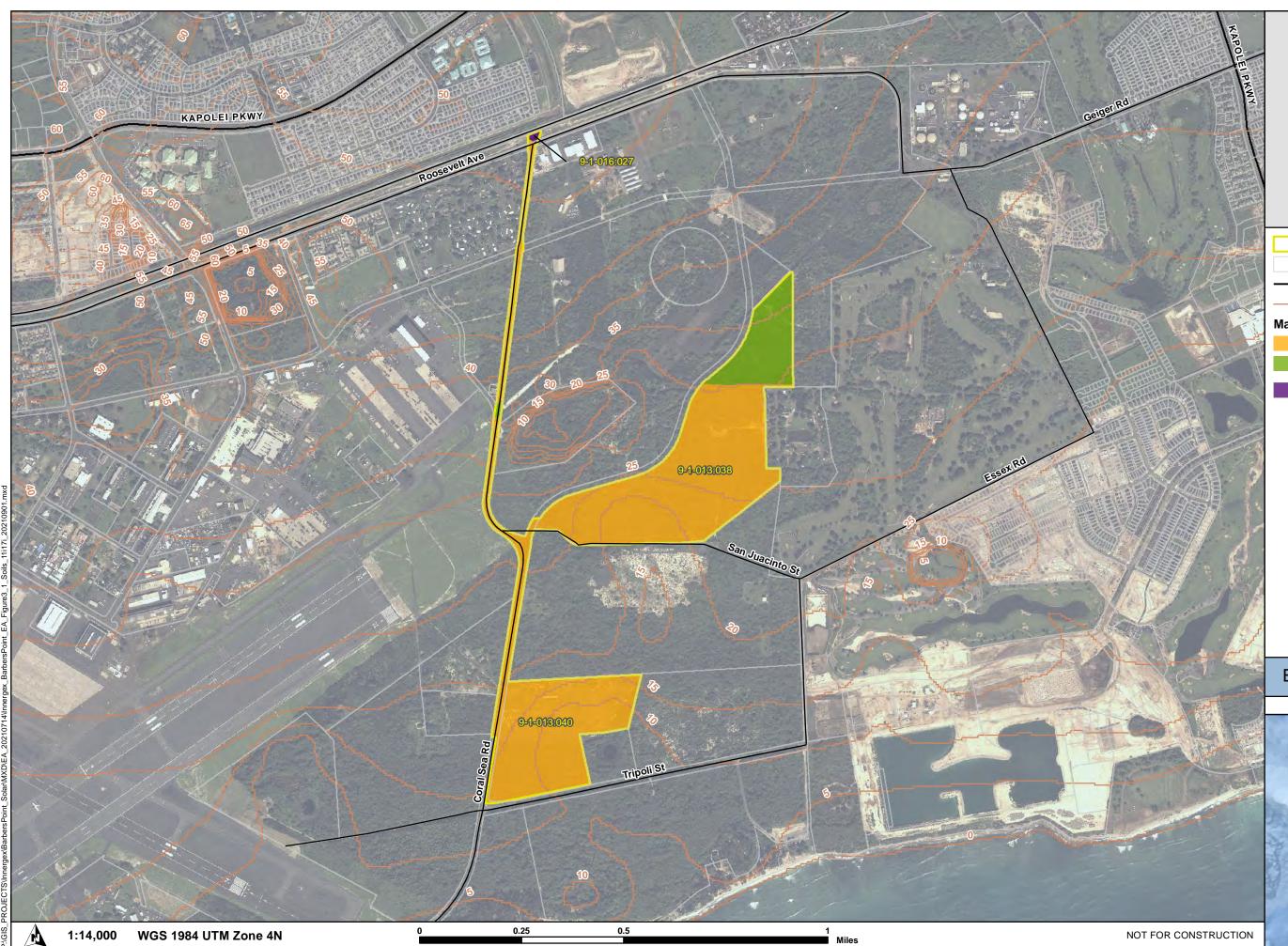


Figure 3-1 Topography and Soils

CITY AND COUNTY OF HONOLULU

- Project Area
- TMK Boundary
- - 5-ft Contour

Map Unit Name

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

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Barbers Point Solar LLC

Reference Map

Oahu

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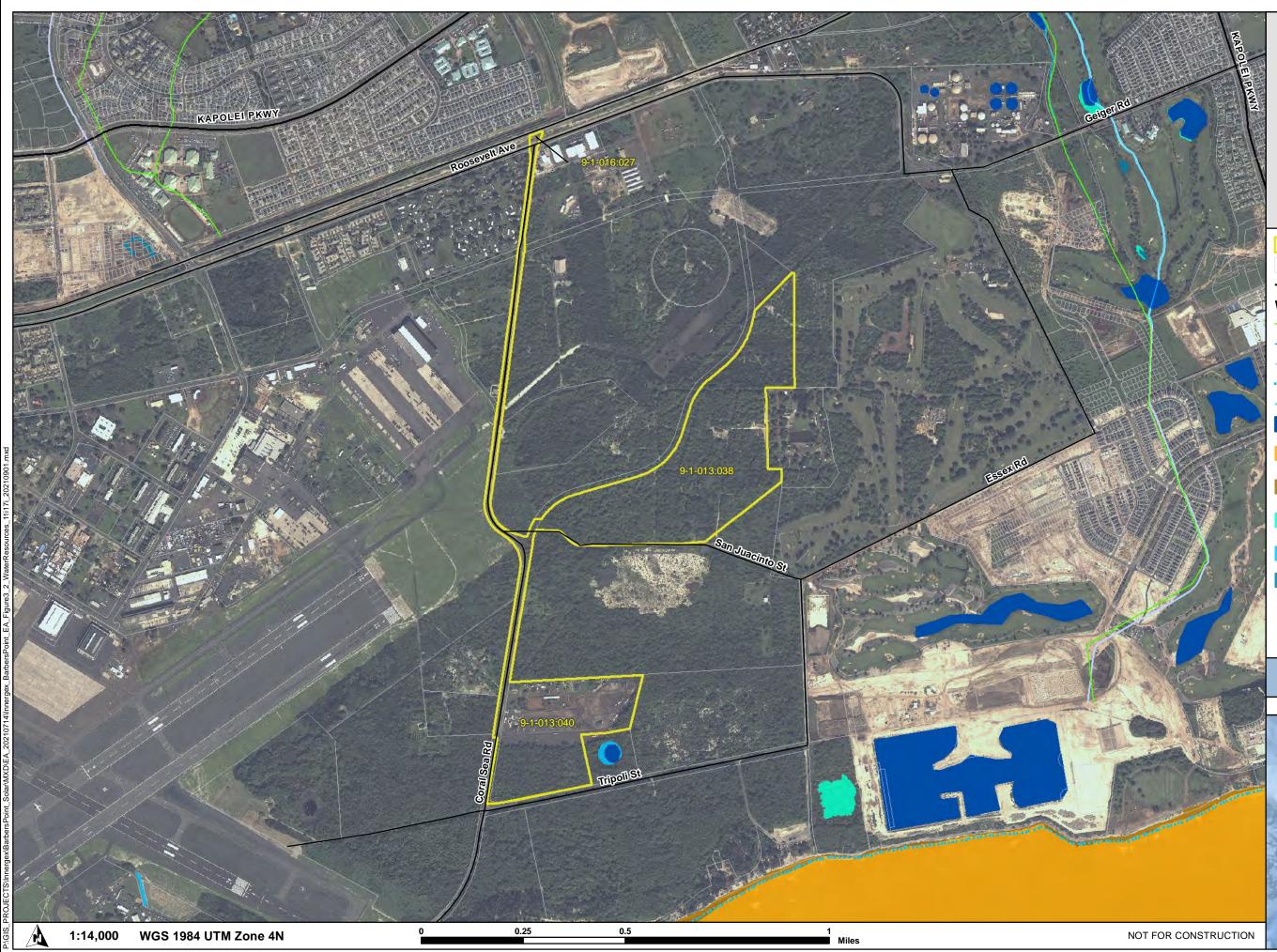


Figure 3-2 Water Resources

CITY AND COUNTY OF HONOLULU

- Project Area TMK Boundary

Water Resources

- 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)

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Reference Map

Oahu

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Figure 3-3 Critical Habitat

CITY AND COUNTY OF HONOLULU

- Project Area
- TMK Boundary
- ----- Road

Critical Habitat Oahu Lowland Dry - Unit 11

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Barbers Point Solar LLC

Reference Map

Oahu

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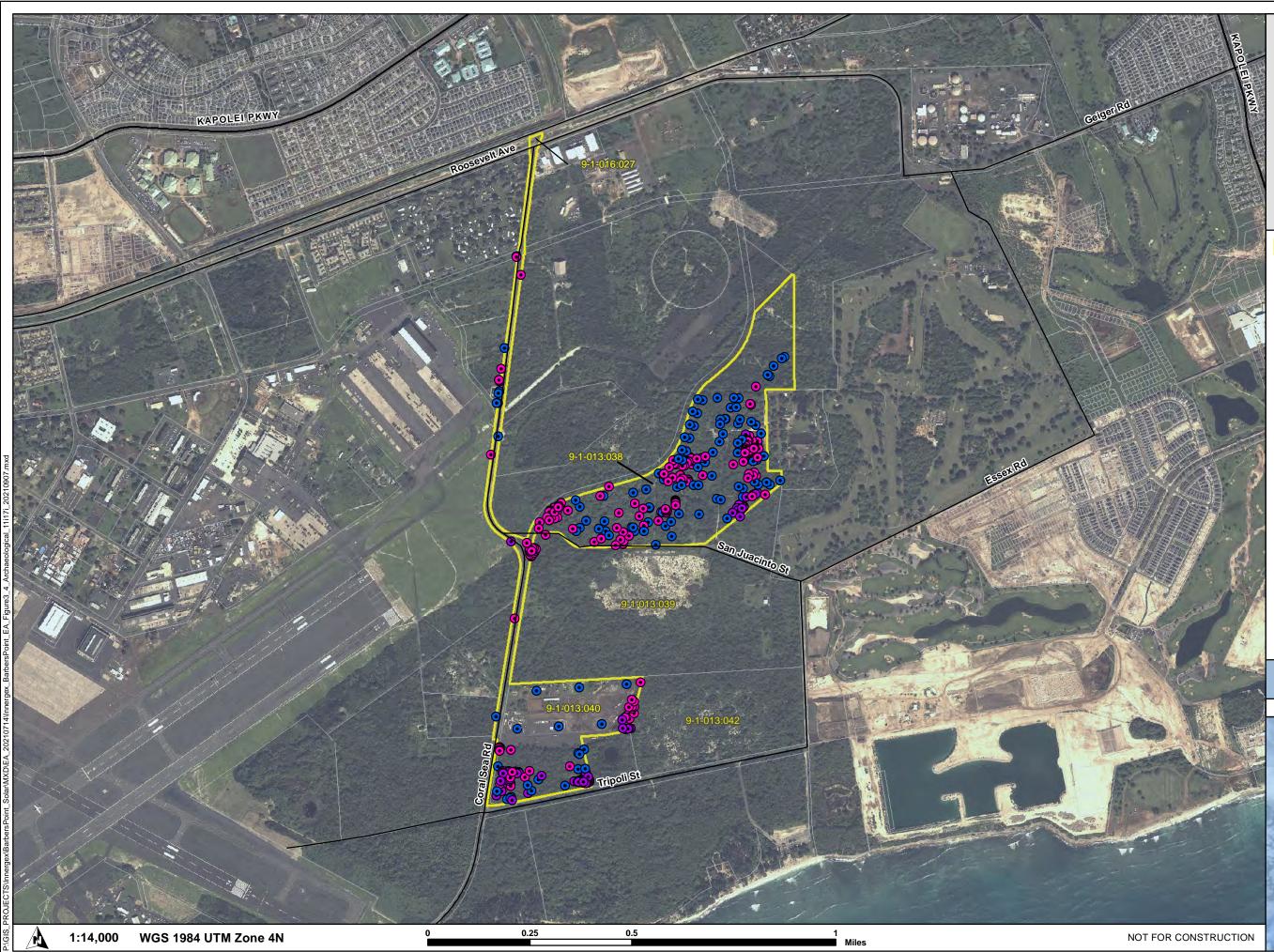


Figure 3-4 Locations of Archaeological Features Identified During the AIS

CITY AND COUNTY OF HONOLULU

- Project Area
- TMK Boundary
- $\overline{\mathbf{O}}$ Historic/Non-Hawaiian Sites
- Pre-Contact/Hawaiian Site
- Unmodified limestone pit

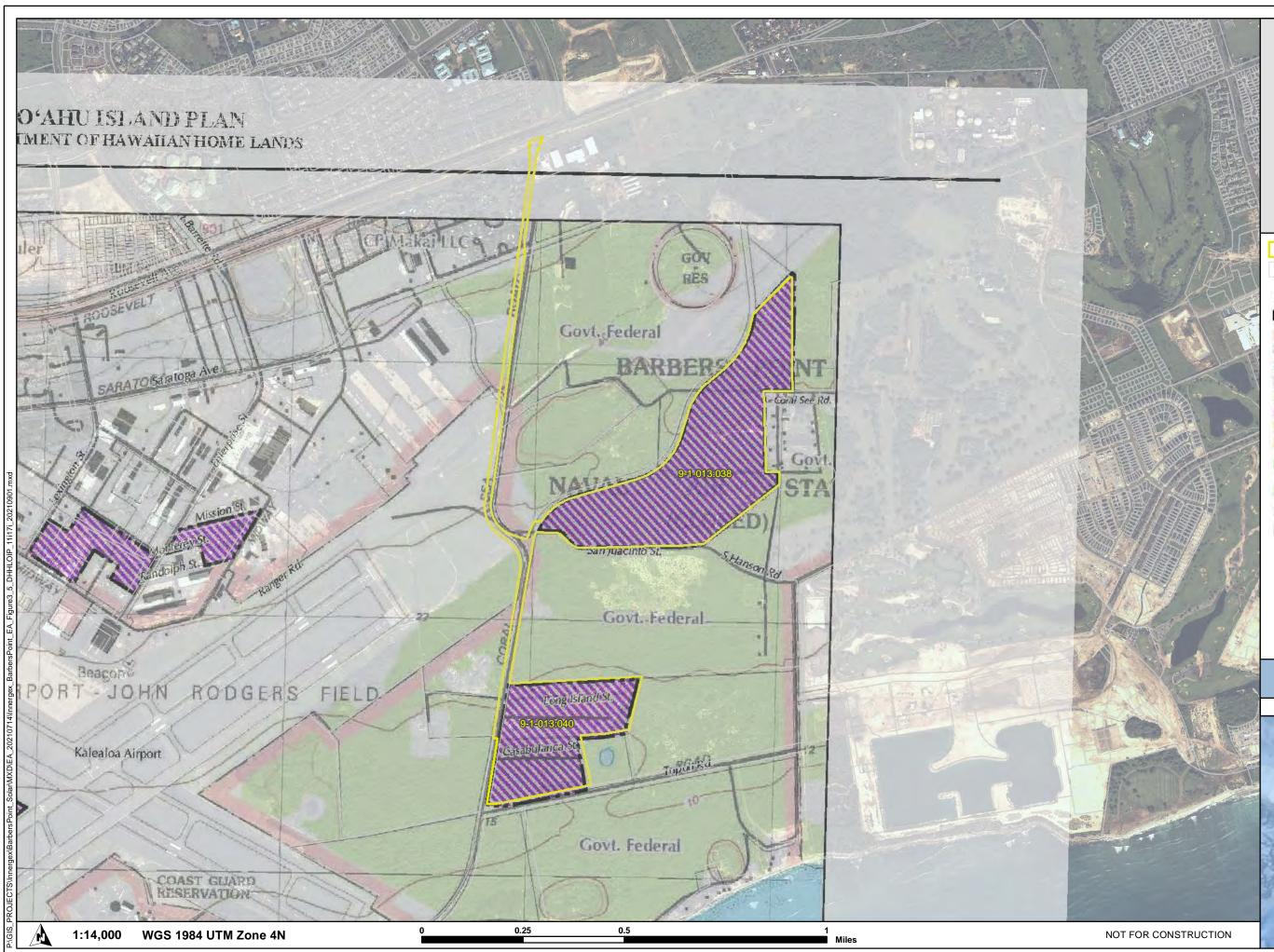
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Barbers Point Solar LLC

Reference Map

Oahu

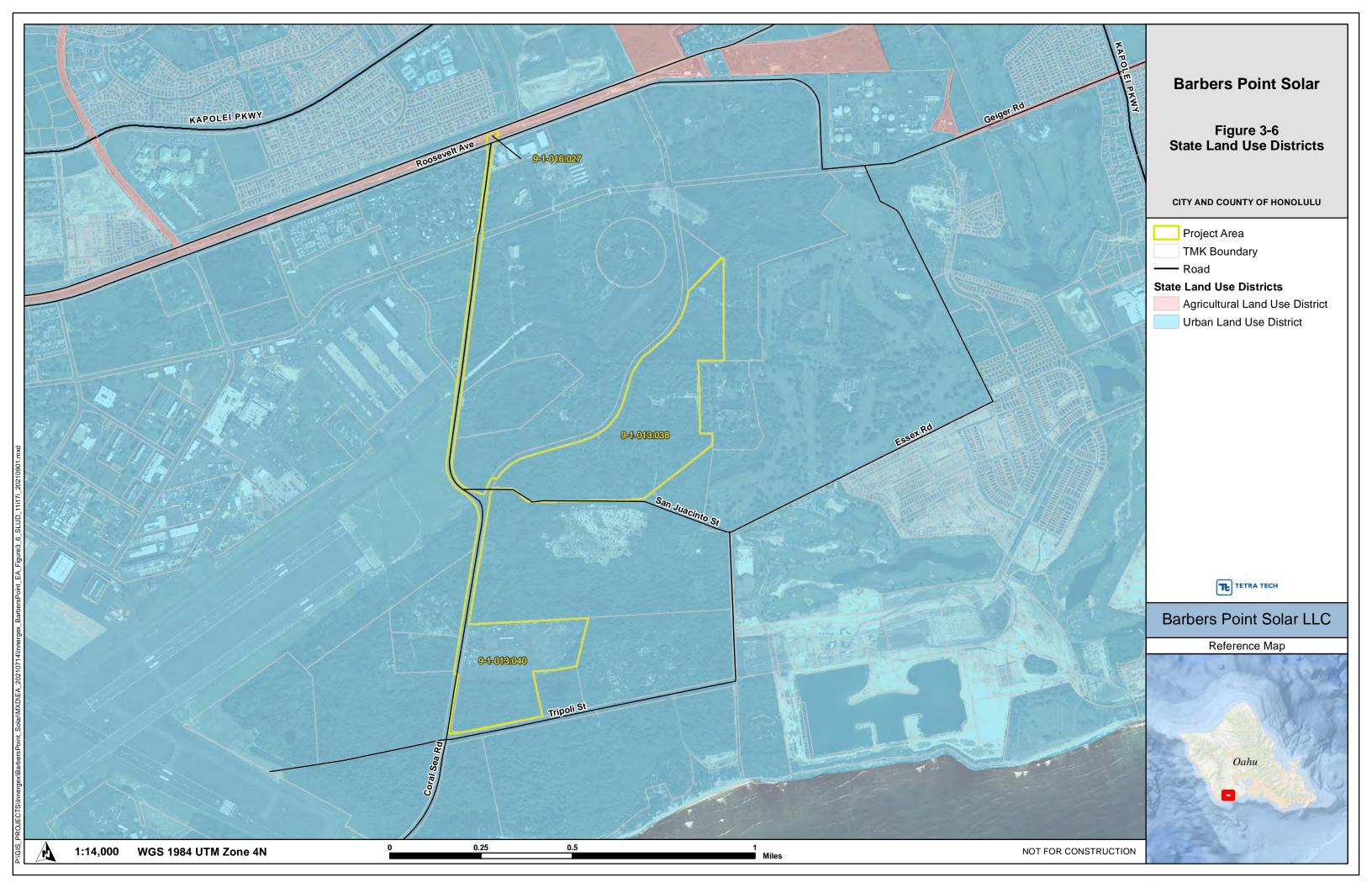
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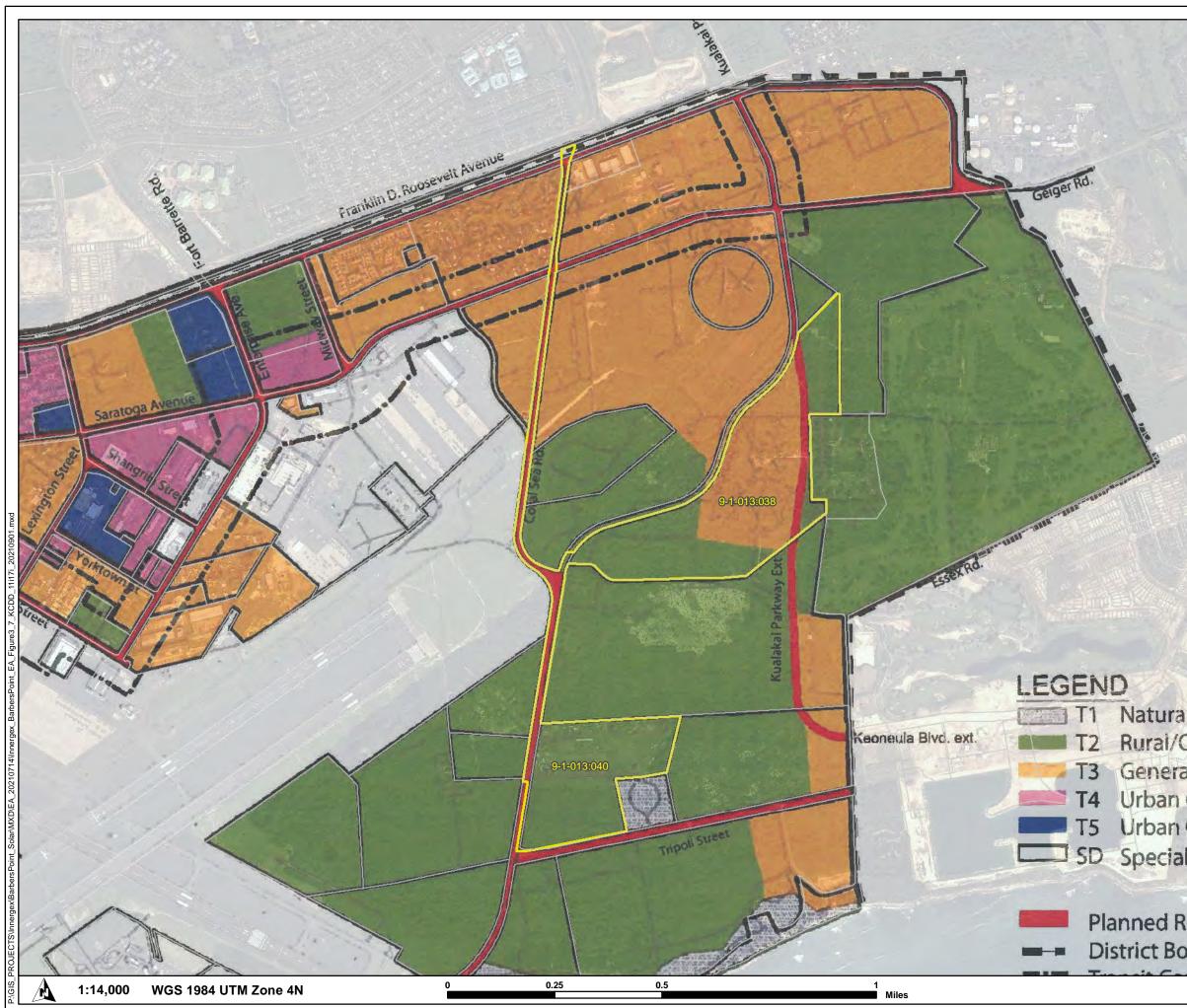


Barbers Point Solar Project Figure 3-5 DHHL **Oahu Island Plan** CITY AND COUNTY OF HONOLULU Project Area TMK Boundary Legend C DHHL Parcels Commercial **W** Community Use Conservation SSS Industrial General Agriculture Special District Homestead - Existing Residential 8888 Homestead - Proposed Residential Homestead - Existing Subsistence Agricultural Homestead - Proposed Subsistence Agricultural Road TMK Parcels TE TETRA TECH Barbers Point Solar LLC **Reference Map**

Oahu

-





	Barbers Point Solar Project
1 State	
	Figure 3-7 HCDA Kalaeloa Community Development District Regulating Plan
1 1 1 1	CITY AND COUNTY OF HONOLULU
State of the second	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
and the second sec	Planned Roadway District Boundary Transit Corridor Emergency Access
	Source: HCDA Regulating Plan, see HAR Chapter 15-215-22
	TE TETRA TECH
al Zone	Barbers Point Solar LLC
Open Space Zor	Reference Map
al Urban Zone	States - Bland
Center Zone	
Center High Int	Contraction in
al District	
VI	Oahu
Roadway	
oundary	LASS NO
NOT FOR CONSTRUCTION	

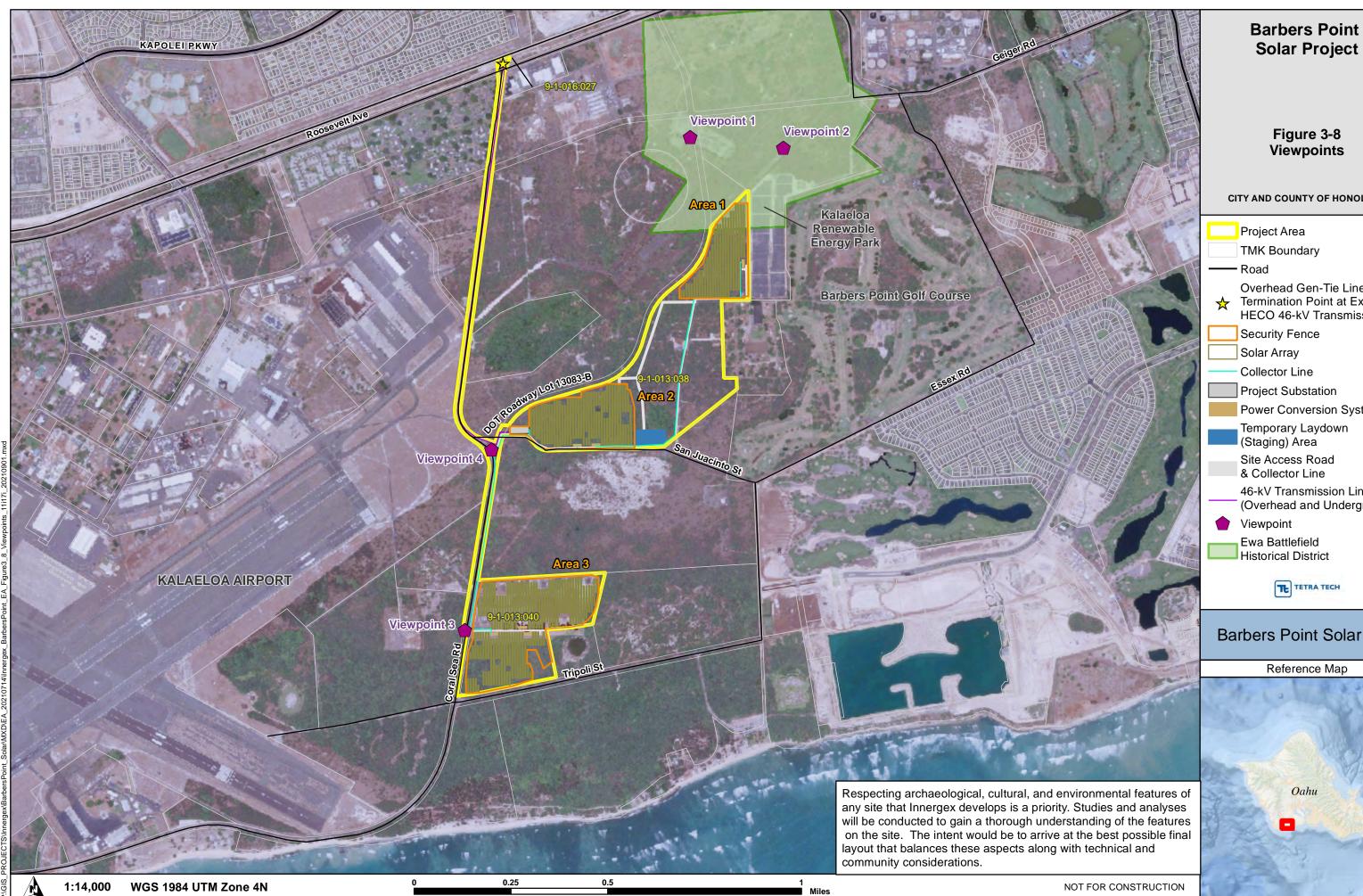
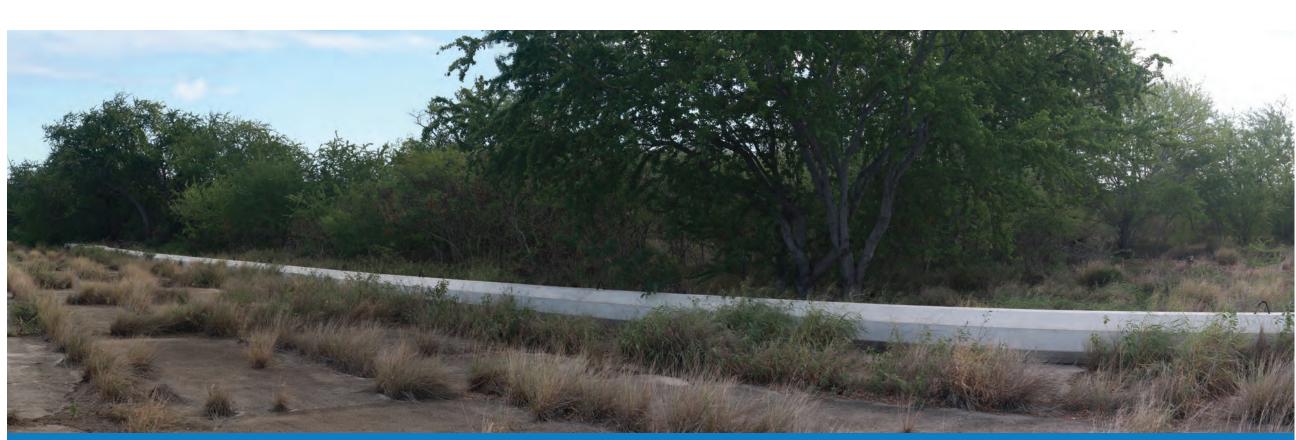


Figure 3-8 Viewpoints CITY AND COUNTY OF HONOLULU Overhead Gen-Tie Line Termination Point at Existing HECO 46-kV Transmission Line Project Substation Power Conversion System Temporary Laydown (Staging) Area Site Access Road & Collector Line 46-kV Transmission Line (Overhead and Underground) Historical District TE TETRA TECH

Barbers Point Solar LLC

Reference Map





Simulated Conditions

BARBERS POINT SOLAR PROJECT

Figure 3-9 PHOTO SIMULATION

Viewpoint 1: Ewa Battlefield _{View From} Proposed Visitor Center



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°





Simulated Conditions

BARBERS POINT SOLAR PROJECT Figure 3-10 PHOTO SIMULATION

Viewpoint 2: Ewa Battlefield View From Historic Runway



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°





Simulated Conditions

BARBERS POINT SOLAR PROJECT Figure 3-11a PHOTO SIMULATION

Viewpoint 3: Coral Sea Road No Landscaping



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°





Simulated Conditions

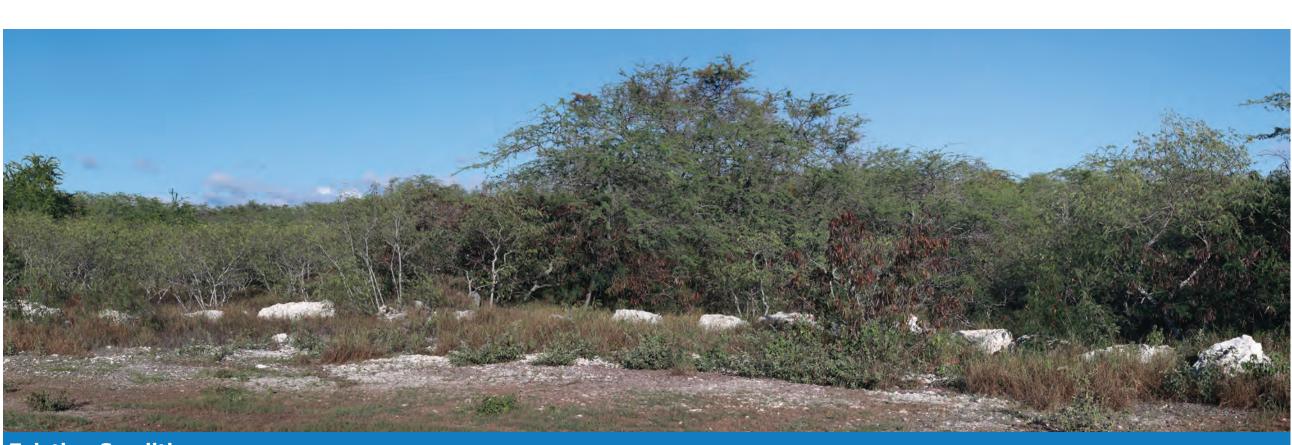
BARBERS POINT SOLAR PROJECT Figure 3-11b PHOTO SIMULATION

Viewpoint 3: Coral Sea Road With Proposed Landscaping



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°





Simulated Conditions

BARBERS POINT SOLAR PROJECT Figure 3-12 PHOTO SIMULATION

Viewpoint 4: Coral Sea Road Near San Juacinto Street





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°

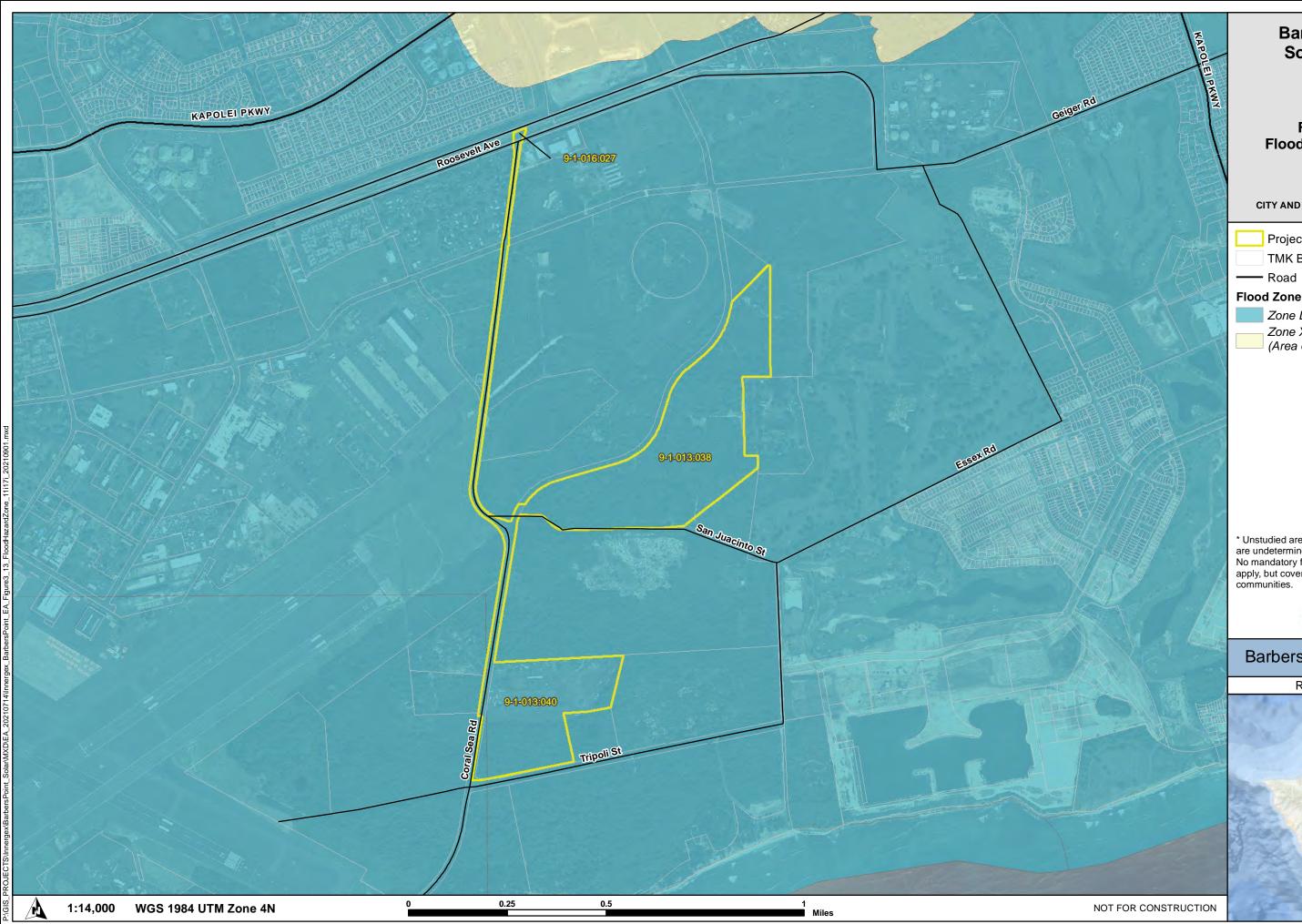


Figure 3-13 Flood Hazard Zones

CITY AND COUNTY OF HONOLULU

- Project Area TMK Boundary

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.



Barbers Point Solar LLC

Reference Map

Oahu

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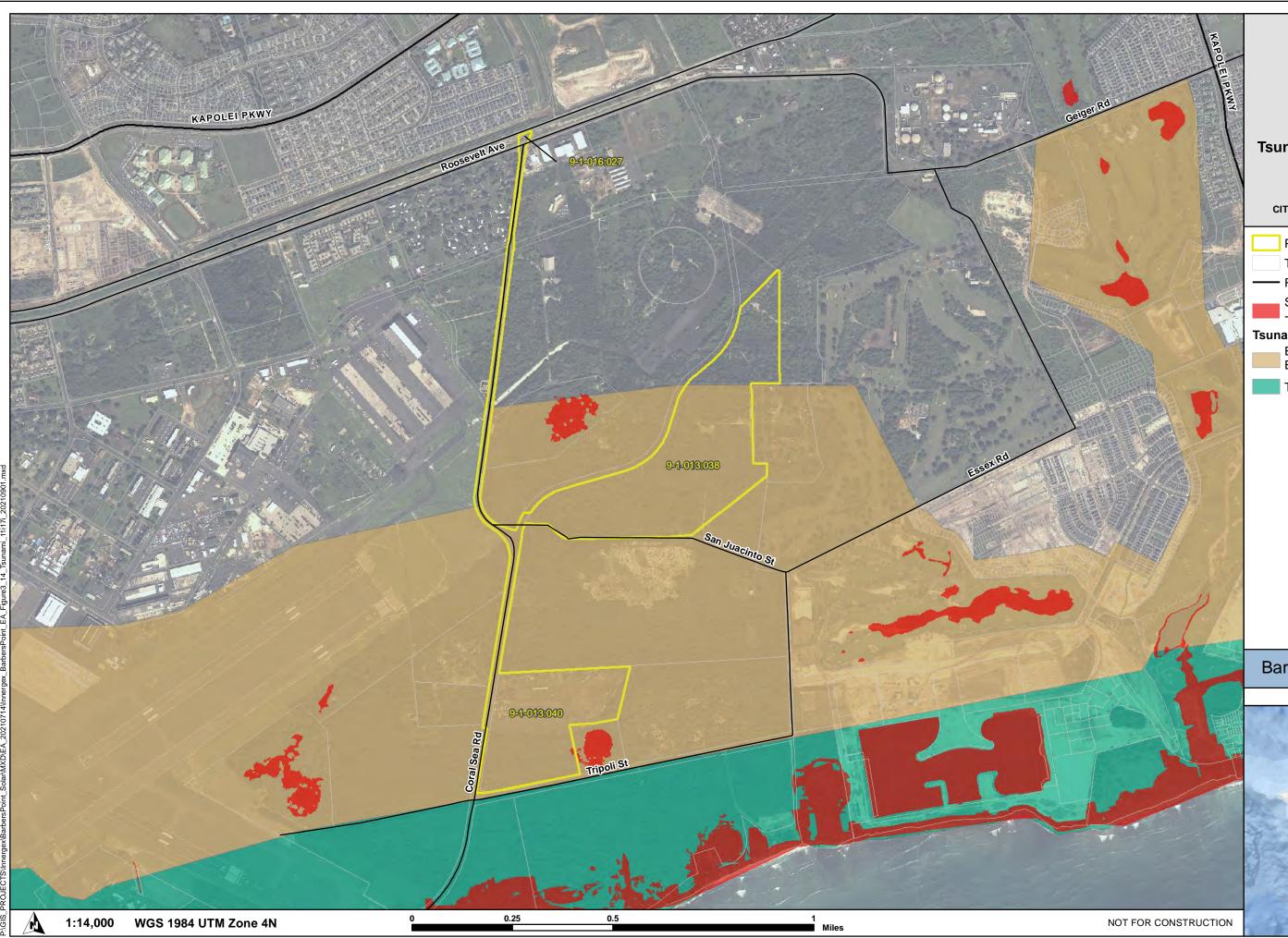


Figure 3-14 Tsunami Evacuation Zones

CITY AND COUNTY OF HONOLULU

- Project Area
- TMK Boundary
- Road
 - Sea Level Rise Exposure Area - 3.2 feet
- Tsunami Evacuation ZonesExtreme TsunamiEvacuation Zone
 - Tsunami Evacuation Zone

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Barbers Point Solar LLC

Reference Map

Oahu

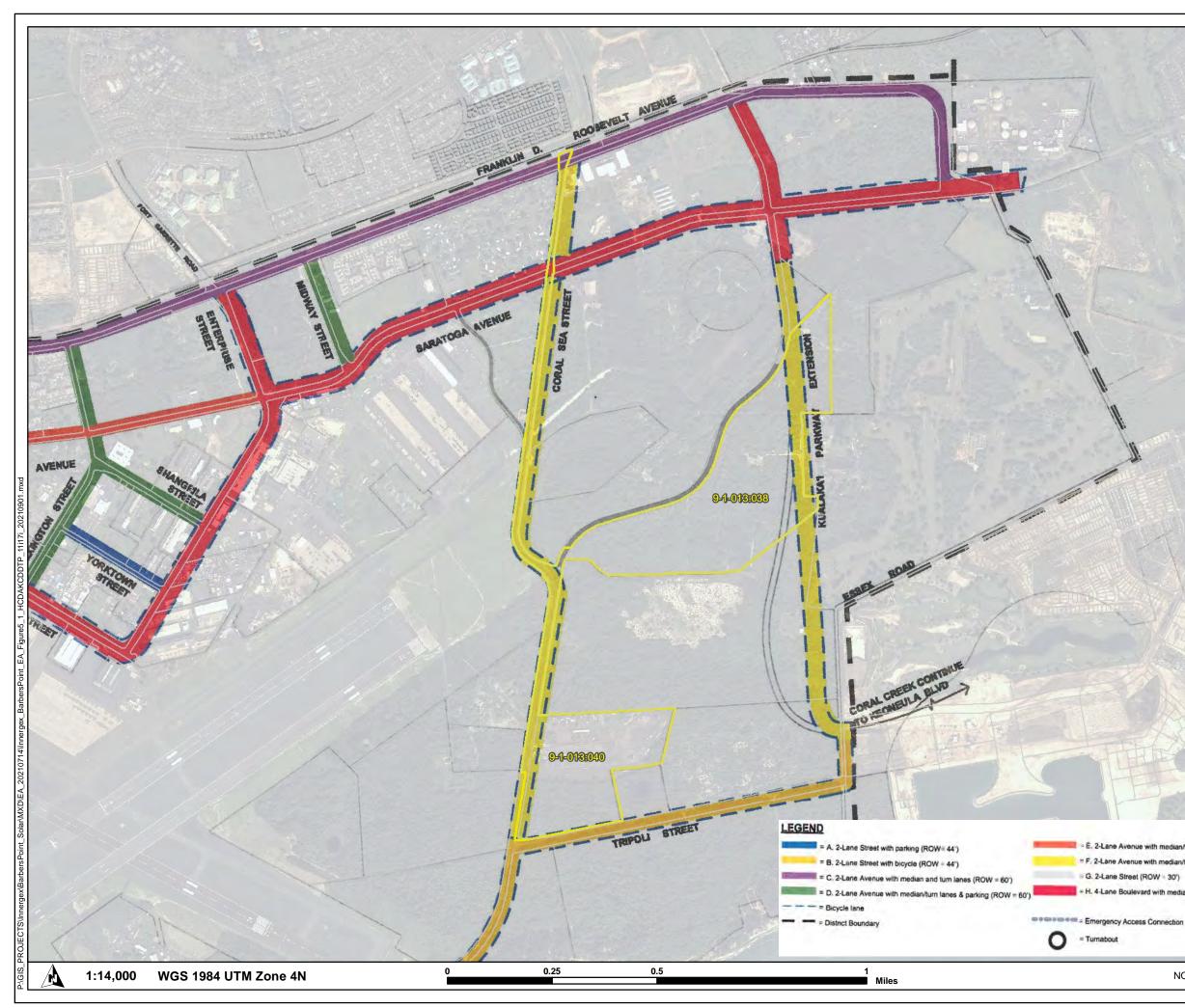




Figure 5-1 HCDA Kalaeloa Community Development District Thoroughfare Plan

CITY AND COUNTY OF HONOLULU

Project Area TMK Boundary

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

TE TETRA TECH

Barbers Point Solar LLC

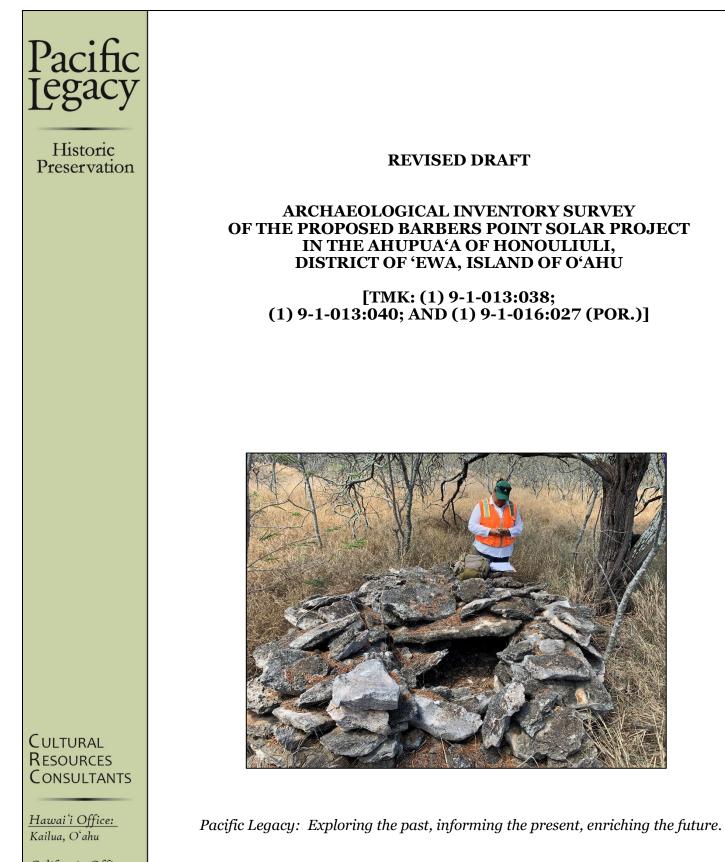
Reference Map

Oahu

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APPENDICES

APPENDIX A. DRAFT ARCHAEOLOGICAL INVENTORY SURVEY



<u>California Offices:</u> Bay Area Sierra/Central Valley This page intentionally left blank

REVISED 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.)]

Prepared by: Jennifer J. Robins, B.A., James D. McIntosh, B.A., Kylie Tuitavuki, B.A., Krickette M. Pacubas, B.A., and Mara A. Mulrooney, Ph.D.

Pacific Legacy, Inc. 146 Hekili Street, Suite 205 Kailua, HI 96734 (808) 263-4800

Prepared for: Barbers Point Solar LLC c/o Innergex Renewable Energy Inc. 888 Dunsmuir Street, Suite 1100 Vancouver, British Columbia V6C 3K4

November 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) (1) 9-1-013:038 and (1) 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 (1) 9-1-016:027 (owned by Kapolei Infrastructure, LLC). The project area is located within the *ahupua*'a of Honouliuli in the *moku* of 'Ewa on the island of O'ahu [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 Hawai'i Administrative Rules (HAR) §13-284-6.



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'Ewa, Oʻahu November 2021	;;;	Historic
november 2021	iii	Preservation

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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. For example, in MCAS Ewa the 'okina is not used in 'Ewa because it is part of the installation name, but when referring to the district of 'Ewa, the diacritical is used.

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



INTRODUCTION 1.0

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 'Ewa Plain of southwestern O'ahu Island. The project area is within the traditional land division of Honouliuli Ahupua'a and broader *moku* (district) of 'Ewa (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 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). 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 Hawai'i 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 'Ewa Plain which encompasses the southeast point of O'ahu, 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.



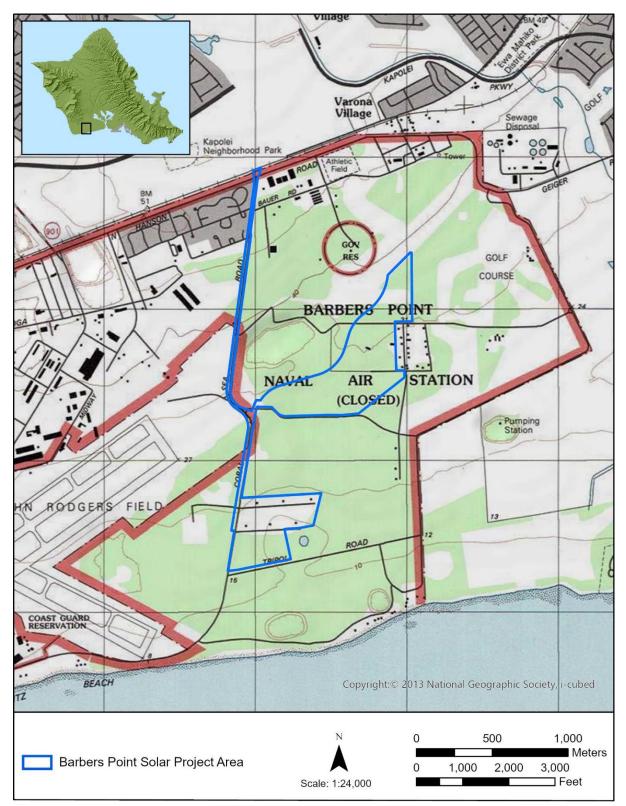


Figure 1. Portion of U.S. Geological Survey 7.5 Minute Ewa Quadrangle showing Barbers Point Solar Project Area location (USGS Ewa Quadrangle 1998).



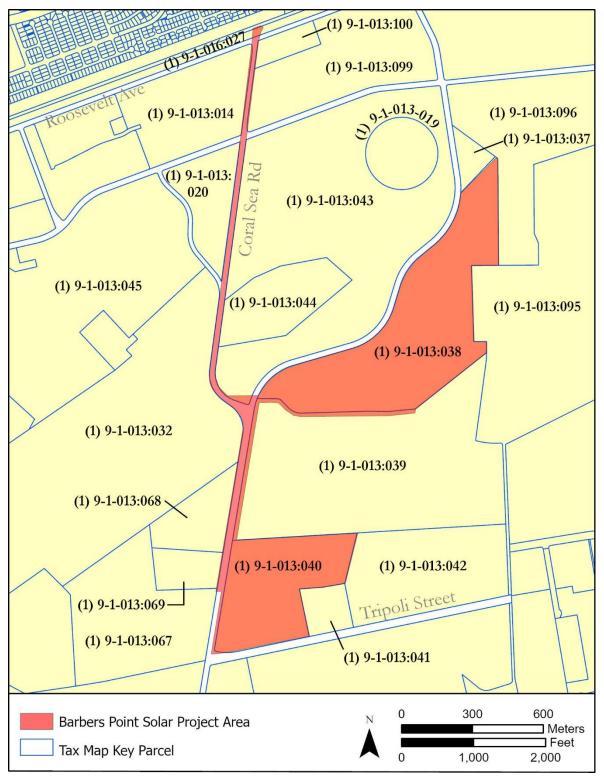


Figure 2. Barbers Point Solar Project Area showing TMKs within and adjacent to the project area (Source: Hawaii Statewide GIS Program, 2021).



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.



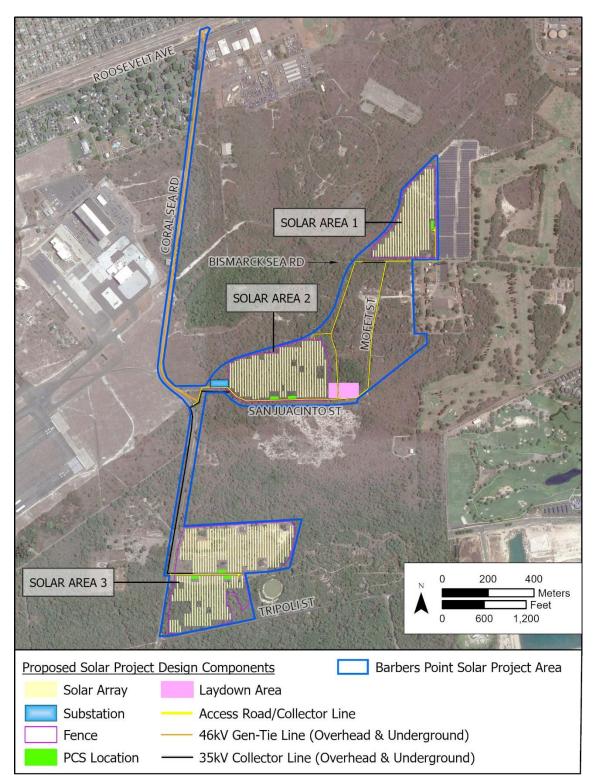


Figure 3. Proposed Barbers Point Solar Project Design (courtesy of Innergex; base map: Google Earth Imagery 2019).



1.3 **ENVIRONMENTAL SETTING**

The project area is located on the 'Ewa Plain in the southwestern portion of O'ahu 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) northnortheast 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 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 'Ewa 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 '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 underground water source captured in the multitude of limestone pits on the 'Ewa 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), 'opiuma (Pithecellobium dulce), Chinese violet (Asystasia gangetica), Zulu giant (Stapelia qiqantea), sisal (Aqave sisalana), Guinea grass (Megathyrsus maximus), 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 'ilima (Sida fallax), hoary abutilon (Abutilon incanum), and kauna'oa pehu (Cassytha filiformis), a parasitic plant found in the canopy of kiawe trees.



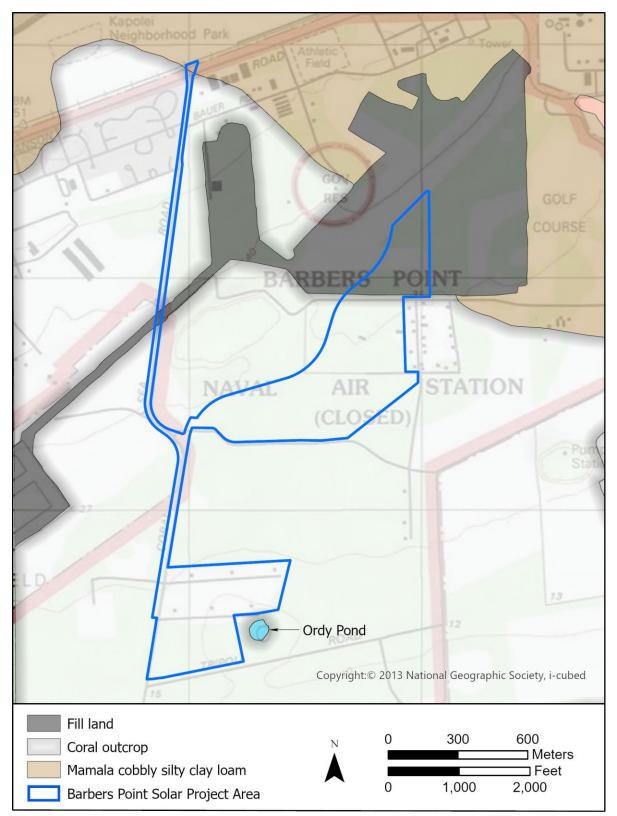


Figure 4. Soil classifications in project area (Soil Survey Staff 2020; USGS Ewa Quadrangle 1998).

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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 Hawai'i State Historic Preservation Division (SHPD). Historic documents, maps, and reference volumes were found in the Hawai'i State Archives, the University of Hawai'i Library system, Bishop Museum Archives, and private collections. Online sources of information included the United States Department of Agriculture (USDA), the State of Hawai'i Department of Accounting and General Services (DAGS), the Office of Hawaiian Affairs Kipuka and Papakilo Databases, the Hawaii Office of Planning Statewide GIS Program, Waihona 'Āina, 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 O'ahu lands into political districts occurred in the 15th century under the rule of Mā'ilikūkahi. This division resulted in the creation of six districts or *moku* during traditional times: 'Ewa, Kona, Koʻolaupoko, Koʻolauloa, Waialua, and Wai'anae. The Barbers Point Solar Project is located in the traditional land division called Honouliuli Ahupua'a, in the 'Ewa District (Figure 5). Honouliuli is the largest *ahupua'a* on the island of O'ahu and forms a portion of the 'Ewa Plain. In general, an *ahupua'a* 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 Ĥawaii*. 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 *ahupua'a* of Honouliuli, in the *moku* of 'Ewa. 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.



Place Name	Meaning, Description	Pg. No. in Pukui et al. 1974
'Ewa	"crooked"	28
Honouliuli	"dark bay"	51
Kalaeloa	"the long point"; the southwest point of O'ahu	72
Kānehili	 kane is defined in Pukui and Elbert (1992) as Tinea, a fungus skin disease (ringworm). Kāne (note the diacritical) may be related and has the following potentially applicable definitions: 1. male; the leading of the four great Hawaiian gods; 3. name given at 'Ewa for the Tahitian banana known as polapola and hē'ī. The following definitions for hili from Pukui and Elbert 1986 may be applicable: to braid or plait; 2. to turn aside, deviate, wander, stray; 3. to whip, smite, thrash, batter. 	n/a
Kaupe'a	crisscross, interwoven (Pukui and Elbert 1992:55); bat's perch, Southern Cross (Kane 2011)	n/a
Keahi	"the fire"; point west of Pearl Harbor noted for 'ō'io fish and as a surfing site	100
Kualaka'i	<i>Tethys</i> (a sea creature); a spring here is called Hoaka-lei (lei reflection) because Hi'iaka picked <i>lehua</i> flowers here to make a lei and saw her reflection in the water	119
Leina a ka'uhane	"leaping place of ghosts". Land section near Ka'ena Point, O'ahu, from which ghosts were thought to leap to the nether world.	131
Puʻukapolei	Variantly as Pu'u-o-kapolei. Kapolei means "beloved Kapo" (a sister of Pele). Pu'u means "hill." The pig-man demigod, Kamapua'a, established his grandmother here as queen after conquering most of O'ahu.	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
Pu'upālailai	"young <i>lai</i> fish hill"	205
Waimānalo	"potable water"; land division, road, and gulch in Barbers Pt. quad; site of the home of Chief Kākuhihewa	225

Table 1. Place Names Associated with the Project Area



The name of the rains in Honouliuli is Nāulu. In the moʻolelo of the journey of Hiʻiaka, sister of the goddess Pele, Hi'iaka travels to 'Ewa and describes it as dry, calling out to the Naulu clouds to relieve the people.

'A'ole au e hele i ke kaha o Kaupe'a

Kēlā kaha kūpā koili a ka lā i ke kula

Ua kūpono a'ela ka lā i ka piko o Wākea

Ola i ke ahe a ka makani Māunuunu

I ka hapahapai mai a ka makani 'Aoʻaoa

Ke koi lā i ke ao o ka **Nāulu** e hanini i ka wai

Ola ihola nā kupa kama'āina i ka wai a ka 'ōpua

Ke halihali aʻela nā ʻōpua i ke awa lau

I shall not tread Kaupe'a's expanse

That stretch where the sun beats down on the plain

The sun is right overhead, at the navel of Wākea

I am spared by the Māunuunu wind

By the uplifting 'Ao'aoa breeze

Urging the Nāulu storm clouds to pour down their waters

The natives here survive on water from the clouds

Which billowing clouds carry along to the branching lochs

(Akana and Gonzalez 2015:195)



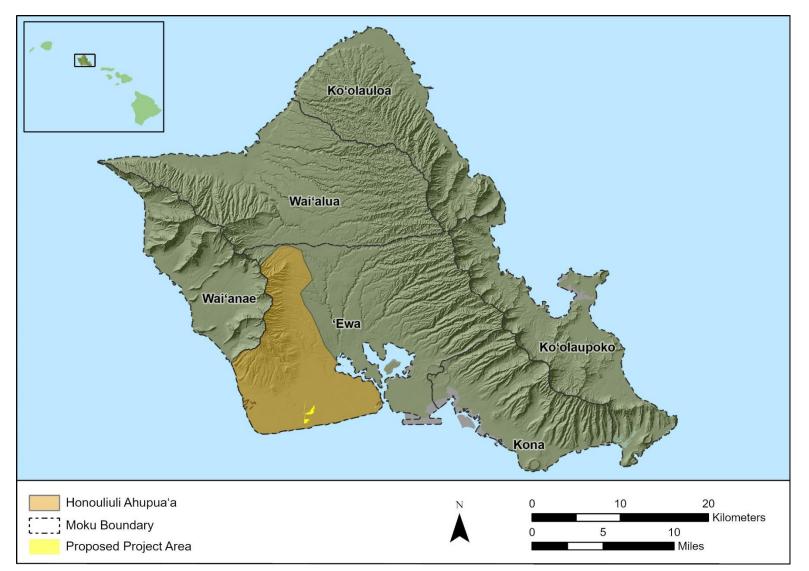


Figure 5. Hill shade imagery showing traditional *moku* boundaries of O'ahu and *ahupua'a* of Honouliuli.



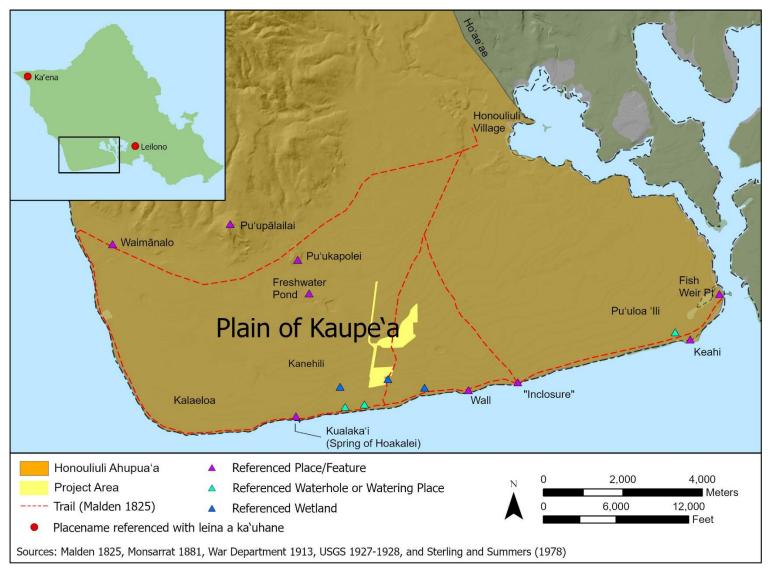


Figure 6. Traditional Hawaiian place names and resources of 'Ewa Moku.

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3.1.2 'Ōlelo No'eau

Hawaiian proverbs, or '*o*lelo no'eau, have been passed down through oral traditions. Many '*o*lelo *noeau* have been collected and published in Hawaiian language newspapers and other primary and secondary sources. The 'olelo no'eau presented below were compiled by Mary Kawena Pukui in the book entitled 'Olelo No'eau Hawaiian Proverbs and Poetical Sayings (Pukui 1983). These '*o*lelo no'eau often have both a literal and metaphorical meaning (called kaona). '*O*lelo no'eau about geographical features and areas can help us to understand natural phenomenon. land use, and the history of a place. There is one *'olelo no'eau* that is specifically attributed to Honouliuli Ahupua'a because of the 'anaeholo fish that would populate the area.

Ka i'a hali a ka makani. (1330)

The fish fetched by the wind.

The 'anaeholo, a fish that travels from Honouliuli, where it breeds, to Kaiapāpa'u on the windward side of O'ahu. 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 '*o*lelo no'eau that describe the people and attributes of the 'Ewa Moku. Each 'olelo no'eau is numbered, and the sayings can be referenced that way, rather than by page number (Pukui 1983).

'Āina koi 'ula i ka lepo. (80)

Land reddened by the rising dust.

Said of 'Ewa, O'ahu.

Anu o 'Ewa i ka i'a hāmau leo e. E hāmau! (123)

'Ewa is made cold by the fish that silences the voice. Hush!

A warning to keep still. First uttered by Hi'iaka to her friend Wahine'oma'o to warn her not to speak to Lohi'au while they were in a canoe near 'Ewa.

'Ewa kai lumaluma'i. (385)

'Ewa of the drowning sea.

An epithet applied to 'Ewa, where kauwā were drowned prior to offering their bodies in sacrifice.

'Ewa nui a La'akona. (386)

Great 'Ewa of La'akona.

La'akona was a chief of 'Ewa, which was prosperous in his day.

Haunāele 'Ewa i ka Moa'e. (493)

'Ewa is disturbed by the Moa'e wind.



Used about something disturbing, like a violent argument. When the people of 'Ewa went to gather the pipi (pearl oyster), they did so in silence, for if they spoke, a Moa'e breeze would suddenly blow across the water, repilling it, and the ovsters would disappear.

He kai puhi nehu, puhi lala ke kai o 'Ewa. (661)

A sea that blows up nehu fish, blows up a quantity of them, is the sea of 'Ewa.

He lō'ihi o 'Ewa; he pali o Nu'uanu; he kula o Kulaokahu'a; he hiki mai koe. (768)

'Ewa is a long way off; Nu'uanu is a cliff; Kulaokahu'a is a dry plain; but all will be here before long.

Said of an unkept promise of food, fish, etc. O'ahu 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 'Ewa e hoʻolono nei. (1263)

The dashing of the waves is at Waialua but the sound is being heard at 'Ewa.

Sounds of fighting in one locality are quickly heard in another.

Ka i'a hāmau leo o 'Ewa. (1331)

The fish of 'Ewa that silences the voice.

The pearl oyster, which has to be gathered in silence.

Ka i'a kuhi lima o 'Ewa. (1357)

The gesturing fish of 'Ewa.

The pipi, or pearl osyter. Fishermen did not speak when fishing for them but gestured to each other like deaf-mutes.

Ke kai he'e nehu o 'Ewa. (1721)

The sea where the nehu come to schools to 'Ewa.

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 'Ewa. (1776)

The sand on which there was a linking of arms on the breadth of 'Ewa.

'Ewa, O'ahu. 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 a'e 'Ewa; Noho iho 'Ewa. (1855)

Stand-up 'Ewa; Sit-down 'Ewa.

The names of two stones, now destroyed, that once marked the boundary between the chiefs' land (Kua'e 'Ewa) and that of the commoners (Noho iho 'Ewa) in 'Ewa, O'ahu.

O 'Ewa, 'āina kai 'ula i ka lepo. (2357)

'Ewa, land of the sea reddened by earth.

'Ewa was once noted for being dusty, and its sea was reddened by mud in time of rain.

Ua 'ai i ke kāi-koi o 'Ewa. (2770)

He has eaten the kāi-koi taro of 'Ewa.

Kāi is Oʻahu's best eating taro; one who has easten it will always like it. Said of a youth or a maiden of 'Ewa, who, like the kāi taro, is not easily forgotten.

3.1.3 Spiritual Realms (Ao)

Kamakau (2000:53) describes four spiritual realms recognized by Native Hawaiians: 1) the world we live in; 2) the realm of homeless or wandering souls (ao kuewa or 'auwana), 3) the aumakua realm (ao 'aumakua), and 4) the realm of endless darkness, the po pau 'ole, also referred to as the *Milu*.

The plains of Honouliuli are traditionally referred to as Kānehili and Kaupe'a, an area known as a wandering place of the spirits of the dead, or realm of *ao kuewa* or *ao 'auwana* (Maly and Maly 2012:18). Described as an uninhabited plain with *wiliwili* (*Eruthrina*) and 'ohai' (Sesbania) tomentosa), Kaupe'a was affiliated with the placename Kanehili and Leiolono (a leina in Moanalua) and from Kaupe'a, "one may see Leiolono where unclaimed spirits are lost on never ending darkness" (Maly and Maly 2012:24).

Kaupe'a is translated as "crisscross," "interwoven" (Pukui and Elbert 1986) or the "Bat's Perch" (pe'a translated as bat) in relation to the Southern Cross constellation or Hanaiakamalama (as defined in Polynesian Voyaging Society, Hōkūle'a) with its upside-down cross (Kane 2011:3). Used as a significant navigational tool, Kane believes the Southern Cross constellation with only a lone star visible from the 'Ewa plain marked the geographic area of Kaupe'a and Kahiki:

As it rises, it is an indication that one is moving into the southern latitudes. As it descends it is an indication that that one is moving toward the northern latitudes. Thus, to our ancestors or the Poe Kahiko, Kaupe'a pointed to the lone star and the way home to Kahiki.

Ka leina a ka 'uhane (leaping places of the spirit) is a place where wandering spirits, if guided by relatives or 'aumakua, passed into the ao 'aumakua—a realm believed to be "a good place that one day we all want to get to and restore those acquaintances with our ancestors" (Kane 2011:3). If a wandering soil is unguided or unworthy of entering the *ao 'aumakua*, their soul would perish in the po pau 'ole o Milu (Kamakau 2000:48).



S.M. Kamakau in Ka Po'e Kahiko provides the following description of ka leina a ka 'uhane near Ka'ena:

The *leina a ka 'uhane* on Oahu was close to the cape of Ka'ena, on its right (or north, *'akau*) side, as it turns toward Waialua, and near the cutoff (*alanui 'oki*) that goes down to Keaoku'uku'u. The boundaries of this leina a ka 'uhane, it is said, were Kaho'iho'ina-Wakea, a little below Kakahe'e, and the leaping place (kawa-kai) of Kilauea at Keawa'ula. (Kamakau 2000:48)

Others believe the *leina a ka 'uhane* is located in Moanalua along the inland side of Aliamanu, east of a rock at Kapukakī and directly in line with a burial mound at Aliamanu (Maly and Maly 2012:16). Some of the wandering souls "passed this leaping place, went on to the care of their 'aumakua; others, who had no one to help them, drifted down to Kaupe'a, Kama'oma'o, and Kānehili [the plains around Pu'u o Kapolei], where they would wander aimlessly in hope that someone would direct them to the spirit world" (Maly and Maly 2012:16).

3.1.4 The Mythical Era

Preserved in *mo*'olelo (story) are tales about a period in Hawai'i before $k\bar{a}naka$ (humans), when gods and deities inhabited the islands, often bringing about the creation of lands and resources. Below are excerpts of *mo'olelo* that occur in Honouliuli Ahupua'a and the larger 'Ewa Moku.

The Name of Honouliuli

An explanation of the name Honouliuli is provided by Westervelt (1915) who attributes the name of this 'āina (land) to an O'ahu chief who had the same name. In the mo'olelo Lepe-a-moa, Chief Honouliuli lives with his wife Chiefess Kapālama. Together they raise their granddaughter Lepe-a-moa in the uplands of Kapalama. 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 'Ewa

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, Kane 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)

Hi'iakaikapoliopele

In the Hawaiian epic story of Hi'iakaikapoliopele, the youngest sister of Pele travels from Hawai'i Island to Kaua'i and back. On her journey back to Kīlauea, Hawai'i Hi'iaka travels across Keahumoa, the plain between the *ahupua'a* of Waipi'o and Honouliuli. There she sees a group of women gathering *ma*'o blossoms and she offers them the following 'oli (chant):



E lei ana ke kula o Keahumoa i ka maʻo 'Ohu'ohu wale nā wahine kui lei o ke kanahele Ua like no a like me ka lehua o Hōpoe Me he pua koili lehua ala i ka lā Ka oni pua koai'a i ka pali I nā kaupoku hale o 'Āpuku Ke ku no i ke alo o ka pali o Pu'uku'ua He ali'i no na'e ka 'āinā He kauwā no na'e ke kanaka I kauwā no na'e wau i ke aloha Na ke aloha no na'e i kono e haele no māua E hele no wau aThe plain of Keahumoa wears the ma'o blossoms as its lei Adorning the women who string garlands in the wild It is like the lehua blossoms of Hopoe Lehua blossom upon which the sun beats down On the nodding koai'a flowers of the cliff On the rooftops of the houses at 'Āpuku *Rising in the presence of the cliff of* Pu'uku'ua The land is indeed the chief Man is indeed a slave I am indeed a slave to aloha-love It is love which invites us to twocome I come (Ka Hoku o Hawaii 1927)

Legend of Nāmakaokapao'o

Nāmakaokapao'o 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, Nāmakaokapao'o was a brave, strong child, but he did not get along with his step-father Puali'i. One day Nāmakaokapao'o pulled up the *uala* (sweet potatoes) that Puali'i had planted near their home. Angry at what Nāmakaokapao'o had done, Puali'i came after him with an axe. Nāmakaokapo'o used his mana (power) to say a death prayer against Puali'i 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 Palila, a famous Kaua'i kupua (demigod) who ventured from Ka'ena, Kaua'i to Waikele, O'ahu. Palila quickly traveled across the 'Ewa plains with the aid of his $l\bar{a}$ 'au $p\bar{a}lau$ (war club).

Haʻalele keia ia Kaʻena, hele mai la a Kalena, a Pōhākea, Maunauna, Kānehoa, a ke kula o Keahumoa, nana ia 'Ewa. Kū kēia i laila nānā i ke kū a ka ea o ka lepo i nā kānaka, e pahu aku ana kēia i ka la 'au 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 pa'apu ana nā kānaka i ka nānā lealea a ke liʻi o Oʻahu nei, oai o Ahuapau.

After leaving Ka'ena, he came to Kalena, then to Pohākea, 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 Waipi[•]o] and looked toward 'Ewa. 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 O'ahu, Ahuapau by name. (Fornander 1918:136-153)



Kānekua'ana

Kānekua'ana is the mo'o (lizard) goddess who maintained the abundant resources at Ke-awa-lau o Pu'uloa (the many harbored seas of Pearl Harbor). This 'āina stretched from Pā'akule, near the harbor's inlet, to the many loko i'a (fishpond) along the shore. Kānekua'ana was known as the guardian or the protector of the *pipi* (Hawaiian pearl oyster) that were found throughout Pu'uloa. She was loved by the people of 'Ewa who built *heiau* in her honor and heeded 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 'olelo no'eau for the area: "ka i'a hamau leo o 'Ewa" meaning "Ewa's fish that silence voices."

According to a *mo*'olelo 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. Kānekua'ana 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).

Ka'ahupāhau and the Sharks at Pu'uloa

Ka'ahupāhau is the beloved shark goddess who guards the waters of 'Ewa. She lived in an underwater cave near Moku'ume'ume (Ford Island) at Keanapua'a Point near the entrance of East Loch. Her brother, Kahi'ukā was famous for his tail that he would use to attack enemies or warn fishermen if danger was nearby.

The people of Pu'uloa (Pearl Harbor) treated Ka'ahupāhau 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 'olelo no'eau, "Alahula o Pu'uloa, he alahele na Ka'ahupāhau" (Everywhere in Pu'uloa is the trail of Ka'ahupāhau) 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 Pu'uloa.

In one *mo*'olelo, Mikololou, a man-eating shark from the island of Maui, visited Ka'ahupāhau at Pu'uloa. He rested on the shores, enjoying the hospitality of his host and the people of Pu'uloa; however, after a while he became hungry and angry when Ka'ahupāhau 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.

Ka'ahupāhau and Kahi'ukā 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 'awa that he became stupefied. At the same time, people gathered at the base of the river, ready to trap and attack Mikololou. 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 Ka'ahupāhau is also recorded in the mele Pūpū A'o 'Ewa (Shells of 'Ewa) that was written by Elbert & Mahoe:

Pūpū (a'o 'Ewa) i ka nu'a (nā kānaka) E naue mai (a e 'ike) I ka mea hou (o ka 'āina) Ahe 'āina (ua kaulana) Mai nā kūpuna mai Alahula Pu'uloa he ala hele nō Kaʻahupāhau, (Kaʻahupāhau) Alahula Pu'uloa he ala hele nō Kaʻahupāhau, Kaʻahupāhau

Nani Kaʻala hemolele i ka mālie Kuahiwi kaulana a'o 'Ewa E ki'i ana i ka makani o ka 'āina Hea ka Moa'e eia au e ke aloha

Kilakila 'o Polea noho i ka 'olu Ia home hoʻohihi a ka malihini E walea ana i ka 'olu o ke kiawe I ka pā kolonahe a ke Kiu

Shells of 'Ewa throngs of people Coming to learn The news of the land A land famous From the ancient times All of Pu'uloa, the path trod upon by Ka'ahupāhau All of Pu'uloa, the path trod upon by Ka'ahupāhau

Beautiful Ka'ala, sublime in the calm Famous mountain of 'Ewa That fetches the wind of the land The tradewind calls, "here I am, beloved"

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)

3.1.5 Ali'i of 'Ewa

The *mo*'olelo of 'Ewa ali'i (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 mo'olelo and highlight events that are said to have occurred in Honouliuli Ahupua'a and the larger 'Ewa Moku.

Māweke

'Ewa was once known as the political epicenter of O'ahu. Fornander and Grant (Fornander and Grant 1996:47) write about Māweke, a great chief, who lived in 'Ewa in the mid-eleventh century. It is said that his son, Keaunui, navigated his way out of Pu'uloa (Pearl Harbor) by creating a path with his canoe. His descendants ruled O'ahu until Chief Haka was defeated in around 1540 (Cordy 2002:24).

Kala'imanuia

Kala'imanuia, a powerful wahine ali'i (female ruler), united O'ahu around 1600-1620 (Cordy 2002). She divided the island amongst her four children, giving Ha'o responsibility of the 'Ewa and Wai'anae districts. Her eldest son, Kū, was given the title of $m\bar{o}$ (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, Ha'o and his brother Ka'ihikapu fought



together and defeated Kū. Ka'ihikapu became the new $m\bar{o}$ 'i; however, over time Ka'ihikapu grew jealous of the wealth and abundance of resources that Ha'o had in 'Ewa. In one *mo'olelo*. 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, Ka'ihikapu sent the carcass of a maneating shark to Ha'o and instructed him to sacrifice it at his *heiau* in Waikele (Fornander and Grant 1996:270–271). Seeing this as moment of vulnerability, Ka'ihikapu and his men attacked Ha'o and his priests during the ceremony, killing them all and taking control of 'Ewa.

A third version of the story seems to be a combination of the previous two (Kamakau 1991:67). Ka'ihikapu catches a shark in Waikīkī and offers it to Ha'o to sacrifice at his *heiau* in Waikele. When the shark is on the altar, Ka'ihikapu and his men jump out of the shark and kill Ha'o and the priests. Ka'ihikapu'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, Ha'o, and Ka'ihikapu-is reflected in the 'olelo no'eau "Ke one *kuilima laula o 'Ewa*. The sand on which there was a linking of arms [*kuilima*] on the breadth of 'Ewa" (Pukui 1983:191).

Kahahana

Chief Kahahana was the last independent ruler of O'ahu. Born into a high ranking family on O'ahu, Kahahana was sent to Maui to grow up in the court of his relative Chief Kahekili-ruler of Maui, Moloka'i, Lāna'i and Kaho'olawe (Cordy 2002:42).

According to one mo'olelo, Kahahana was sent by Chief Kahekili to Waikīkī to meet with a kahuna (priest) named Ka'ōpulupulu. 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, Ka'opulupulu left O'ahu and returned to Maui.

When Chief Kahekili learned of what had happened, he was furious. He ordered Ka'opulupulu to take his son, Kahulupue, and return to O'ahu where they were to reunite with Kahahana in Wai'anae. When they arrived, they were violently abused by Kahahana'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, Kekuapo'i, and friend Alapa'i into the depths of 'Ewa.

For two years and four months, the three of them traveled and hid in the depths of 'Ewa, moving from Moanalua down to the lochs of Pu'uloa, before heading mauka (upland) to Waipi'o, 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 Alapa'i, 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 Alapa'i at the plains of Hō'ae'ae in Honouliuli.



An *oli kanikau* was given in honor of Kahahana's life by his wife Kekuapo'i at Apuakehau Heiau in Waikiki where he was sacrificed by Kahekili. Shad Kane (2011:3) cites a portion of the *oli* that suggests Pu'u Kapolei was an entry point of the spiritual realm of Milu:

In this oli kanikau, Kekuapoʻi mentions all the names of the places that were special to her husband. She however makes an interesting reference to Puʻukapolei. She states that ger husband's "spirit" entered the Milu by way of Puʻukapolei (Kane 2011:3).

Waipi'o Kīmopō

After Kahahana's death in 1785, his father, 'Elani, conspired with other O'ahu chiefs to kill Kahekili and his men. The O'ahu chiefs coordinated to all attack on the same night. 'Elani and his men were to kill the chiefs of 'Ewa; Chief Maka'ioulu and Pupuka would attack Kahekili in Waikīkī; and Konamanu and Kaliko'onui would kill Hu'eu in Waialua.

Someone informed Kahekili about the plot, and he sent a messenger to 'Ewa and Wai'alua to warn the other men. The chiefs in 'Ewa escaped to the *moku* of Kona, but the messenger who was sent to Waialua did not make it in time, and so Hu'eu and his men were killed. To avenge the death of Hu'eu, Kahekili gathered his men together to wage war with the districts of 'Ewa and Kona, ultimately killing all of the men, women, and children. It is said that the Kahoa'ai'ai stream in 'Ewa was filled with dead bodies, and that the water flowed red and tasted bitter from the smashed brains of those who were massacred (Kamakau 1991:138). This incident was known as the Waipi'o Kīmopō (Waipi'o assassination) because the plot originated there, and from that day forward, 'Ewa was known as, "the land of deadly plots" (Sterling and Summers 1978).

3.1.6 Ka 'Oihana Mahi 'Ai no Honouliuli—Traditional Agriculture of Honouliuli

The backbone of Hawaiian society were the planters and fishermen, and *mahi 'ai* and *lawai'a* are the traditions of farming and fishing in Hawai'i. While the ruling *ali'i* (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 Hawai'i, 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 *'ōlelo no'eau: "Ko koā uka, ko koā kai* (those of the upland, those of the shore)" (Pukui 1983:196).

Most of the people living in any *ahupua'a* were *maka'āinana* (commoners). Literally, *maka'āinana* means "people that attend the land." They prepared, planted, and harvested their own plots. They also cultivated the lands of whichever *ali'i* 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 *ali'i* to treat people fairly and maintain the occupancy of industrious *maka'āinana*, who were free to relocate.

Taste the Kāī-koi of 'Ewa

From the abundance of *wai* grew a renowned variety of *kalo* named Kāī O 'Ewa. There were many sub-varieties of Kāī O 'Ewa: Kāīke'oke'o, Kāī 'ele'ele, Kāīuliuli, Kāī 'ula'ula, Kāīkea, and Kāīkoi. Kāīke'oke'o was said to be beloved by the chiefs for its unique aroma and flavor. Kāīkoi was known to spread out, quickly sending out *huli* (shoots) until it covered the entire *lo'i* (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 '*ōlelo no'eau* (Pukui 1983:305):



Ua 'ai i ke kāi-koi o 'Ewa. (2770)

He has eaten the kāi-koi taro of 'Ewa.

Kāi is Oʻahu's best eating taro; one who has easten it will alwaus like it. Said of a uouth or a maiden of 'Ewa, 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 *lo'i kalo*. The abundance of water in this particular *'āina* nourished a bounty of crops that once sustained hundreds of Native Hawaiians.

3.1.7 Ka 'Oihana Lawai'a 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), 'õhua (Acanthurus triostegus sandvicensis), 'ama'ama (Muqil cephalus), āholehole (Kuhlia sandvicensis), 'ōpae (Halocaridina rubra), he'e (Octopus cyanea), and the prized 'anae (adult mullet, Mugil cephalus).

Traditionally 'anae were associated with the waters of 'Ewa. These 'anae traveled along the coast from Honouliuli in 'Ewa to La'iemalo'o in the district of Ko'olauloa and were known as Ka'anae o Kaihuopala'ai (The 'anae of Kaihuopala'ai). A mo'olelo explains that Kaihuopala'ai 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 Pu'uloa (Pearl Harbor) to his home in La'iemalo'o. It's believed that the 'anae of the area still travel this route today.

An alternate *mo'olelo* depicts the migration of the 'anae as 'ama'ama, young mullet. Although in a different life stage, these *i*'a followed the same migratory pattern, moving from Honouliuli to La'ie (Titcomb and Pukui 1977:64).

Kaihuopala'ai (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 'ama'ama 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 Apoka'a, 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 'ama'ama. From this 'ama'ama child came all the 'ama'ama of Kaihuopala'ai, and thus did it gain renown for its 'ama'ama [...] Laniloa went to La'ie in Ko'olauloa, and there he married. His sister remained in Honouliuli and married Mokueo, and to them were born the poeple who owned the 'ama'ama, including the late Mauli'awa 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 La'ie he heard of the great schools of 'ama'ama at Honouliuli. There were no 'ama'ama, large or small, where he lived. He thought of his younger sister, the 'ama'ama, 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 'ama'ama..." Laniloa left La'ie to go to 'Ewa... 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 'ama'ama 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 'Ewa [...] 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 Ka'a'ali'i, then they rose to the surface [...] They reached Waikīkī [...] They went on. The sister slept at Nu'upia while the fish stopped outside of Na



Moku Manu [...] Finally she reached La'ie, and to this day this is the route taken by the 'ama'ama.

The 'olelo no'eau "ka i'a hali a ka makani (the fish blown by the wind)" refers to this mo'olelo and the annual migration pattern of the 'anae (Pukui 1983:145). When the 'anae migrate they are known as 'anae-holo (running or travelling mullet), but when they remain offshore or in the same area they are referred to as 'anae-pali (cliff mullet).

Within the 'Ewa Moku, Pu'uloa Ahupua'a 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 Pohākea 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 '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)

3.2.3 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, 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 *ahupua*^{*i*} a of Honouliuli was claimed by Kamehameha I following his conquest of O^{*i*} ahu. He gave the ahupua'a to Kalanimoku, who passed the land on to his sister, Wahinepi'o. The entire ahupua'a was awarded to Kamehameha's granddaughter, Miriam Ke'ahi-Kuni Kekau'onohi, except for kuleana awards, located primarily within and adjacent to the Honouliuli Gulch. Upon Kekau'ōnohi's death, the lands passed to her third husband, Levi Ha'alelea. 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 'Ewa. 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 8).

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 'Ewa Plain and was in operation until 1947 (Figure 7). 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 'Ewa Plain (see Tuggle 1997).



Figure 7. 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 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:



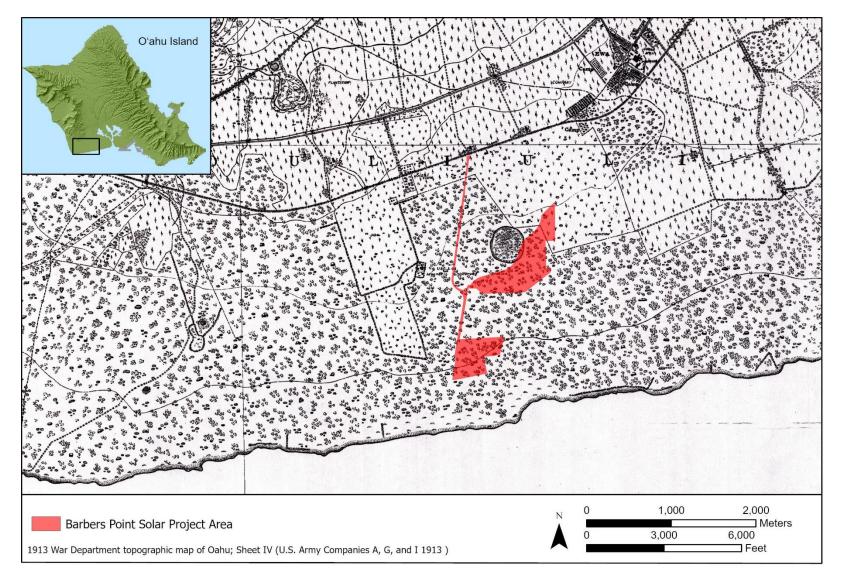


Figure 8. Military survey map showing Ewa Plantation fields in northeastern portion of the project area. Individual plant symbols indicate commercial agriculture.

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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. None of the land awards listed are in the immediate vicinity of the project area.

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 (<i>loʻi</i>)	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 (<i>loʻi</i>)	LCA 1570 to Kekua 1: "Ap. 2. He loi Haalelenui ma Aihonu, Poohilo, Honouliuli, Ewa. Oahu." 0.248 acre
Hakelo (<i>loʻi</i>)	Claim no. 1605B by Nakai is for "a moo aina in 3 pieces, & having 6 lois, one called Hakelo" (FT 9:131.)
Halawa (<i>moʻo</i>)	LCA 845 to Kaukahiko: "[Apana 1] Moo aina Halawa, ili o Niukee, Honouliuli, Ewa, Oahu." 1.234 acre (AB 7:258)
Haleokane (<i>loʻi</i>)	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 (<i>moʻo</i>)	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 (<i>moʻo</i>)	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 (<i>loʻi</i>)	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 (<i>moʻo</i>)	LCA 1701 to Alauka: "Ap. 1. Ekolu loi, Hopeiki, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.802 acre (AB 6:136)
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Place Name	LCA No. and Description
Hopenui (<i>moʻo</i>)	LCA 1701 to Alauka: "Ap. 2. He loi iloko o Hopenui, Poohilo, Honouliuli, Ewa,
	Oahu." 0.087 acre (AB 6:136)
lao (<i>loʻi</i>)	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 lao of
	Leleaupa." (FT 9:142)
Kaaimano (<i>loko</i>)	Claim no. 5653B by Kanehekili in the mo'o [Ka]Mookahi is bounded "makai by the
	loko Kaaimano of konohiki." (FT 9:143)
Kaaiopelu (<i>loʻi</i>)	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 (<i>ʻili 'aina</i>)	LCA 755 to Kainohananui for Kaope: "Apana 2. Kahuahale i kula o Kaakau
	Honouliuli." 1.53 acres (IN 765; AB 2:149)
Kaamaikeaha	Claim no. 5653C [LCA 751] by Kalauli for "3 lois called Hiwalalo in the moo aina
(loʻi)	Malua, ili of Polapola" is bounded "Waianae by the loi Kaamaikeaha of Mili." (FT
	9:143)
Kaaumakua	LCA 1719 to Hiilea is for his "Moo aina Kanuwahine, ili o Kaaumakua, Honouliuli,
(ʻili ʻaina)	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	LCA 1570C to Naholowaa: "Ap. 2. He moo aina Kaauwaiwai, ili o Kaaumakua,
(<i>moʻo</i>)	Honouliuli, Ewa, Oahu." 1.674 acres. Written "Kaauwewai" in FT 9:140 (AB 6:138)
Kahakumaka (<i>loʻi</i>)	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	LCA 755 to Kainohananui: "He moo aina Kahewamakawalu, Niukee, Honouliuli,
(<i>moʻo</i>)	E.O." (AB 2:149)
Kahiwapalaai	Claim no. 1580B by Kapioho "consists first of 2 moos named Namooelua [q.v.] &
(ʻili ʻaina)	2d one loi in the moo aina Hiwalalo, both in the ili Kahiwapalaai, Honouliuli, Ewa,
	Oahu." In the Award Book Namooelua is in the <i>'ili</i> of Polapola. This is probably a
	garble for Kaihuopalaai (q.v.). (FT 9:133)
Kahoopauli (<i>moʻo</i>)	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 (<i>moʻo</i>)	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 (<i>moʻo</i>)	LCA 1713 to Kealani: "Ap. 1. He moo aina, Kahuilalo, ili o Niukee, Honouliuli, Ewa,
	Oahu." 1.07 acres (AB 6:130)
Kahuiluna (<i>moʻo</i>)	LCA 876 to Nohunohu: "Moo aina o Kahuiluna, ili o Niukee, Honouliuli, E.O."
	1.047 acres (AB 2:277)
Kahuiopalaai	Claim no. 5670B by Kaohai "is called Lopanui in the ili Kaihuopalaai, Honouliuli,
(ʻili ʻaina)	Ewa, Oahu" but the LCA is placed in Polapola (q.v.) (FT 9:137)
Kailikahi (<i>'ili 'aina</i>)	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 (<i>loko</i>)	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)



Place Name	LCA No. and Description
Kalaipuawa	LCA 839 to Kaaiawaawa: "Apana 1. He moo kalo Kalaipuawa, ili o Poohilo,
(<i>moʻo</i>)	Honouliuli, Ewa, Oahu." 1.127 acres. Misspelt "Kaluipuawa" (q.v.) in LCA 1666B to
	Kuahilo but written "Kaleipuawa" in FT 9:132
Kalawaha (<i>loʻi</i>)	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	Claim no. 1666B by Kuahilo for "an apana moo aina called Kaleipuawa in the ili of
(<i>moʻo</i>)	Poohilo, Honouliuli, Ewa, Oahu." (FT 9:132)
Kaloiiki (<i>loʻi</i>)	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)
Kaloiliilii (<i>loʻi</i>)	LCA 901 to Kuahine: "Apana 2. Kaloiliilii, ili o Niukee, Honouliuli, E.O." (AB 2:301)
Kaloiloa (<i>moʻo</i>)	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 (<i>moʻo</i>)	LCA 1565 to Kaalauahi: "Ap. 1. He moo aina Kalokoeli, N[i]ukee, Honouliuli, Ewa,
	Oahu." 1.642 acres. (AB 6:131)
Kalokoloa (<i>loʻi</i>)	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 (<i>moʻo</i>)	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	LCA 832 to Opiopio: "Ap. 2. Elua loi, Kaluakanaka, Poohilo, Honouliuli, E.O."
(<i>moʻo</i>)	0.538 acre (AB 2:219)
Kaluamanoiki	LCA 832 to Opiopio: "Ap. 2. Elua loi, Kaluakanaka, Poohilo, Honouliuli, E.O."
(moʻo)	0.538 acre (AB 2:169)
Kaluamoo (<i>moʻo</i>)	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	LCA 766 to Paele: "Apana 2. He kahuahale ma kula o Kaluamooiki, Honouliuli."
('ili 'aina)	0.316 acre (IN 766, AB 2:169)
Kaluanonomuku	Claim no. 1570 by Kekua 1: "Apana 3, a kula mahiai called Kaluanonomuku in the
(kūʻula)	moo aina of Aihonu, ili of Poohilo, Honouliuli, Ewa, Oahu." (FT 9:139)
Kamaieleele (<i>loʻi</i>)	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 (<i>moʻo</i>)	LCA 831 to Kaekuna: "He moo aina Kamaihiili, Poohilo, Honouliuli, E.O." 1.030
	acres. (AB 2:217)
Kamaipipipi	LCA 760 to Kuhemu: "Apana 2. He kahuahale ma kula o Kamaipipipi, Honouliuli."
(ʻili ʻaina) Kamahua (laʻi	0.198 acre. Also LCA 907 to Luana. (IN 766; AB 2:157, 7:260)
Kamalua (<i>loʻi,</i>	Claim no. 5950 by Pihana: "Apana 2. 1 loi o Kamalua ka inoa iloko o ka moo o
moʻo)	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
	r siapsia, ristoululi, Ewa, ouria a lo souridod Watar by the for taihalda of



Place Name	LCA No. and Description					
	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 (<i>ʻili</i>	LCA 839 to Kaaiawaawa: "Apana 3. He apana moo aina Kahui, ili o Kamilomilo,					
'aina)	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 (<i>ʻili ʻaina</i>)	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 (<i>loʻi</i>)	LCA 911 to Kauhailopa: "Ap. 2. He loi Kamooiki, Hopenui, Poohilo, Honouliuli,					
	E.O." 0.389 acre. (AB 2:327)					
Kamookahi (<i>moʻo</i>)	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	LCA 933 to Uia: "Ap. 1. He moo aina, Kamoomuku, ili o Niukee, Honouliuli, Ewa.					
(moʻo)	Oahu." 0.637 acre. (AB 6:132)					
Kamuku (<i>moʻo</i>)	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	LCA 1573 to Kawahamana: "Ap. 1. He moo aina Kamumuku, ili o Niukee,					
(moʻo)	Honouliuli, Ewa, Oahu." 0.671 acre. (AB 6:131)					
Kaneakiha (<i>moʻo</i>)	LCA 1672 to Makue: "He moo aina Kaneakiha, ili o Kamoku, Honouliuli, Ewa,					
	Oahu." 1.699 acres. (AB 6:133)					
Kanenelu (<i>moʻo</i>)	LCA 990 & 1688 to Poopuu: "He moo aina Kanenelu, ili Loloulu, Honouliuli, Ewa,					
	Oahu." 0.712 acre (AB 6:133)					
Kanuoopu (<i>moʻo</i>)	LCA 762 to Kalama: "He moo aina Kanuoopu, ili o Kaaumakua, Honouliuli, E.O."					
Kanauwahina	5.0 acres. Written "Kanuoopa" in FT 9:140. (AB 2:161)					
Kanuwahine (<i>moʻo</i>)	LCA 1719 to Hiilea: "Moo aina Kanuwahine, ili o Kaaumakua, Honouliuli, Ewa,					
	Oahu." 1.01 acre. (AB 6:130) LCA 5654 to Kuhiena: "He moo kalo Kapaiokiha, ili o Maui, Honouliuli, Ewa,					
Kapaiokiha (<i>moʻo</i>)	Oahu." 0.606 acre. (AB 6:135)					
Kapalaha (<i>loʻi</i>)	Claim no. 5670C by Kumupopo: "Apana 2. A loi called Mooiki in the ili Loloulu,					
Napalalla (101)	Honouliuli, Ewa, Oahu, is bounded M[auka] by the loi Kapalaha of Kekua (claim					
	no. 1570 or 1598)." (FT 9:138)					
Kapapapuhi ('ili	LCA 887 to Kaihikapu: "Ap. 2. He kahuahalae ma Kapapapuhi, Honouliuli, E.O."					
'aina)	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 (<i>moʻo</i>)	LCA 874 to Laamaikahiki: "Apana 1. Elua loi ma Kapaua, ili o Polapola, Honouliuli.					
	(AB 2:273)					
Kapoepoe (<i>lo'i</i>)	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	LCA 933 to Uwia: "Ap. 2. Moo Kauakahimalolo, ili o Niukee, Honouliuli, Ewa,					
(<i>moʻo</i>)	Oahu." 1.299 acres. (AB 6:132)					
Kauhikuakua	LCA 1570 to Moano: "Ap. 1. He moo aina Kauhikuakua, ili o Loloulu, Honouliuli,					



Place Name	LCA No. and Description					
Kauilahanau	Claim no. 764 by Maeaea is "ma Kauilahanau ma Lihue i Honouliuli [Apana 1]					
(<i>moʻo</i>)	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)					
Kaulaula (<i>'ili 'aina</i>)	LCA 749 to Mahina is for "He ili aina o Kaulaula, Honouliuli, Ewa, Oahu. 1.358					
· · · ·	acres" less 20 <i>loʻi</i> of Makaula containing 0.412 acre, net 0.946 acre. (IN 767; AB					
	9:435)					
Kaumaka (<i>moʻo</i>)	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 (<i>moʻo</i>)	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 (<i>moʻo</i>)	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	LCA 5670C to Kumupopo: "Ap. 1. He moo aina Kepoe, ili o Kepoe, Honuliuli.					
(moʻo, ʻili ʻaina)	E.O." 1.369 acres. (IN 767; AB 6:141)					
Kepoi (<i>moʻo</i>)	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	Claim no. 1605B by Nakai for a moo aina in Niukee: "Apana 1 is bounded M[auka]					
(loko)	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 Claim no. 5584 by Kauhi (not awarded) "is situated in the place called						
(place)	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	Claim no. 1570B by Pekane: "Apana 2, the fishpond [Mokumeha] is bounded					
(kūʻula)	W[aianae] by the kula alialia Kohumakahou." (FT 9:140)					
Koula (<i>moʻo</i>)	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 (<i>moʻo</i>)	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 (<i>loʻi</i>)	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 (<i>loʻi</i>)	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 (<i>loʻi</i>)	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 (<i>loʻi</i>)	LCA 901 to Kuahine: "He loi o Kuaka, ili o Niukee, Honouliuli, E.O." (AB 2:301)					
Kuamano (<i>loʻi</i>)	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					
Kumuhahane	Kuamanoiki." (FT 9:137) LCA 827 to Kauakahilau: "He moo aina Kumuhahane, Poohilo, Honouliuli, E.O."					
(<i>moʻo</i>)	1.597 acres. Also claim no. 9351 by Kauakahilau (AB 2:213; NR 4:444)					
(110 0)	1.001 autos. Aisu ulaitti tiu. 3001 by Naudratiliau (AD 2.213, NN 4.444)					



Place Name	LCA No. and Description
Kumuhau (<i>moʻo</i>)	LCA 848 to Kapule: "Apana 1. He moo aina Kumuhau, ili Poohilo, Honouliuli, E.O."
	0.984 acre. (AB 7:260)
Kumuniu (<i>moʻo</i>)	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 (<i>loʻi,</i>	Claim no. 8658 by Kapoli for "he loi a me kahi kula no, a me kahi kio, o Kumupali
moʻo)	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 (<i>moʻo</i>)	LCA 905 to Kaimuena: "Apana 2. He moo kalo, Kumuula, ili o Kaaumakua,
()	Honouliuli, E.O." (AB 2:307)
Kumuulu (<i>kōʻele</i>)	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 (<i>ʻili ʻaina</i>)	Claim no. 764 by Maeaea (not awarded) for two parcels in Lihue, each "bounded
· · · · ·	Honolulu by vacant land called Kunia." (FT 2:285)
Kupaihi (<i>moʻo</i>)	LCA 1605B to Nakai: "Ap. 3. He loi ma Kupaihi, ili o Niukee, Honouliuli, Ewa.
	Oahu." 0.162 acre. (AB 6:141)
Lihue (<i>ʻili ʻaina</i>)	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 Wai'anae
	quads at about N21-27-00, W158-06-00, in Honouliuli. It is named in a survey of
	Ho'āeae as lying north and west of that land, south of Kunia Camp. Some sources
	extend the region northward to include Wahiawā and Wai'anae Uka (see catalog
	no. 176.02.027) (FT 2:285; BCT 1:133; USGS 1928 (Schofield, Waianae); Coulter
	1935:179.)
Loloulu (<i>ʻili ʻaina</i>)	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 (<i>loʻi</i>)	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 (<i>loʻi</i>)	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 lo'i in the 'ili Niukee (IN 767; AB 6:141;
	FT 9:131; NT 9:277)
Makaii (<i>ʻili ʻaina</i>)	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 (<i>moʻo</i>)	LCA 5204 to Kalama 2: "He moo aina Makawela ili o Polapola, Honouliuli, Ewa,
	Oahu." 0.925 acre. (AB 7:539)
Makawelaiki	LCA 881 to Kikala: "Apana 2. Moo Makawelaiki, ili Polapola, Honouliuli, E.O."
(<i>moʻ</i> o)	1.114 acres. (AB 2:281)



Place Name	LCA No. and Description
Makue (<i>moʻo</i>)	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 (<i>kū'ula</i>)	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 (<i>ʻili</i>	Claim no. 763 by Keliiaa: "Eia ke kolu o koʻu kuleana aina. Aia ma Mauakapuaa i
'aina)	Honouliuli." Not awarded (NR 2:419)
Maui (<i>moʻo, ʻili</i>	LCA 756 to Kauouo: "Moo aina Maui, ili Kaaumakua, Honouliuli, E.O." 1.922
'aina)	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 (<i>moʻo</i>)	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,
Mokumehua	E.O." (FT 9:140) LCA 1570B to Pekane: "Ap. 1. He puuone, Mokumeha, ili o Kaaumakua,
(pu'uone)	Honouliuli, Ewa, Oahu." 1.739 acres. (AB 6:140)
Mooiki (<i>loʻi, moʻo</i>)	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 (<i>moʻo</i>)	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	LCA 1580B to Kapioho: "Ap. 1. He moo aina, Namooelua, ili o Polapola,
(<i>moʻo</i>)	Honouliuli, Ewa, Oahu." 1.256 acres. "in the ili Kahiwapalaai." in FT 9:133 (AB
	6:139)
Naopala (<i>moʻo</i>)	LCA 760 to Kuhemu: "He moo aina Naopala, ili o Niukeee, Honouliuli, E.O." 1.548
	acres. (IN 767; AB 2:157)
Nihola (<i>moʻo</i>)	LCA 767 to Hapauea: "Apana 1. He moo aina Nihola, ili o Niukee, Honouliuli, Ewa,
	Oahu." 0.984 acre. (AB 9:382)
Niukee (<i>moʻo</i>)	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 (<i>moʻ</i> o)	LCA 872 to Kahakuliilii: "He moo aina Paakai ili Loloulu, Honouliuli, E.O." 1.66
Deceluite (meete)	acres. (AB 2:271)
Paeokiha (<i>moʻo</i>)	Claim no. 5654:1 by Kuhiana is for "a moo aina called Paeokiha in the ili of Maui,
Delecu (leíi)	Honouliuli, Ewa, Oahu." (FT 9:134) LCA 848 to Kapule: "Apana 2. Ekolu mau loi Palaau, Poohilo." 0.673 acre
Palaau (<i>loʻi</i>) Palahemo (<i>moʻo</i>)	LCA 646 to Kapule. Apana 2. Ekolu mau loi Palaau, Poonilo. 0.673 acre
	0.256 acre. Also LCA 765 to Kamalae. Perhaps named for the famous "water hole
	inland from South Point Ka'ū, Hawai'i." (PEM 176) (IN 768; AB 2:159, 167)
Palakai (<i>loʻi</i>)	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)



Place Name	LCA No. and Description					
Panaenui (<i>'auwai</i>)	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)					
Panahaha (<i>moʻo</i>)	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 (<i>moʻo</i>)	LCA 898 to Kaneaola: "Ap. 2. He loko kalo, Paneenui, ili o Polapola, Honouliuli, E.O." (AB 2:297)					
Pi (<i>moʻo<u>)</u></i>	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 (<i>ʻili ʻaina</i>)	LCA 1699 to Leleiupa: "Apana 1. He kahuahale ma ke kula o Poaiwaikele, Honouliuli." 0.193 acre. (IN 768; AB 7:261)					
Poepoe (<i>loʻi</i>)	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 (<i>moʻo</i>)	LCA 1580 to Kanahuna: "Ap. 2. Moo aina Poina, ili o Kamilomilo, Honouliuli, Ewa, Oahu." (AB 6:135)					
Polapola (<i>ʻili ʻaina</i>)	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 (<i>ʻili ʻaina</i>)	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)					
Роороо (<i>moʻo</i>)	LCA 828 to Kawahaea: "He pahale ma ke kula o Poopoo, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.255 acre. (AB 2:215)					
Puaaluu (<i>ʻili ʻaina</i>)	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 (<i>moʻo</i>)	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 (<i>loʻi</i>)	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 (<i>loʻi</i>)	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 (<i>moʻo</i>)	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)					



Place Name	LCA No. and Description
Waimanana	Claim no. 902 by Haakue "ma Waimanana i Honouliuli, Ewa" was not awarded
(ʻili ʻaina)	(NR 2:516)
Waioha (<i>mo'o</i>)	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 (<i>kōʻula</i>)	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 Hawai'i as a geographically strategic base. Although the main interest lay in utilization of the lochs of Pearl Harbor, the adjacent plains of 'Ewa at Barbers Point were also a focal point for U.S. military development in Hawai'i. An indepth 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-Pu'uloa, better known today as Pearl Harbor. Strategically, having use of the lochs of Pu'uloa was a great advantage to the U.S. military operations because of Hawai'i'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 Hawai'i 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 'Ewa Plain. A mooring mast, a steel tower, was erected near 'Ewa 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 'Ewa 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 'Ewa. It remained unused until the Marine Corps arrived in 1940 to construct an airfield. (Denfeld 1995:175)



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). Some of the larger caves and pits formed in the underlying coral bedrock were used as ammunition storage bunkers and the smaller ones served as machine gun nests (J. Bond, personal communication, 8 November 2021).

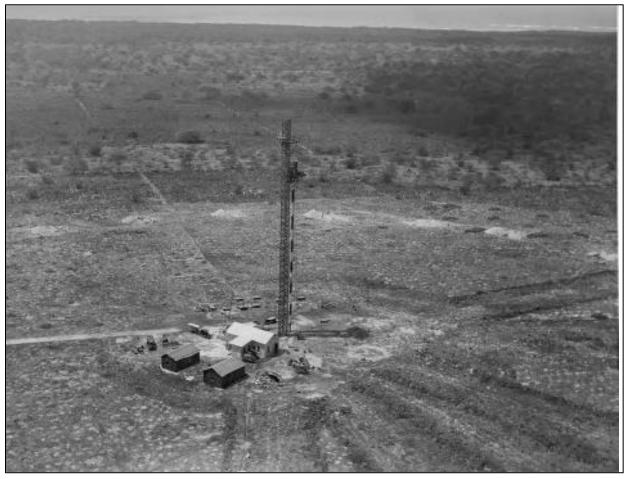


Figure 9. 1925 photograph of Ewa Field dirigible mooring mast and associated buildings (National Park Service USAR-2967, in Frye and Resnick 2013: Figure 8).

On December 7, 1941, beginning at 7:55 am, Ewa Field was attacked in three waves by the Imperial Japanese Navy (IJN) 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). On the Sunday morning of December 7, 1941 most of the Ewa Field marines were asleep or had arose for their daily tasks or "day of rest." The first wave of attacks happened at 7:53 am or 7:55 am:





Figure 10. December 2, 1941 aerial photograph of Ewa Field (Naval History Heritage Command, in Frye and Resnick 2013).

Ewa's officer of the day, Captain Leonard Ashwell, looked up from the mess hall and saw a line of 18 Japanese torpedo planes at an altitude of approximately 1,000 ft, heading to Pearl Harbor. The aircraft were south of Ewa and Barbers Point traveling up the beach towards the Pearl Harbor Naval Base. It was then Ashwell saw the second formation of Japanese aircraft coming from the Waianae mountains in the direction of Nanakuli to the northwest. The formation (single-seated



fighters) passed just to the north of Ewa, wheeled right, and attacked this camp [Ewa Mooring Field] from a string formation. Ashwell turned back into the mess hall, shouting "Air Raid. . . Air Raid! Pass the word!" before heading to the guardhouse, to have "call to arms" sounded (Resnick et al. 2018:9).

Most of the air to ground attack on Ewa Field came in the form of strafing from the IJN aircraft. which was countered by return fire from the marines stationed at Ewa Field, direct air-to-air combat and anti-aircraft fire from ships at Pearl Harbor, as well as other ground to air fire from the surrounding area. During the first attack, the Ewa marines used whatever weapons they could find while attempting to salvage the destroyed planes and equipment (Resnick et al. 2018:8). By the second wave of attack, the marines had set up anti-aircraft positions using machine guns from remaining aircraft (for example) and they moved trucks and other vehicles onto the airfield to block any future airborne troops (Resnick et al. 2018:8). Since the first wave of attack succeeded in destroying all the aircraft at Ewa Airfield, the second wave of attack strafed personnel, vehicles, and buildings.

The third wave of attack at Ewa Field was "comparatively light and ineffectual" because of the lack of targets at Ewa Field and the effective defensive positions established following the prior two attacks (Resnick et al. 2018:8).



Figure 11. December 7, 1941 photograph of MCAS Ewa marines observing IJN aircraft from swimming pool under construction (National Park Service, in Frye and Resnick 2016: Figure 17).



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 O'ahu 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 •

Post-1941 Development of MCAS Ewa

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). The MCAS Ewa buildup in 1942-1943 involved the expansion of the airfield, construction of 75 "half-dome" aircraft revetments on the south side of the airfield, and the creation of at least two borrow pits to extract coral fill for the massive construction projects associated with the base expansion. Administration and storage buildings were also erected among the revetments (NRHP nomination form, Frve and Resnick 2013:7) and a housing area was constructed by the U.S Naval Construction Battalions or "Seabees" southeast of the revetments (Figure 12). "Seabee" is a nickname for the abbreviation "CB" for Construction Battalion.

Seabee units were some of the first fully integrated units in the US Navy and was the case with the 130th NCB at MCAS Ewa Field. Some NCB were also segregated as well. The Navy NCB's all seemed to have unique unit characteristics depending upon when and where they were formed. The particular leaders and the composition of experience greatly affected how and where they were used in WW-II. Some units remained largely together throughout the war while others were constantly broken up, reformed and reassigned as wartime needs dictated. (J. Bond, personal communication, 8 November 2021)



A Historic American Buildings Survey (HABS) was completed for the aircraft revetments that were built by the Seabees and 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)

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). the



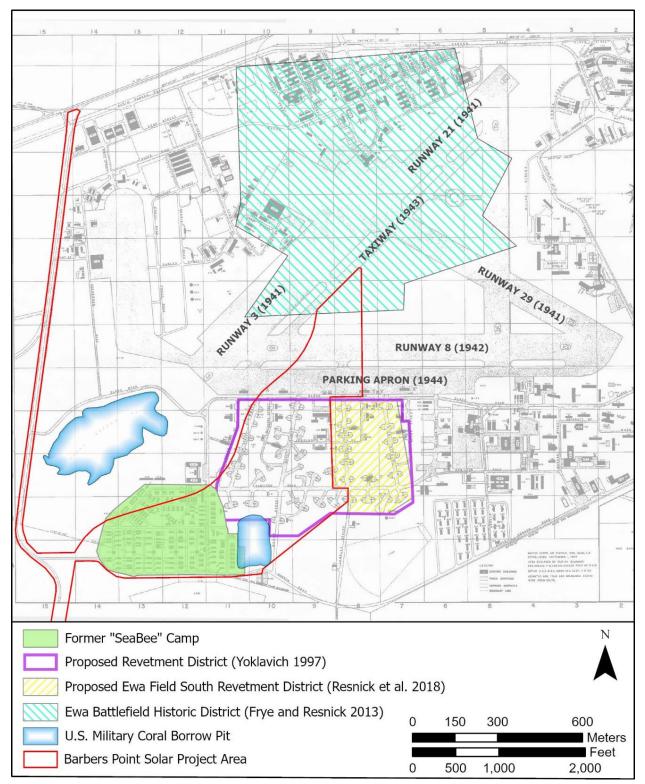


Figure 12. Map of MCAS Ewa (U.S. Navy 1948) showing historic districts, the U.S. Naval Seabee Camp, borrow pits for base construction, and expanded airfield after December 7, 1941.



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** •

U.S. Naval Construction Battalions Camp (SeaBee Camp)

MCAS Ewa specialist Mr. John Bond provided an overview of the U.S. Naval Construction Battalions and the Seabee Camp at MCAS Ewa that was constructed and occupied by the U.S. Navy "Seabees" between 1943 and 1945 (J. Bond, personal communication, 8 November 2021). Excerpts relative to MCAS Ewa and the Seabee Camp are included below.

In April 1943, the Seabees took over construction at MCAS Ewa. The Seabees were U.S. Naval Construction Battalions (CBs or Seabees), skilled tradesmen organized to build advance bases including airfields, and trained in military tactics. By October, there were five Seabee battalions at Ewa, with 664 men. The 16th Battalion was the first Seabee unit assigned to Ewa and one of their major works comprised constructing a pipeline to connect the aviation gasoline storage to the southwest part of the station.

The 10th Battalion arrived in June 1943 and began work on a Quonset hut camp for themselves. Within a month, they had completed 20 Quonset huts for the Seabee camp, 9 wood-frame barracks, several squadron workshops and storage buildings, an administration building, and a warm-up area, with accompanying taxi-strips.

The decisive United States victory over Midway early in 1943 had turned the tide of the war, and Japan was now on the defensive in the Pacific. As a result, MCAS Ewa was in the process of transitioning to a more administrative and supporting role. With the squadrons more or less set, and the status of the station no longer in question, MCAS Ewa was fixed to leave the physical plant to the station and the tactical functions to the tactical units. However, the scale of the expansion experienced by the Marines was so great, and there were no precedents. "Ewa, in both a figurative and a literal sense, became an experimental center."

The Construction Battalion Maintenance Unit (CBMU) is a commissioned unit which operates and maintains public works and public utilities at an advanced base or shore facility after construction has been completed. The functions resemble that of a public works department as a naval activity. (J. Bond, personal communication, 8 November 2021)



According to John Bond (personal communication, 8 November 2021):

The SeaBees as an organization was intentionally non-traditional Navy to avoid the Navy's tendency for top down arrogance in Navy ship line officer command and control. It was among the first US military organizations to be racially diverse and promote and pay members based upon skills and abilities regardless of skin color. It was also unique in bringing in older Americans, up to age 50 if they could show they were physically fit and could increase the value of the overall workforce product. The average SeaBee age was 37.

In addition to the 20 Quonset huts, multiple storehouses, recreational structures, and administrative buildings erected at the MCAS Ewa Seabee Camp, the surrounding coral landform was modified with the construction of roads (Figure 15), underground utilities, and the creation of at least two deep coral borrow pits immediately north and east of the Seabee Camp (see Figure 12; Figure 13 through Figure 17). The following text is taken from a 1945 130th U.S. Naval Construction Battalion "Cruisebook" (130th NCB 1945), who became the main base contractor in 1944 (J. Bond, personal communication, 8 November 2021):

At Ewa we took over a pit developed by the 10th Seabees. The coral there was firm, with very little decomposition. It required blasting nearly every yard, but this hard material proved for superiority in wearing qualities than older deposits encountered later. From two to three hundred vards were daily diverted to a portable crushing plant where a primary jaw-crusher and a gyratory secondary reduced the pit run to approximately one inch for final surfacing. A stockpile of two thousand yards was maintained for emergencies.

...Beach sand was used in considerable amount for the tent flooring and camp walks. Composed of coral, it is more porous and drains better than other sand. All concrete work was done with this coral sand, and it proved to be satisfactory.

...Four wagon-drills worked two shifts, seven days a week, drilling and blasting an average of 200 twelve-foot holes a day to produce the coral used on the MCAS air strip at Ewa. The largest shot set off was 783 holes in which 205 50-pound cases of dynamite were used. Wired in a graded series, this was the shot that rained chunks of coral through the roof of the chapel.

...For the sewage system serving the Marine Air Base at Ewa, approximately 3,500 lineal feet of concrete pipe were laid, varying in size from 4 to 18 inches in diameter. For the base's water system, some 10,000 feet of pipe were installed, ranging from the 4 to 12-inch size. The crews built hundreds of brick manholes to service the systems, and cast concrete lids on the job for use as manholes. All concrete pipe was laid with mortar joint, and was backfilled with sand to prevent it being crushed (130^{th} NCB 1945).

The original Seabee camp was later used as housing for Navy patrol squadrons (J. Bond, personal communication, 5 March 2021). The Seabee camp was eventually dismantled in ca. 1961 and all Ouonset huts were removed from the property (J. Bond, personal communication, 8 November 2021: Fung Associates, Inc. 2014).



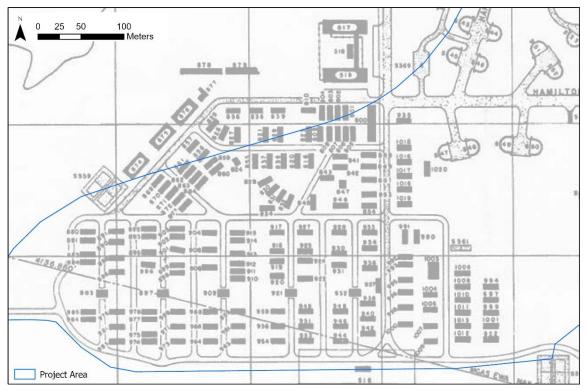


Figure 13. Portion of U.S. Navy 1948 map showing layout of Seabee Camp structures and roads, with plane revetments in upper right corner.



Figure 14. Aerial perspective of portion of Seabee Camp with Coral Sea Road in background (view west) (source: J. Bond).





Figure 15. Photograph of the 130th Seabees at work constructing new roads at MCAS Ewa (source: 130th NCB 1945).

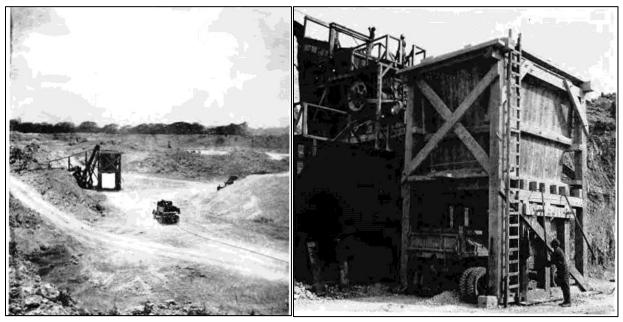


Figure 16. Photographs of "coral pit" (left) and "rock crusher" (right) in borrow pit at MCAS Ewa (source: 130th NCB 1945).





Figure 17. Photographs of blasting for pool construction north of the Seabee Camp (left) and for underground utilities at MCAS Ewa (right) (source: 130th NCB 1945).

U.S. Military Activities from 1950 Onward

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 18) 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, 21 December 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 Mahele 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.**



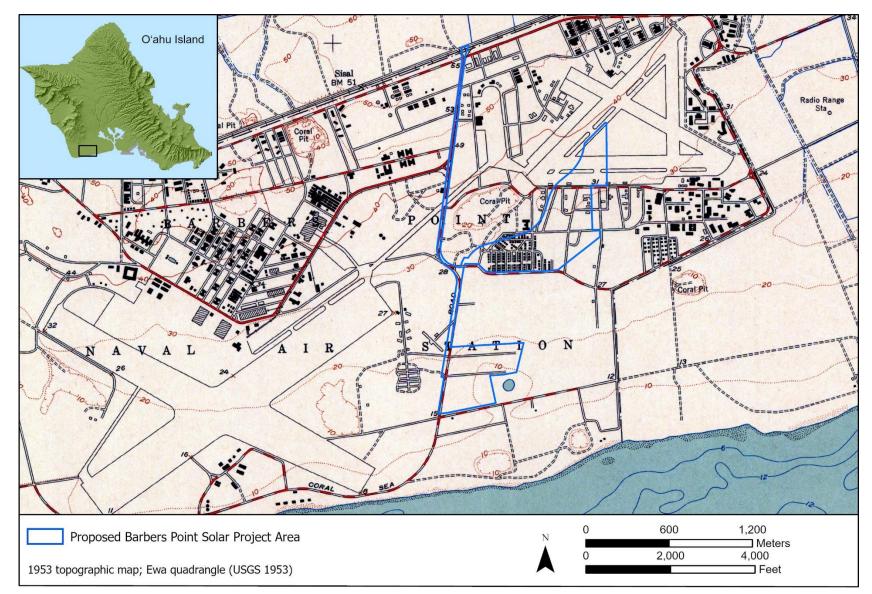


Figure 18. Portion of 1953 USGS topographic map (Ewa Quadrangle) showing project area location.



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 19.

Ewa Marina Community Project

Several archaeological investigations were conducted in the Ewa Marina Community Area located east of the current project area (see Figure 19). 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.

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.



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.

Table 3. Summary of Previous Archaeological Investigations in Vicinity of Project Area



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 Oʻahu'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.	



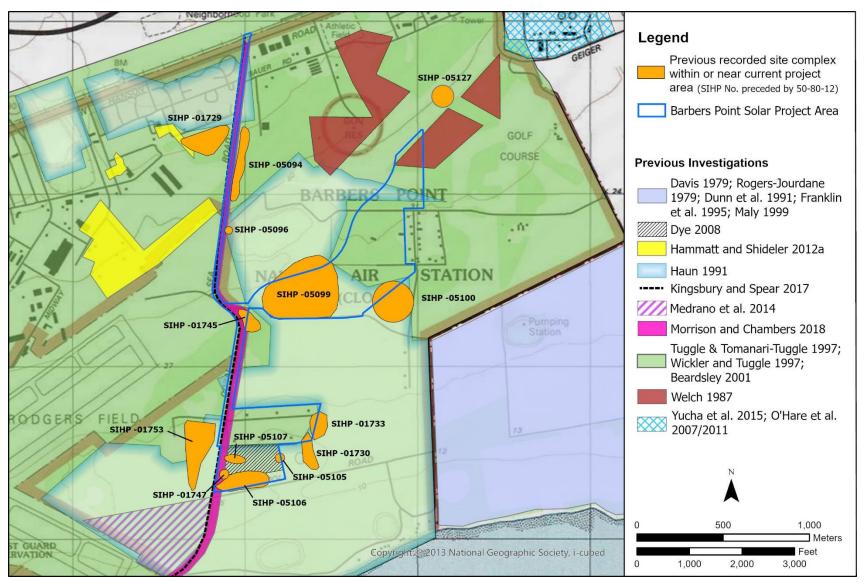


Figure 19. Previous archaeological investigations and documented sites in project area (USGS Ewa Quadrangle 1998).

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SIHP No.	Fea. Count	Туре	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

Table 4. Summary of Previously Documented Sites within and Adjacent to Barbers Point Solar Project Area

REVISED DRAFT — Archaeological Inventory Survey Report Barbers Point Solar Project, Honouliuli Ahupua'a 'Ewa, O'ahu November 2021



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.

SIHP 50-80-12-01729

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).

SIHP 50-80-12-01730

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 sites, 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 paleoenvironmental 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 20thcentury 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).

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. Dve (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 'Ewa 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 'Ewa 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 20). 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 50-80-12-08025).

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

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	



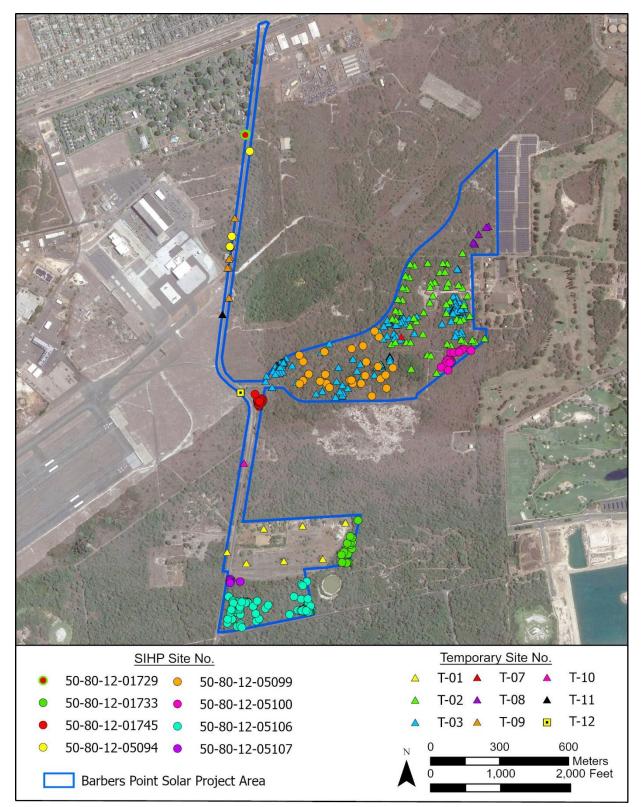


Figure 20. Archaeological site locations in the Barbers Point Solar Project Area (Google Earth Imagery 2019).



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 nonmodified 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).

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

Table 6. Feature Types Identified in the Barbers Point Solar Project Area



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 beginning of *makahiki* on O'ahu is determined by astronomical observations, and is usually around late October and early November, when Makali'i (Pleiades) rises above Pu'u o Mahuka Heiau, as seen from Kaena Point. The *makahiki* season 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 Cshaped and L-shaped enclosures (Table 7 and Figure 21). 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 21). An interesting perspective from 'Ewa 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 'aina* or *hale mua*) and sleeping (*hale noa*; Handy and Pukui 1972:9).



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
50 00 40 05400			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
	1		

* 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.



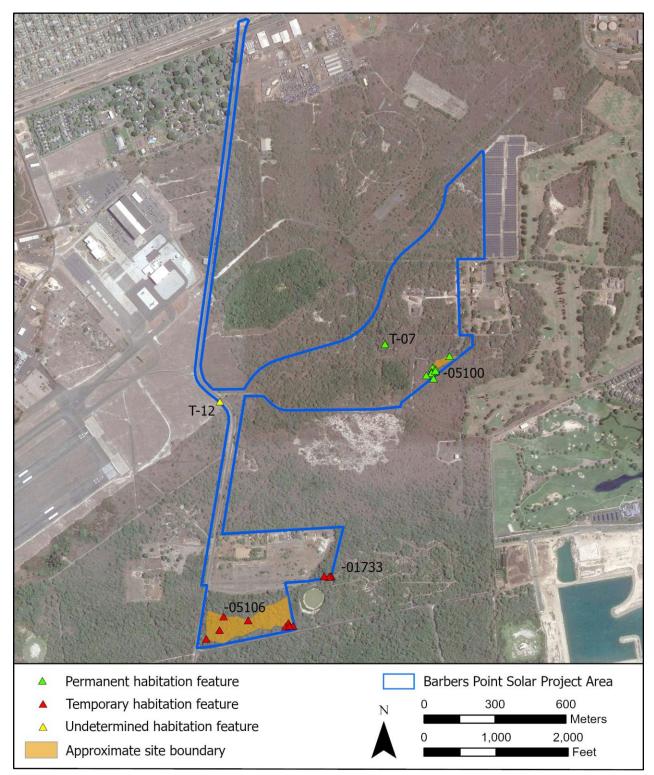


Figure 21. Distribution of traditional Hawaiian temporary and permanent habitation features (Google Earth Imagery 2019).



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 (0.37 miles) from the coast at around 3 m (12 ft) asl (see Figure 21).

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 'Ewa 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 22).

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 *kahua* (enclosed grounds) for practicing games and sports during the *'ikuwā*, 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 Mulroonev 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.



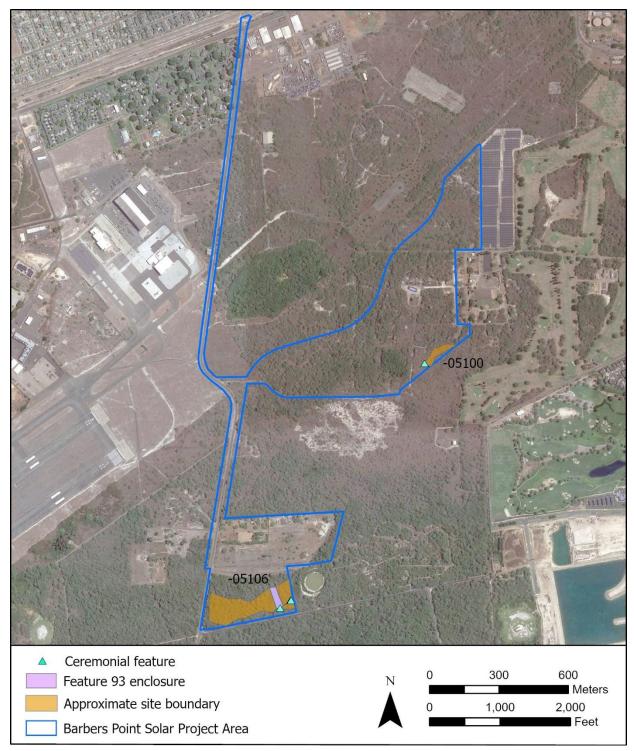


Figure 22. Distribution of traditional Hawaiian ceremonial features (Google Earth Imagery 2019).



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 23 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.

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

Table 8. Frequencies of Agricultural Feature Types



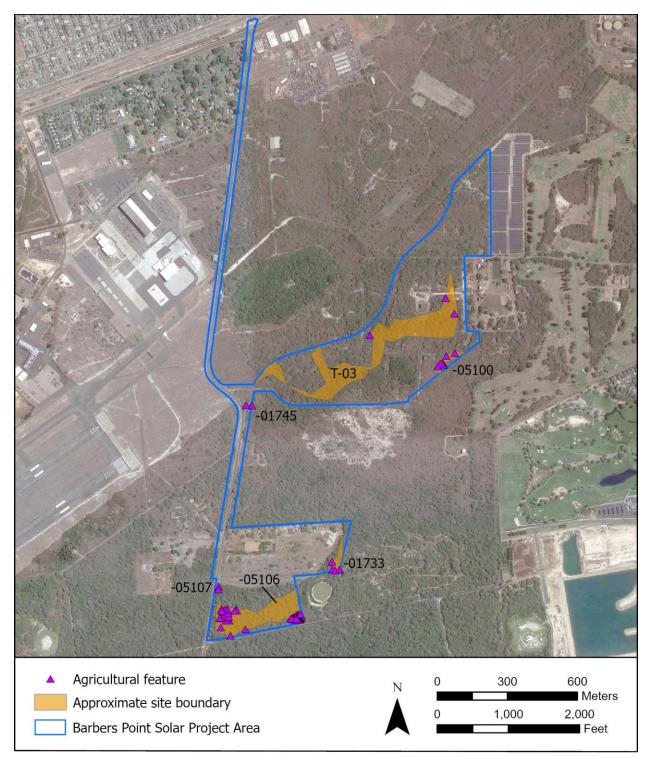


Figure 23. Distribution of traditional Hawaiian agricultural features that include all modified limestone pits (Google Earth Imagery 2019).



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 24).

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.

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

Table 9. Frequencies of Unmodified Limestone Pits at Historic Properties



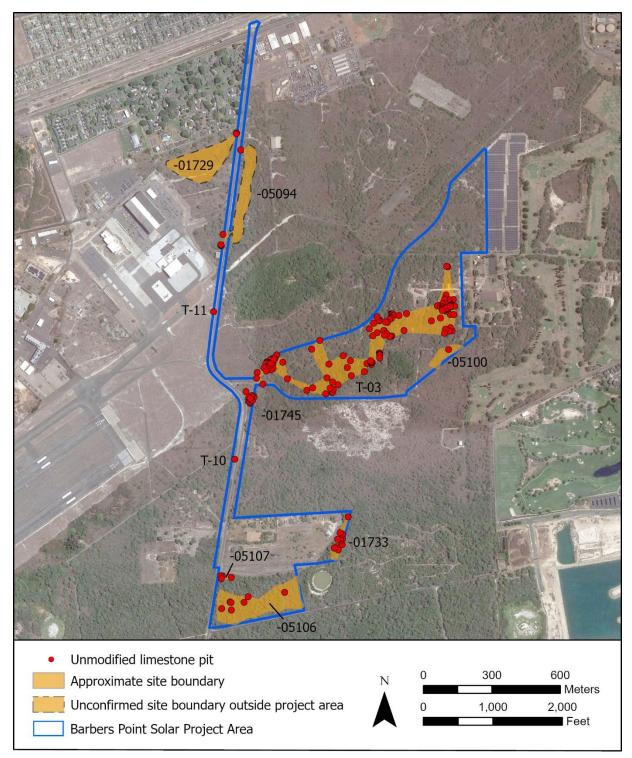


Figure 24. Distribution of unmodified limestone pits (Google Earth Imagery 2019).



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 25).

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, 5 March 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, 5 March 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 Ouonset 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.



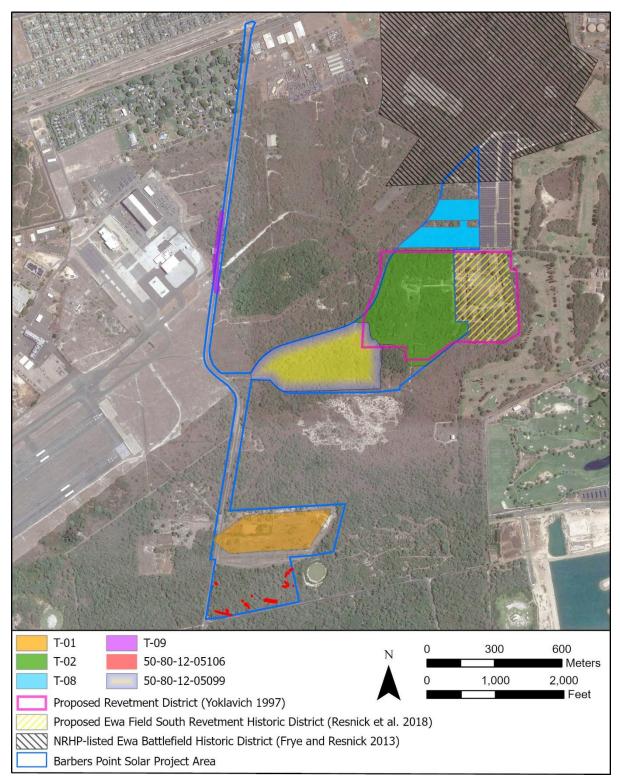


Figure 25. Distribution of U.S. military sites and SIHP 50-80-12-05106 military features within the Barbers Point Solar Project Area in relation to proposed and established historic districts (Google Earth Imagery 2019).



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 26). 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 \times 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.



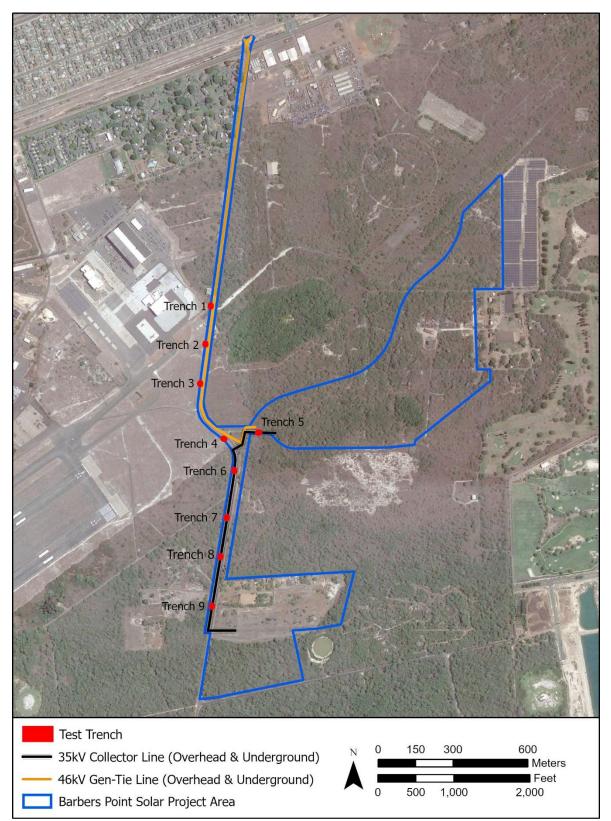


Figure 26. Locations of test trenches for Barbers Point Solar Project (Google Earth Imagery 2019).



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 60.5liter 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 Laver IV midden inventory.

One single shell fragment identified as Turbinidae was recovered from a natural soil laver (Laver 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 27) 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 28) 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 3/4 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.



Barbers Point Solar AIS	Tre	ench 4
Depth		03 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%

Table 10. Identification and Weights of Site T-12 Midden



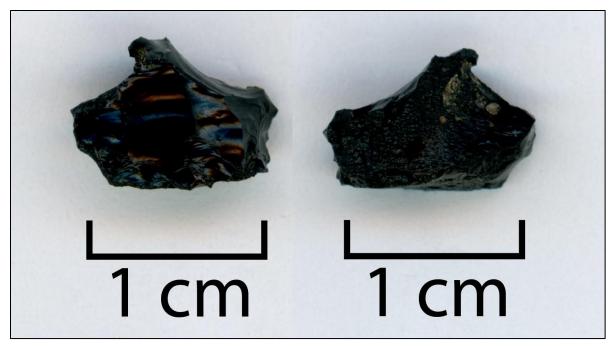


Figure 27. Artifact No. 1, volcanic glass scraper.



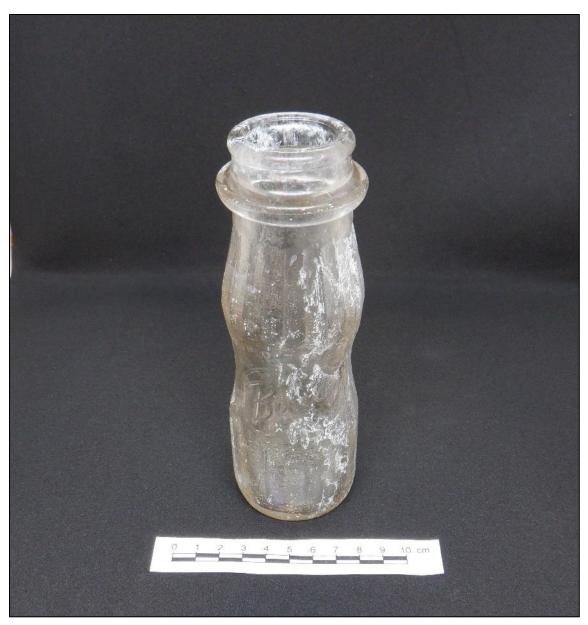


Figure 28. Artifact No. 2, "Bireley's" soda bottle.



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 29). 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.



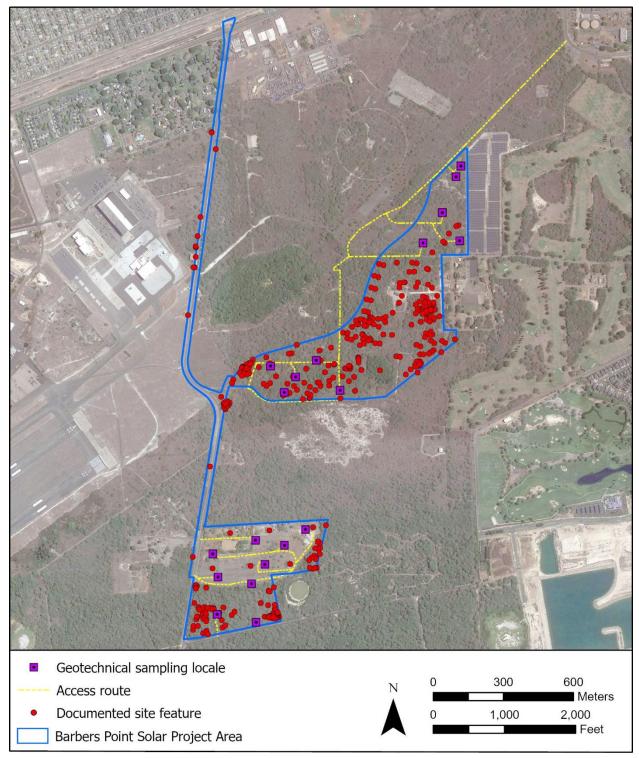


Figure 29. Geotechnical testing locations in the Barbers Point Solar Project Area (Google Earth Imagery 2019).



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).
- September 30, 2021: Meeting with Jan Becket via Zoom to discuss comments received on the draft AIS report.
- October 4, 2021: Meeting with Historic Hawaii Foundation via Zoom to discuss the findings of the AIS and proposed mitigation recommendations.
- October 25, 2021: Site visit with Kapolei Community Development Corporation (KCDC) and members of the Kapolei Homestead Association.

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, Historic Hawaiʻi Foundation, 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 vielded, or is likely to vield, 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 '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 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 '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 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
05106	47	Mound	Agriculture	Pre-Contact	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
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	с	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

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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	с	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	с	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	Preservation
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	No Further Work
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

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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 30). 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 BarbersPoint Solar Project Area

Recommended Mitigation	No. of Features
No Further Work	48
Data Recovery	42
Preservation	348
TOTAL	438



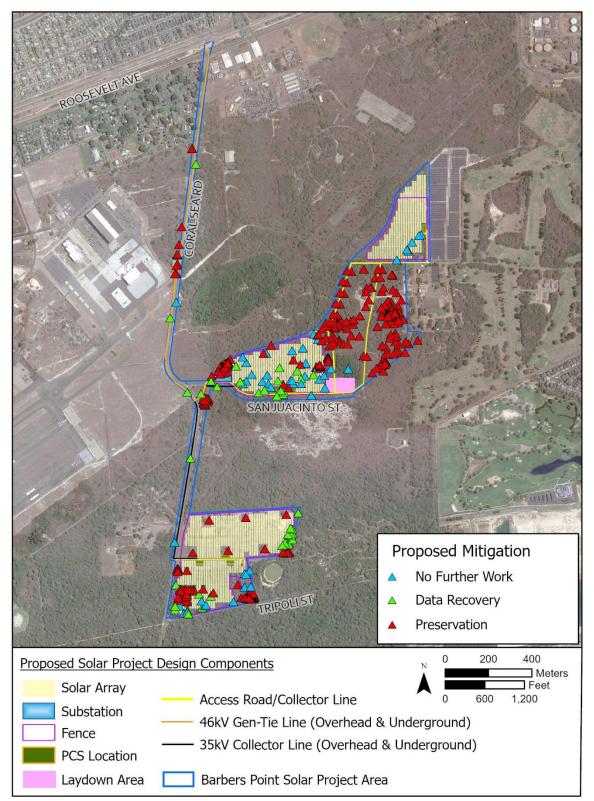


Figure 30. Proposed mitigation measures for individual features of the historic properties in the Barbers Point Solar Project Area (Google Earth Imagery 2019).



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, which will be developed in consultation with cultural descendants and other key stakeholders, including the Hawai'i Historic Foundation.

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; Beardslev 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 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-09.

Archaeological monitoring is recommended for the Project. Before initiation of any grounddisturbing 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, O'ahu 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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REVISED 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.)]

APPENDIX A:

SITE DESCRIPTIONS OF PREVIOUSLY IDENTIFIED HISTORIC PROPERTIES

Cultural Resources Consultants

<u>Hawaiʻi Office:</u> Kailua, Oʻahu

<u>California Offices</u>: Bay Area Sierra/Central Valley

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APPENDIX A:

SITE DESCRIPTIONS OF PREVIOUSLY IDENTIFIED HISTORIC PROPERTIES

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November 2021

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) \times 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 vielded 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 $0.7 (E/W) \times 0.6 \text{ m} (N/S) \times 1.0 \text{ m}$ 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 $0.7 (N/S) \times 0.7 m (E/W) \times 0.3 m$ deep. The pit is filled with soil and scattered limestone cobbles. The pit is in poor condition with poor excavation potential.



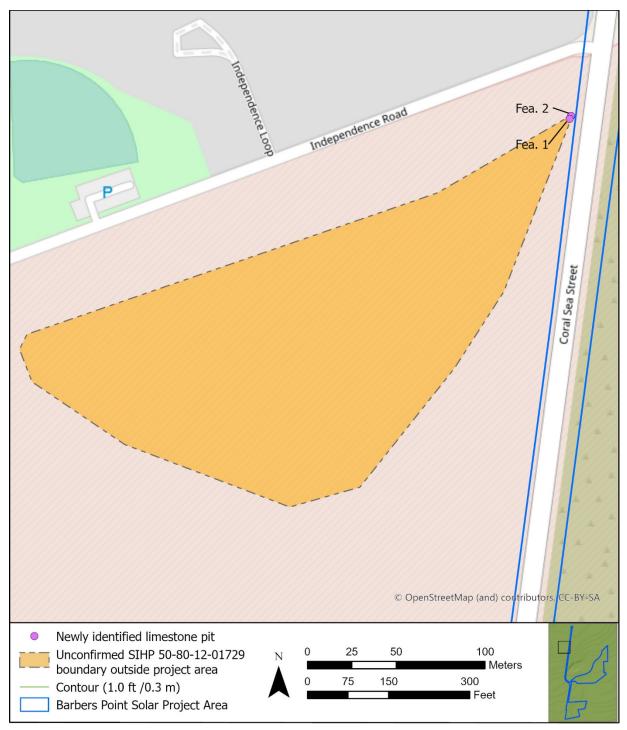


Figure 1. SIHP 50-80-12-01729 with newly identified features and expanded site boundary.





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.



Feature Field No.		Туре	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 Unmod		Unmodified pit	Undetermined		

Table 1. Summary of SIHP 50-80-12-01733, Features 1 through 18, Currently Recorded in Project Area

Table 2. SIHP 50-80-12-01733 Features Documented and Tested by Beardsley (2001:IV.104–107)

Feature	Feature Type		Tested	Archaeological Materials
В	Modified sinkhole (limestone pit)	Agricultural		-
С	Modified sinkhole (limestone pit)	Agricultural	Х	-
D	L-shaped wall	Agricultural		-
F	Cairn (mound)	Agricultural	Х	-
Н	Cairn (mound)	Agricultural	Х	-
I	Cairn (mound)	Agricultural	Х	-
K	Wall	Agricultural		-
L	C-shaped wall	Agricultural	Х	Sparse faunal
М	Cairn (mound)	Agricultural	Х	-
N	Cairn (mound)	Agricultural	Х	-



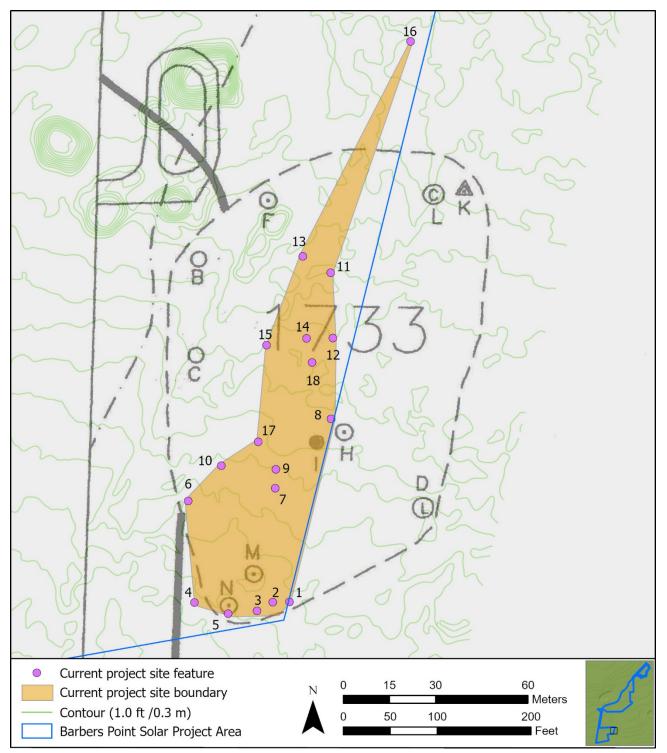


Figure 4. SIHP 50-80-12-01733 with current project feature locations and site boundary overlaid on PHRI feature location map (Beardsley 2001:Figure IV-118); underlying contours created from aerial LiDAR, 2019.



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.

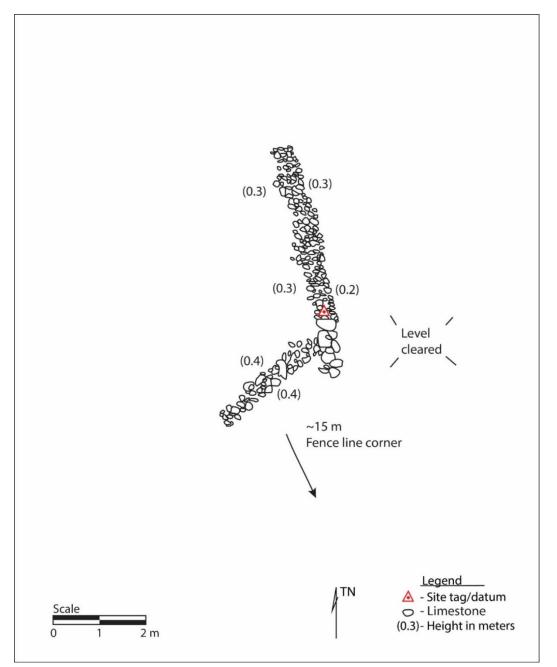


Figure 5. Plan-view map of SIHP 50-80-12-01733, Feature 1 wall.





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.

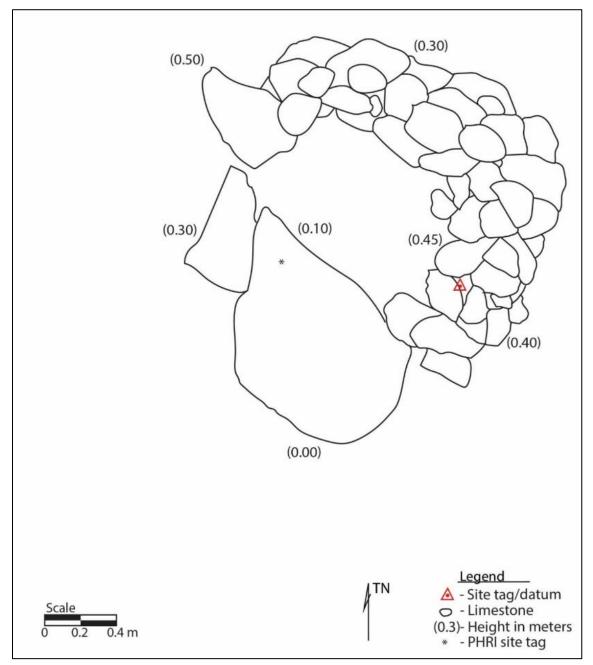


Figure 7. Plan-view map of SIHP 50-80-12-01733, Feature 2 C-shaped wall.





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.

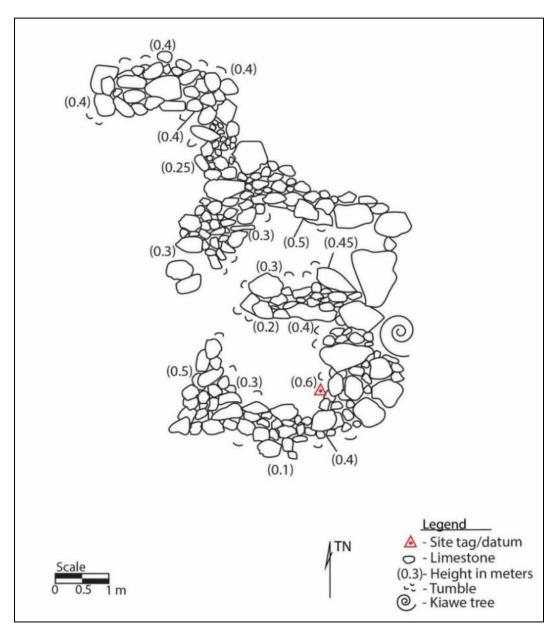


Figure 9. Plan-view map of SIHP 50-80-12-01733, Feature 3 contiguous enclosures.





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) \times 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.

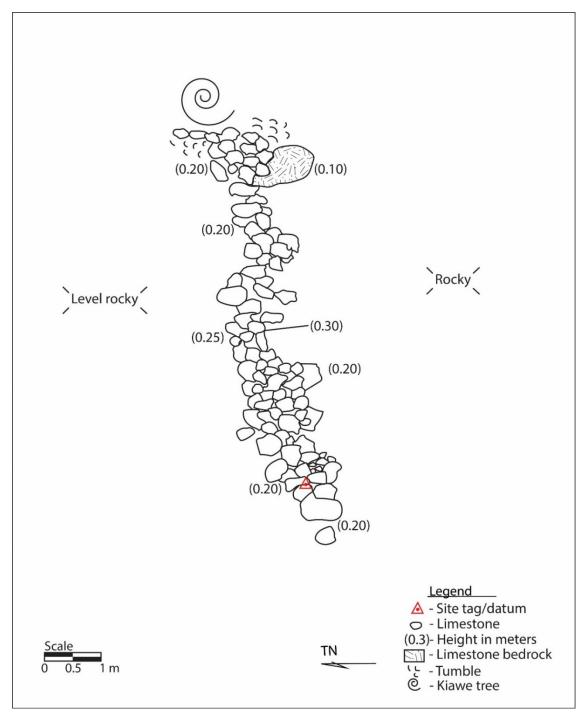


Figure 13. Plan-view map of SIHP 50-80-12-01733, Feature 4 wall.





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 $(N/S) \times 2 \text{ m} (E/W) \times 0.4 \text{ m}$ high. The Feature 5.2 southern mound is 2.2 m $(E/W) \times 1.1 \text{ m}$ $(N/S) \times 0.4$ m high. Feature 5 may have functioned as agricultural mounds. Both are in fair to good condition.

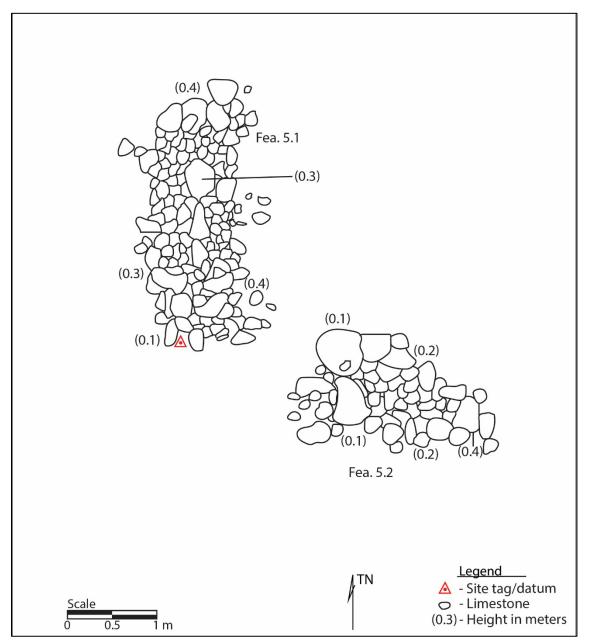


Figure 15. Plan-view map of SIHP 50-80-12-01733, Feature 5.1 and 5.2 mounds.





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 $(E/W) \times 1.7 \text{ m} (N/S) \times 0.7 \text{ m}$ high. Feature 6 possibly functioned as an agricultural mound. It is in good condition.

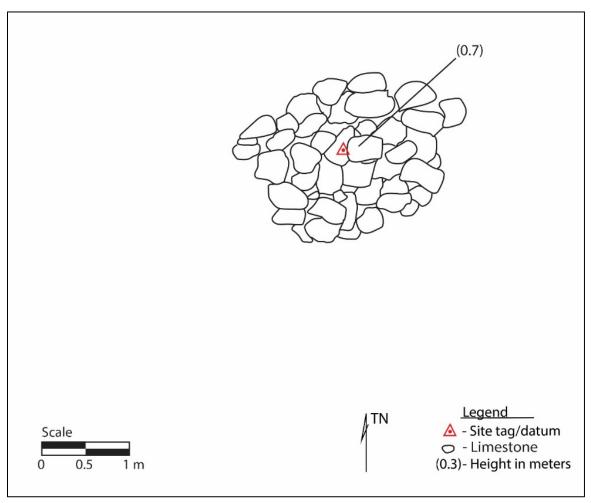


Figure 18. Plan-view map of SIHP 50-80-12-01733, Feature 6 mound.





Figure 19. SIHP 50-80-12-01733, Feature 6 mound (view to east).

Features 7 through 18 are limestone pits distributed over an area $160 \text{ m} (\text{N/S}) \times 40 \text{ m}$ (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).

Feature No.	Field No.	Width	Length	Depth	Stone- filled	Soil floor	Additional Contents
7	T-122	1.4	1.4	0.5	-	Х	0.3 m soil deposit in pit
8	T-124	1.7	1.2	0.4	Х	-	-
9	T-125	0.7	1.1	2.0	-	Х	-
10	T-126	0.9	1.0	0.6	-	Х	-
11	T-127	1.3	1.3	1.7	-	-	-
12	T-129	1.6	1.9	1.1	Х	-	-
13	T-131	1.1	1.4	1.3	Х	-	-
14	T-132	0.9	1.0	0.5	Х	-	-
15	T-133	0.4	0.6	0.5	Х	-	-
16	T-136	0.9	1.0	0.9	Х	-	-
17	T-519	0.6	0.9	1.3	-	Х	-
18	T-520	1.6	1.1	1.0	Х	Х	0.1 m soil deposit in pit

Table 3. SIHP 50-80-12-01733 Pit Descriptions





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).



Feature Field No.		Туре	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		Unmodified pit	Undetermined		

Table 4. Summary of SIHP 50-80-12-01745 Features

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	Х	Х	-
2	T-470	1.0	1.3	0.9	Х	Х	-
3	T-471	1.0	1.2	0.8	Х	Х	-
4	T-472	0.6	1.0	1.2	Х	Х	-
5	T-473	0.9	3.4	0.8	Х	Х	-
6	T-474	2.5	5.0	0.8	Х	Х	Piled wall along edge
7	T-475	0.8	1.1	1.0	-	Х	-
8	T-476	0.6	0.8	0.5	Х	Х	-
9	T-477	1.6	1.7	2.1	Х	-	-
10	T-478	1.2	1.1	1.2	Х	Х	-
11	T-479	1.0	1.2	1.0	Х	-	Two openings
12	T-480	1.6	4.0	1.2	Х	-	Overhang on west side
13	T-481	3.5	5.4	0.6	Х	-	Walled along opening
14	T-482	1.1	1.8	1.2	Х	-	-
15	T-483	1.0	1.5	0.9	-	Х	-
16	T-484	0.8	2.0	1.2	Х	-	Two openings
17	T-530	0.8	1.1	1.0	Х	Х	-
18	T-468	1.0	1.3	1.1	Х	-	-



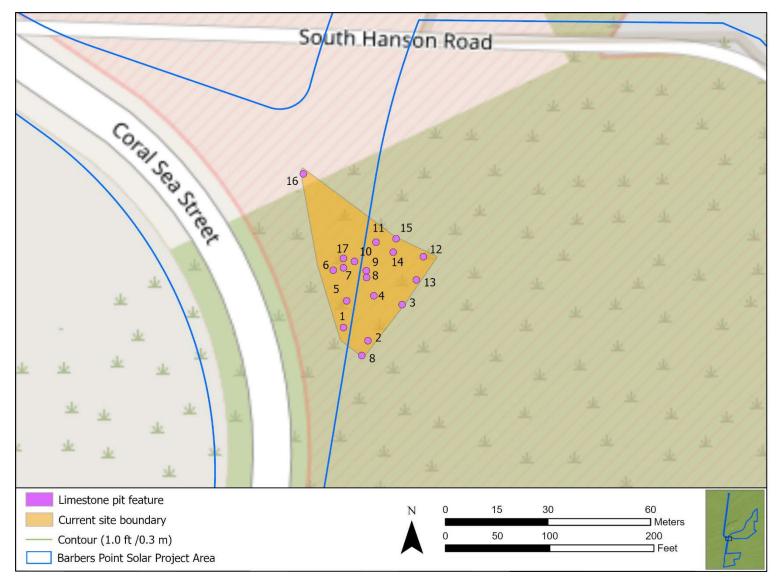


Figure 32. SIHP 50-80-12-01745, locations of current limestone pit features and expanded site boundary (site features outside of project area documented within original project area boundary).

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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.

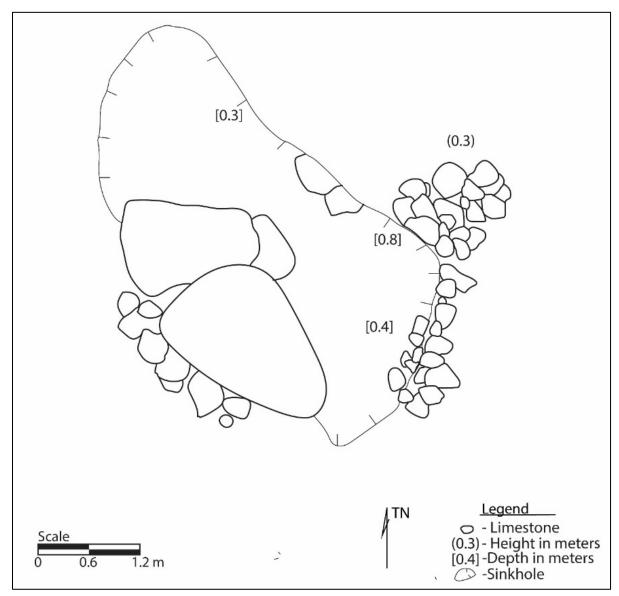


Figure 33. Plan-view map of SIHP 50-80-12-01745, Feature 6 modified pit.





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 $4.6 \times 2.3 \times 0.7$ 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).

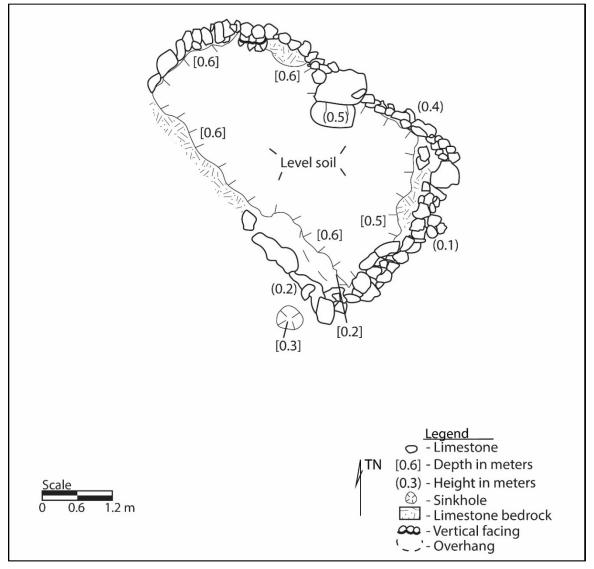


Figure 35. Plan-view map of SIHP 50-80-12-01745, Feature 13 modified pit.





Figure 36. SIHP 50-80-12-01745, Feature 13 modified pit (view to north).



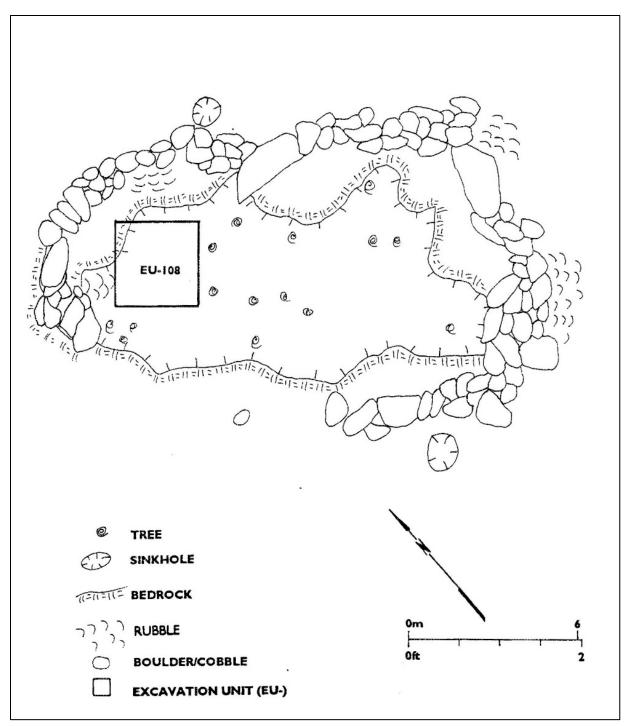


Figure 37. Plan-view map of SIHP 50-80-12-01745, Feature 13 showing location of Beardsley's excavation unit (from Beardsley 2001: Appendix I, Figure IV-74).





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) \times 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 $1.8 \text{ m} (\text{E/W}) \times 2.0 \text{ m} (\text{N/S}) \times 0.6 \text{ m}$ 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) \times 1.3 m (N/S) \times 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) \times 2.0 m (N/S) \times 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 $1.2 \text{ m} (\text{E/W}) \times 1.2 \text{ m} (\text{N/S}) \times 0.35 \text{ m}$ deep. The pit is filled with limestone cobbles and small boulders almost to ground surface.



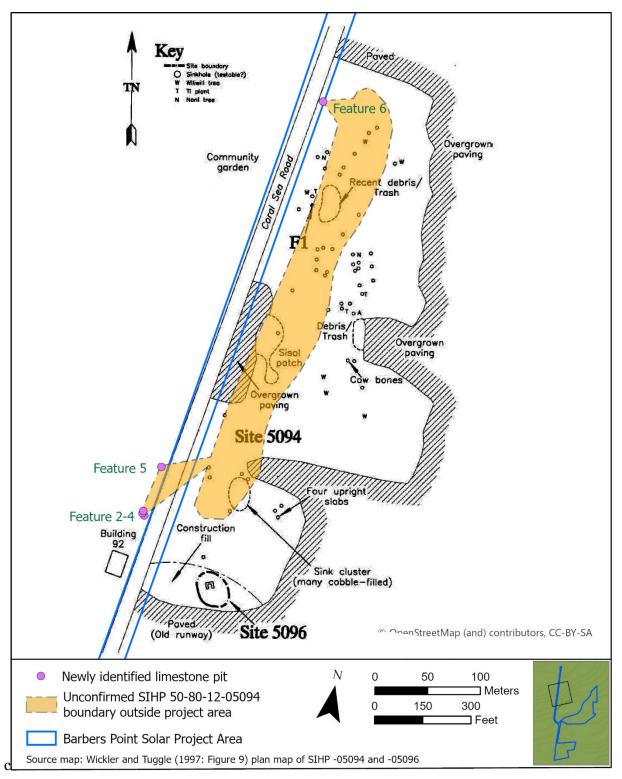


Figure 54. Locations of newly identified limestone pits on plan view map of SIHP 50-80-12-05094. The current site boundary is approximate outside of the project corridor and is based on a previous site boundary not reflecting features shown on Wickler and Tuggles' (1997) Figure 9 map.





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).

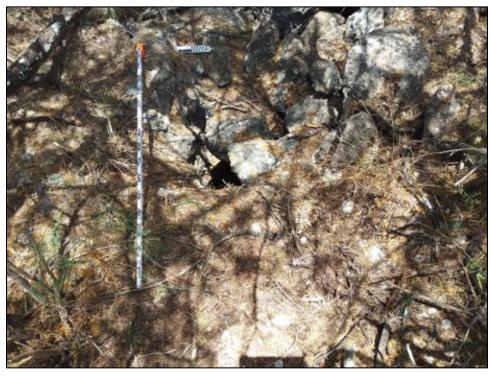


Figure 58. SIHP 50-80-12-05094, Feature 5 limestone pit (view to west).





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 O'ahu. 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 utililities 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.



Feature	Temporary Field No.	Туре	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

Table 6. Summary of SIHP 50-80-12-05099 Features



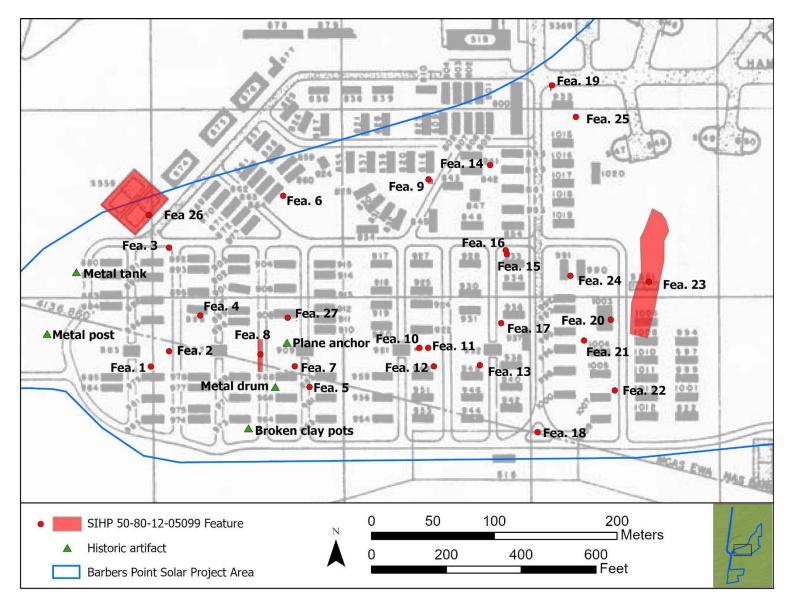


Figure 60. SIHP 50-80-12-05099 feature locations ovelaid on map of MCAS Ewa (U.S. Navy 1948).





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) \times $2 \text{ m} (\text{N/S}) \times 0.9 \text{ m}$ high. The concrete curbing is $2 \text{ m} (\text{E/W}) \times 1.45 \text{ m} (\text{N/S})$ with an exterior height of 0.9 m and internal depth of 12 cm. The metal frame was painted with alternating vellow 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 $(N/S) \times 3.5$ 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).



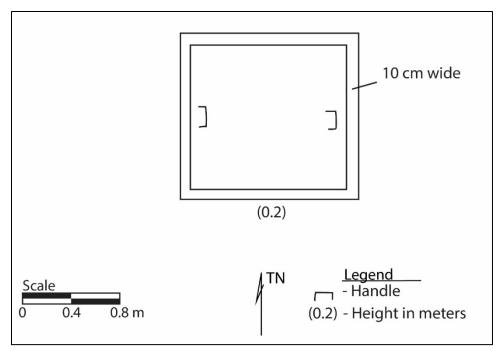


Figure 67. Plan-view map of SIHP 50-80-12-05099, Feature 6 concrete box with metal cover.



Figure 68. SIHP 50-80-12-05099, Feature 6 concrete box with metal cover (view to northwest).



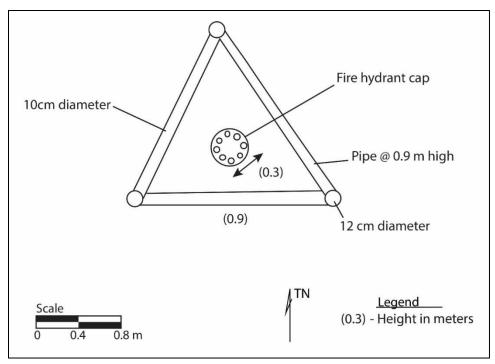


Figure 69. Plan-view map of SIHP 50-80-12-05099, Feature 7 triangular metal pipe frame.



Figure 70. SIHP 50-80-12-05099, Feature 7 metal frame (view to west).



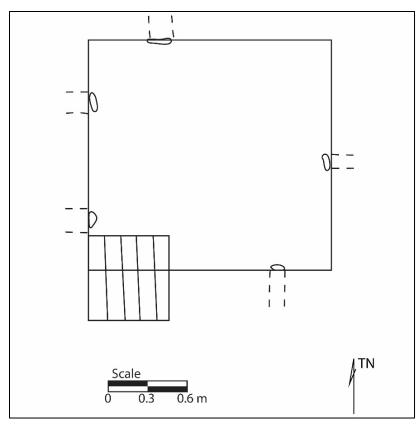


Figure 71. Plan-view map of SIHP 50-80-12-05099, Feature 9 concrete basin.



Figure 72. SIHP 50-80-12-05099, Feature 9 concrete basin (view to east).

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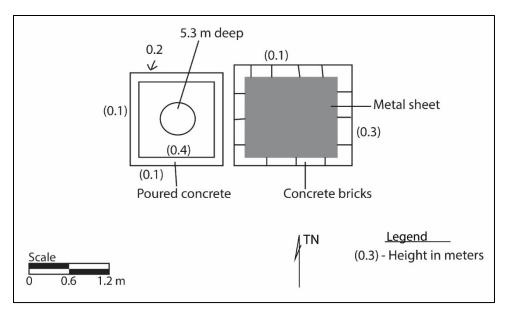


Figure 73. Plan-view map of SIHP 50-80-12-05099, Feature 10 concrete boxes.



Figure 74. SIHP 50-80-12-05099, Feature 10 concrete boxes (view to east).

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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).

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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).



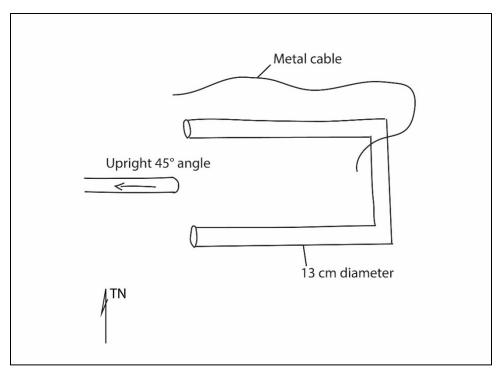


Figure 79. SIHP 50-80-12-05099, Feature 15 metal pipe frame sketch (no scale).



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).



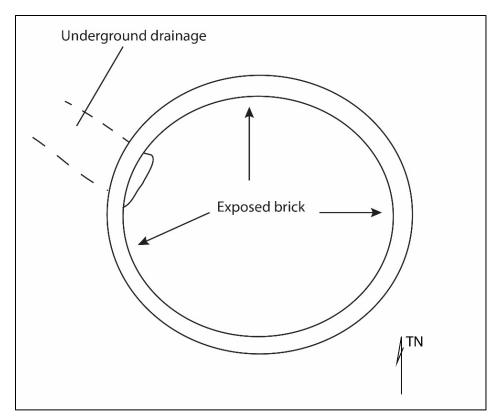


Figure 82. SIHP 50-80-12-05099, Feature 17 drain hole sketch (no scale).



Figure 83. SIHP 50-80-12-05099, Feature 17 drain hole (view to west).



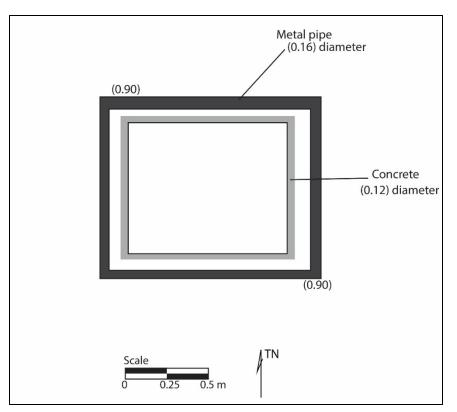


Figure 84. Plan-view map of SIHP 50-80-12-05099, Feature 18 rectangular metal frame.



Figure 85. SIHP 50-80-12-05099, Feature 18 metal frame (view to east).



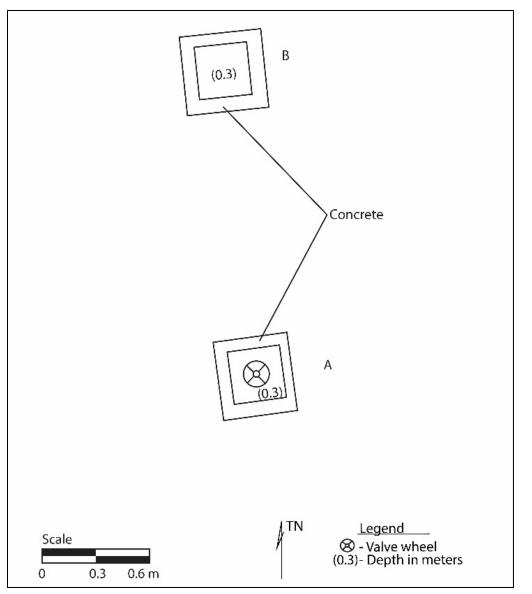


Figure 86. Plan-view map of SIHP 50-80-12-05099, Feature 19 concrete boxes with valve.





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).



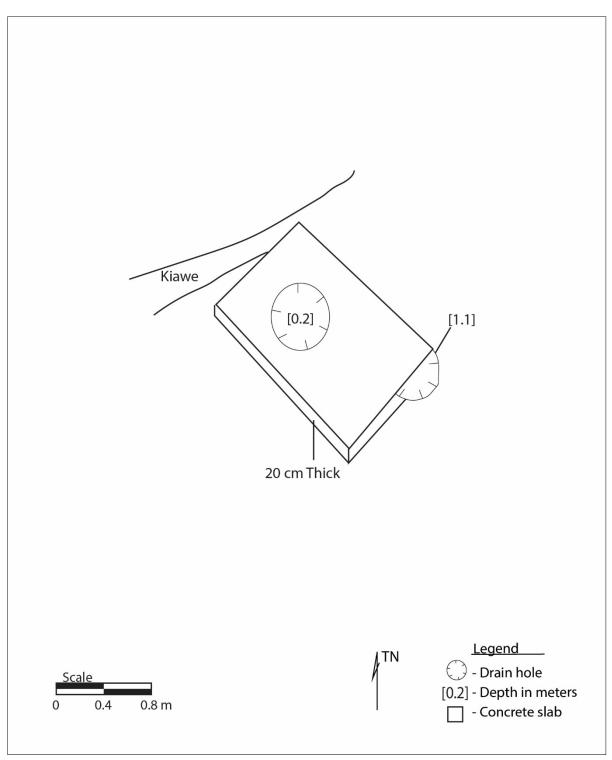


Figure 89. Plan-view map of SIHP 50-80-12-05099, Feature 20 concrete slab.





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).



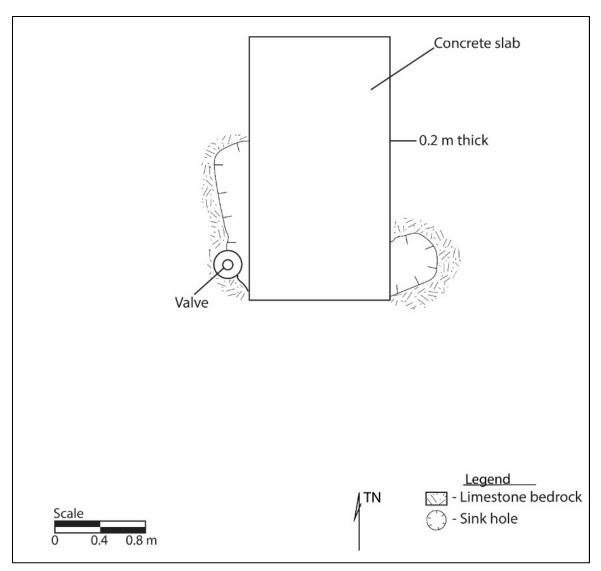


Figure 94. Plan-view map of SIHP 50-80-12-05099, Feature 24 concrete slab.





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 \times 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.



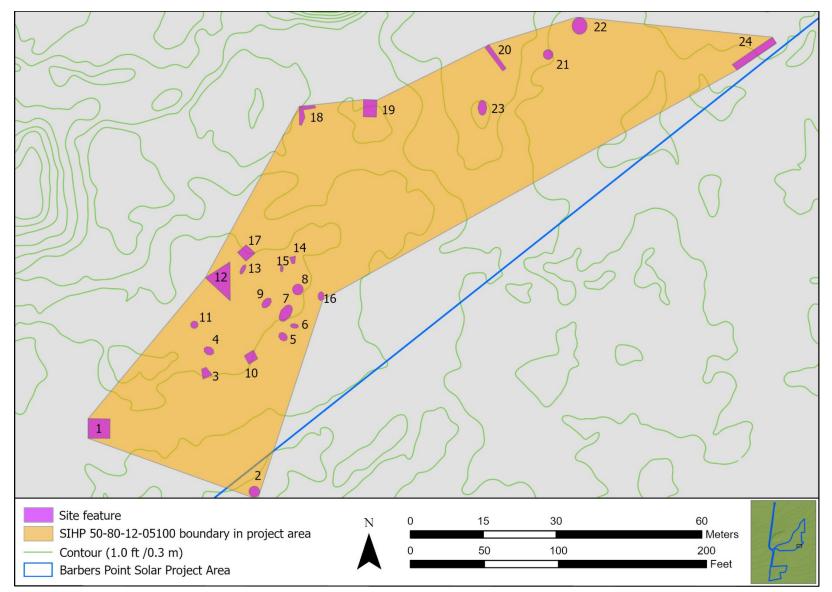


Figure 97. SIHP 50-80-12-05100, location of features overlaid on contours created from aerial LiDAR data, 2019.

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21-270QMoundPermanent habitation3T-271PlatformPermanent habitation4T-272GMoundPermanent habitation4T-272GMoundPermanent habitation5T-273BPlatformPermanent habitation5T-273BPlatformPermanent habitation6T-274MoundPermanent habitation7T-275HMoundPermanent habitation8T-276MoundPermanent habitation9T-277AMoundPermanent habitation10T-278MoundPermanent habitation-11T-279MoundAgriculture-12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MoundAgriculture-23T-303MoundAgriculture-24MoundAgriculture25T-303MoundAgriculture-	Feature	Temporary Field No.	PHRI Feature	Туре	Possible Function	Archaeological Material
21-270QMoundPermanent habitationbird, and fish bone3T-271PlatformPermanent habitation4T-272GMoundPermanent habitationCoral abrader, kuku nuts, marine shell, fis mongoose, and rode bone, fire-altered limestone, ash, and charcoal5T-273BPlatformPermanent habitationCoral abrader, kuku nuts, marine shell, fis mongoose, and rode bone, fire-altered limestone, ash, and charcoal6T-274MoundPermanent habitationMarine shell, fish, bir and rodent bone7T-275HMoundPermanent habitationMarine shell, fish, bir and rodent bone8T-276MoundPermanent habitation-9T-277AMoundPermanent habitation-10T-278MoundPermanent habitation-11T-279MoundAgriculture-12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-16T-284MoundAgriculture-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	1	T-268	0	Enclosure		Marine shell
4T-272GMoundPermanent habitation5T-273BPlatformPermanent habitationCoral abrader, kuku mongoose, and rode bone, fire-altered limestone, ash, and charcoal6T-274MoundPermanent habitationMarine shell, fish, bir and rodent bone7T-275HMoundPermanent habitationMarine shell, fish, bir and rodent bone8T-276MoundPermanent habitation-9T-277AMoundPermanent habitation-10T-278MoundPermanent habitation-11T-279MoundAgriculture-12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	2	T-270	Q	Mound	Permanent habitation	Marine shell, rodent, bird, and fish bone
5T-273BPlatformPermanent habitationCoral abrader, kuku nuts, marine shell, fis mongoose, and rode bone, fire-altered limestone, ash, and 	3	T-271		Platform	Permanent habitation	
5T-273BPlatformPermanent habitationnuts, marine shell, fis mongoose, and rode bone, fire-altered limestone, ash, and charcoal6T-274MoundPermanent habitation7T-275HMoundPermanent habitation8T-276MoundPermanent habitation-9T-277AMoundPermanent habitation-10T-278MoundPermanent habitation-11T-279MoundAgriculture-12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-19T-289MoundAgriculture-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	4	T-272	G	Mound	Permanent habitation	
7T-275HMoundPermanent habitationMarine shell, fish, bir and rodent bone8T-276MoundPermanent habitation-9T-277AMoundPermanent habitation-10T-278MoundPermanent habitation-11T-279MoundAgriculture-12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundSinkUndetermined23T-304SinkUndetermined-	5	T-273	В	Platform	Permanent habitation	limestone, ash, and
71-275HMoundPermanent habitationand rodent bone8T-276MoundPermanent habitation-9T-277AMoundPermanent habitation-10T-278MoundPermanent habitation-11T-279MoundAgriculture-12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MSinkUndetermined-23T-304SinkUndetermined-	6	T-274		Mound	Permanent habitation	
9T-277AMoundPermanent habitation-10T-278MoundPermanent habitation-11T-279MoundAgriculture-12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundSinkUndetermined-23T-304SinkUndetermined-	7	T-275	Н	Mound	Permanent habitation	Marine shell, fish, bird, and rodent bone
10T-278MoundPermanent habitation-11T-279MoundAgriculture-12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundAgriculture-23T-304SinkUndetermined-	8	T-276		Mound	Permanent habitation	-
11T-279MoundAgriculture-12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	9	T-277	Α	Mound	Permanent habitation	-
12T-280EnclosurePermanent habitation-13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	10	T-278		Mound	Permanent habitation	-
13T-281MoundAgriculture-14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	11	T-279		Mound	Agriculture	-
14T-282MoundAgriculture-15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	12	T-280		Enclosure	Permanent habitation	-
15T-283MoundAgriculture-16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	13	T-281		Mound	Agriculture	-
16T-284MoundAgriculture-17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	14	T-282		Mound	Agriculture	-
17T-287EnclosurePermanent habitation-18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitation-23T-304SinkUndetermined-	15	T-283		Mound	Agriculture	-
18T-288C-shaped wallPermanent habitation-19T-289MoundAgriculture-20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitationFishhook, volcanic gla flake, modified bone marine shell, fish, bir and rodent bone, an undated charcoal 	16	T-284		Mound	Agriculture	-
19T-289MoundAgriculture20T-301Wall remnantUndetermined21T-302MoundAgriculture22T-303MMoundPermanent habitation23T-304SinkUndetermined	17	T-287		Enclosure	Permanent habitation	-
20T-301Wall remnantUndetermined-21T-302MoundAgriculture-22T-303MMoundPermanent habitationFishhook, volcanic gla flake, modified bone marine shell, fish, bir and rodent bone, an undated charcoal cultural feature23T-304SinkUndetermined-	18	T-288		C-shaped wall	Permanent habitation	-
21T-302MoundAgriculture-22T-303MMoundPermanent habitationFishhook, volcanic gla flake, modified bone marine shell, fish, bir and rodent bone, an undated charcoal cultural feature23T-304SinkUndetermined-	19	T-289		Mound	Agriculture	-
22T-303MMoundPermanent habitationFishhook, volcanic gla flake, modified bone marine shell, fish, bin and rodent bone, an undated charcoal cultural feature23T-304SinkUndetermined-	20	T-301		Wall remnant	Undetermined	-
22T-303MMoundPermanent habitationflake, modified bone marine shell, fish, bir and rodent bone, an undated charcoal cultural feature23T-304SinkUndetermined-	21	T-302		Mound	Agriculture	-
	22	T-303	М	Mound	Permanent habitation	
24 T-319 Wall remnant Undetermined -	23	T-304		Sink	Undetermined	-
	24	T-319		Wall remnant	Undetermined	-

Table 7. Summary of SIHP 50-80-12-05100 Features



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 $2 \text{ m} (N/S) \times 2 \text{ m} (E/W)$ 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 bifaced wall, roughly 2 m long \times 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 ('Ewa 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 bifaced wall section, the feature is currently in fair condition.



Figure 98. SIHP 50-80-12-05100, Feature 1 enclosure (view to southeast).



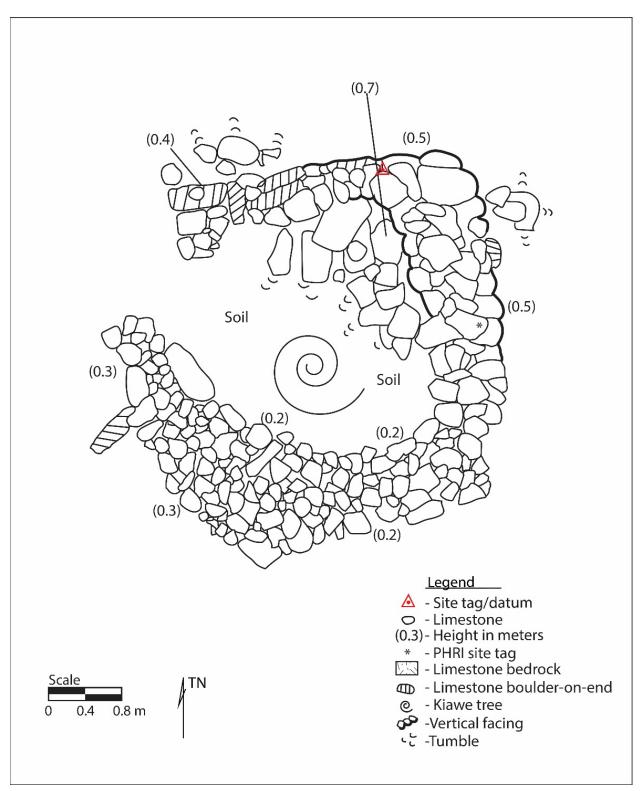


Figure 99. Plan-view map of SIHP 50-80-12-05100, Feature 1 enclosure.



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 m 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).



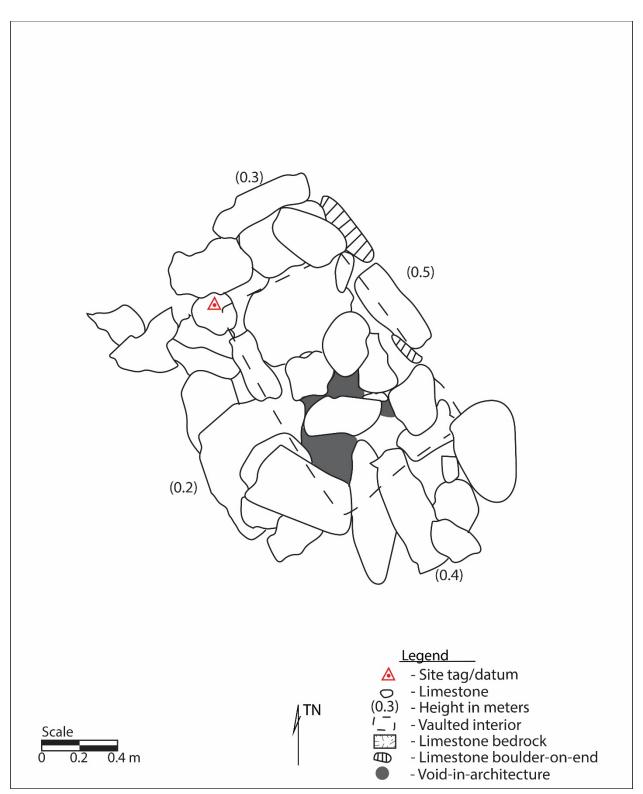


Figure 101. Plan-view map of SIHP 50-80-12-05100, Feature 2 mound.



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) \times 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).



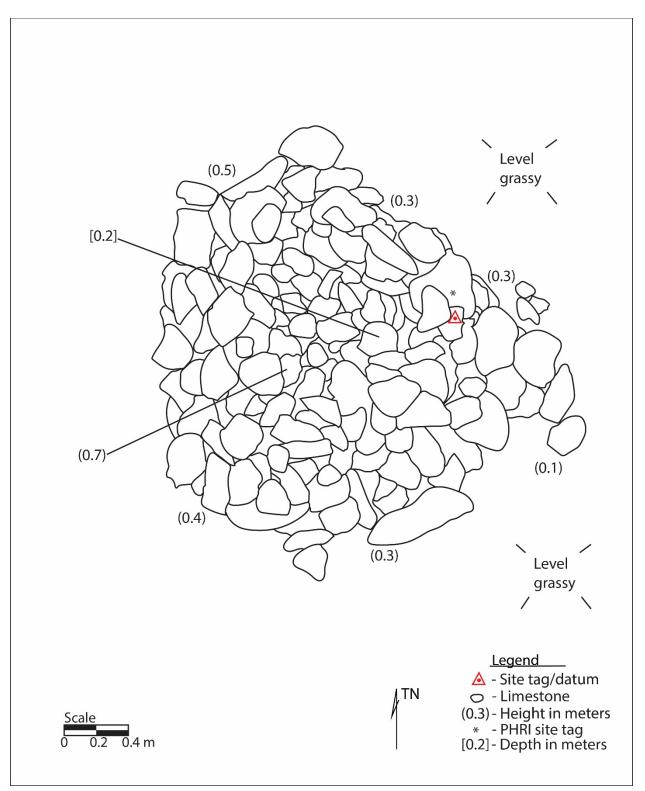


Figure 103. Plan-view map of SIHP 50-80-12-05100, Feature 3 platform.



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).



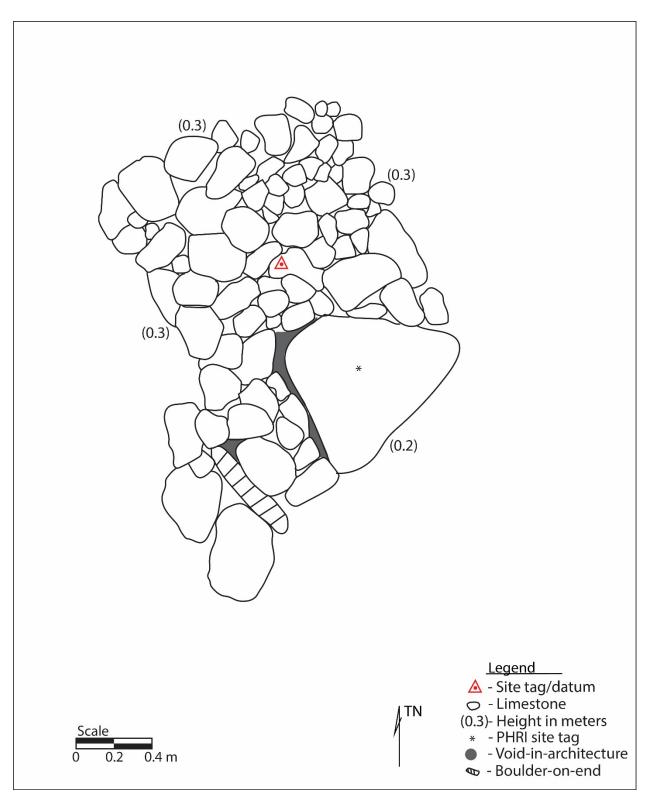


Figure 105. Plan-view map of SIHP 50-80-12-05100, Feature 4 mound.



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 (Beardslev 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) $\times 2.5 \text{ m}$ (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 vielded 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).



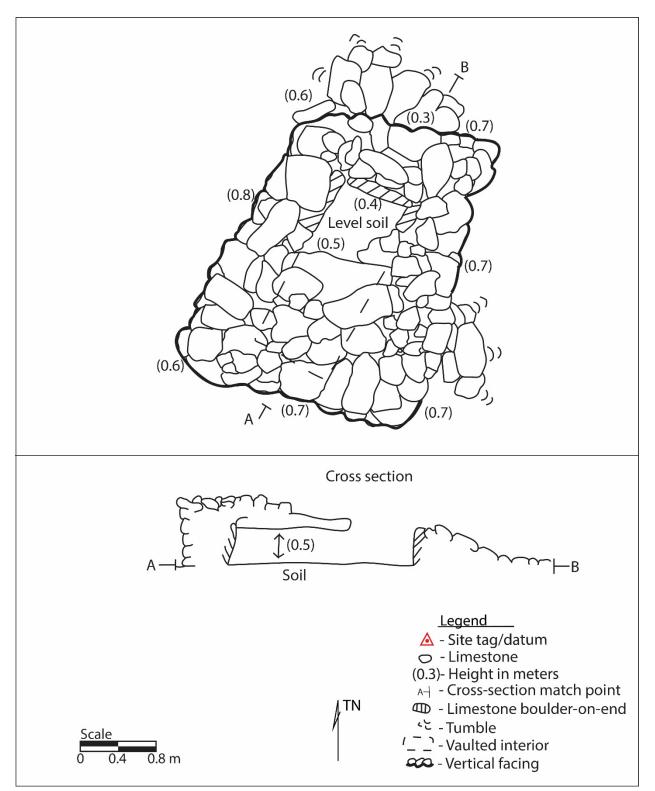


Figure 108. Plan-view map of SIHP 50-80-12-05100, Feature 5 vaulted platform.



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) \times 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).



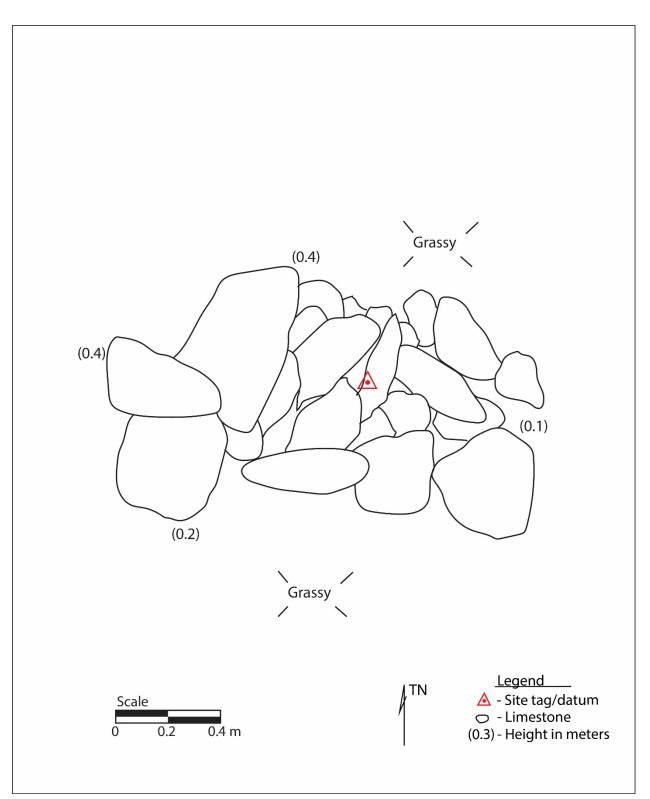


Figure 110. Plan-view map of SIHP 50-80-12-05100, Feature 6 mound.



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 $0.5 \times$ 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) $\times 2.2 \text{ m}$ (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).



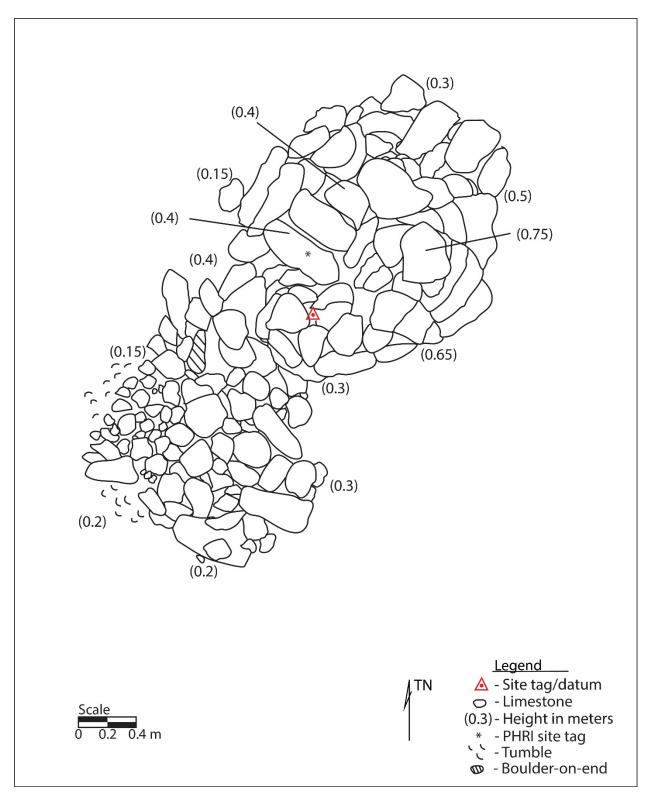


Figure 112. Plan-view map of SIHP 50-80-12-05100, Feature 7 mound.



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) \times 1.8 m (E/W) \times 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).



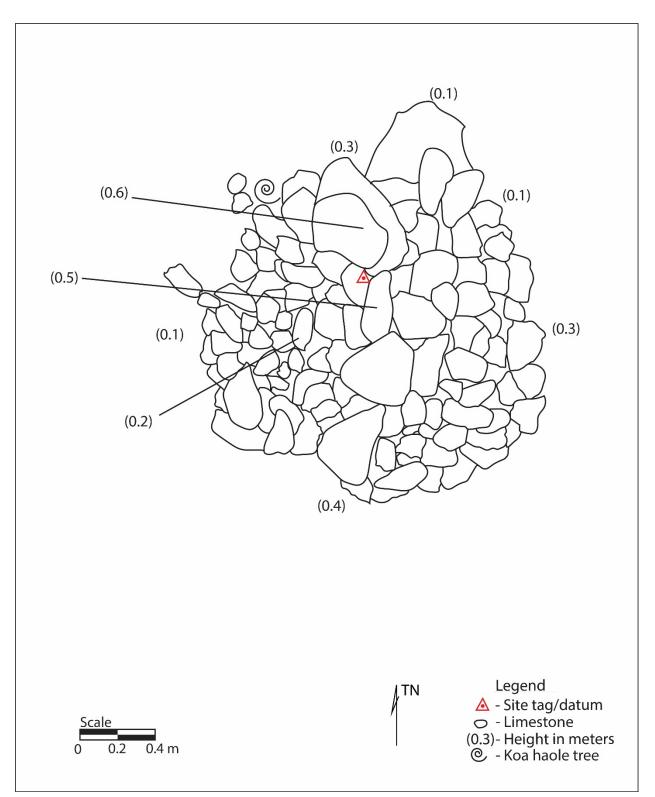


Figure 114. Plan-view map of SIHP 50-80-12-05100, Feature 8 mound.



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) \times 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).



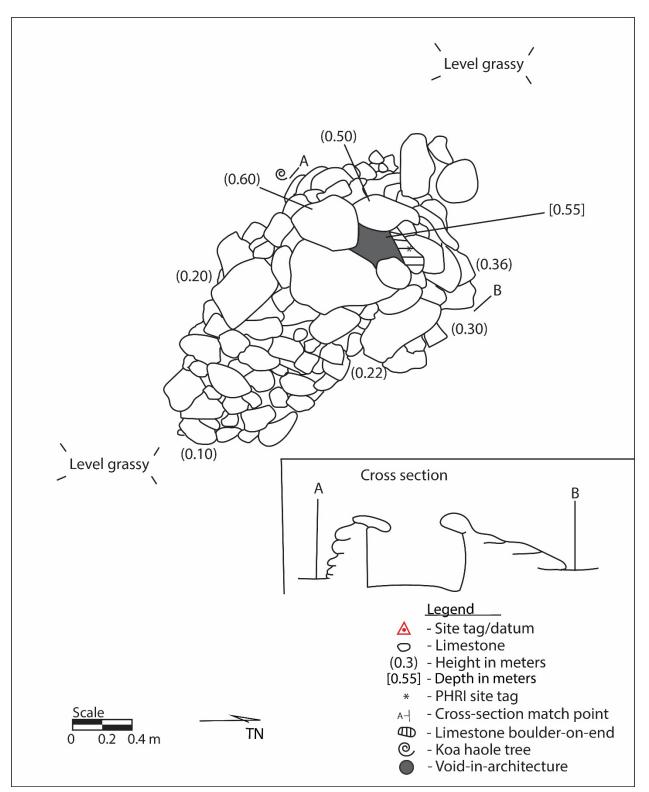


Figure 116. Plan-view map of SIHP 50-80-12-05100, Feature 9 mound.



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 $2.2 \text{ m} (\text{E/W}) \times 2.0 \text{ m} (\text{N/S})$ 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).



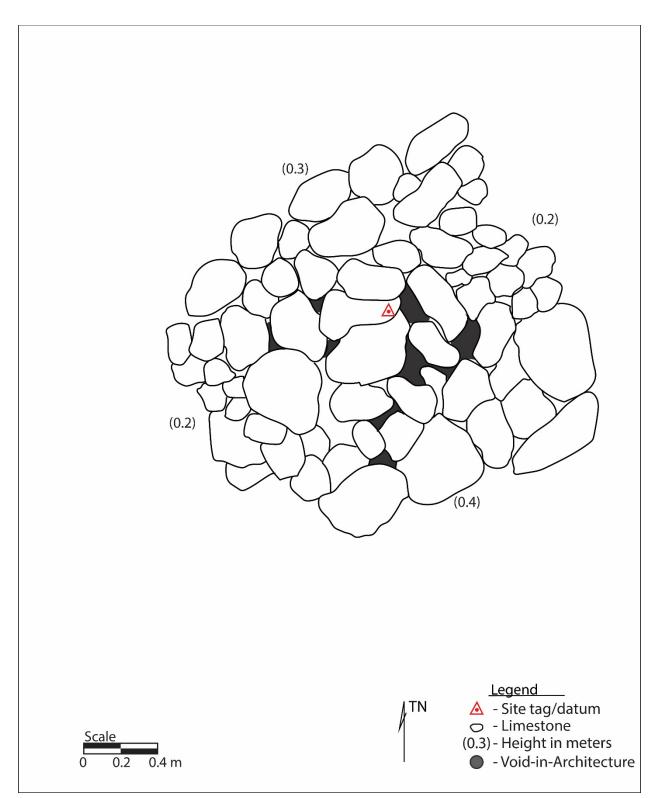


Figure 118. Plan-view map of SIHP 50-80-12-05100, Feature 10 mound.



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 $1.25 \text{ m} (N/S) \times 1.5 \text{ m} (E/W)$ and 0.4 m high. Feature 1 is likely an agricultural feature.

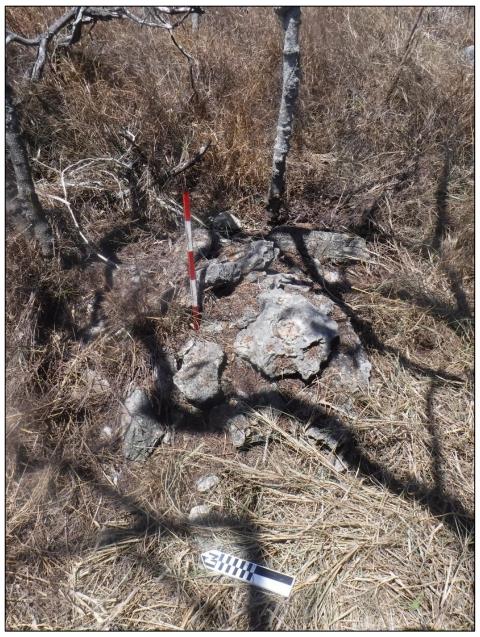


Figure 119. SIHP 50-80-12-05100, Feature 11 mound (view to northeast).



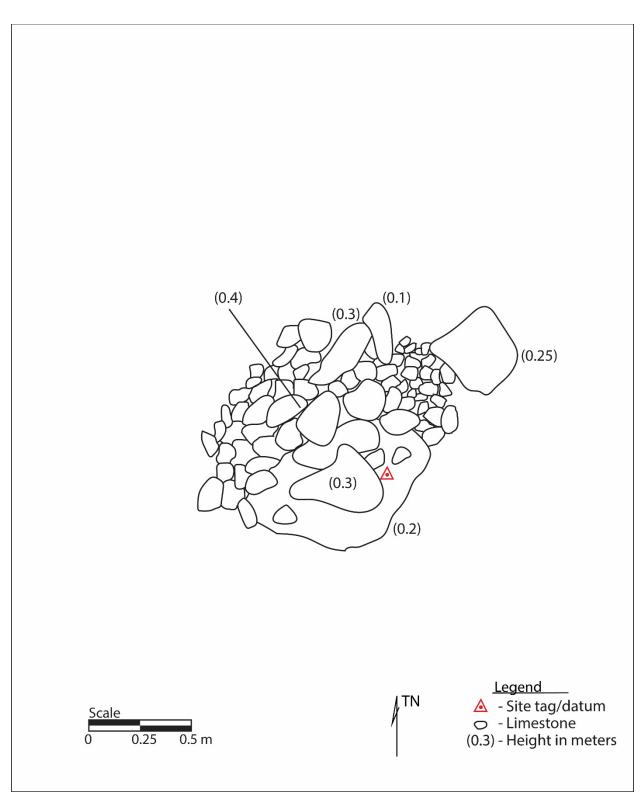


Figure 120. Plan-view map of SIHP 50-80-12-05100, Feature 11 mound.



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) \times 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).



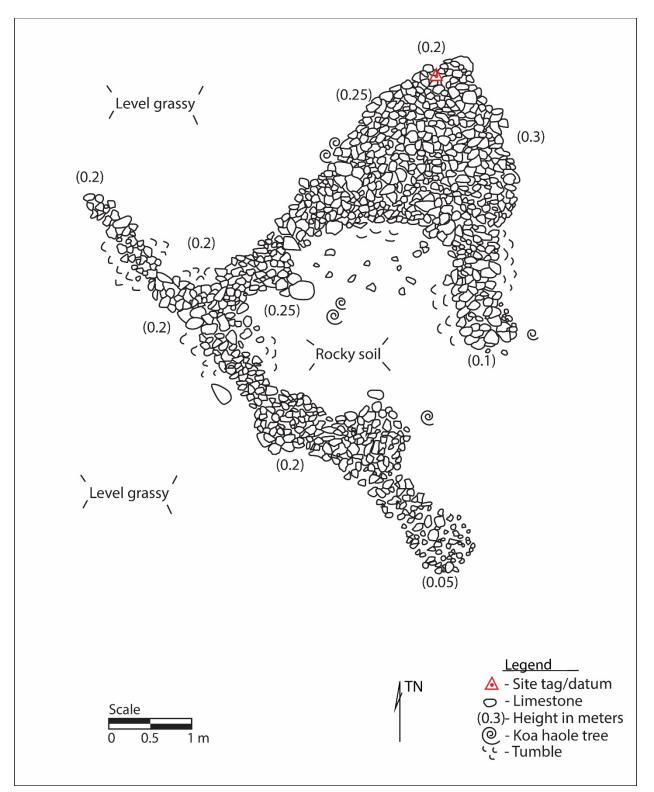


Figure 122. Plan-view map of SIHP 50-80-12-05100, Feature 12 terraced enclosure.



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 $2 \text{ m} (\text{N/S}) \times 1.2 \text{ m} (\text{E/W})$ 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).



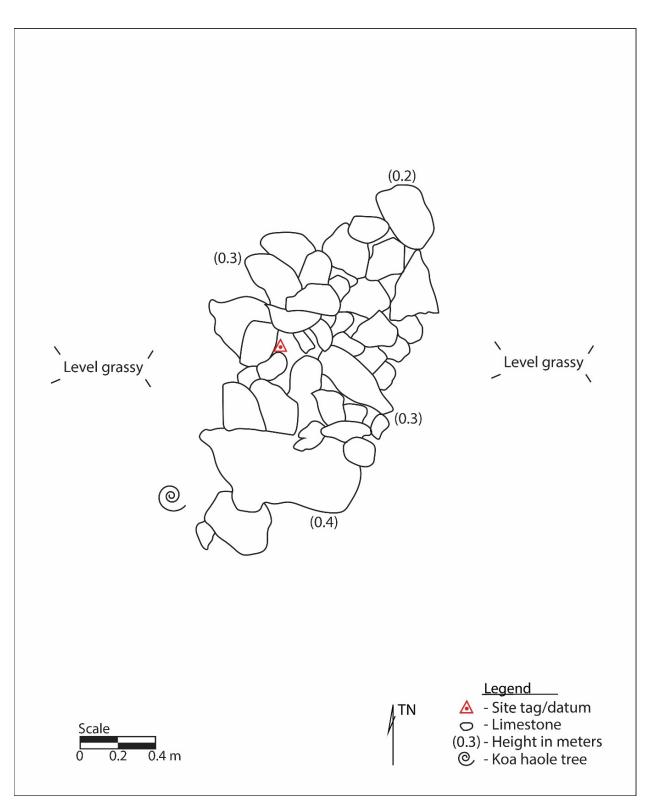


Figure 124. Plan-view map of SIHP 50-80-12-05100, Feature 13 mound.



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 $(N/S) \times 1.25$ 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).



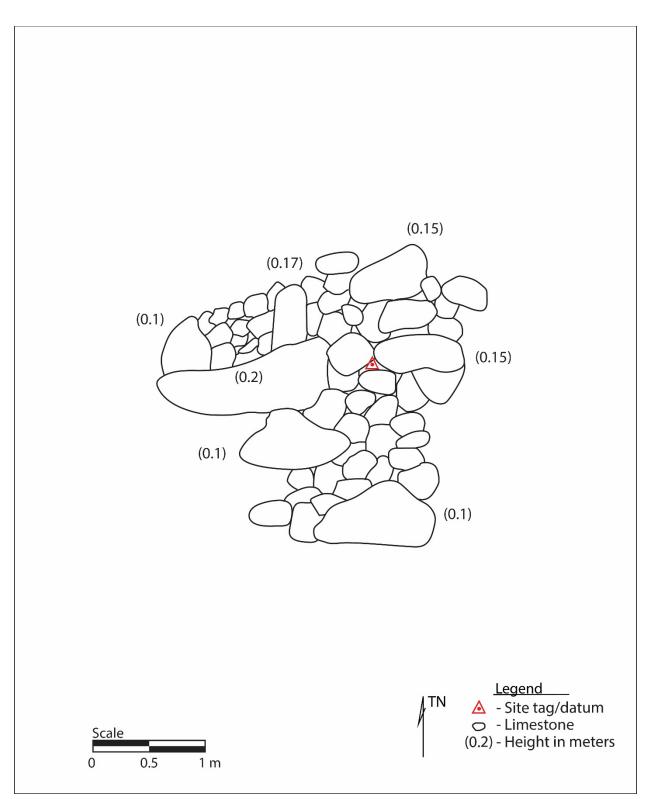


Figure 126. Plan-view map of SIHP 50-80-12-05100, Feature 14 mound.



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 $1.5 \text{ m} (\text{N/S}) \times 0.75 \text{ m} (\text{E/W})$, 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).



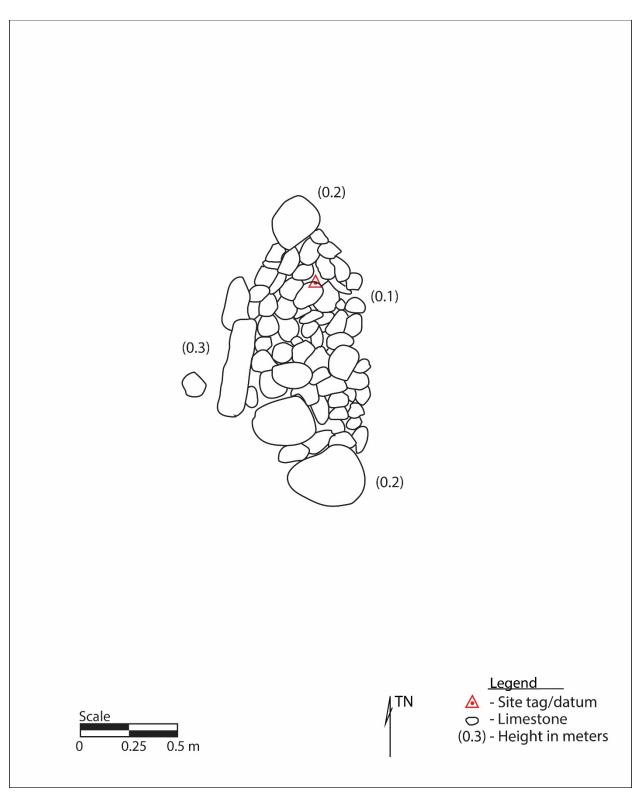


Figure 128. Plan-view map of SIHP 50-80-12-05100, Feature 15 mound.



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 $(N/S) \times 1.25$ 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).



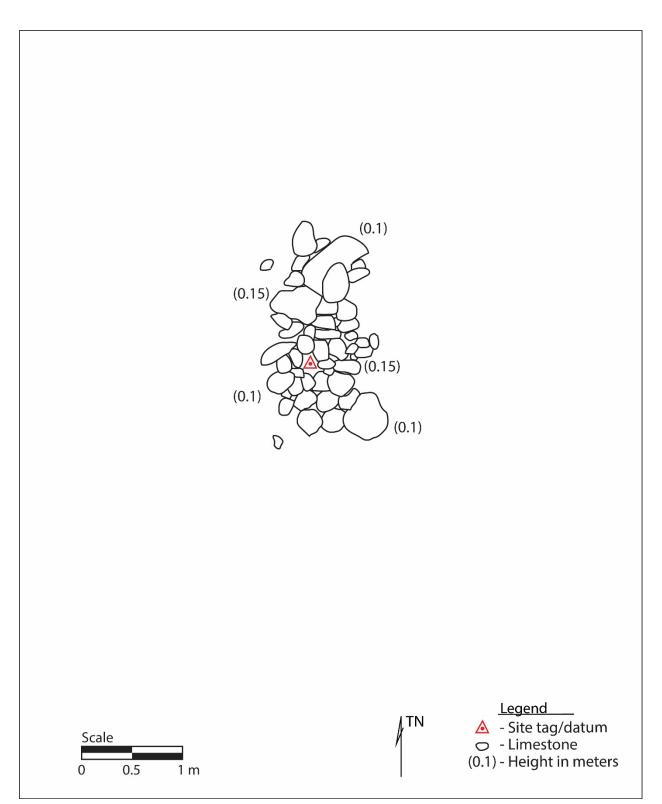


Figure 130. Plan-view map of SIHP 50-80-12-05100, Feature 16 mound.

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).



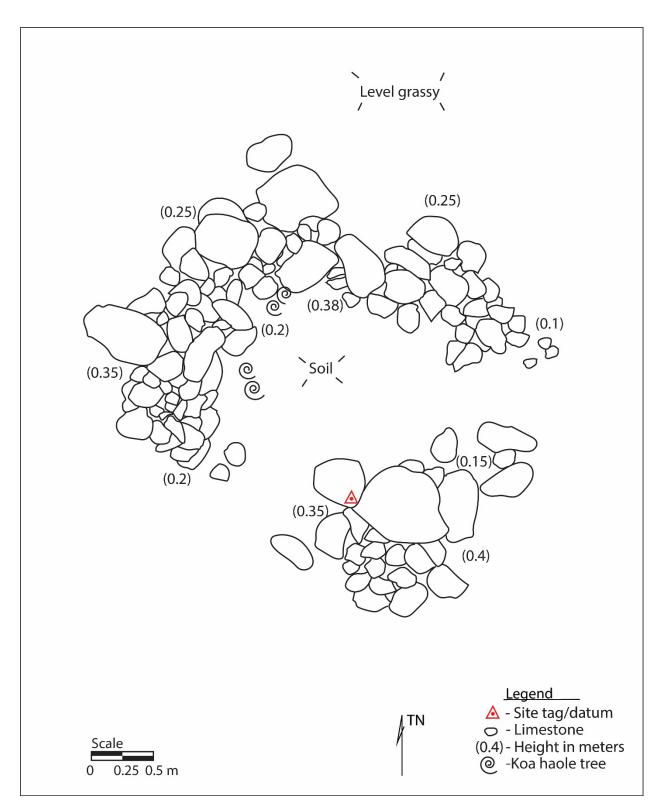


Figure 132. Plan-view map of SIHP 50-80-12-05100, Feature 17 C-shaped wall and mound.

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 $3.8 \text{ m} (\text{N/S}) \times 3.2 \text{ m} (\text{E/W})$ 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).



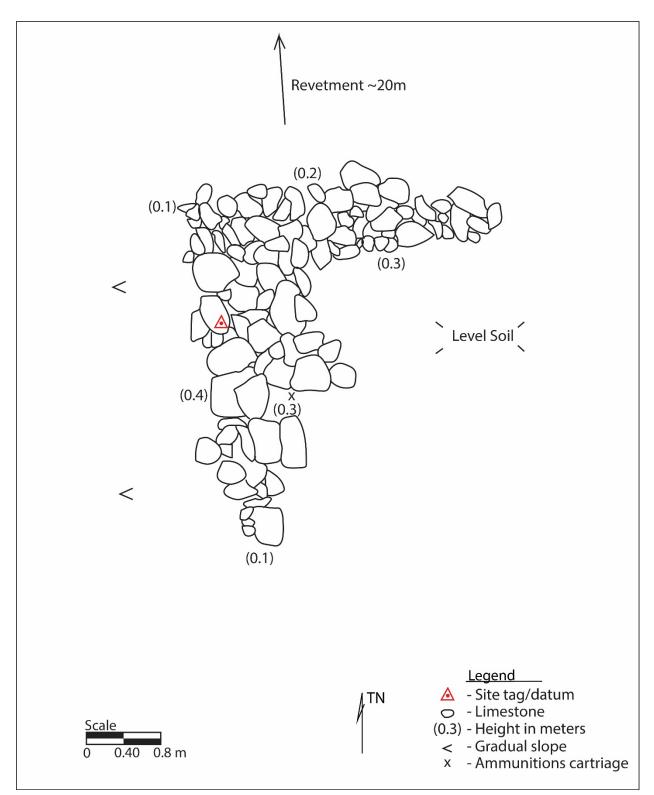


Figure 134. Plan-view map of SIHP 50-80-12-05100, Feature 18 L-shaped wall.



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 $3.5 \text{ m} (\text{N/S}) \times 2.7 \text{ m} (\text{E/W})$. 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).



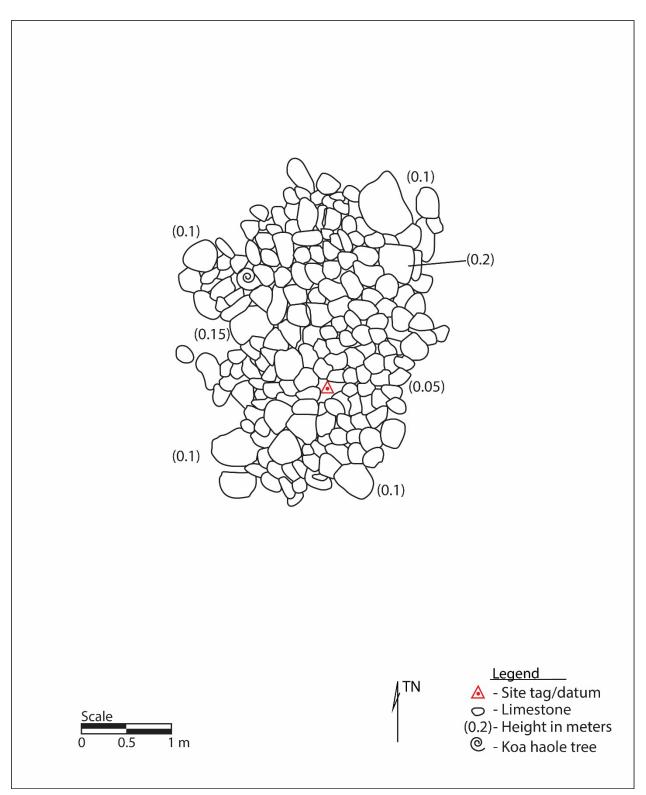


Figure 136. Plan-view map of SIHP 50-80-12-05100, Feature 19 rectangular mound.



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) \times 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).



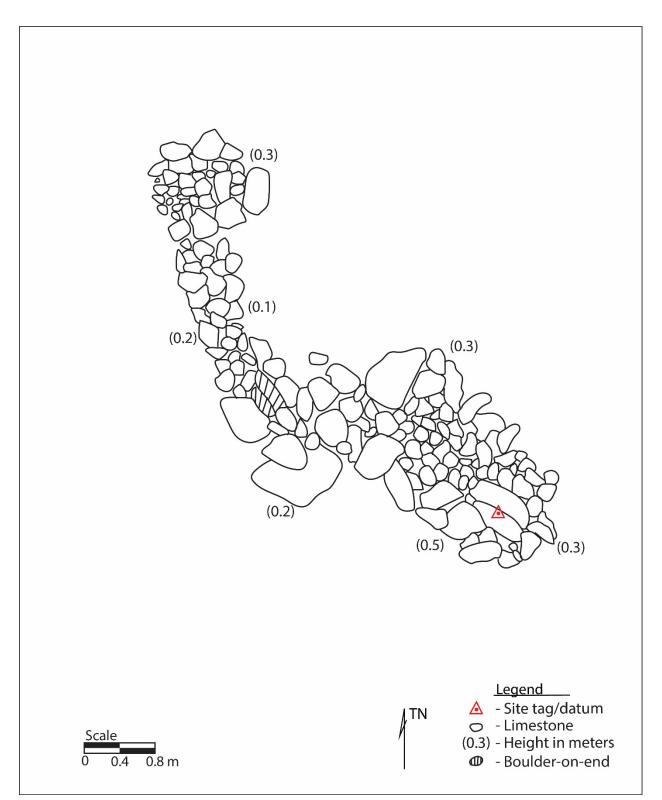


Figure 138. Plan-view map of SIHP 50-80-12-05100, Feature 20 wall.



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 $(N/S) \times 2 \text{ m} (E/W)$ and 0.25 m high. The feature is in fair condition and likely functioned as an agricultural mound.

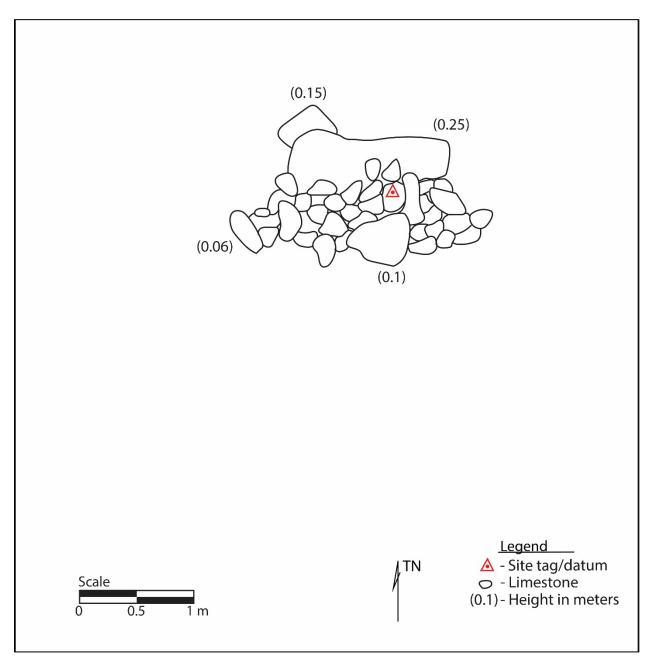


Figure 139. Plan-view map of SIHP 50-80-12-05100, Feature 21 mound.





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).



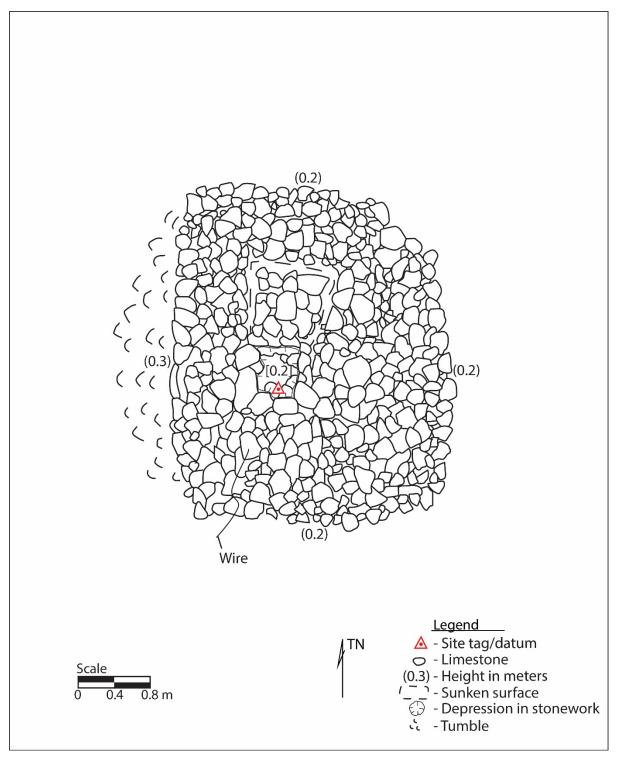


Figure 142. Plan-view map of SIHP 50-80-12-05100, Feature 22 rectangular mound.



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 \times 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) \times 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.

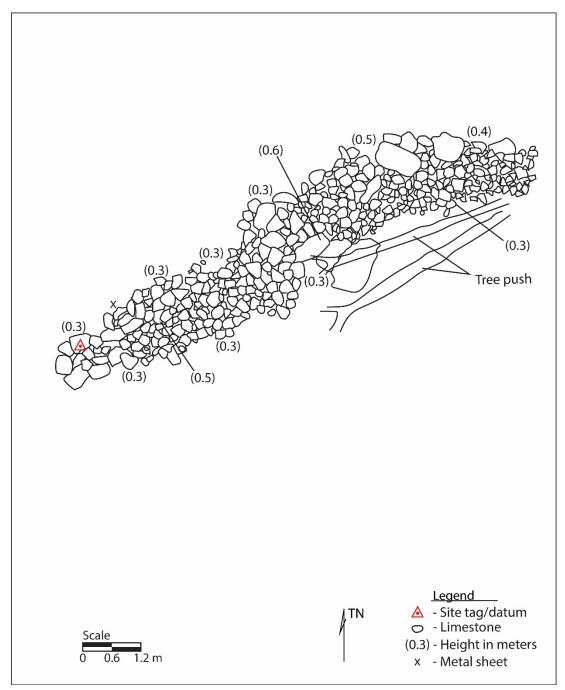


Figure 144. Plan-view map of SIHP 50-80-12-05100, Feature 24 wall. SIHP No.: 50-80-12-05106

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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 barbedwire 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).



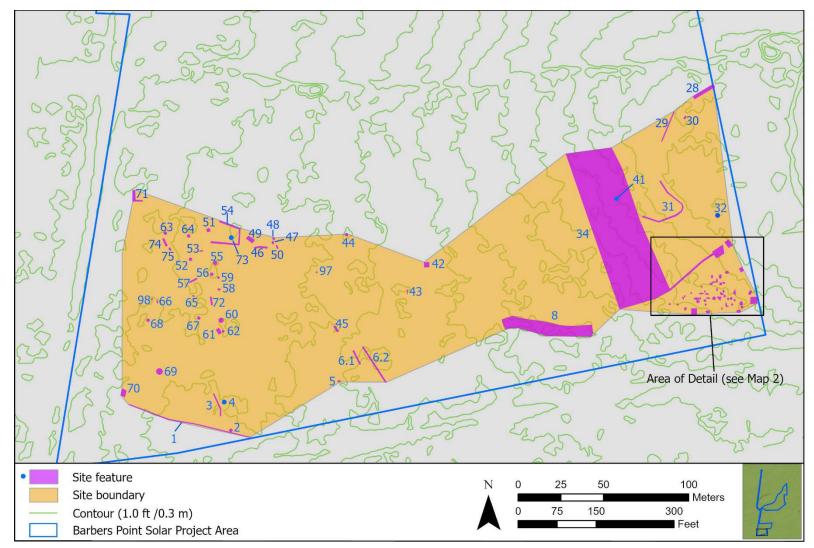


Figure 145. SIHP 50-80-12-05106, Map 1, location of features and inset showing area of detail of Map 2 (see following figure); overlaid on contours created from aerial LiDAR data, 2019.



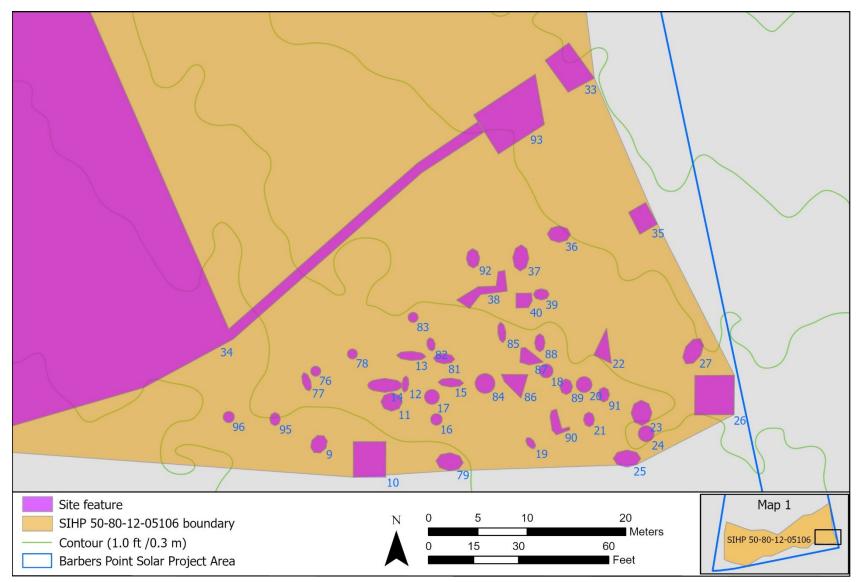


Figure 146. Map 2 showing location of features in southeast corner of SIHP 50-80-12-05106; overlaid on contours created from aerial LiDAR data, 2019.

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Feature	Temporary Field No.	IARII/ PHRI Feature No.	Туре	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
40	T-053	-	Mound	Agriculture

Table 8. Summary of SIHP 50-80-12-05106, Features 1 through 99

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Feature	Temporary Field No.	IARII/ PHRI Feature No.	Туре	Possible Function
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	l (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
80	T-501	-	Mound	Agriculture
81	T-502	- 1	Mound	Agriculture

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Feature	Temporary Field No.	IARII/ PHRI Feature No.	Туре	Possible Function
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



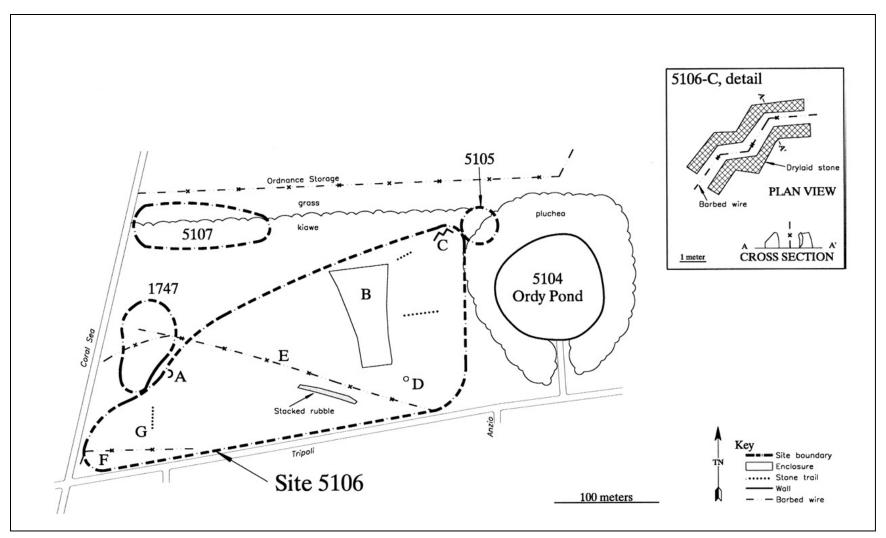


Figure 147. Plan-view map of SIHP 50-80-12-05106, Features A through G, and surrounding site complexes (from Wickler and Tuggle 1997:49; Figure 12).



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 northwestsoutheast 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) \times 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.

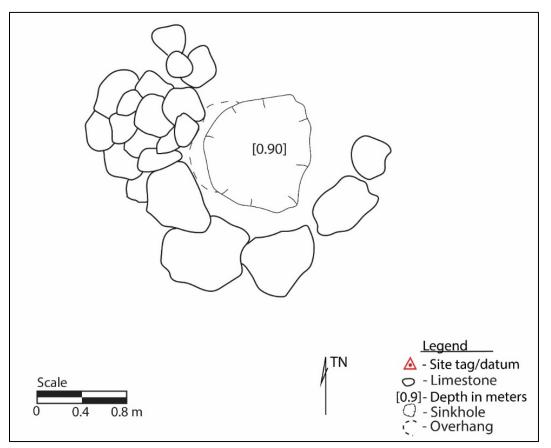


Figure 149. Plan-view map of SIHP 50-80-12-05106, Feature 2 modified pit.





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.

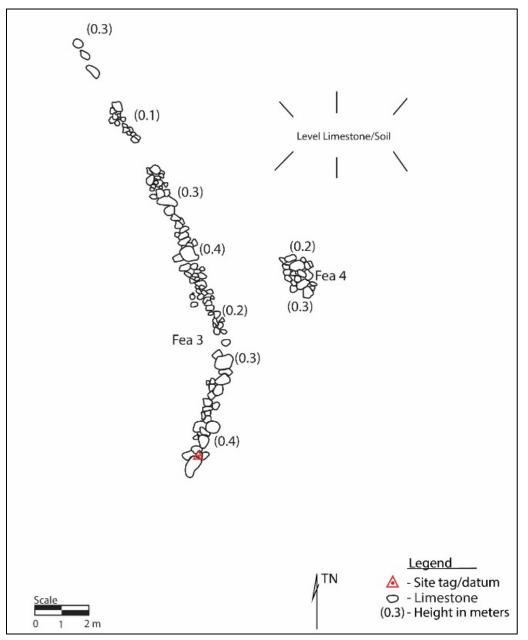


Figure 151. Plan-view map of SIHP 50-80-12-05106, Feature 3 wall and Feature 4 mound.





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 $1.2 \text{ m} (\text{N/S}) \times 1.6 \text{ m} (\text{E/W})$ 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.

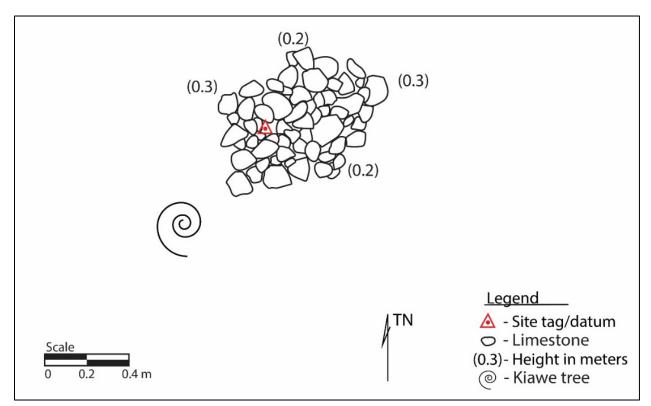


Figure 154. Plan-view map of SIHP 50-80-12-05106, Feature 5 mound.





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 northwestsoutheast beginning approximately 40 m north of Tripoli Road. The southwest wall is 3.5 m $(NW/SW) \times 1.2 \text{ m}$ (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).



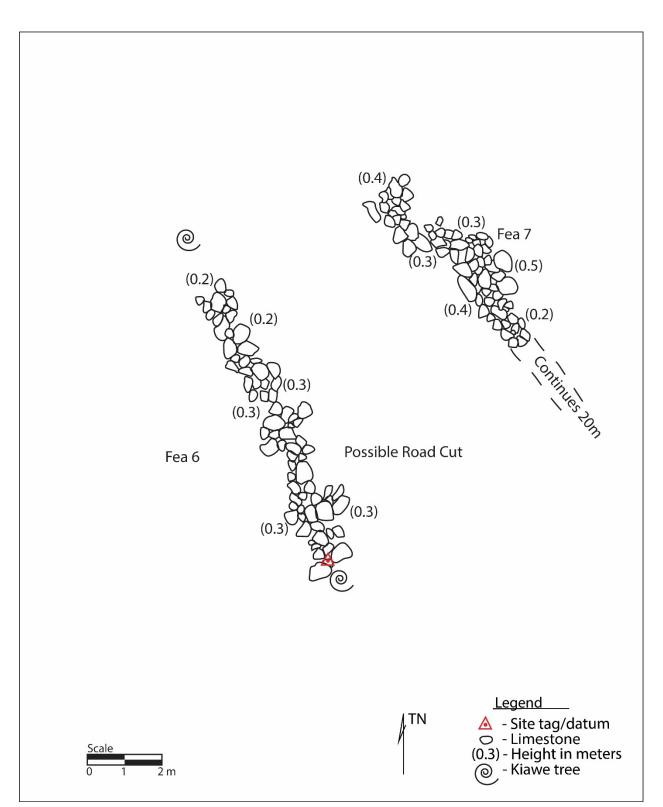


Figure 158. Plan-view map of SIHP 50-80-12-05106, Features 6 and 7 walls.



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 $(E/W) \times 7.0$ 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.

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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.

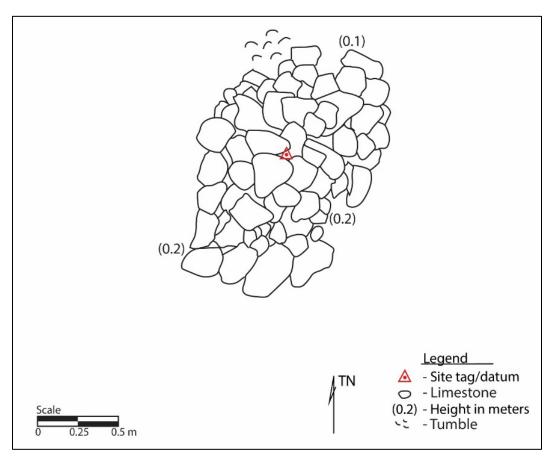


Figure 161. Plan-view map of SIHP 50-80-12-05106, Feature 9 mound.





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 $3.6 \text{ m} (\text{N/S}) \times 3.3 \text{ m} (\text{E/W})$ 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.

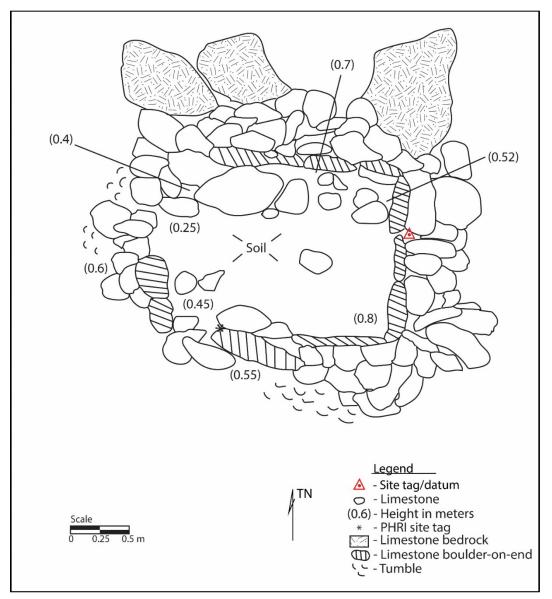


Figure 163. Plan-view map of SIHP 50-80-12-05106, Feature 10 enclosure.





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) \times 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.

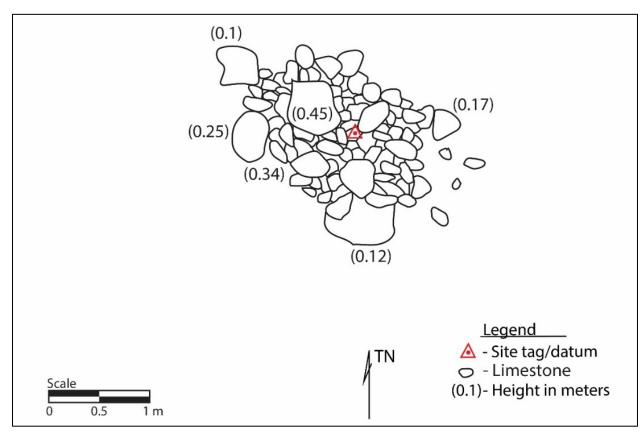


Figure 166. Plan-view map of SIHP 50-80-12-05106, Feature 11 mound.





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) $\times 1$ 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) \times 3 m (E/W) with a maximum height of 0.3 m. The feature is constructed of 3–4 smalland medium-sized limestone boulders and small, medium, and large piled limestone cobbles. Feature 13 is interpreted as an agricultural mound in fair condition.

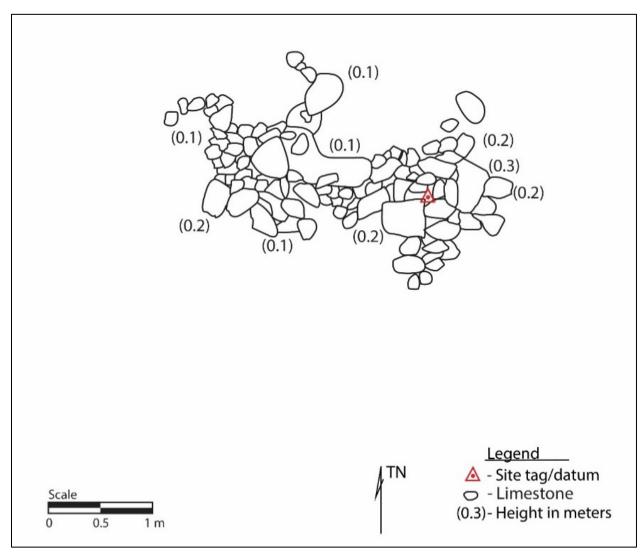


Figure 170. Plan-view map of SIHP 50-80-12-05106, Feature 13 mound.





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) \times 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.

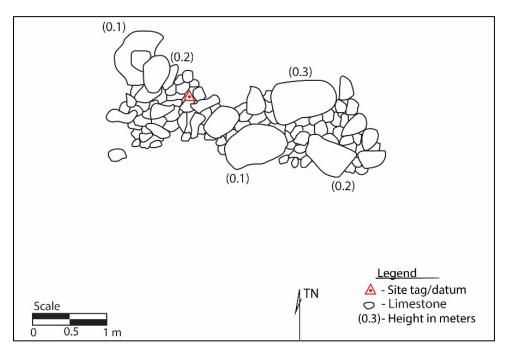


Figure 172. Plan-view map of SIHP 50-80-12-05106, Feature 14 mound.



Figure 173. SIHP 50-80-12-05106, Feature 14 mound (view to west).

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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 $1.5 \text{ m} (N/S) \times 3 \text{ m} (E/W)$ 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.

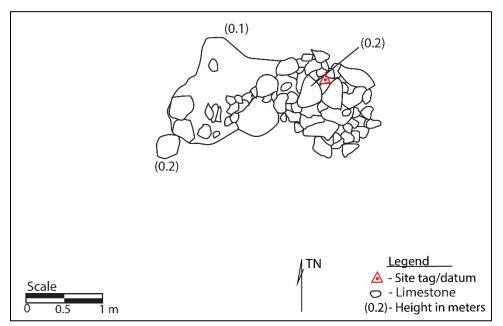


Figure 174. Plan-view map of SIHP 50-80-12-05106, Feature 15 mound.



Figure 175. SIHP 50-80-12-05106, Feature 15 mound (view to north).

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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.

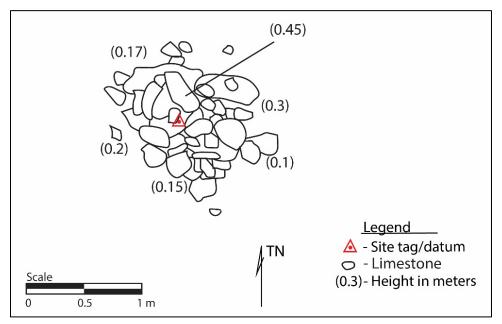


Figure 176. Plan-view map of SIHP 50-80-12-05106, Feature 16 mound.



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) $\times 1.5 \text{ m}$ (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.

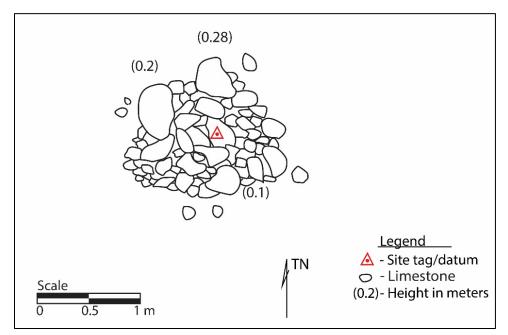


Figure 178. Plan-view map of SIHP 50-80-12-05106, Feature 17 mound.



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 $1.3 \text{ m} (\text{N/S}) \times 1.5 \text{ m} (\text{E/W})$ 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.

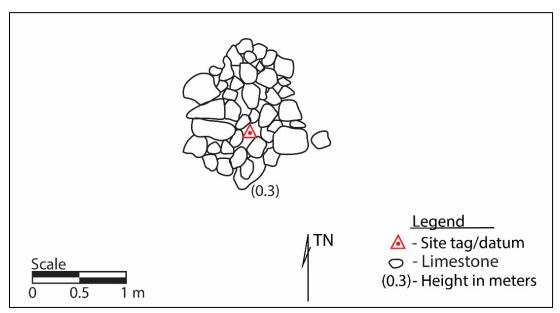


Figure 180. Plan-view map of SIHP 50-80-12-05106, Feature 18 mound.



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 $1.4 \text{ m} (\text{NW/SE}) \times 1.1 \text{ m} (\text{E/W})$ 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.

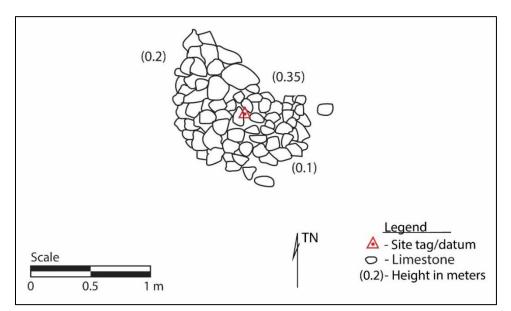


Figure 182. Plan-view map of SIHP 50-80-12-05106, Feature 19 mound.



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 $1.8 \text{ m} (\text{N/S}) \times 1.8 (\text{E/W})$ 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.

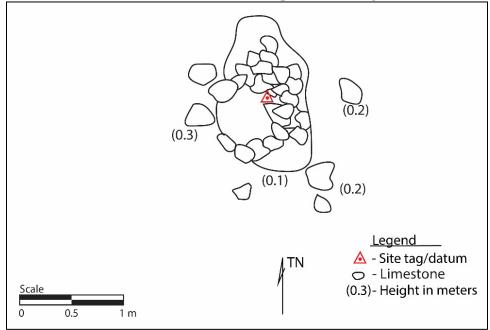


Figure 184. Plan-view map of SIHP 50-80-12-05106, Feature 20 mound.



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 $1.2 \text{ m} (\text{N/S}) \times 1.6 \text{ m} (\text{E/W})$ 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.

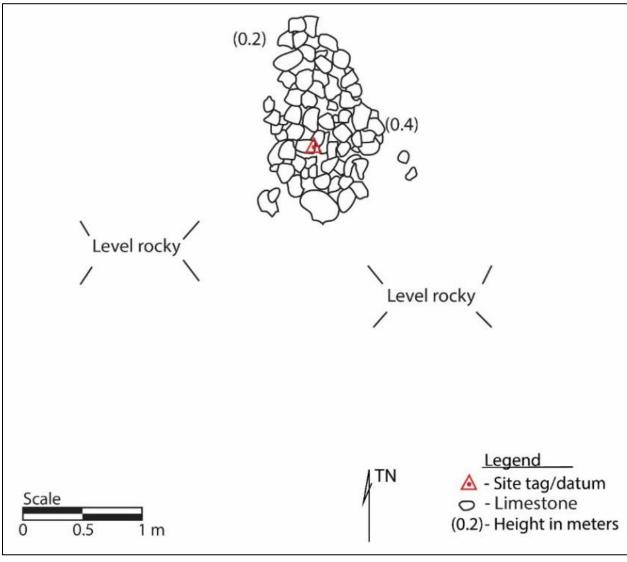


Figure 186. Plan-view map of SIHP 50-80-12-05106, Feature 21 oval-shaped mound.





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.

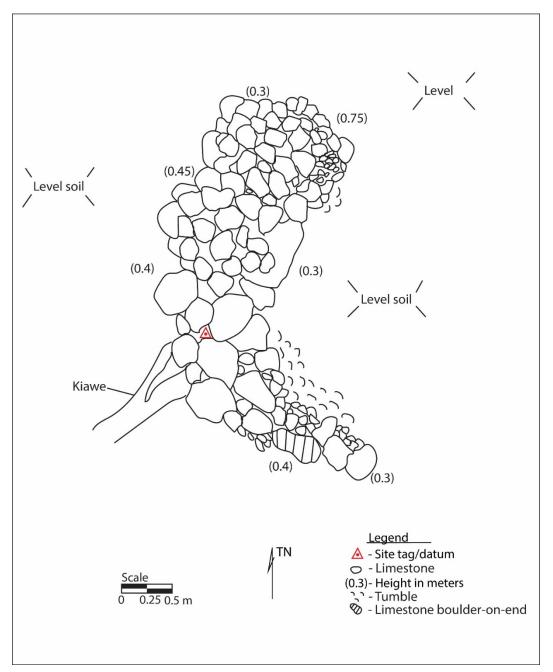


Figure 188. Plan-view map of SIHP 50-80-12-05106, Feature 22 L-shaped mound.





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) \times 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.

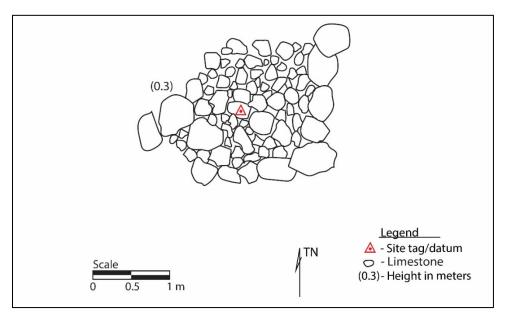


Figure 190. Plan-view map of SIHP 50-80-12-05106, Feature 23 mound.



Figure 191. SIHP 50-80-12-05106, Feature 23 mound (view to east).

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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) \times 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.

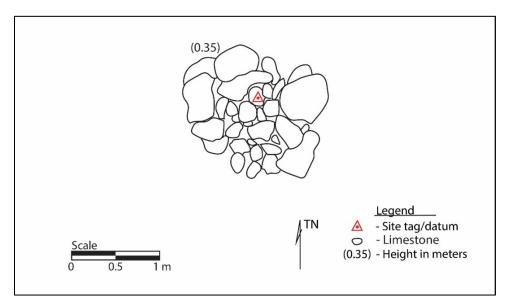


Figure 192. Plan-view map of SIHP 50-80-12-05106, Feature 24 mound.



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) \times 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.

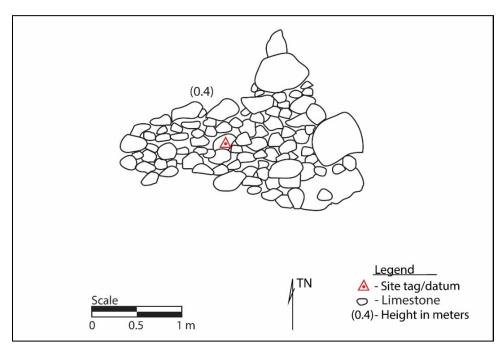


Figure 194. Plan-view map of SIHP 50-80-12-05106, Feature 25 mound.



Figure 195. SIHP 50-80-12-05106, Feature 25 mound (view to southwest).

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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) \times 4 m (E/W) with a maximum height of 0.5 m. The remnant enclosure is best defined by a rectangular soil floor $0.6 \text{ m} (\text{E/W}) \times 2 \text{ m} (\text{N/S})$ in size. Another small level soil area is at the southern end of the enclosure and is roughly $0.8 \text{ m} (\text{N/S}) \times 0.8 \text{ m} (\text{E/W})$. 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.

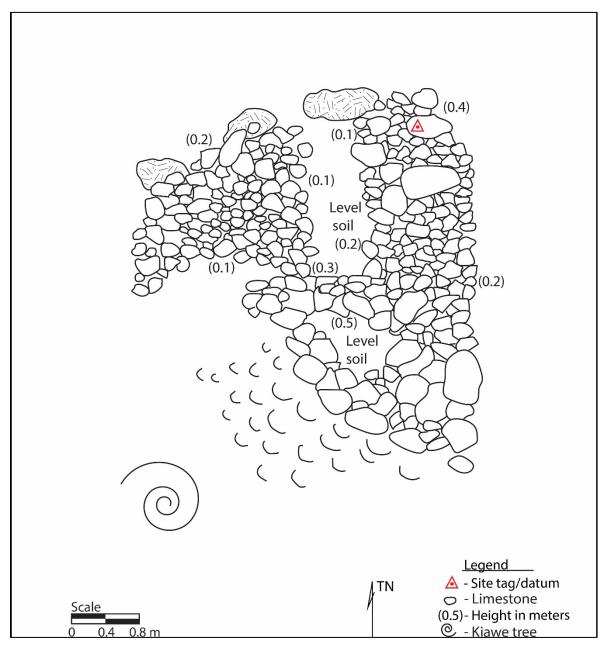


Figure 196. Plan-view map of SIHP 50-80-12-05106, Feature 26 remnant enclosure.





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.

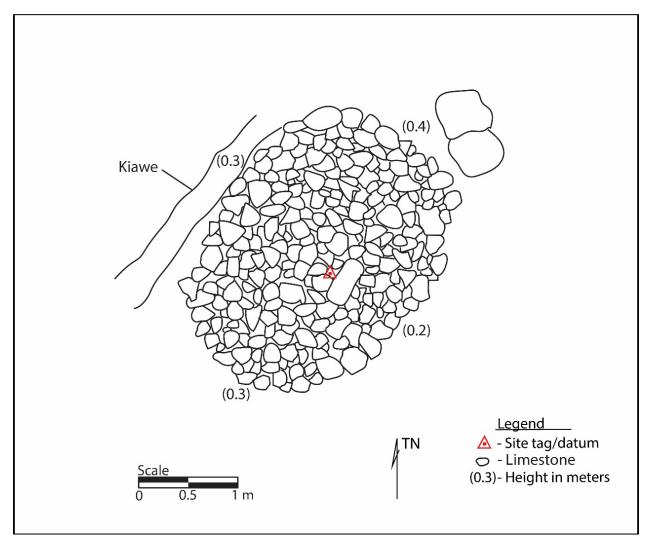


Figure 198. Plan-view map of SIHP 50-80-12-05106, Feature 27 remnant circular mound.





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.

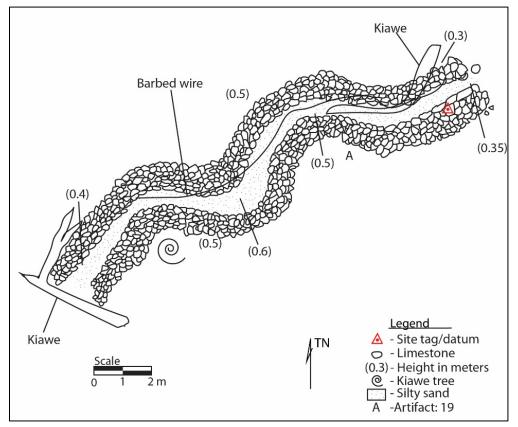


Figure 200. Plan-view map of SIHP 50-80-12-05106, Feature 28 stone channel.





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 southwestnortheast 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.

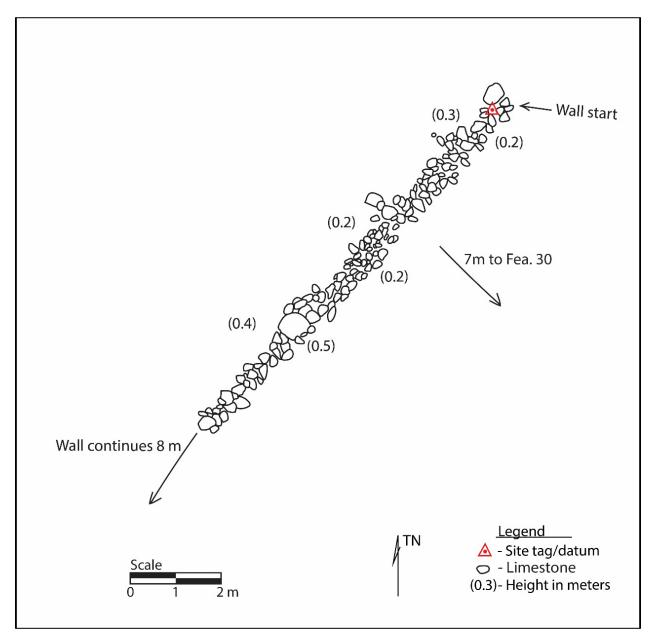


Figure 202. Plan-view map of SIHP 50-80-12-05106, Feature 29 remnant wall.





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) \times 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.

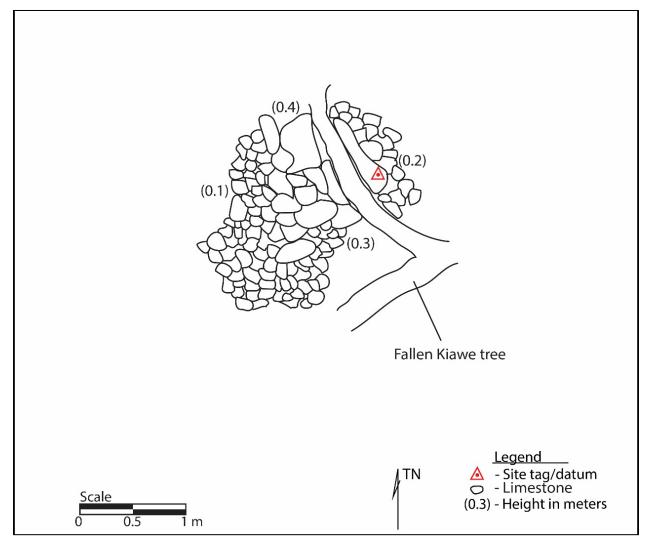


Figure 204. Plan-view map of SIHP 50-80-12-05106, Feature 30 mound.



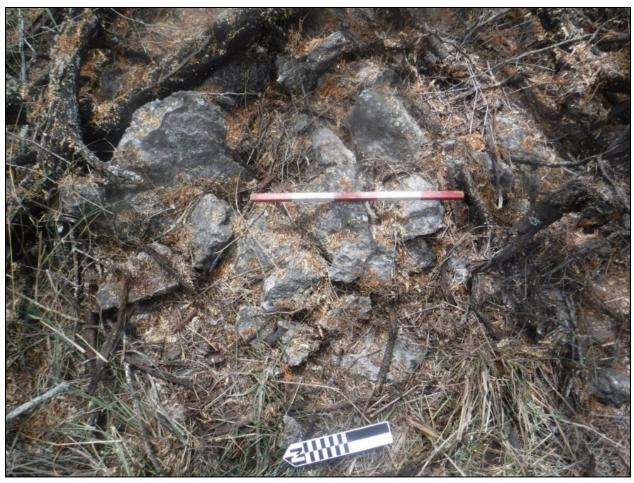


Figure 205. SIHP 50-80-12-05106, Feature 30 mound (view to south).



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.

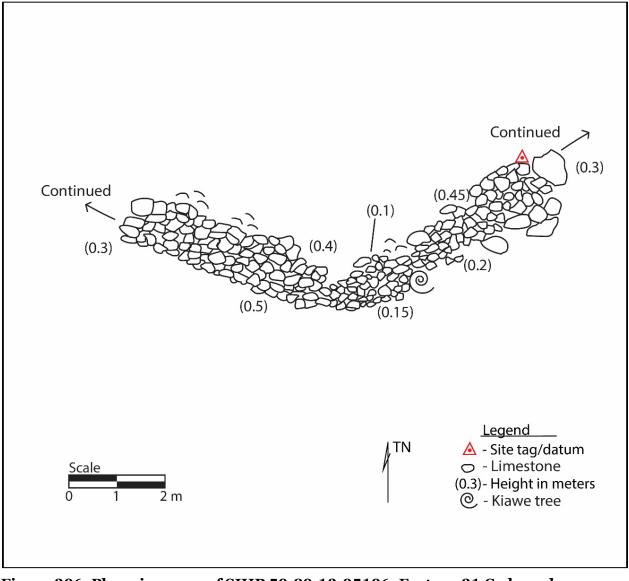


Figure 206. Plan-view map of SIHP 50-80-12-05106, Feature 31 C-shaped enclosure.





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.

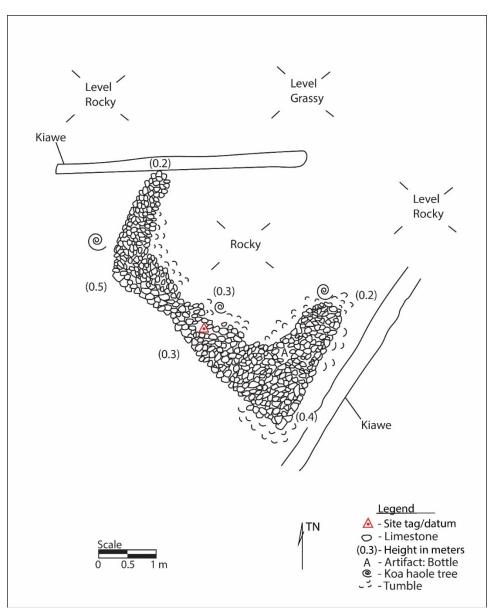


Figure 209. Plan-view map of SIHP 50-80-12-05106, Feature 33 C-shaped enclosure.





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) \times 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.



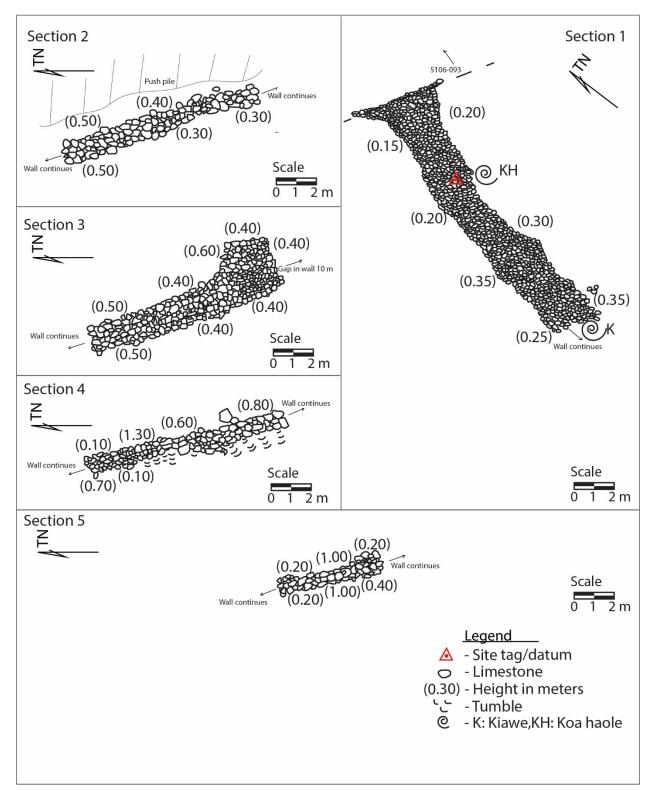


Figure 212. Plan-view map of SIHP 50-80-12-05106, Feature 34 wall sections.





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 $2.7 \text{ m} (N/S) \times 2.7 \text{ m} (E/W)$ 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.

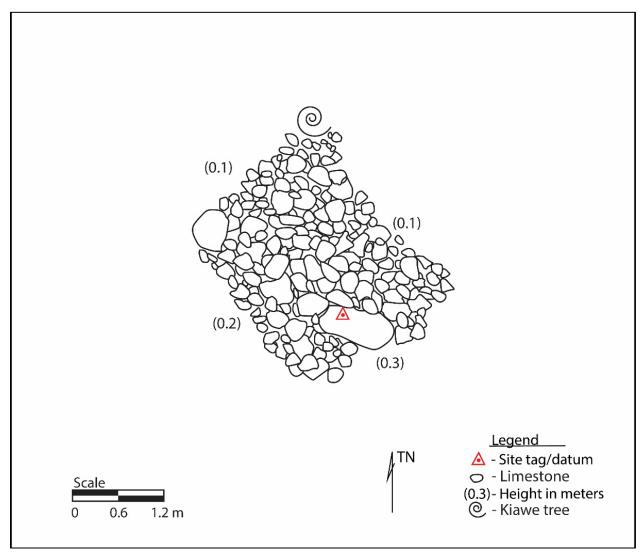


Figure 219. Plan-view map of SIHP 50-80-12-05106, Feature 35 mound.





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 $(N/S) \times 2.5 \text{ m} (E/W)$ 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.

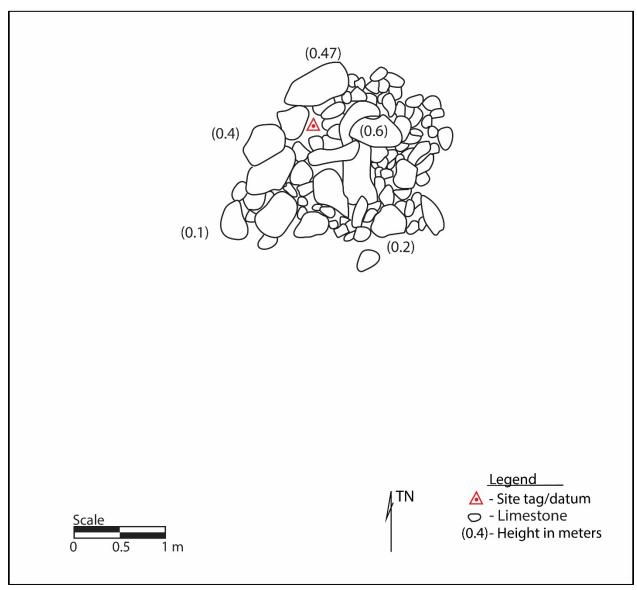


Figure 221. Plan-view map of SIHP 50-80-12-05106, Feature 36 small limestone mound.





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 $2.5 \text{ m} (\text{N/S}) \times 2 \text{ m} (\text{E/W})$ 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.

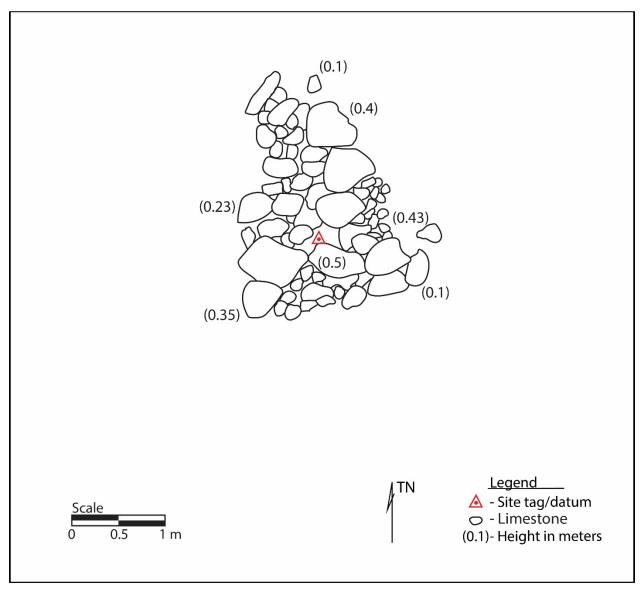


Figure 223. Plan-view map of SIHP 50-80-12-05106, Feature 37 triangular mound.





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) \times 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.

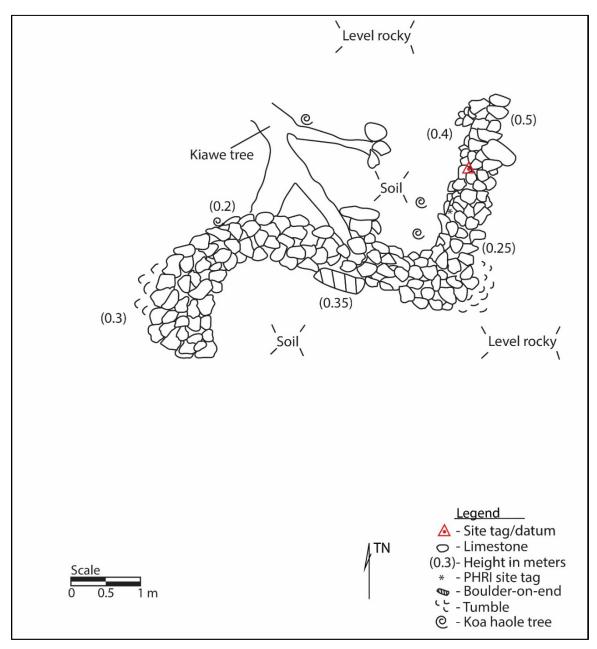


Figure 225. Plan-view map of SIHP 50-80-12-05106, Feature 38 S-shaped enclosure.





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) $\times 1.75 \text{ m}$ (E/W) with a maximum height of 0.32 m. The mound is relatively lowlying 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.

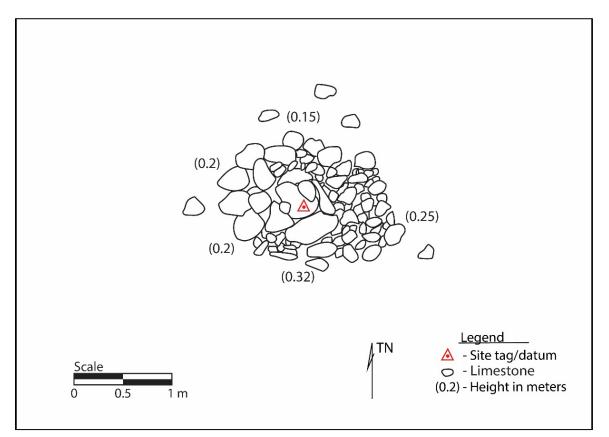


Figure 227. Plan-view map of SIHP 50-80-12-05106, Feature 39 mound.





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) \times 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.

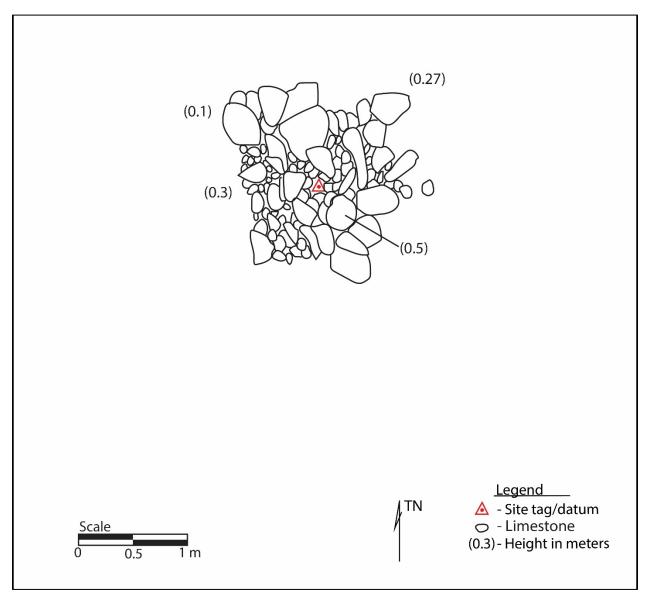


Figure 229. Plan-view map of SIHP 50-80-12-05106, Feature 40 mound.





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 $1.8 \text{ m} (\text{N/S}) \times 1.75 \text{ m} (\text{E/W})$ 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.

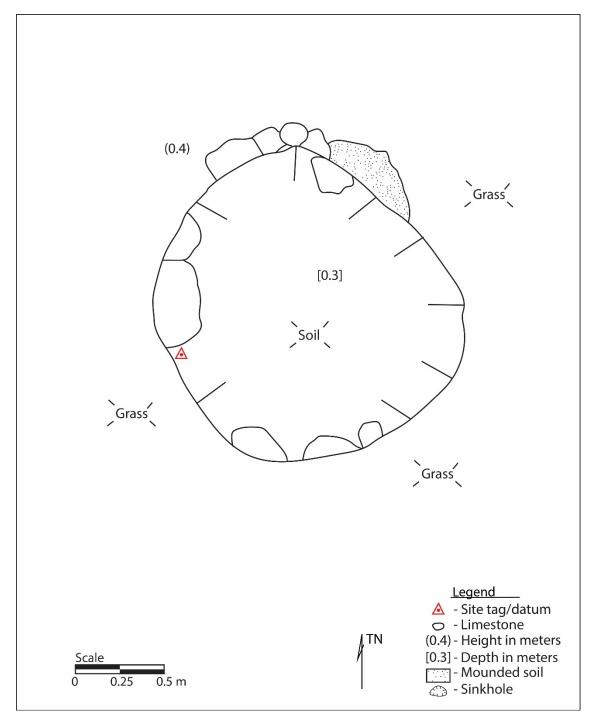


Figure 231. Plan-view map of SIHP 50-80-12-05106, Feature 41 modified limestone pit.





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 $3.2 \text{ m} (\text{N/S}) \times 1.3 \text{ m} (\text{E/W})$ 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.

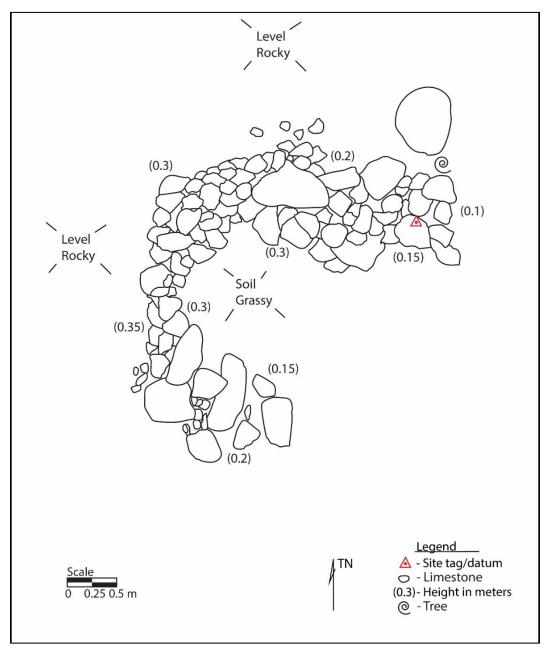


Figure 233. Plan-view map of SIHP 50-80-12-05106, Feature 42 C-shaped wall.





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.

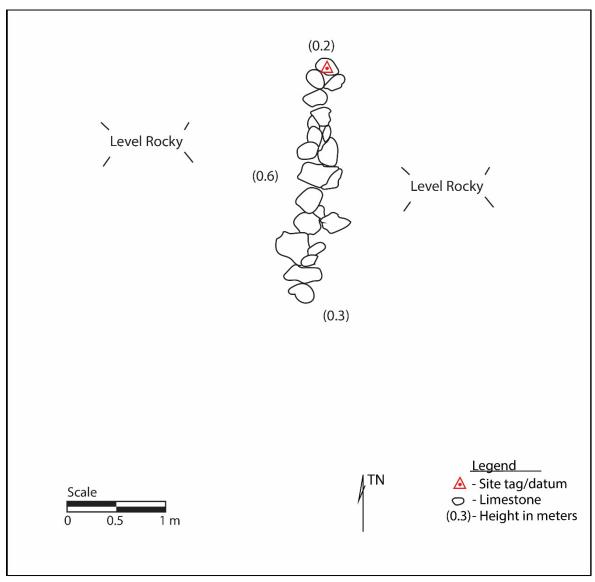


Figure 235. Plan-view map of SIHP 50-80-12-05106, Feature 43 wall.





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 $1 \text{ m long} \times 0.9 \text{ m wide} \times 0.4 \text{ m deep}$. 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) \times 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.

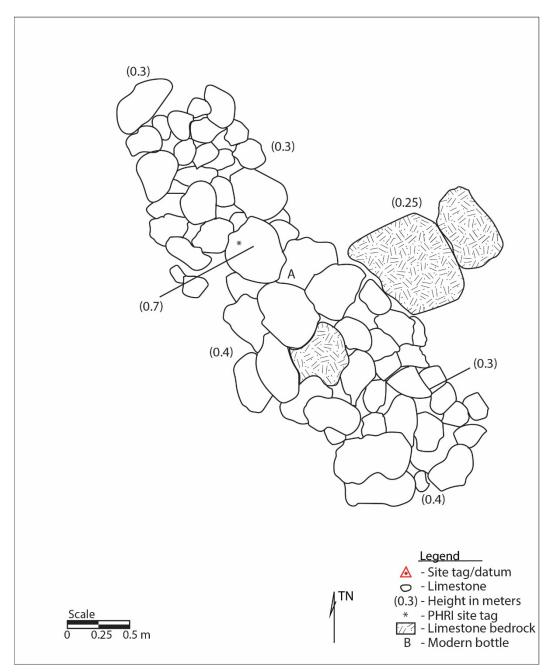


Figure 238. Plan-view of SIHP 50-80-12-05106, Feature 45 mound.

Feature 46 (Figure 239 and Figure 240) is a remnant wall segment located in the central-

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western portion of Parcel 40, about 125 m north of Tripoli Road. Feature 46 measures 7.5 m long $(E/W) \times 0.5$ 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.

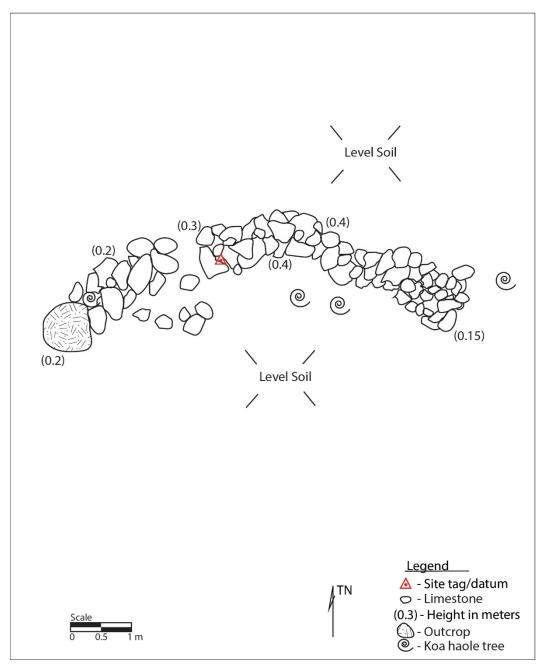


Figure 239. Plan-view map of SIHP 50-80-12-05106, Feature 46 wall segment.





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 centralwestern portion of Parcel 40. Feature 48 is $1.15 \text{ m} (\text{N/S}) \times 1.5 \text{ m} (\text{E/W})$ 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.

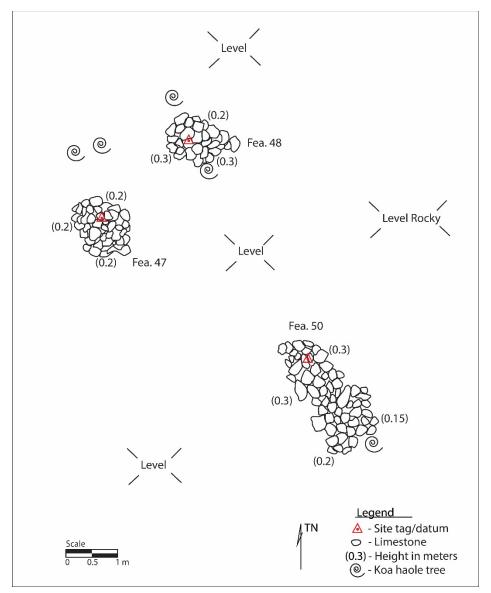


Figure 241. Plan-view map of SIHP 50-80-12-05106, Features 47, 48, and 50 (mounds).





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) × REVISED DRAFT – Archaeological Inventory Survey Report Barbers Point Solar Project, Honouliuli Ahupua'a 'Ewa, O'ahu November 2021 211



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.

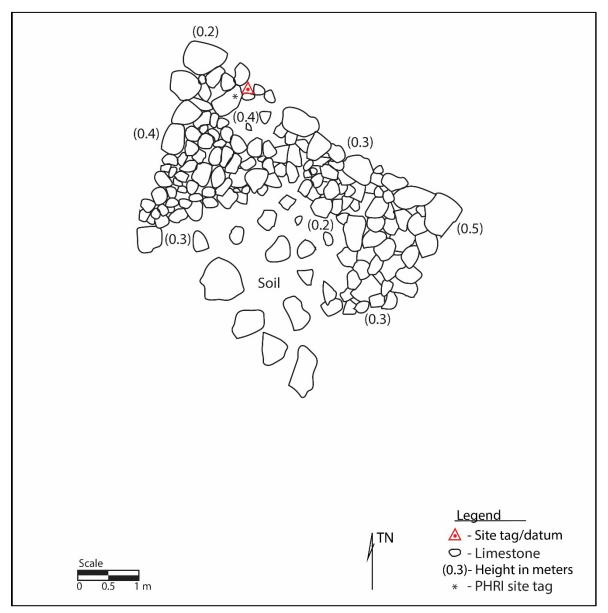


Figure 244. SIHP 50-80-12-05106, Feature 49 remnant enclosure.





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.

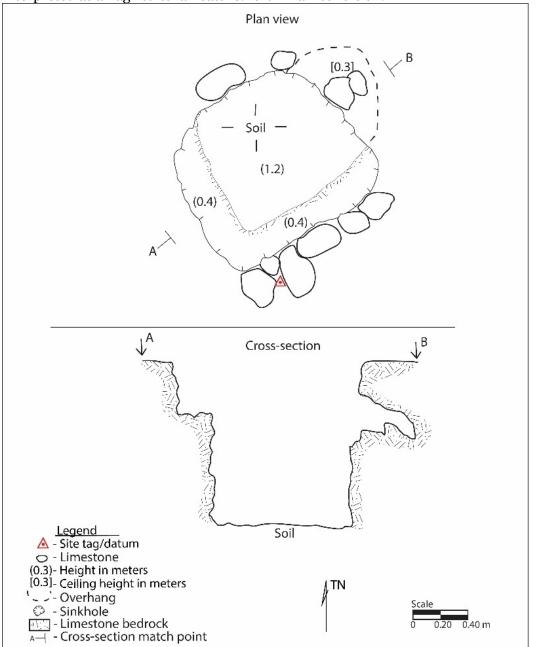


Figure 247. Plan-view map of SIHP 50-80-12-05106, Feature 51 modified limestone pit.

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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) $\times 2 \text{ m}$ (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.

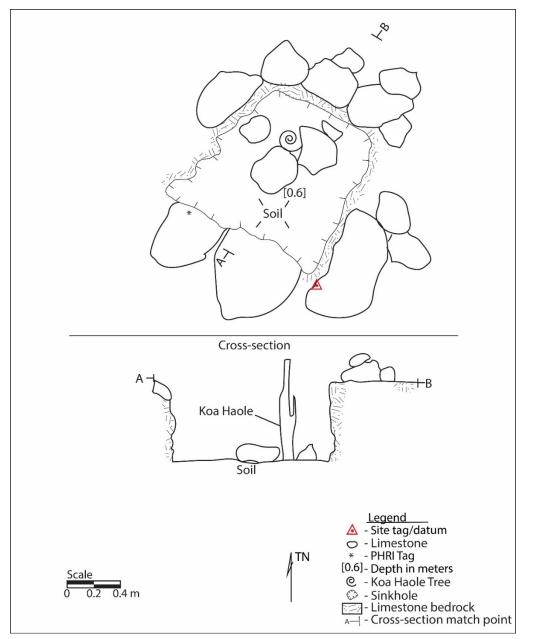


Figure 249. Plan-view map of SIHP 50-80-12-05106, Feature 52 modified limestone pit.





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 $0.7 \text{ m} (\text{N/S}) \times 2 \text{ m} (\text{E/W})$ 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.

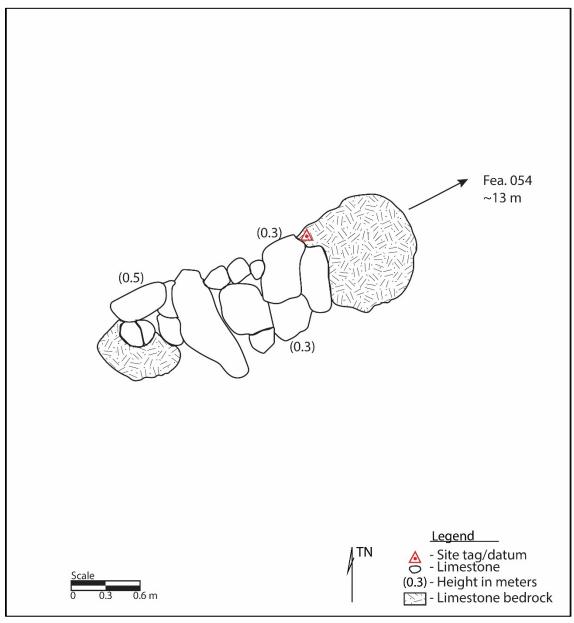


Figure 251. Plan-view map of SIHP 50-80-12-05106, Feature 53 linear mound.





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.

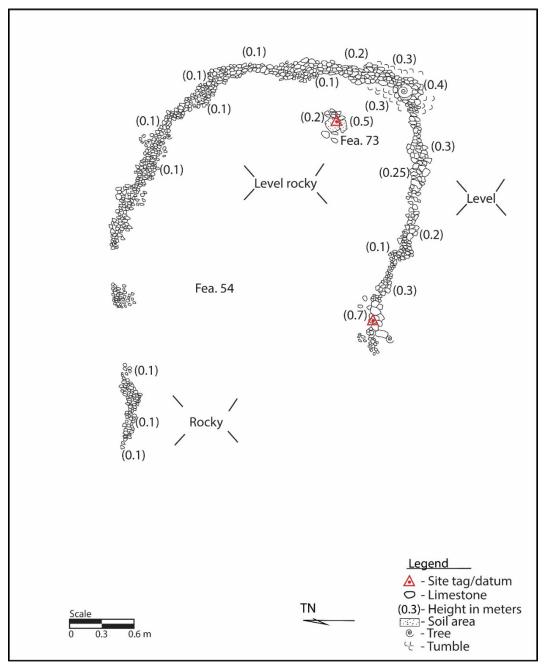


Figure 253. Plan-view map of SIHP 50-80-12-05106, Feature 54 enclosure and Feature 73 (a boulder on-end) in southeast corner.





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) $\times 2.25 \text{ m}$ (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.

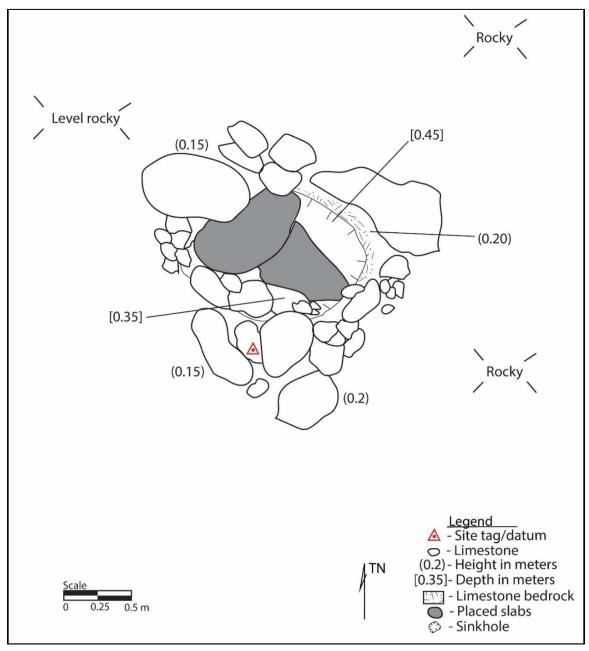


Figure 256. Plan-view map of SIHP 50-80-12-05106, Feature 55 modified pit.





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) \times 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.

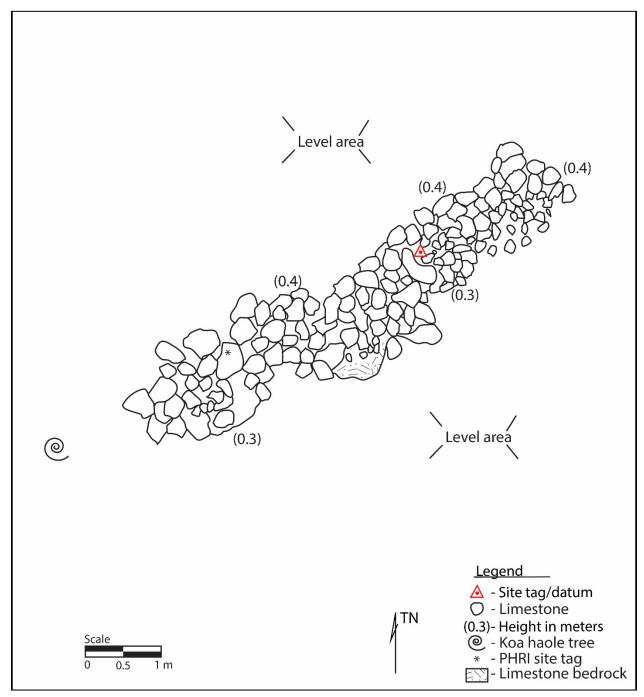


Figure 259. Plan-view map of SIHP 50-80-12-05106, Feature 57 wall remnant.





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 centralwestern portion of Parcel 40. The pit is $1.5 \text{ m} (\text{N/S}) \times 2 \text{ m} (\text{E/W})$ 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.

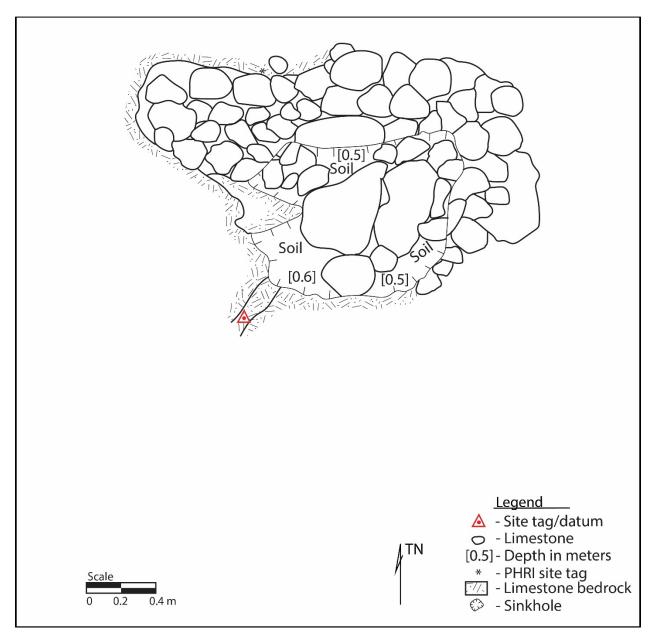


Figure 261. Plan-view map of SIHP 50-80-12-05106, Feature 58 modified limestone pit.





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 $1.2 \text{ m} \times 0.9$ m $\times 0.25$ 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.

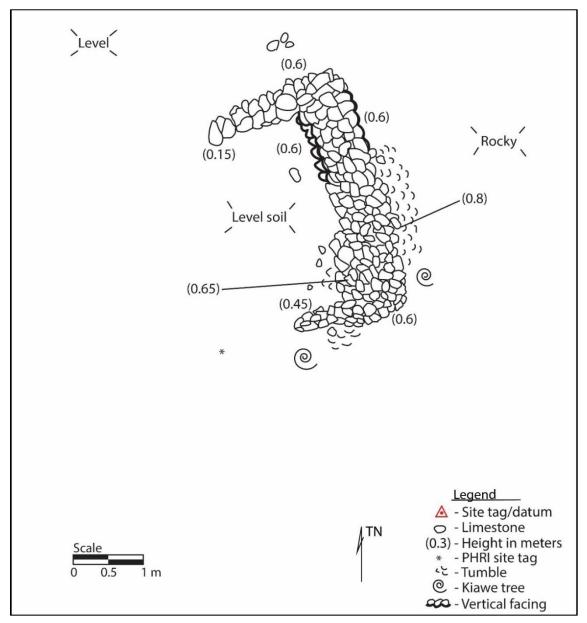


Figure 265. Plan-view map of SIHP 50-80-12-05106, Feature 61 C-shaped enclosure.





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 Cshape. 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) \times 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.

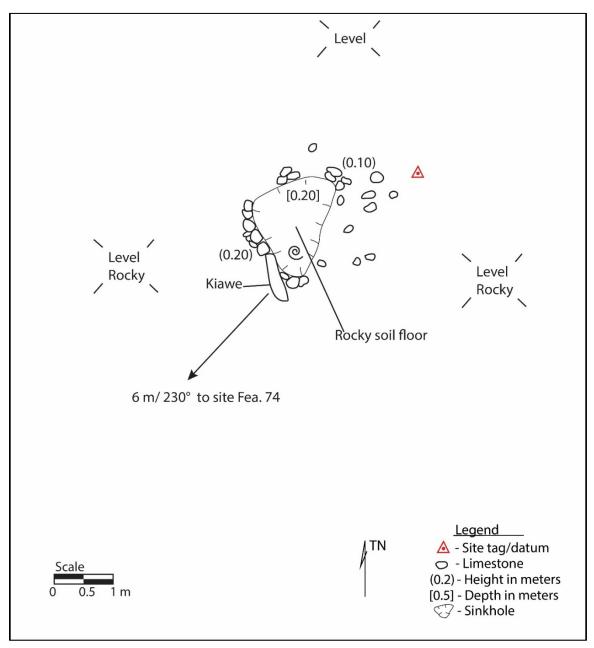


Figure 268. Plan-view of SIHP 50-80-12-05106, Feature 63 overview of pit.





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 $(N/S) \times 1.8$ 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.

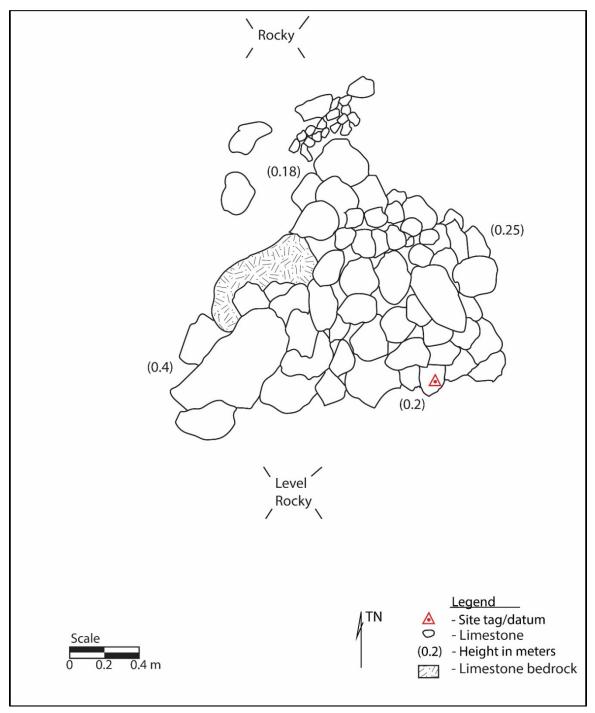


Figure 270. Plan-view map of SIHP 50-80-12-05106, Feature 64 mound.





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 $0.9 \text{ m} (\text{N/S}) \times 1.6 \text{ m} (\text{E/W})$ 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.

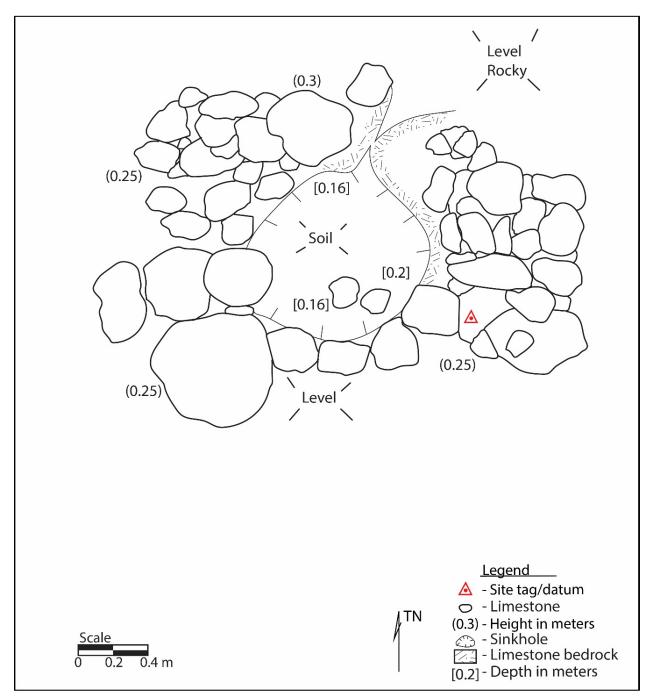


Figure 272. Plan-view map of SIHP 50-80-12-05106, Feature 65 modified limestone pit.





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) \times 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.

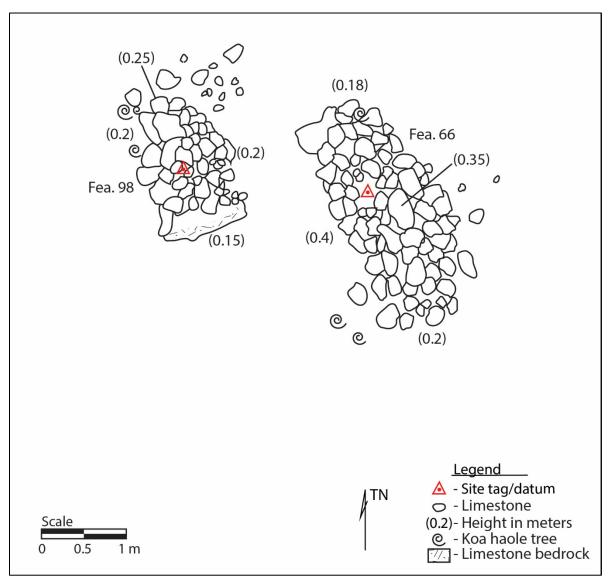


Figure 274. Plan-view map of SIHP 50-80-12-05106, Feature 66 and Feature 98 mounds.





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 $67 \text{ is } 1.2 \text{ m} (\text{N/S}) \times 1.68 \text{ m} (\text{E/W})$ 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.

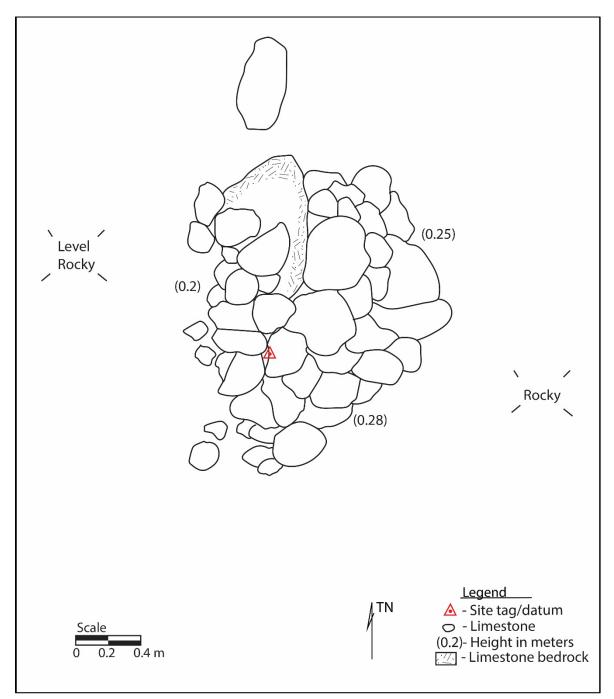


Figure 276. Plan-view map of SIHP 50-80-12-05106, Feature 67 mound.





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 \times 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 $1.5 \text{ m} (\text{E/W}) \times 2.5 \text{ m} (\text{N/S})$ 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 $\times 0.5 \text{ m}$ 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.

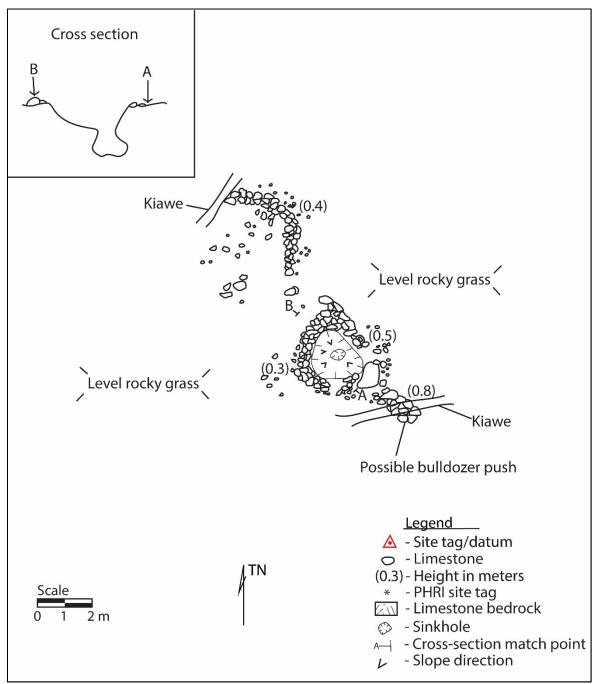


Figure 279. Plan-view map of SIHP 50-80-12-05106, Feature 69 modified pit.





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) \times 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.

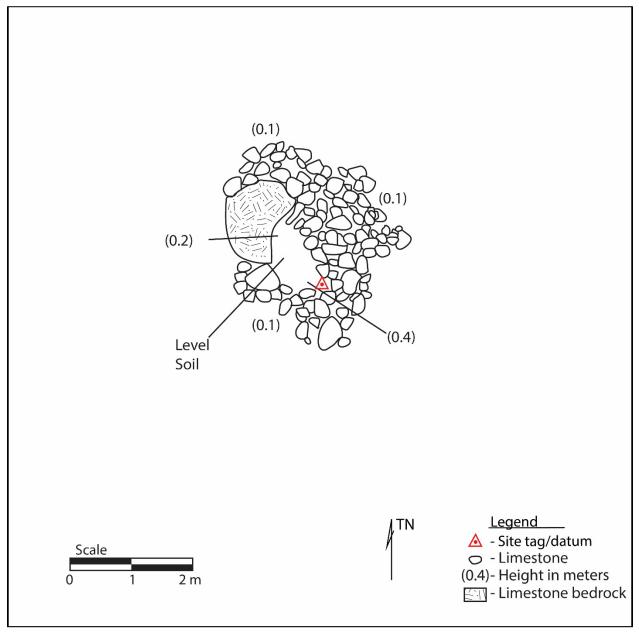


Figure 281. Plan-view map of SIHP 50-80-12-05106, Feature 70 remnant enclosure.





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.

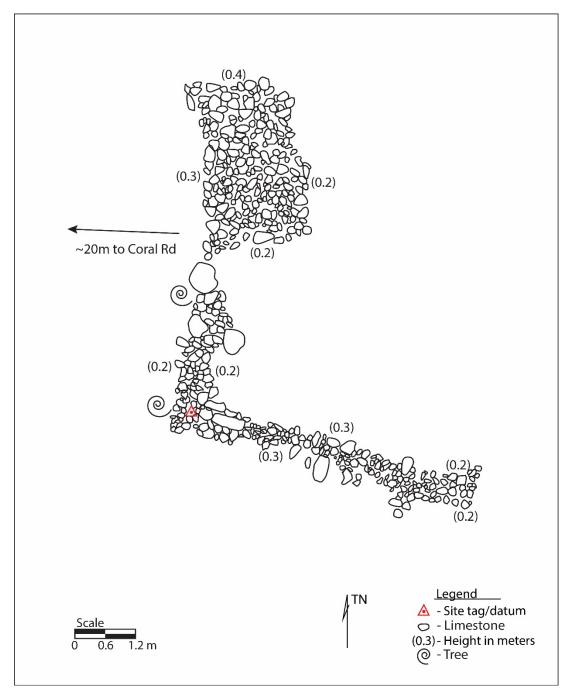


Figure 283. Plan-view map of SIHP 50-80-12-05106, Feature 71 L-shaped wall.





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) \times 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".

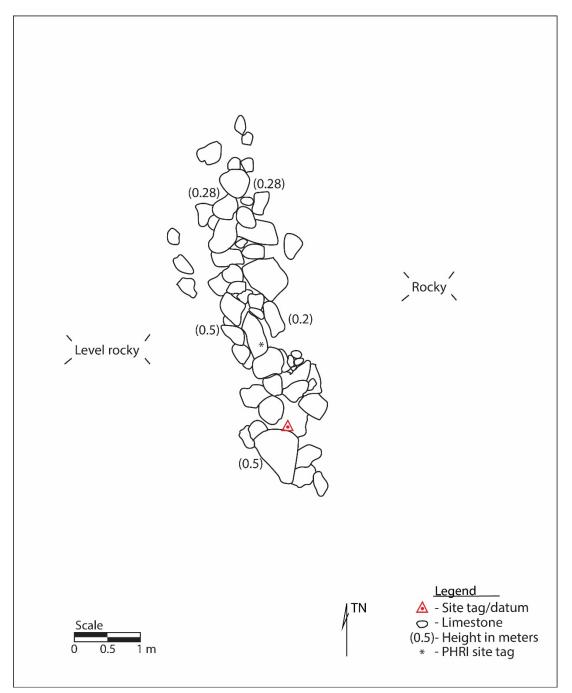


Figure 285. Plan-view map of SIHP 50-80-12-05106, Feature 72 wall.





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 $(N/S) \times 1.25$ 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.

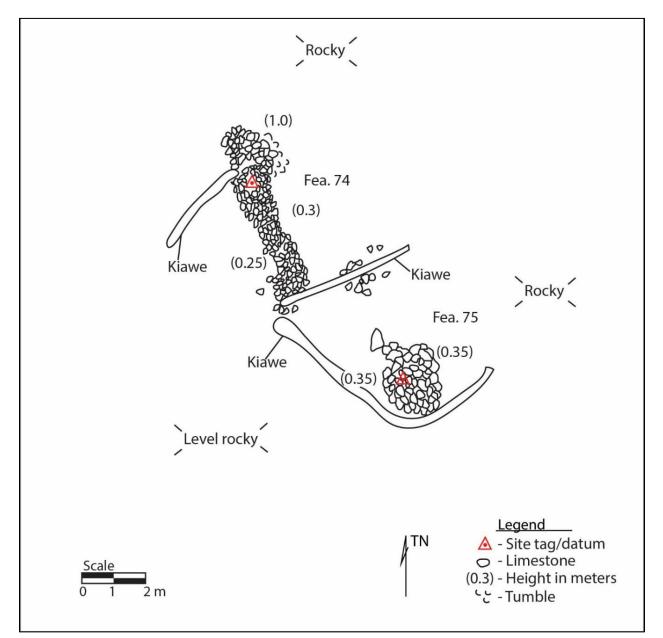


Figure 288. Plan-view map of SIHP 50-80-12-05106, Feature 74 wall and Feature 75 mound.





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) \times 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.

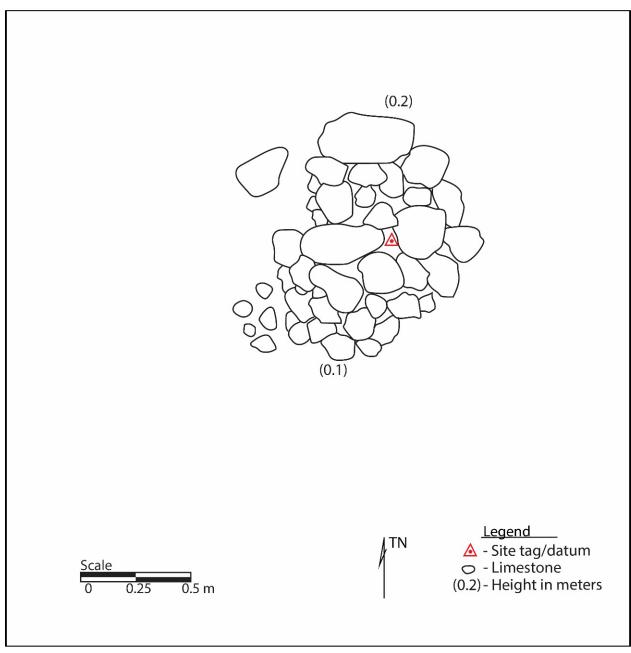


Figure 291. Plan-view map of SIHP 50-80-12-05106, Feature 76 mound.





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) \times 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.

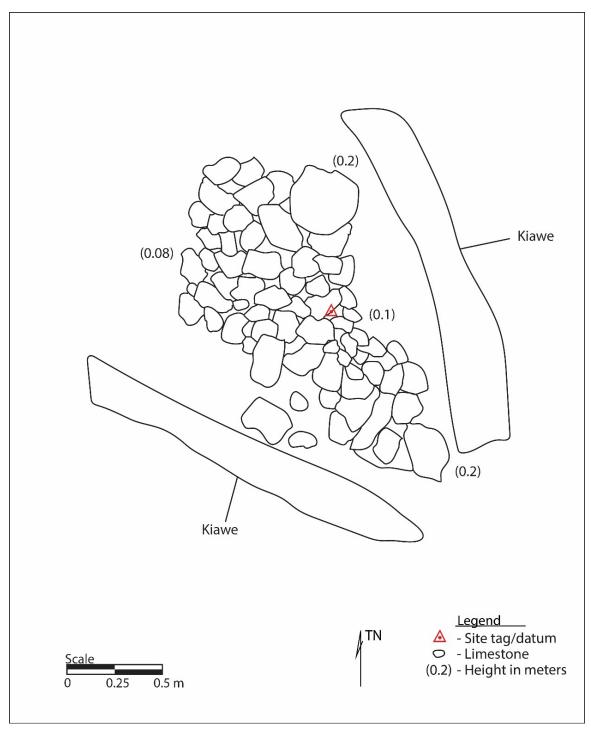


Figure 293. Plan-view map of SIHP 50-80-12-05106, Feature 77 mound.





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) \times 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.

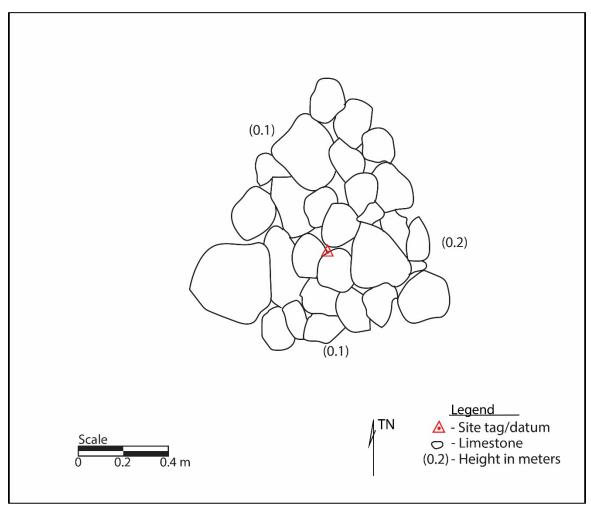


Figure 295. Plan-view map of SIHP 50-80-12-05106, Feature 78 mound.





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.

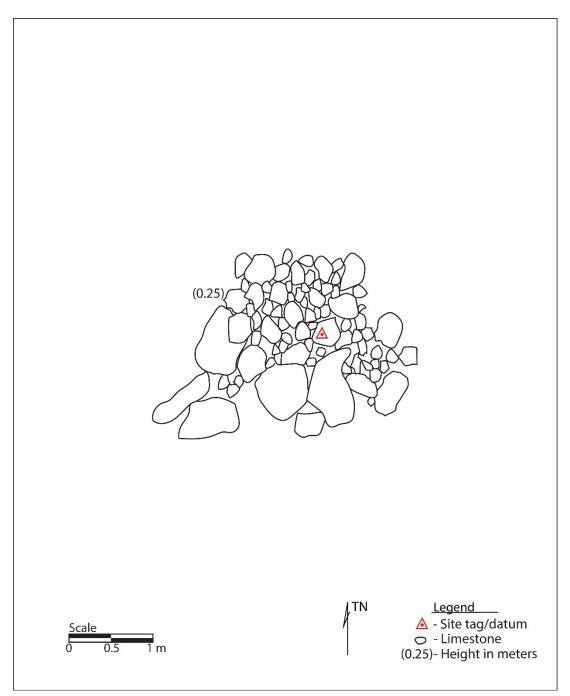


Figure 297. Plan-view map of SIHP 50-80-12-05106, Feature 79 mound.





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 $1.7 \text{ m} (\text{N/S}) \times 1.4 \text{ m}$ (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.

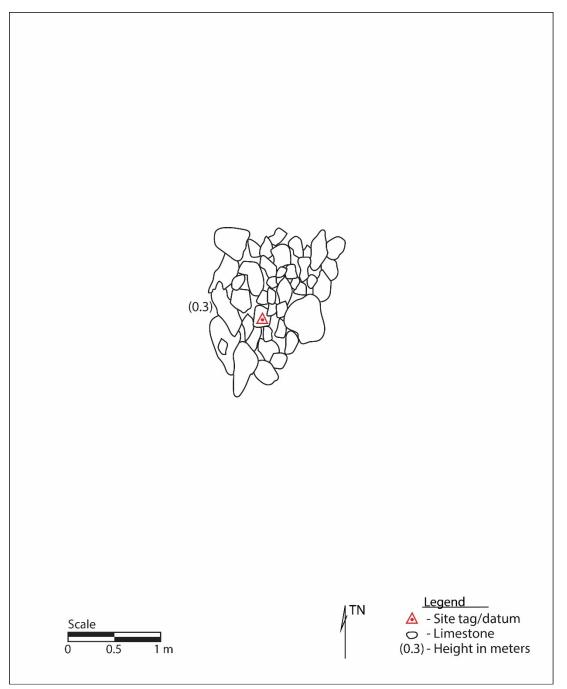


Figure 299. Plan-view map of SIHP 50-80-12-05106, Feature 80 triangular mound.





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) \times 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.

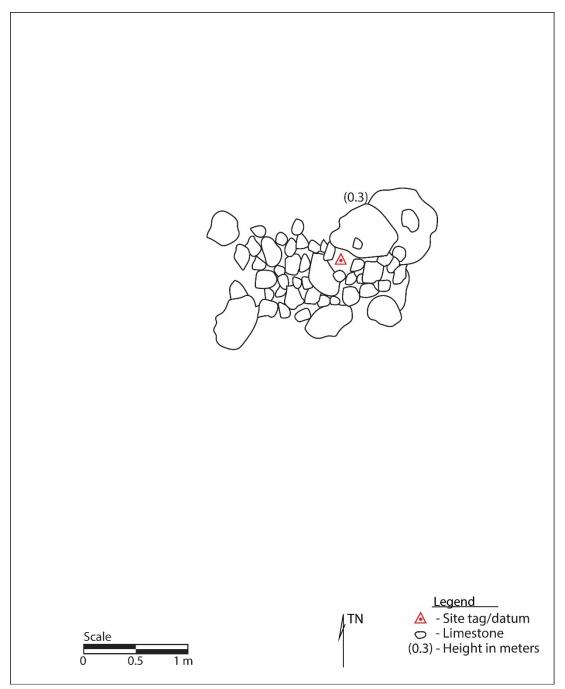


Figure 301. SIHP 50-80-12-05106, Feature 81 mound.





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) \times 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.

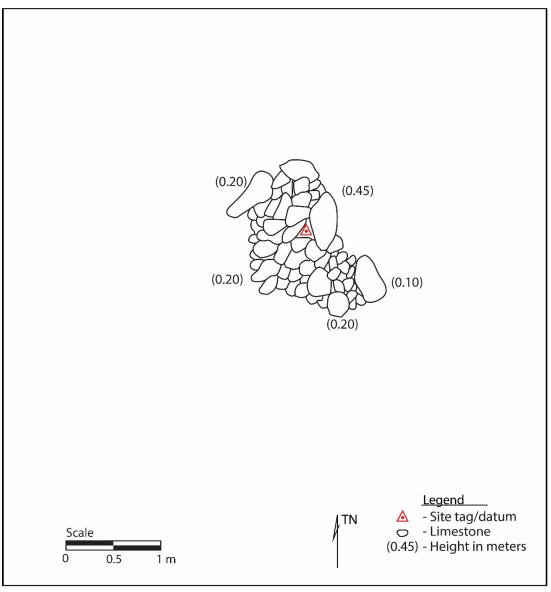


Figure 303. Plan-view map of SIHP 50-80-12-05106, Feature 82 linear mound.





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 $1.1 \text{ m} (\text{N/S}) \times$ 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.

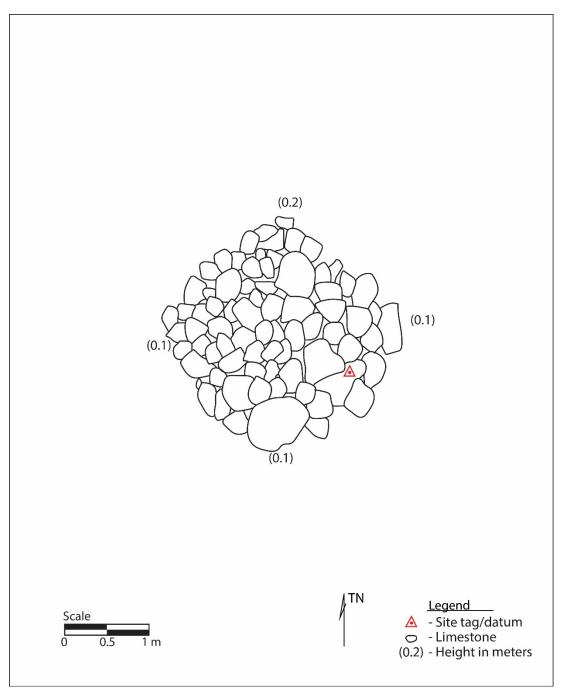


Figure 305. Plan-view map of SIHP 50-80-12-05106, Feature 83 mound.





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 $2 \text{ m}(N/S) \times 2 \text{ m}(E/W)$ 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.

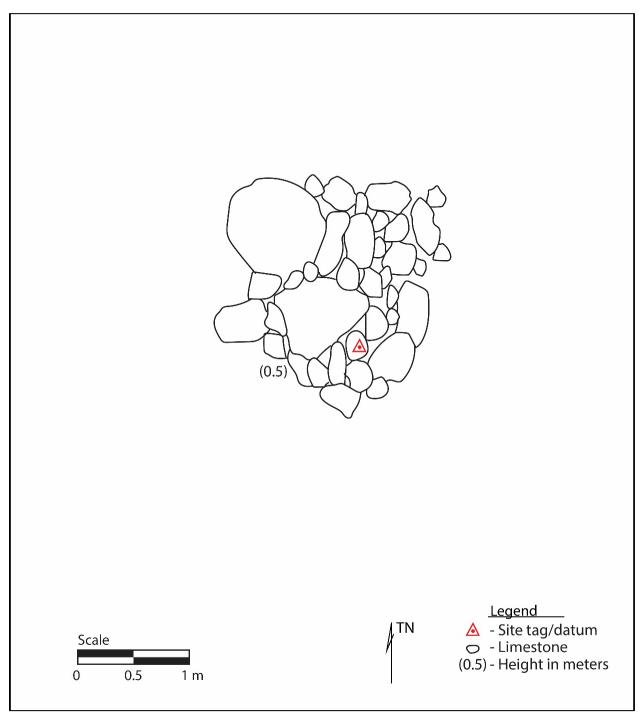


Figure 307. Plan-view of SIHP 50-80-12-05106, Feature 84 mound.



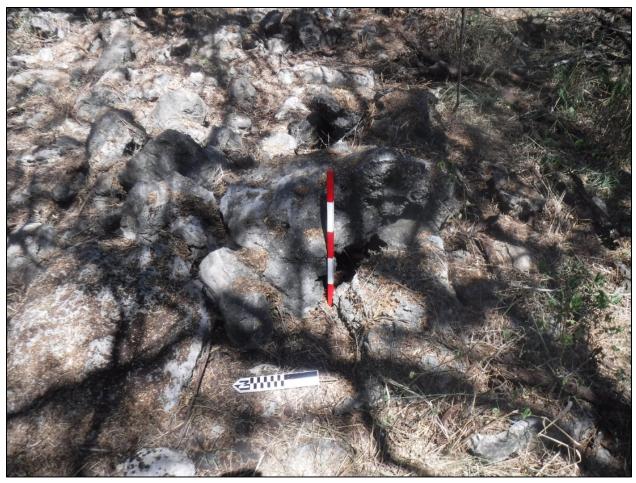


Figure 308. SIHP 50-80-12-05106, Feature 84 mound (view to east).



Feature 85 (Figure 309 and Figure 310) is an elongated, teardrop-shaped limestone mound that measures $1.8 \text{ m} (\text{N/S}) \times 1 \text{ m} (\text{E/W})$ 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.

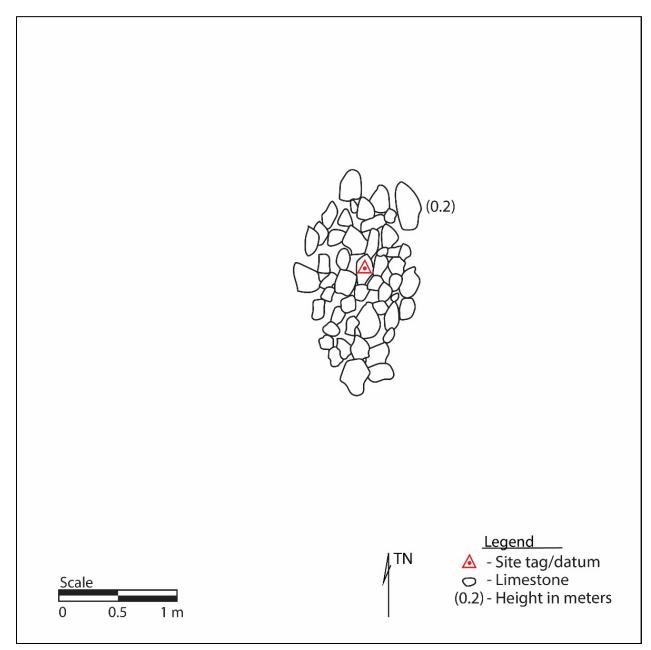


Figure 309. Plan-view map of SIHP 50-80-12-05106, Feature 85 elongated mound.





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) $\times 2.5 \text{ m}$ (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.

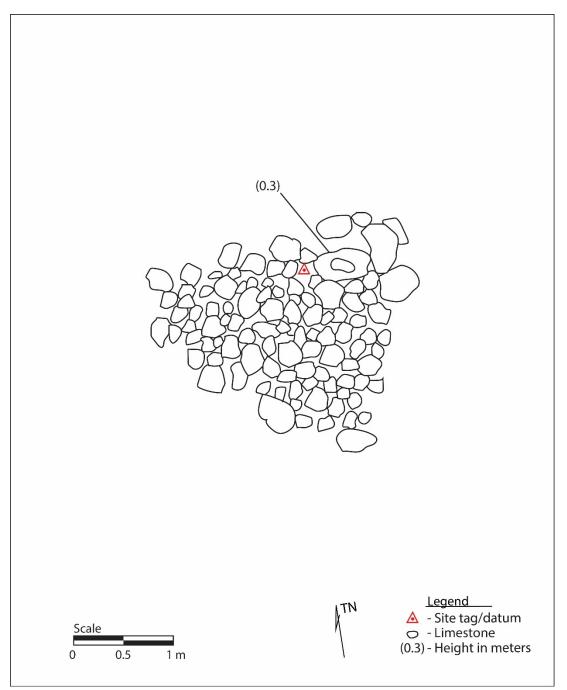


Figure 311. Plan-view map of SIHP 50-80-12-05106, Feature 86 triangular mound.





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 $1.4 \text{ m} (\text{N/S}) \times 1.7 \text{ m} (\text{E/W})$ 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.

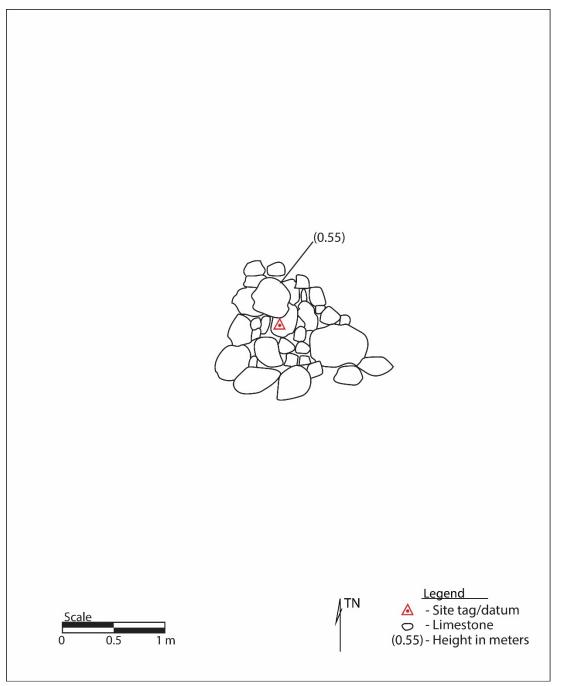


Figure 313. Plan-view map of SIHP 50-80-12-05106, Feature 87 triangular mound.





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 $(N/S) \times 1.2 \text{ m}$ (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.

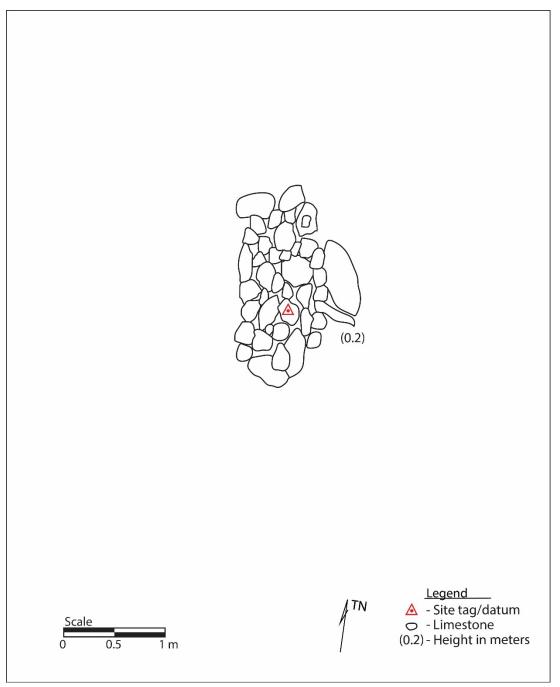


Figure 315. Plan-view map of SIHP 50-80-12-05106, Feature 88 elongated mound.





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) \times 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.

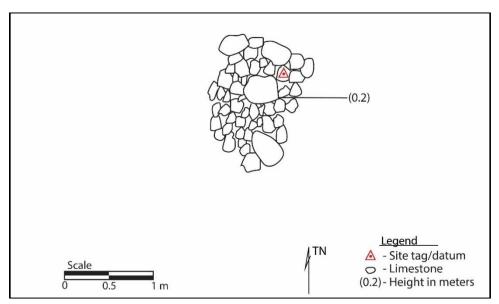


Figure 317. Plan-view map SIHP 50-80-12-05106, Feature 89 oval-shaped mound.



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 $(N/S) \times 2 \text{ m} (E/W)$ 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.

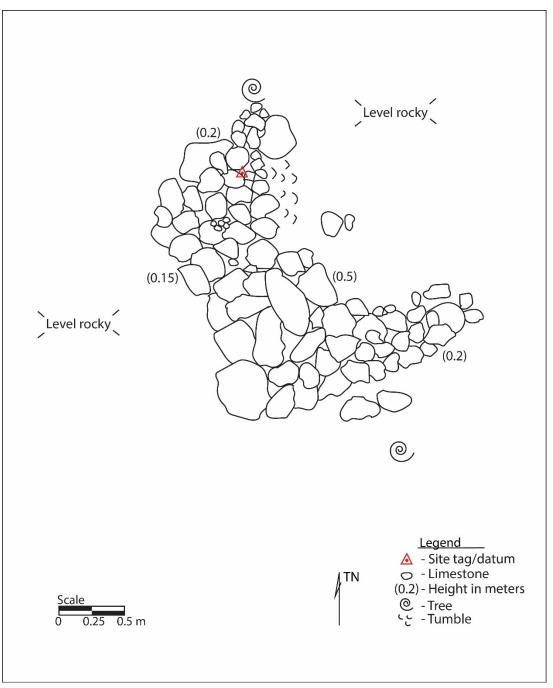


Figure 319. Plan-view map of SIHP 50-80-12-05106, Feature 90 linear mound.





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) \times 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.

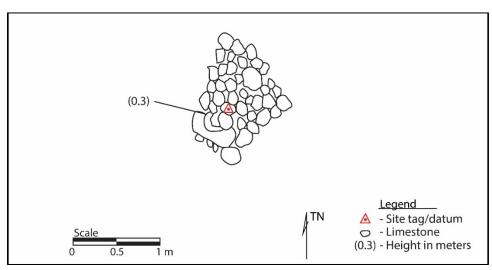


Figure 321. Plan-view map of SIHP 50-80-12-05106, Feature 91 diamond-shaped mound.



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 REVISED DRAFT – Archaeological Inventory Survey Report Barbers Point Solar Project, Honouliuli Ahupua'a 'Ewa, O'ahu November 2021



 $(N/S) \times 1.5 \text{ m} (E/W)$ 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.

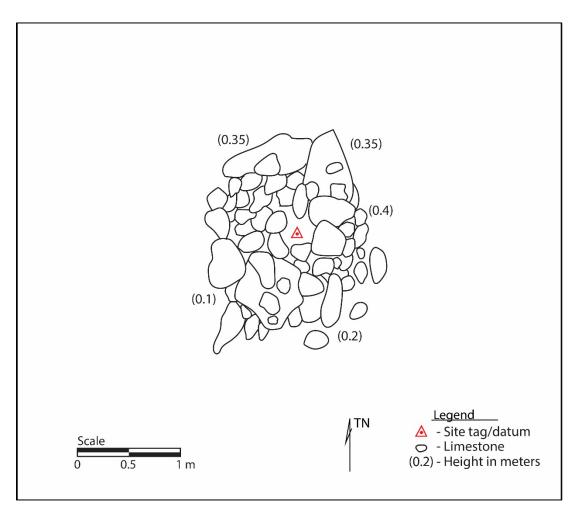


Figure 323. Plan-view map of SIHP 50-80-12-05106, Feature 92 oval-shaped mound.





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) \times 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.

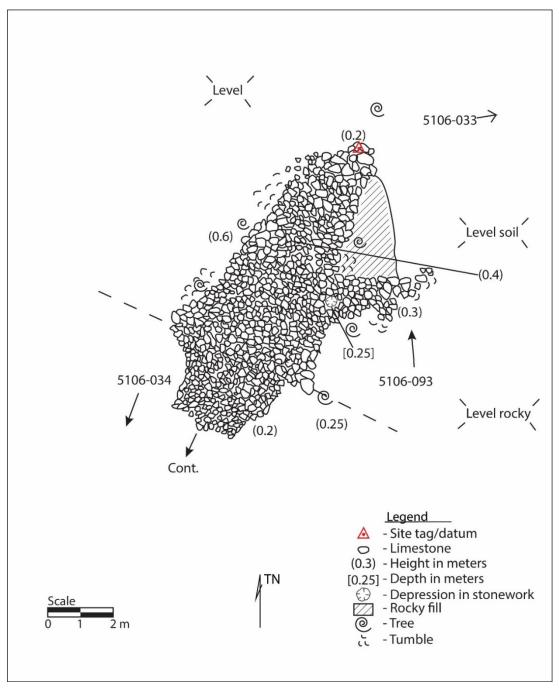


Figure 325. Plan-view map of SIHP 50-80-12-05106, Feature 93 remnant platform.

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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 $2 \text{ m}(N/S) \times 2 \text{ m}(E/W)$ 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.

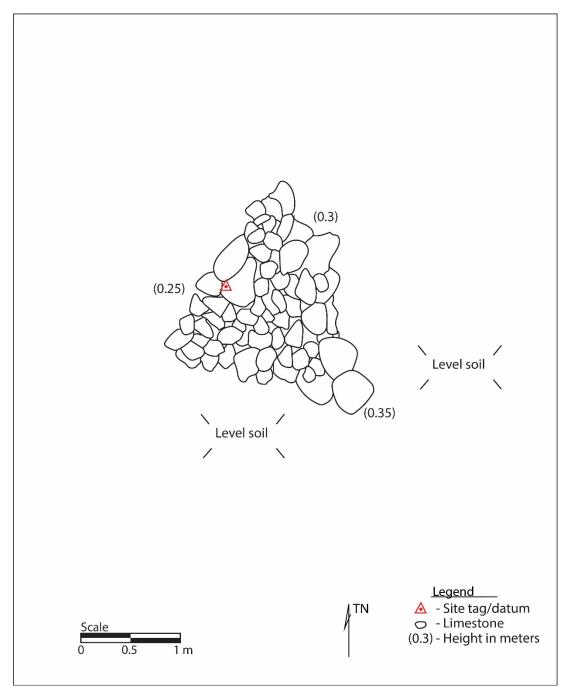


Figure 327. Plan-view map of SIHP 50-80-12-05106, Feature 94 triangular mound.





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 $(N/S) \times 0.9 \text{ m}$ (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.

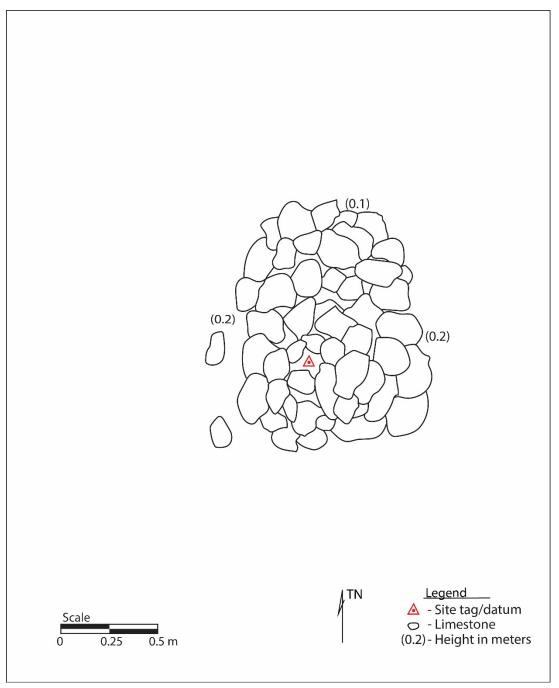


Figure 329. Plan-view map of SIHP 50-80-12-05106, Feature 95 mound.





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 $2 \text{ m} (\text{N/S}) \times 0.8 \text{ m} (\text{E/W})$ 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.

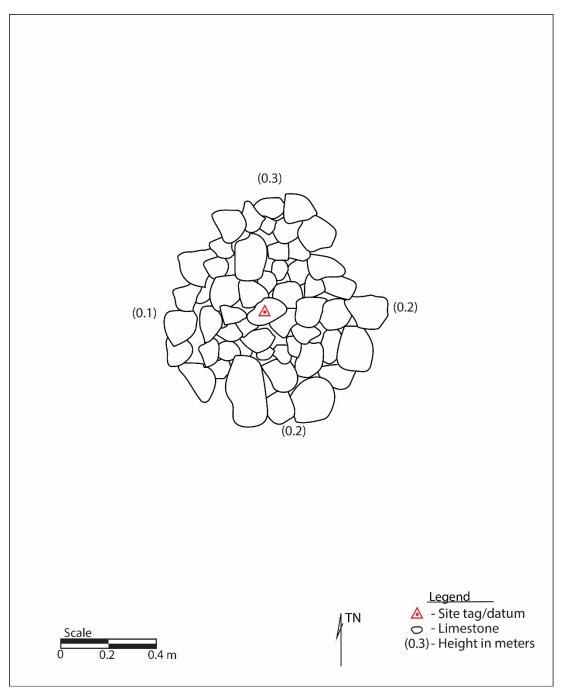


Figure 331. Plan-view map of SIHP 50-80-12-05106, Feature 96 trapezoidal mound.





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 \times 0.5 m wide \times 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 $1.75 \text{ m} (\text{N/S}) \times 1.25 \text{ m}$ (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) \times 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.

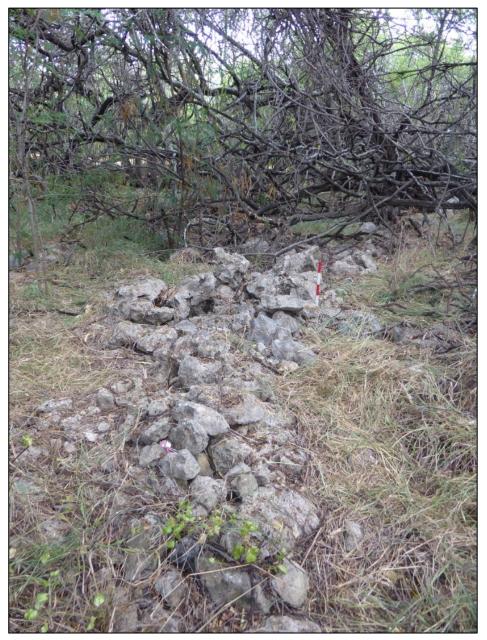


Figure 335. SIHP 50-80-12-05106, Feature 99 wall (view to west).



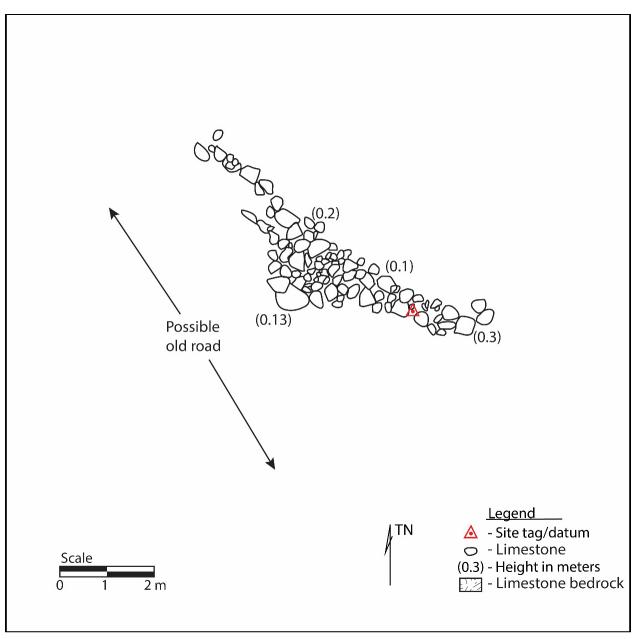


Figure 336. Plan-view map of SIHP 50-80-12-05106, Feature 99 wall.



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.

Feature	Field No.	Туре	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

Table 9. Summary of SIHP 50-80-12-05107 Modified and Unmodified Limestone Pits





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).



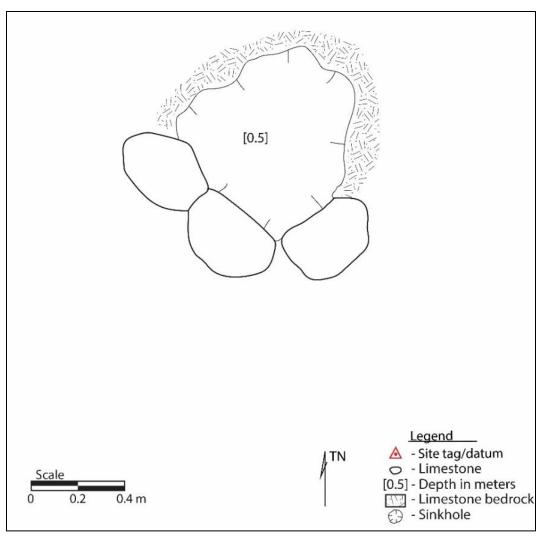


Figure 343. Plan-view of SIHP 50-80-12-05107, Feature 6 modified limestone pit.





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).



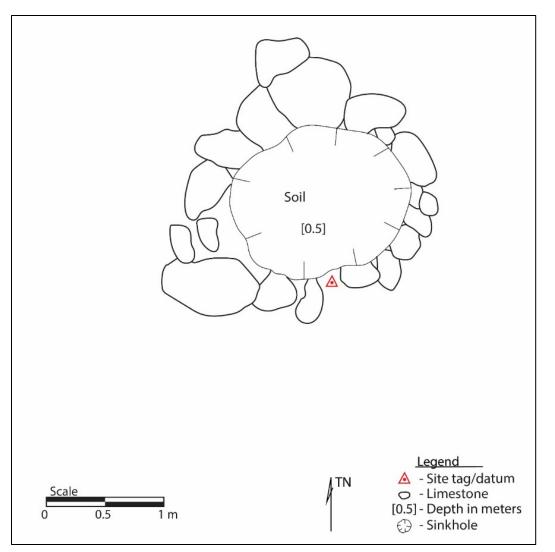


Figure 346. Plan-view of SIHP 50-80-12-05107, Feature 7 modified limestone pit.

