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ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

Jul 10, 2023

Ms. Mary Alice Evans, Acting Director
Office of Planning and Sustainable Development
Environmental Review Program
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

SUBJECT: Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
Tax Map Key: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Acting Director Evans:

This letter hereby transmits the Final Environmental Assessment and Finding of No Significant Impact (FEA-FONSI) for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area for publication in the next edition of the periodic bulletin. The project is proposed by the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DLNR - DOBOR), which owns and maintains the Pohoiki Boat Ramp facility. DOBOR's boat ramp facility is undamaged but remains landlocked. Volcanic material from the 2018 eruption that has accumulated in Pohoiki Bay, Puna District, Island of Hawai'i will be dredged and distributed primarily on new lava land away from the ocean.

We respectfully submit the required items for publication including a searchable PDF file of the FEA. If there are any questions about this submittal, please do not hesitate to contact DOBOR's project manager Finn McCall at (808) 587-3250 or via email to finn.d.mccall@hawaii.gov. You may also contact DOBOR's consultant, Trevor Vagay of The Limtiaco Consulting Group (TLCG) at 808-596-7790 or via email to trevor@tlcghawaii.com.

Sincerely,

Dawn N.S. Chang, Chairperson
Board of Land and Natural Resources

cc: Finn McCall, Project Manager (DLNR – DOBOR)
Trevor Vagay, TLCG

enc.

From: webmaster@hawaii.gov
To: DBEDT OPSD Environmental Review Program
Subject: New online submission for The Environmental Notice
Date: Monday, July 17, 2023 1:02:42 PM

Action Name

Pohoiki Boat Ramp Dredging of Volcanic Debris

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
- (2) Propose any use within any land classified as a conservation district
- (3) Propose any use within a shoreline area

Judicial district

Puna, Hawai‘i

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

(3) 1-3-008:014 por. and unencumbered land

Action type

Agency

Other required permits and approvals

Numerous, identified in Final Environmental Assessment

Proposing/determining agency

Department of Land and Natural Resources, Division of Boating and Ocean Recreation

Agency contact name

Finn McCall

Agency contact email (for info about the action)

finn.d.mccall@hawaii.gov

Agency contact phone

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4 Sand Island Access Road
Honolulu, Hawaii 96819
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Map It

Was this submittal prepared by a consultant?

Yes

Consultant

The Limtiaco Consulting Group

Consultant contact name

Trevor Vagay

Consultant contact email

trevor@tlcghawaii.com

Consultant contact phone

(808) 596-7790

Consultant address

1622 Kanakanui Street
Honolulu, Hawaii 96817
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Map It

Action summary

The Kīlauea Volcano eruption of 2018 disrupted the use of the Pohoiki Boat Ramp facility in the Puna District. Ocean rescue services, commercial fishing, ocean/volcano tours, recreational opportunities, and food sustainability practices of the Puna community are negatively affected by the closure of the boat ramp, which is undamaged but landlocked by accumulated volcanic debris. The Pohoiki Boat Ramp facility is owned and maintained by the Department of Land and Natural Resources, Division of Boating and Ocean Recreation.

Accumulated material consisting of sand, rock, and cobble currently blocks navigational access to the Pacific Ocean. The proposed project would restore navigational access by removing accumulated material from Pohoiki Bay through excavation and dredging. Volcanic material would be placed in areas of new lava or new beach that are away from the ocean. Pohoiki Bay would be restored to a shape and depth that resembles pre-eruption conditions to the extent possible.

Reasons supporting determination

HRS 343 significance criteria is discussed in Section 6, Determination of the Final EA

Attached documents (signed agency letter & EA/EIS)

- Pohoiki-Final-EA.pdf
- Pohoiki-BR-Final-EA_Agency-Transmittal-Ltr-part-1-signed.pdf

Shapefile

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

Action location map

- Location-shapefile.zip
- Location-shapefile1.zip

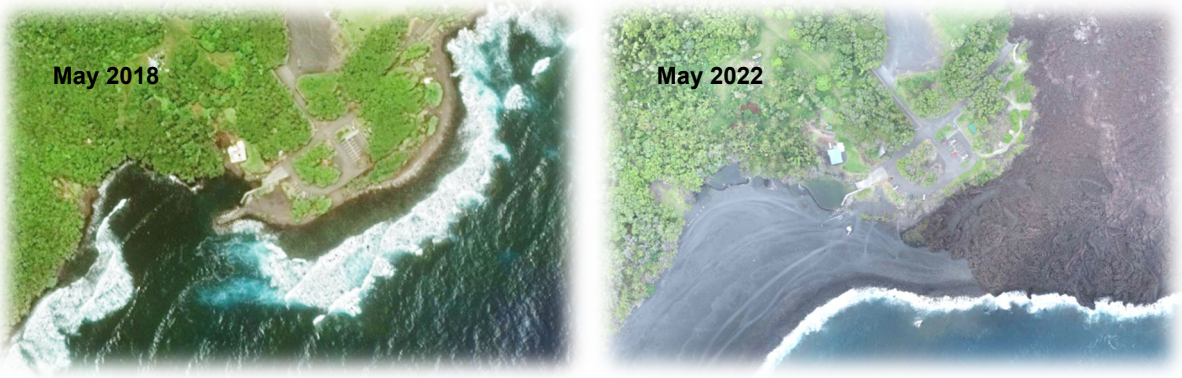
Authorized individual

Trevor Vagay

Authorization

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

Final Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai‘i



Prepared For:

State of Hawai‘i, Department of Land and Natural Resources,
Division of Boating and Ocean Recreation

Prepared By:

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 2023

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Final Environmental Assessment
for the
Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai‘i

Tax Map Keys (3) 1-3-008:014 por. and unencumbered land (new lava flow)

This environmental document has been prepared pursuant to
Chapter 343, Hawai‘i Revised Statutes

Prepared For:

State of Hawai‘i, Department of Land and Natural Resources,
Division of Boating and Ocean Recreation

Prepared By:

The Limtiaco Consulting Group
Civil Engineering and Environmental Consultants
1622 Kanakanui Street
Honolulu, Hawai‘i 96817

July 2023

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Appendix G Pre-Design Report
Appendix H Consultation and Comments

ABBREVIATIONS

Abbreviation	Definition
AFONSI	Anticipated Finding of No Significant Impact
BMPs	Best Management Practices
CAB	Hawai‘i, Department of Health, Clean Air Branch
CDUP	Conservation District Use Permit
CIA	cultural impact assessment
COOPS	Center for Operational Oceanographic Products and Services
CDIP	Coastal Data Information Program
CSH	Cultural Surveys Hawai‘i, Inc.
CZM	Coastal Zone Management
DAR	Division of Aquatic Resources
DLNR	Hawai‘i, Department of Land and Natural Resources
DOBOR	Division of Boating and Ocean Recreation
DOH	Hawai‘i, Department of Health
DOT	Hawai‘i Department of Transportation
EA	Environmental Assessment
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
HAR	Hawai‘i Administrative Rules
HI-EMA	Hawai‘i Emergency Management Agency
HRS	Hawai‘i Revised Statutes
LRFI	literature review and field inspection
LUO	Land Use Ordinance
LUPAG	Land Use Pattern Allocation Guide
MLLW	Mean Lower Low Water
msl	mean sea level
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NPDES	National Pollutant Discharge Elimination System
NWP	Nationwide Permit

ABBREVIATIONS (Continued)

Abbreviation	Definition
OHA	Office of Hawaiian Affairs
OPSD	Office of Planning and Sustainable Development
SHPD	State Historic Preservation Division
SIHP	State Inventory of Historic Places
SLR	sea level rise
SMA	Special Management Area
SWL	still water level
TMK(s)	Tax Map Key(s)
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

PROJECT SUMMARY

Applicant:	State of Hawai‘i, Department of Land and Natural Resources, Division of Boating and Ocean Recreation
Approving Agency:	Mr. Finn McCall, Project Manager
Location:	Puna District, Island of Hawai‘i, Hawai‘i
Tax Map Key:	(3) 1-3-008:014 (por.) - State of Hawai‘i, Department of Land and Natural Resources, Division of Boating and Ocean Recreation unencumbered land - State of Hawai‘i
Land Area:	11 acres (excavation and dredging of Pohoiki Bay); 35 acres (for volcanic material placement); approx. area within project limits is 50 acres
Recorded Fee Owner:	State of Hawai‘i
Existing Use:	Inoperable boat ramp facility adjacent to county beach park and unencumbered land (new lava flow)
Proposed Use:	Operable boat ramp facility adjacent to county beach park and unencumbered land (new lava flow)
Community Plan Region:	Puna
Land Use Designations:	
State Land Use	Conservation
Development Plan	Open
County Zoning	Open
Action Requested:	The project will restore navigational access from the Pohoiki Boat Ramp facility to the Pacific Ocean. Volcanic material from the 2018 eruption that has accumulated in Pohoiki Bay will be dredged and distributed on new lava land away from the ocean. Pohoiki Bay will be restored to a shape and depth that resembles pre-eruption conditions to the extent possible. The project will return the existing Pohoiki Boat Ramp facility to productive use.
Agency Determination:	Finding of No Significant Impact (FONSI)

The State of Hawai‘i, Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DLNR - DOBOR) is responsible for small boat harbors, launching ramps, jetties, wharves, and landings that were previously under the jurisdiction of the State of Hawai‘i Department of Transportation (DOT). The transfer from DOT to DOBOR occurred on July 1, 1992 pursuant to Act 272, Session Laws of Hawai‘i, 1991. The list of DOT functions that DLNR inherited are identified in Hawai‘i Revised Statutes (HRS) §200-3 Ocean recreation and coastal areas programs. The list includes the following functions:

(8) Assisting in abating air, water, and noise pollution; and

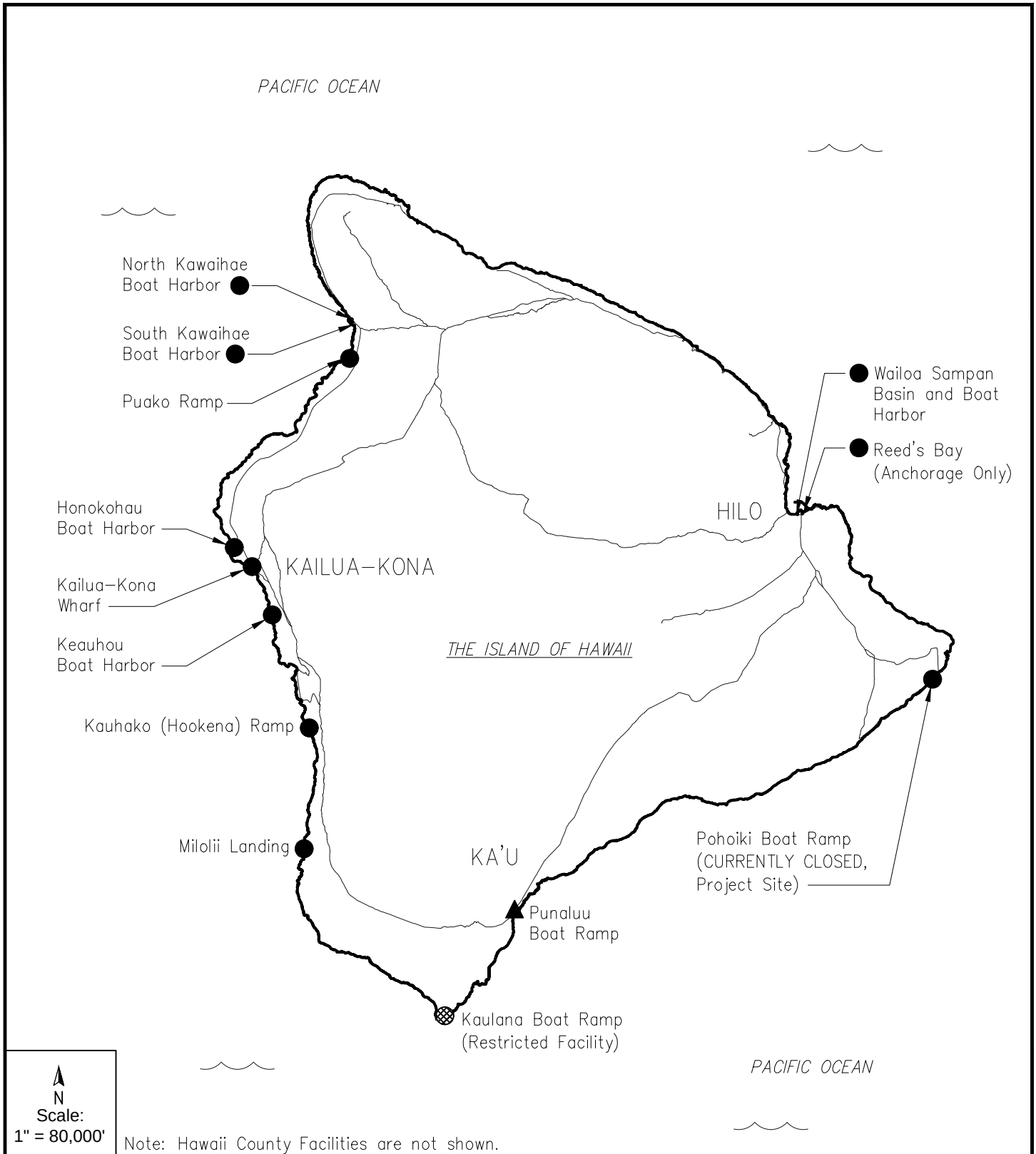
(13) Removing nonnatural obstructions and public safety hazards from the shoreline, navigable streams, harbors, channels, and coastal areas of the State.

Figure PS-1 depicts the following Hawai‘i Island facilities that are under the jurisdiction of DOBOR and available for recreational and commercial use: Honokōhau Small Boat Harbor, Kailua-Kona Wharf, Kauhako (Ho‘okena) Boat Ramp, Kaulana Boat Ramp (a restricted facility), Kawaihae Small Boat Harbor, Keauhou Small Boat Harbor, Miloli‘i Landing, Pohoiki Boat Ramp (which is currently closed), Puako Boat Ramp, Reed’s Bay (an anchorage), and Wailoa Sampan Basin and Small Boat Harbor. The privately-owned Punalu‘u Wharf is included on Figure PS-1 for discussion purposes only. Site improvements at the Punalu‘u facility were suggested during the Draft Environmental Assessment (EA) comment period as an alternative to the proposed action. DOBOR is not considering improvements at the Punalu‘u Wharf, which is a historic property with a shoreline ramp built in 1916 and a heiau nearby (Pacific Media Group, 2017).

The Federal Emergency Management Agency (FEMA) has obligated disaster funding to Hawai‘i County that will be utilized for its projects (e.g., repairs to Pohoiki Road, water infrastructure, and park facilities). DOBOR’s proposed project will not utilize funding that Hawai‘i County receives for its projects. As of this writing, FEMA has not obligated disaster funding to the State of Hawai‘i for construction of the proposed project. The scope of the proposed project (i.e., the extent of the dredging effort) is likely to be affected by federal and state funding allotments.

For the purpose of this document, volcanic debris is defined as broken down lava flow fragments and fresh black sand that was created as molten lava contacted the ocean and was chilled, shattered by surf, and transported by wave currents. Volcanic debris that has accumulated in Pohoiki Bay may also be referred to as volcanic material.

DOBOR’s proposed project does not involve alterations to or activities near the Pohoiki Warm Springs, which are located mauka (or upland) of the beach and vegetation line at Pohoiki Bay. Dredged material would be placed in the backshore area, which will result in backfilling of ponds created by the accumulation of volcanic debris in Pohoiki Bay. The ponds are makai (or seaward) of the vegetation line.



N

Scale: 1" = 80,000'

Note: Hawaii County Facilities are not shown.

LEGEND

- ● Facilities Under Jurisdiction of the Department of Boating and Ocean Recreation (DOBOR)
- ▲ Privately-owned Facility (Not under DOBOR's jurisdiction)

Source: https://dlnr.hawaii.gov/dobor/big-island-facilities/

FIGURE PS 1
LOCATION OF HAWAII ISLAND
SMALL BOAT HARBOR FACILITIES

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

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1. SETTING AND PROJECT DESCRIPTION

1.1. Introduction and Background

In 2018, lava from the Kīlauea Volcano, Lower East Rift Zone eruption flowed across vast areas of the lower Puna district (South of Hilo, North of Kaʻū) and reached the southeast coastline of Hawaiʻi Island. On May 24, 2018, three lava flows reached the ocean between Pohoiki Bay and MacKenzie State Park, which is about 2.1 miles to the southwest. Lava entered the ocean approximately 0.9 miles northeast from Pohoiki Bay at ʻAhalanui Beach Park on July 12, 2018 and advanced to approximately 230 feet southeast of the Pohoiki Boat Ramp facility by August 6, 2018. Fresh black sand that was created as molten lava was chilled and shattered by the surf was transported by wave currents to Pohoiki Bay. On August 13, 2018, a visible sandbar of accumulated volcanic material in Pohoiki Bay was blocking the boat ramp.

The existing boat ramp area at Pohoiki Bay was spared from lava inundation but nearby terrain to the east has been altered including a large portion of Isaac Hale Beach Park; the lava flow formed a new land mass consisting of a new lava layer on existing land and accretion land consisting of entirely new land that extends into the Pacific Ocean. Constant wave activity at the accretion land and ocean interface continuously produces sand, rock, and cobbles. The boat ramp and a breakwater structure are located at Pohoiki Bay, which was approximately 1,000 feet wide at the mouth and extended inland approximately 450 feet. Loose material transported along the coast by prevailing wave direction and ocean currents has accumulated in Pohoiki Bay since 2018, such that the undamaged boat ramp facility remains landlocked.

An exploratory boring at Pohoiki Bay was taken in May 2022. The boring extended to a depth of 27 feet and revealed a beach deposit surface layer about 18 feet thick that is underlain by a shallow marine deposit extending to a depth of roughly 20.5 feet. A clinker deposit approximately 4 feet thick is below the shallow marine deposit. The underlying layer, extending to the maximum depth explored, consists of basalt rock. The likely composition of the accumulated material in Pohoiki Bay includes sand, gravel, some cobbles and occasional boulders. A more detailed description of the exploratory findings is provided in Section 2.1.2. Soils and Topography.

Accumulated volcanic material consisting of sand, rock and cobble currently covers an area of approximately 11.6 acres and blocks navigational access from the Pohoiki Boat Ramp facility to the Pacific Ocean (see Figures 1 through 3). The Puna coastline is almost entirely rocky sea cliffs, with deep water close to shore and relatively high nearshore ground elevations. Other than what used to be Pohoiki Bay, there are no shallow water embayments (a recess along a coastline) or significant headlands (such as bluffs or mounds) to provide natural wave protection. The coast is directly exposed to the persistent and prevailing trade winds generated by the seas, and summer season south swell. Tropical storms and hurricanes passing south of the island generate large waves that can batter the coast.

Microsoft Corporation, Maxar, CNES
Distribution Airbus DS, 2022

FIGURE 1
SITE AND VICINITY MAP

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

Photo 1 – Landlocked Pohoiki Boat Ramp. March 2022

Photo 2 – New Accretion Land to the East, March 2022

FIGURE 2
SITE PHOTOS SET 1

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CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

Photo 3 – Pohoiki Bay Shoreline. March 2022

Photo 4 – Surface Debris with Hawaii Driver's License for Comparison, March 2022

FIGURE 3
SITE PHOTOS SET 2

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

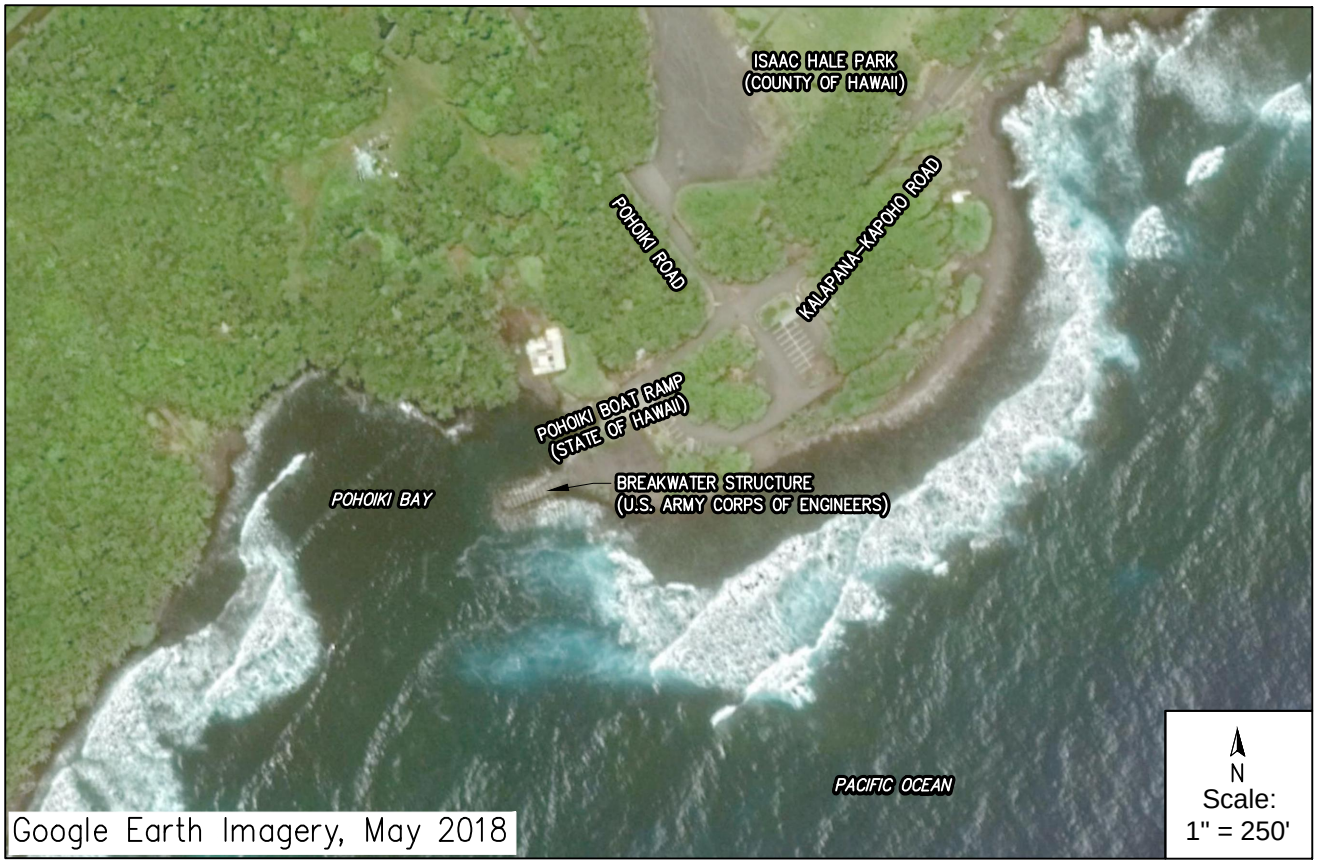
POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

Community members most impacted by the inoperable boat ramp have been adamant about the need to re-open the Pohoiki Boat Ramp facility, which is owned and maintained by the Department of Land and Natural Resources, Division of Boating and Ocean Recreation. The existing Pohoiki Boat Ramp facility has an 18-foot-wide single-lane ramp. The U.S. Army Corps of Engineers (USACE) is responsible for maintaining the 90-foot-long breakwater structure that was completed in 1979. DOBOR's boat ramp is undamaged and USACE's breakwater structure is intact but partially covered by accumulated volcanic material.

DOBOR registers small vessels and is responsible for the management and administration of statewide ocean recreation and coastal area programs pertaining to the ocean waters and navigable streams of the State of Hawai'i. DOBOR's jurisdiction excludes commercial harbors. The areas and facilities that fall within DOBOR's jurisdiction include 21 small boat harbors, 54 launching ramps, 13 offshore mooring areas, 10 designated ocean water areas, 108 designated ocean recreation management areas, associated aids to navigation throughout the State, and beaches encumbered with easements in favor of the public.

The project proposed by DOBOR will reestablish pre-eruption navigational access to the Pacific Ocean and return the Pohoiki Boat Ramp facility to productive use. The proposed project involves dredging the accumulated volcanic material in Pohoiki Bay to restore the bay to a shape and depth that resembles pre-eruption conditions to the extent possible (see Figure 4). Dredged volcanic material would be distributed on newly formed lava land and away from the Pacific Ocean. Existing debris would be removed from Pohoiki Bay through excavation and dredging before being transported via trucks to nearby locations identified for volcanic material placement. Heavy equipment utilized for the project will avoid traveling and working on or near the existing breakwater structure. Settled sand and cobbles on the breakwater may be manually removed with the use of hand tools to ensure that the breakwater structure is not damaged.

State of Hawai'i lands and funds will be utilized for DOBOR's project, which will partially occur within a conservation district; therefore, the preparation of an Environmental Assessment (EA) pursuant to HRS §343 and associated Title 11, Chapter 200.1, Hawai'i Administrative Rules (HAR) is required. This EA was prepared to examine potential project impacts and to provide for public participation as required and defined in the statutes. The project will occur within the Special Management Area (SMA). FEMA may also award federal funding as part of its Public Assistance program, which allows communities to respond and recover from major disasters or emergencies. The Hawai'i Emergency Management Agency (HI-EMA) would work with FEMA and conduct final reviews of FEMA-approved projects. FEMA would reimburse the State of Hawai'i up to 75 percent of eligible project costs.



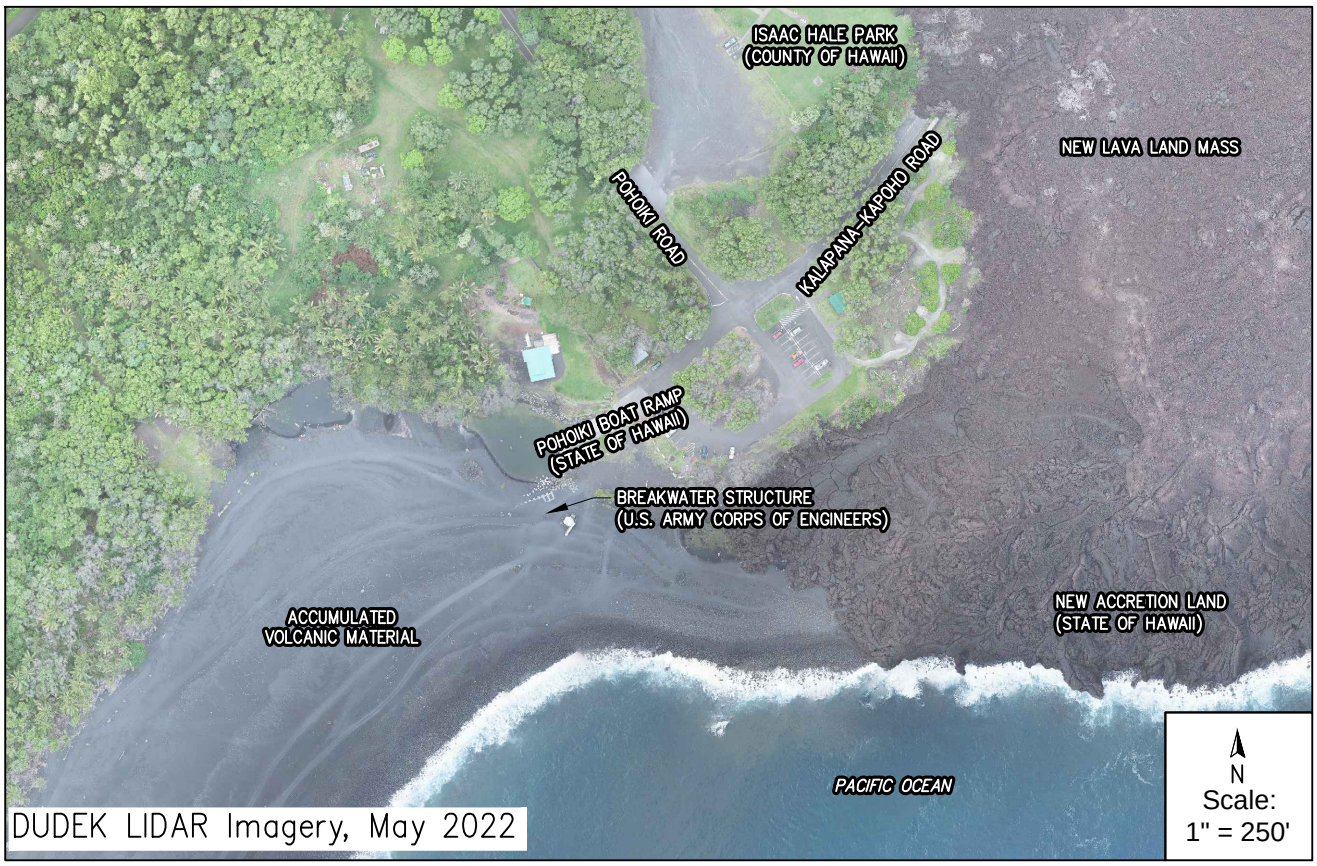


FIGURE 4
PRE AND POST ERUPTION CONDITIONS

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CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

1.2. Project Need and Objectives

The Kīlauea Volcano eruption of 2018 disrupted the use of the Pohoiki Boat Ramp facility in the Puna District. Ocean rescue services, commercial fishing, ocean/volcano tours, recreational opportunities, and food sustainability practices of the Puna community are negatively affected by the closure of the undamaged but landlocked boat ramp. No new boat launch areas have been developed along the Puna coastline to replace DOBOR's now-inoperable facility at Pohoiki Bay. The nearest operable boat ramp facility is at Wailoa Sampan Basin and Boat Harbor in Hilo, which is approximately 40 miles away (refer to Figure PS 1).

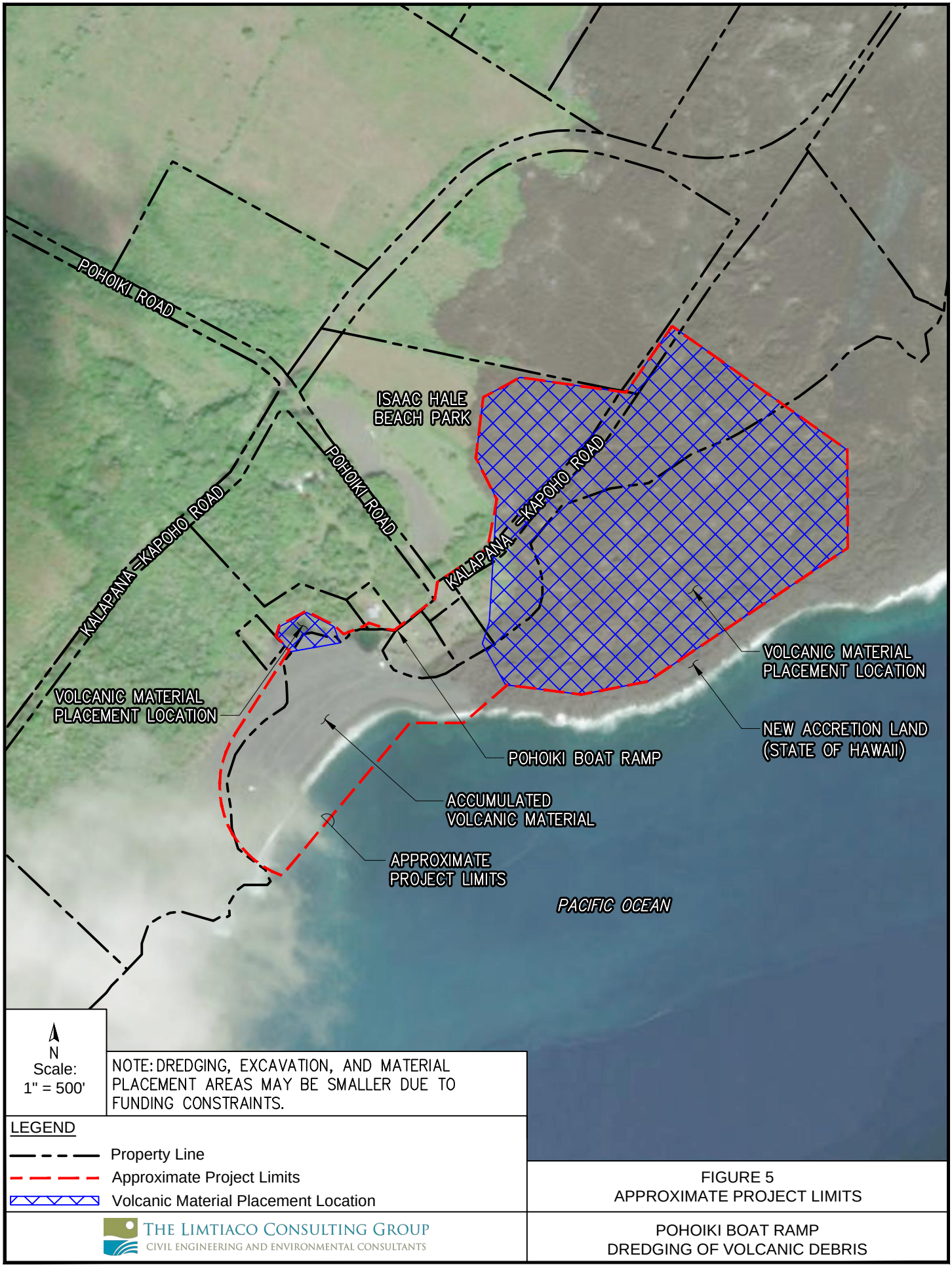
The proposed project is expected to achieve several objectives:

- restore navigational access by removing accumulated volcanic material from Pohoiki Bay through excavation and dredging;
- support the resumption of ocean rescue services, commercial fishing, ocean/volcano tours, food sustainability practices of the Puna community, and recreational opportunities at Pohoiki Bay;
- return Pohoiki Bay to a shape and depth that resembles pre-eruption conditions to the extent possible; and
- strategically place excavated and dredged volcanic material in areas of new lava or new beach.

DOBOR's project, which would restore navigational access and return the Pohoiki Boat Ramp facility to productive use, is expected to address the expressed local needs of the Puna community. If the dredged material is found to be suitable as fill material, it may be directed towards a beneficial use that is not known at this time. Dredged material may be used to eliminate identified hazards or nuisances such as ponds in the backshore area. As a result of the project, fisherfolk would provide fresh fish for the local community to purchase and consume, earn income, and feed their families with their catch. The government would receive tax revenue from commerce. A potential outcome of the project is the recovery of the nearshore aquatic habitat in Pohoiki Bay and the marine ecosystem.

1.3. Site Location and Land Use Considerations

The Pohoiki Bay project area is located on the southeast coastline of Hawai‘i Island. The existing Pohoiki Boat Ramp facility that is the subject of this EA is located at Pohoiki Bay and adjacent to Isaac Kepo‘okalani Hale Beach Park, which is a Hawai‘i County facility (see Figure 5). The landlocked boat ramp facility is located on a portion of Tax Map Key (TMK): (3)1-3-008:014, which is a state-owned parcel. DLNR Land Division - Hawai‘i District stated in its letter signed on May 16, 2023 that the new lava flow seaward of TMK: (3)1-3-008:014 is unencumbered land, and the division has no objections to the project as described in the EA.


POHOIKI ROAD
ISAAC HALE
BEACH PARK
POHOIKI ROAD
KALAPANA – KAPOHO ROAD
KALAPANA – KAPOHO ROAD
VOLCANIC MATERIAL
PLACEMENT LOCATION
VOLCANIC MATERIAL
PLACEMENT LOCATION
NEW ACCRETION LAND
(STATE OF HAWAII)
POHOIKI BOAT RAMP
ACCUMULATED
VOLCANIC MATERIAL
APPROXIMATE
PROJECT LIMITS
PACIFIC OCEAN
N
Scale:
1" = 500'
NOTE: DREDGING, EXCAVATION, AND MATERIAL PLACEMENT AREAS MAY BE SMALLER DUE TO FUNDING CONSTRAINTS.
LEGEND
Property Line
Approximate Project Limits
Volcanic Material Placement Location
THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS
FIGURE 5
APPROXIMATE PROJECT LIMITS
POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

Roadways that provide access to the Pohoiki Boat Ramp facility and Isaac Hale Beach Park include Kalapana-Kapoho Beach Road (Route 137) and Pohoiki Road. A new lava land mass and a large area of accretion land with elevations ranging from 12 feet to 45 feet above Mean Lower Low Water (MLLW) are located to the east of the Pohoiki Boat Ramp facility. The surrounding area to the west of Pohoiki Bay is mostly undeveloped and comprised of dense vegetation. A privately-owned parcel (identified as TMK 1-3-008:056) that is mauka of the boat ramp contains the Hale residence and is bounded by remnants of the old Rycroft coffee mill facility to the north and west. The former historic-era Pohoiki courthouse and jail are located on TMK 1-3-008:013, which is a privately-owned parcel along the pre-eruption shoreline. An unimproved, two-track dirt driveway that crosses through a county-owned parcel provides access from the shoreline parcel to Kalapana-Kapoho Beach Road (Route 137).

State Land Use Map designations are shown in Figure 6. The Pohoiki Boat Ramp facility is in the Conservation District, which includes areas that protect watersheds and water sources, prevent floods and soil erosion, and provide value for recreational purposes. Public purpose uses including but not limited to public roads, marinas, harbors, airports, trails, water systems and other utilities, communication systems, flood or erosion control projects, recreational facilities, and community centers are allowed in the Conservation District with a Conservation District Use Permit (CDUP) issued by the Board of Land and Natural Resources (HAR §13-5-22).

The Land Use Pattern Allocation Guide (LUPAG) Map designates the state-owned parcel as OA - Open. LUPAG designations are shown in Figure 7. Portions of Isaac Hale Beach Park may be traversed as part of the project. Some areas of the park are designated as EA - Extensive Agricultural and IAL - Important Agricultural Land. The County of Hawai‘i zoning designation for Pohoiki Bay is O - Open (see Figure 8). Portions of Isaac Hale Beach Park may be traversed as part of the project. Some park areas fall within the zoning designation A-1a - Agricultural District. DOBOR’s project represents a public use that is permitted in any district. Plan approval will be required. The project is in the SMA (see Figure 9); the SMA process is administered by the Department of Planning.

1.4. Historical Setting

Information for this section is summarized from the cultural impact assessment (CIA) prepared by Cultural Surveys Hawai‘i, Inc. (CSH) unless otherwise noted. See Appendix A for the report.

According to traditional accounts, the district of Puna in early times was associated with the rising sun and the god Kāne, as well as its long stretch of sand, fertile plains, *hala* (*pandanus*) trees, and *‘awa* (*Piper methysticum*). Many *‘ōlelo no‘eau* (poetical sayings) and legends describe the Hawaiian volcano goddess Pele’s devouring of land by causing lava flows.

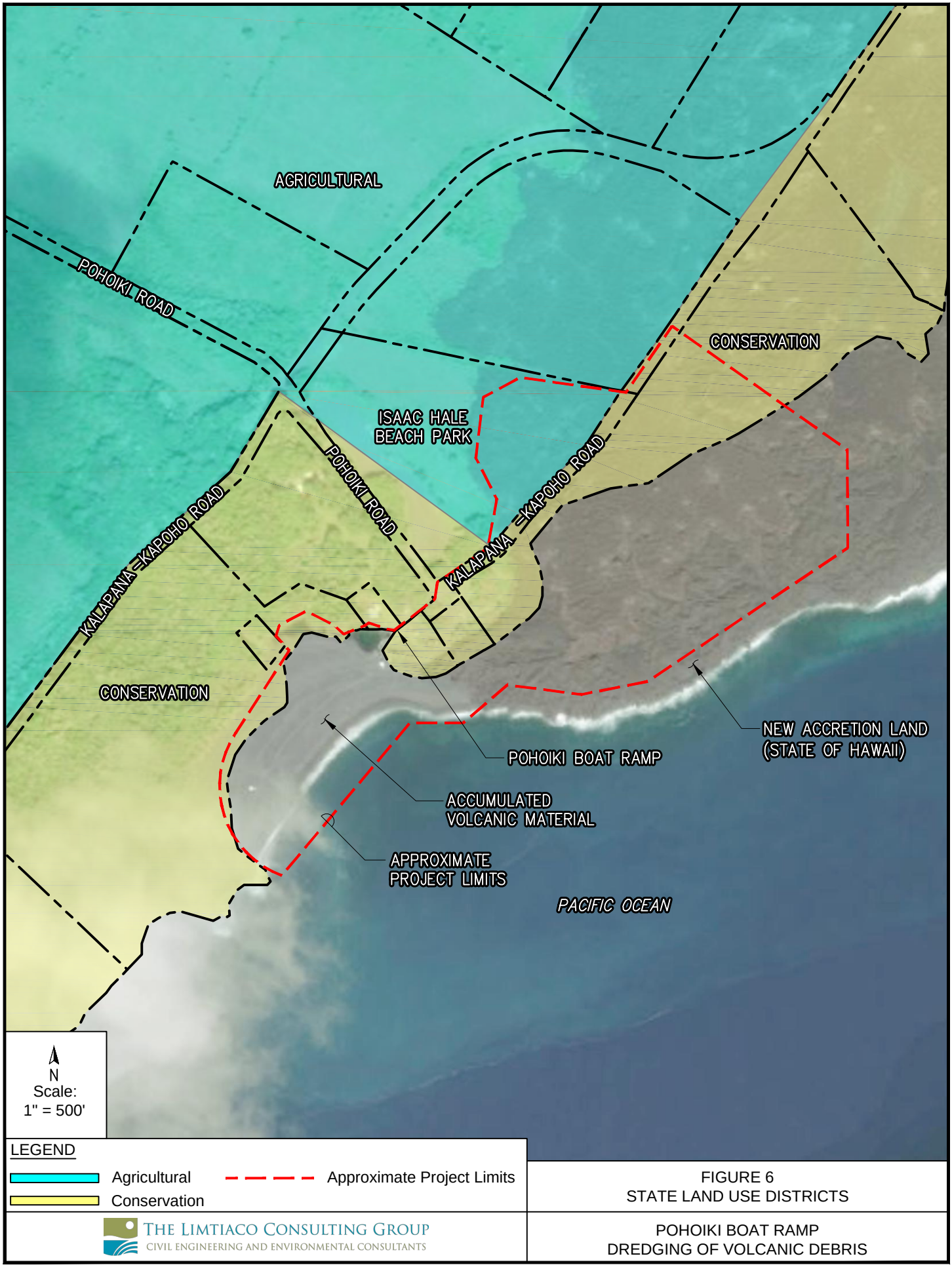


FIGURE 6
STATE LAND USE DISTRICTS

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POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

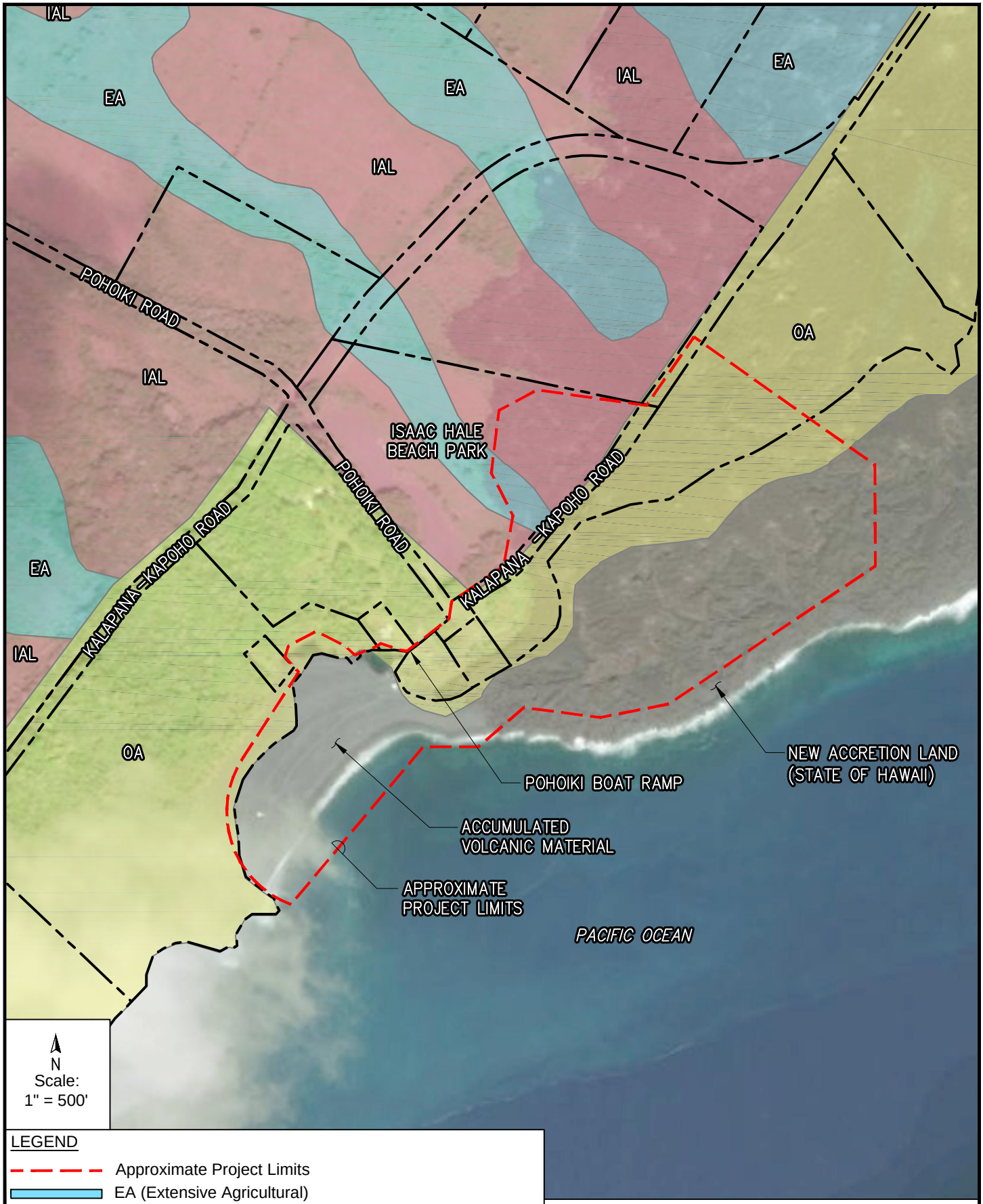

FIGURE 7
LAND USE PATTERN ALLOCATION GUIDE MAP

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

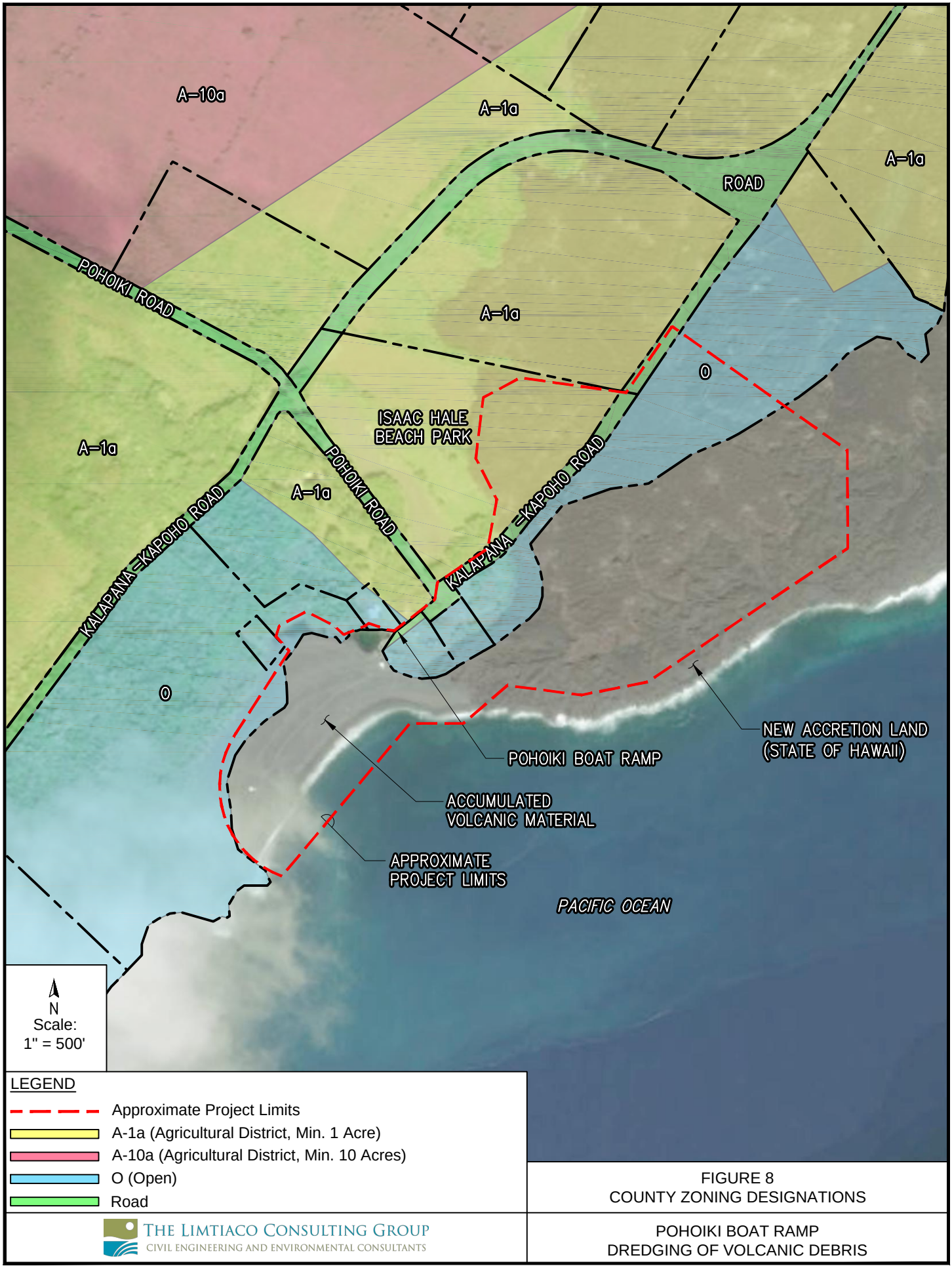

FIGURE 8
COUNTY ZONING DESIGNATIONS

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CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

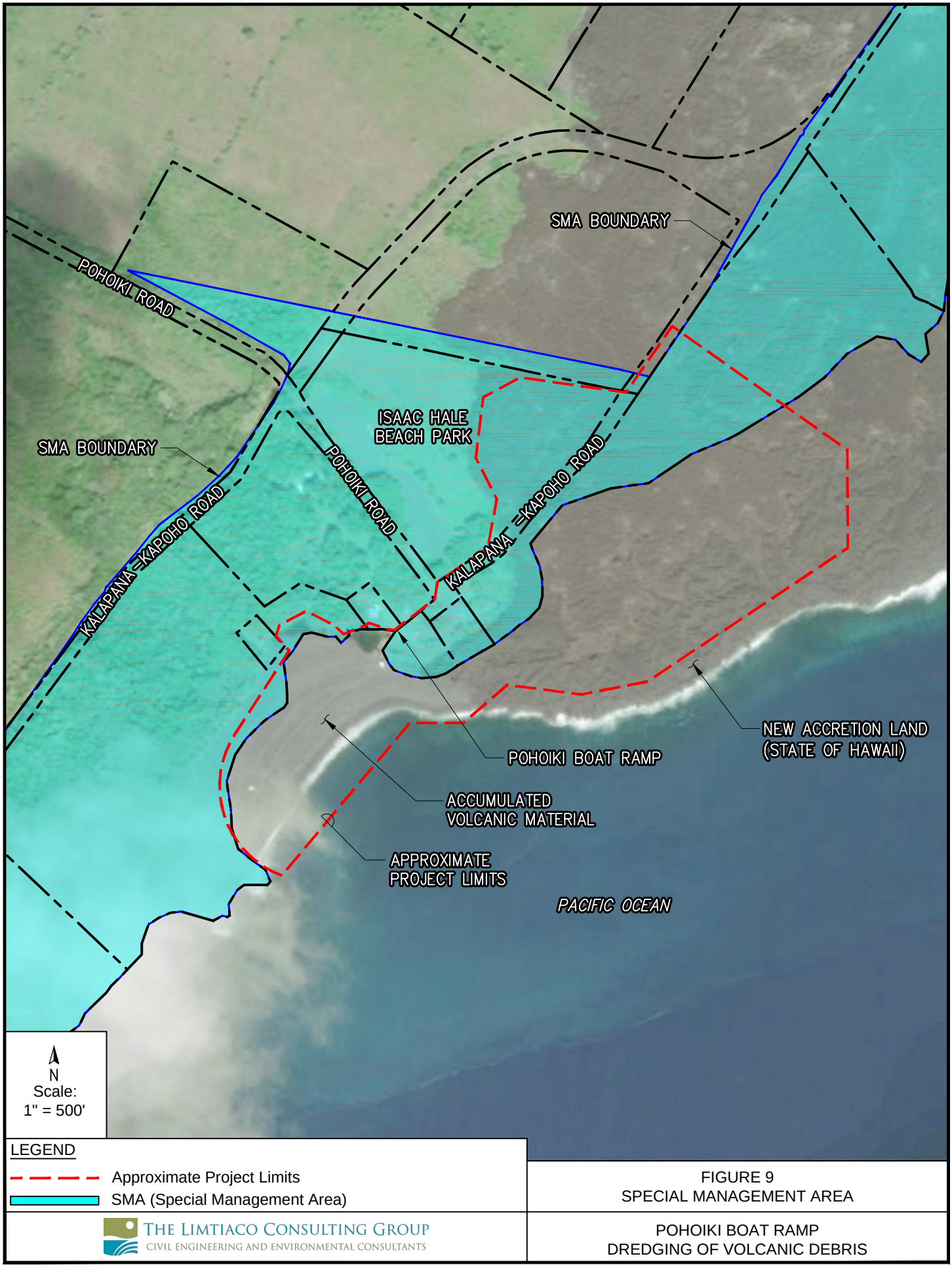

FIGURE 9
SPECIAL MANAGEMENT AREA

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CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

Puna (and specifically Keawaopele) is where Pele landed in her canoe when searching the islands for a new home. Traditional accounts suggest that Puna was one of Hawai‘i’s wealthiest agricultural regions; however, volcanic eruptions in relatively recent times have destroyed much of Puna’s best land.

In the early history of Hawai‘i Island, there were many *ali‘i* (the ruling nobles or chiefs) and ruling families that exerted control over a *moku* (a regional land division), several moku, an *ahupua‘a* (a smaller traditional land division within the moku), or several ahupua‘a. The *mo‘olelo* (narrative stories) of Puna emphasize the area’s familial, genealogical, and political connections to the neighboring districts of Ka‘ū and Hilo. Hawaiian history before the reign of King Kamehameha I includes accounts of ruling island chiefs who battled island rivals and the leaders of other islands. The lack of traditional political history surrounding Puna is attributed to the close connections to the rulers of Ka‘ū and Hilo, who had extended control over the desirable lands of Puna. Consequently, Puna’s political history is closely tied to the fortunes of the ruling families of Ka‘ū and Hilo.

Cultural researcher Kepā Maly utilized multiple sources and suggests the following settlement patterns occurred in the project vicinity:

> *1) initial settlement by the twelfth-thirteenth centuries, with subsistence based on near-residence agriculture and collection of marine resources; 2) by the fourteenth-sixteenth centuries, expansion of agriculture systems into upland areas to accommodate increased populations, accompanied by development of the ‘ohana (extended family) value system linking coastal and upland inhabitants; 3) by the seventeenth-eighteenth centuries, increasingly formalized systems of land use and governance and expansion of settlement into more arid coastal regions. The ahupua‘a system provided inhabitants with all the resources needed to survive, from offshore fisheries into the upland agricultural lands and forest regions above, where timber and other plant and avian resources were obtained.*

Differences in population and cultivation between the southwestern section of Puna and the more easterly area are described in several historical accounts. The English missionary, William Ellis, documented his travel in Hawai‘i in 1823; his detailed journal mentions several specific ahupua‘a and villages of Puna but Pohoiki was not mentioned. T. Stell Newman (1971) reviewed Ellis’s journal of his Hawai‘i travel in 1823, and constructed a map of agricultural lands on different parts of the island. One of the dryland field systems depicted on Newman’s map stretched from Kaimū almost to Kapoho on the southeastern coast of Puna, and thus encompassed the Pohoiki Bay area. The missionary Titus Coan, who became head of the Hilo Station in 1835, mentioned the abundant rainfall, subterranean waters, evidence of volcanic activity, and the fields of vegetables and fruits in his description of Puna. Modern researchers have noted that breadfruit was an important and abundant staple in Puna at this time.

The first specific written mention of Pohoiki is from a report by Chester Lyman that describes a trip with Rev. Coan to Puna in 1846. Lyman describes the natural setting of Pohoiki Bay and the people in attendance at the church service. Other available documentation indicates 52 students were attending classes at a school located at Pohoiki in 1848.

Most visitors to Puna utilized a coastal foot trail that was made into a horse trail called the "Old Government Road." Alterations such as removing paving stones and adding curb stones to mark the edges of the trail were accomplished in the late nineteenth century but a precise timeframe is unknown. The trail was not described as improved when Titus Coan toured Puna in 1848. Anthropologist Barbara Lass believes the present form of the Old Government Road correlates to the early 1870s.

In 1848 during the time of Kamehameha III, a series of legal and legislative changes occurred in the name of land reform known as the Māhele. Land titles were awarded to the monarchy and aliʻi. Previously, all land belonged to the *akua* (gods); the paramount chief held the land in trust while subordinate chiefs managed the land. The Kuleana Act of 1850 resulted in the award of lands to commoners or native tenants. In 1851, certain Government Lands were available for purchase and became known as Royal Patent Grants or Land Grants. Information pertaining to Pohoiki is below:

> *In the Māhele the ahupuaʻa of Keahialaka, Pohoiki, and Oneloa were awarded to the aliʻi William Charles Lunalilo, who would later become King of Hawaiʻi; Oneloa was also awarded to the wahine (woman) Laumaka (Barrère 1994). Keahialaka was retained by Lunalilo, but Pohoiki and Onela were returned as commutation and retained by the government.*
>
> *Examining the patterns of kuleana LCA parcels in the vicinity of the project area provides insight into the likely intensity and nature of Hawaiian activity in the area. However, very few kuleana were awarded in all of Puna. None were claimed in Keahialaka or Oneloa (Clark et al. 2014:29; Maly 1998:38). Two kuleana were claimed in Pohoiki but not awarded: LCA 2557 claimed by Nalima, and LCA 8748 claimed by J.B. Kane. These claims consisted of adjacent house lots at the coast; testimony relating to Kane's claim indicates Nalima's lot was enclosed by a fence and Kane's by a stone wall (Clark et al. 2014:30).*

All of Hawaiʻi experienced population declines in the mid-1800s. Rev. Titus Coan estimated the population of Puna was 4,371 in 1841. The population of Puna may have remained constant until at least 1846 from Chester Lyman's description of his visit at that time. Lyman noted a rapid depopulation from his second visit to Puna in 1871. Out-migration may have been exacerbated by destructive earthquakes in the spring of 1868 that caused a 75-mile stretch of the Puna-Kaʻū coastline to subside

and the destruction of numerous coastal homes and villages by a tsunami. The population of Puna was 2,200 people by 1860, and 800 people by 1890.

Several commercial ventures were undertaken in Puna and the Pohoiki vicinity including the harvesting of *pulu* (soft yellow material from the base of the tree fern), which was used for stuffing mattresses and pillows. Shipments of pulu were first sent to California in 1847, and the industry had declined significantly by the mid-1880s. The recorded history pertaining to Pohoiki Bay is below:

> *In 1877 a man named Robert Rycroft began leasing land in Pohoiki and purchased a store and several outbuildings on a parcel adjacent to Pohoiki Bay (Maly 1998:48). At first Rycroft went into the 'awa shipping business. He constructed a wharf during the mid-1880s, which he agreed to allow for public use (Int. Dept. Book 30:206 in Maly 1998:52). Rycroft's 'awa business was successful and so he increased his land holdings and created a small cattle ranch (Honolulu Advertiser 3 February 1909:5 in Maly 1998:71). According to Whitney (1895:66), a sawmill had also been established at Pohoiki "[…] and a quantity of lumber is exported to Honolulu."*

Rycroft also ventured into coffee and constructed a new mill for processing coffee at Pohoiki Bay. An 1895 map depicts the old mill, new mill, wharf, roadways and several enclosures and structures around the bay including a courthouse and jail, church, and boat shed. The 1895 map also depicts well-established roads and smaller trails for travel in Puna. The "Puna Road" or Old Government Road that connects to Hilo and the summit of Kīlauea is in the Pohoiki vicinity. The map depicts the precursor to the current Pohoiki Road.

The landscape in Puna was transformed in the early 1900s from the establishment of sugar plantations. Land clearing and alterations were accomplished to create planting fields and areas for the mill, village and labor camps. A railroad was built by the Hawaii Consolidated Railway to service the plantations. The first Puna Sugar Company was founded in 1900 and operated as a division of Olaa Sugar Company. The fledging coffee industry in Puna could not compete with the growers in Kona. Coffee operations in Puna declined after 1905 and ended by 1927. The 1955 lava flow inundated Puna Sugar Company lands, and a tsunami on April 1, 1946 inundated the railway on the Hamakua Coast and in Hilo. The Puna Division of Olaa Sugar Company continued to operate until 1948, when transportation of sugarcane was accomplished by trucks.

By the 1940s, wharf facilities at Pohoiki Bay had been abandoned and the former Pohoiki school lot became the site of the first Pohoiki Park. The 1963 USGS topographic map shows "Isaac Hale Park" which reflects the renaming of Pohoiki Park in honor of the Korean War casualty Private Isaac Kepookani Hale of Kapoho. An earthquake in 1975 caused the coastline at Pohoiki to subside by over a foot. The extent of agricultural development surrounding the Pohoiki Bay area is visible in a

1977 aerial photograph. In 1979, the USACE constructed the 90-foot-long breakwater structure at Pohoiki Bay. Excerpts of the modern history of Pohoiki are below:

> *Background research indicates the vicinity of Pohoiki Bay has been used for generations as a fishing village with one of the best natural boat landings along the Puna coast. A small community was present at Pohoiki into the twentieth century. Around 1940 a park was established at Pohoiki. In 1941 the old courthouse property was deeded to Moses Kuamoʻo, and during this time John Hale was actively maintaining the site of the old Rycroft coffee mill. Remnants of the old mill and archaeological features associated with other traditional and historic land uses surround Pohoiki Bay. In 1963 the USACE constructed a boat ramp at the site of the former wharf at Pohoiki, and during the 1970s a major earthquake and construction of the breakwater impacted the shoreline areas. Isaac Hale Beach Park was subsequently expanded to include lands mauka of Kaimu-Kapoho Road (also known as Kalapana-Kapoho Road) that were formerly under papaya cultivation.*
>
> *Isaac Hale Beach Park was expanded and improved in the modern era to include additional facilities on lands mauka of Kaimu-Kapoho Road (also known as Kalapana-Kapoho Road) that were formerly under papaya cultivation. Agriculture continues to be a main economic driver for the area, though many farms were inundated or otherwise impacted by the 2018 eruption. Puna's fishing community has been severely impacted by the loss of the boat ramp. Isaac Hale Beach Park, once a bustling hub for fishermen, surfers, and other local community users is now primarily frequented by tourists curious to see the dramatically changed landscape.*

Agriculture continues to be an important economic activity in Puna. The 2018 eruption destroyed or otherwise impacted many farms in the district, and the inoperable boat ramp is severely impacting Puna's fishing community. The overall project area at Pohoiki has been subjected to prior disturbance as determined from available documentation. Natural terrain in the vicinity of DOBOR's existing boat ramp and within the grounds of Hawaiʻi County's Isaac Hale Beach Park were extensively altered for the development of those facilities. The development of USACE's breakwater structure also altered natural terrain in the Pohoiki Bay area. Coconut, ornamentals, and fruit trees have been planted within park areas and privately-owned parcels. Additional descriptions of Pohoiki from the literature review and field inspection (LRFI) report prepared by CSH and the CIA are provided in Section 2.8. Archaeological and Cultural Resources.

1.5. Technical Considerations

Considerations pertaining to the dredging, hauling and placement of volcanic material are described below. There are three main operations in the transportation of dredged material: loading, transportation and unloading.

Mechanical dredging is typically used for the navigation channel and requires a crane and clamshell or hydraulic excavator to dig the dredged material that would be transported to the placement location via a barge or truck. A crane may also be necessary to place the material at the placement location if barging is used.

Truck hauling requires stable land and ramps that can accommodate the vehicles when they receive and place the dredged material. The entire transportation route from the dredging area to the placement location must also be on stable land.

Barge haul via scow is technically possible but unlikely because this method requires favorable tide and wave conditions to receive, transport, and place dredged material. Site access improvements (i.e., a barge access zone) would also be needed.

Dredged material placed in deep water beyond Pohoiki Bay would presumably be unretrievable. Ocean placement is therefore possible but undesirable since the dredged material may have a beneficial use as fill material. Other placement options are described below.

Nearby placement. Dredged material that is transported to nearby placement locations on newly formed accretion land could be turned over to Hawai‘i County to use. It is expected that the County would be responsible for all necessary environmental requirements related to the final placement of the material.

Upland placement. Trucks may be utilized to transport the dredged material to an upland placement location beyond Isaac Hale Beach Park such as the South Hilo Sanitary Landfill (approximately 10 miles northwest). An upland placement location that is close to Pohoiki Bay is preferable to minimize transportation impacts; however, no such location has been identified at this time.

1.6. Project Schedule and Cost

The environmental review process, which includes publication and public review of the EA, may be completed in 2023. The acquisition of necessary permits and approvals may also be completed in 2023 such that the project may be authorized to begin in 2024.

An initial estimate for the proposed project was calculated in 2022 to be $40 million. DOBOR is requesting State funds to supplement federal funds that may be obligated by FEMA for construction. No funding from Hawai‘i County and no disaster recovery funds that Hawai‘i County receives from FEMA will be utilized for DOBOR’s project. The amount of available funding for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained.

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2. AFFECTED ENVIRONMENT, PROJECT IMPACTS, AND MITIGATION

The *Final Detailed Project Report and Environmental Statement for Pohoiki Bay Navigational Improvements, Pohoiki Bay, Hawai'i* (U.S. Army Engineer District, Honolulu, 1978), which documents the pre-eruption social, economic, and environmental aspects of the Pohoiki Bay project area, is hereby incorporated by reference. In modern times, the project area has experienced distinct periods of intentional disturbance (e.g., development of the boat ramp and breakwater structure, and periodic maintenance dredging). The more recent lava flows contribute to and influence the affected environment in the Pohoiki Bay area.

2.1. Physical Setting

The development of the boat ramp and breakwater structure at Pohoiki Bay considered the dynamic and energetic coastline conditions that are likely to prevail for the foreseeable future. The proposed project, which removes accumulated volcanic material from Pohoiki Bay, is unlikely to affect natural forces (e.g., land formation processes, winds, waves, etc.) that are beyond human influence.

2.1.1. Climate

The climate in the State of Hawai'i is generally characterized by fairly uniform temperatures throughout the year, moderate humidity, persistent northeast trade winds, remarkable differences in rainfall within short distances, and infrequent severe storms. Most of Hawai'i experiences a hotter and drier summer period between May and October whereas the wetter winter period occurs between October and April (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service. n.d.). The average monthly temperatures in the Pohoiki Bay project area range from 70 degrees Fahrenheit in February to 77 degrees Fahrenheit in August (Giambelluca et al, 2013). Temperatures may be higher due to the combined effects of solar heating and high humidity. Annual rainfall in the project area is approximately 88 inches (Ibid.).

2.1.2. Soils and Topography

According to the *Web Soil Survey* (U.S. Department of Agriculture, Natural Resources Conservation Service, n.d.), soil types for the project area consist primarily of sand beaches, 0 to 6 percent slopes and lava flows, 2 to 20 percent slopes (see Figure 10). The sand beaches soil type is somewhat excessively drained. The lava flows soil type is characterized as excessively drained with low to moderately low saturated hydraulic conductivity and very low runoff quality. The soil type for the area behind the beach including at Isaac Hale Beach Park is classified as Malama Extremely Cobbly Highly Decomposed Plant Material, 2 to 40 percent slopes. This map unit is characterized as well drained with low to moderately low saturated hydraulic conductivity and low runoff quality.

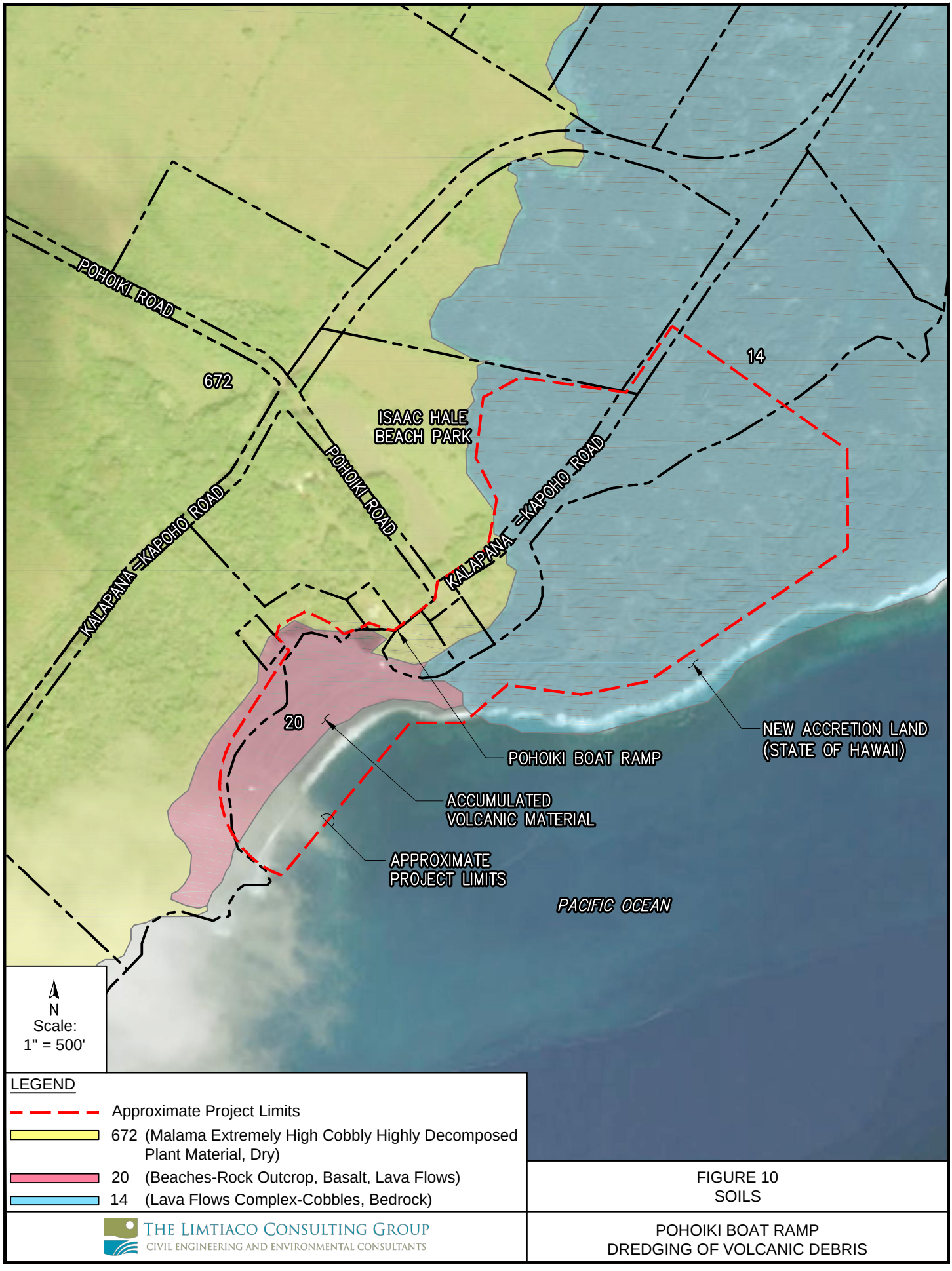


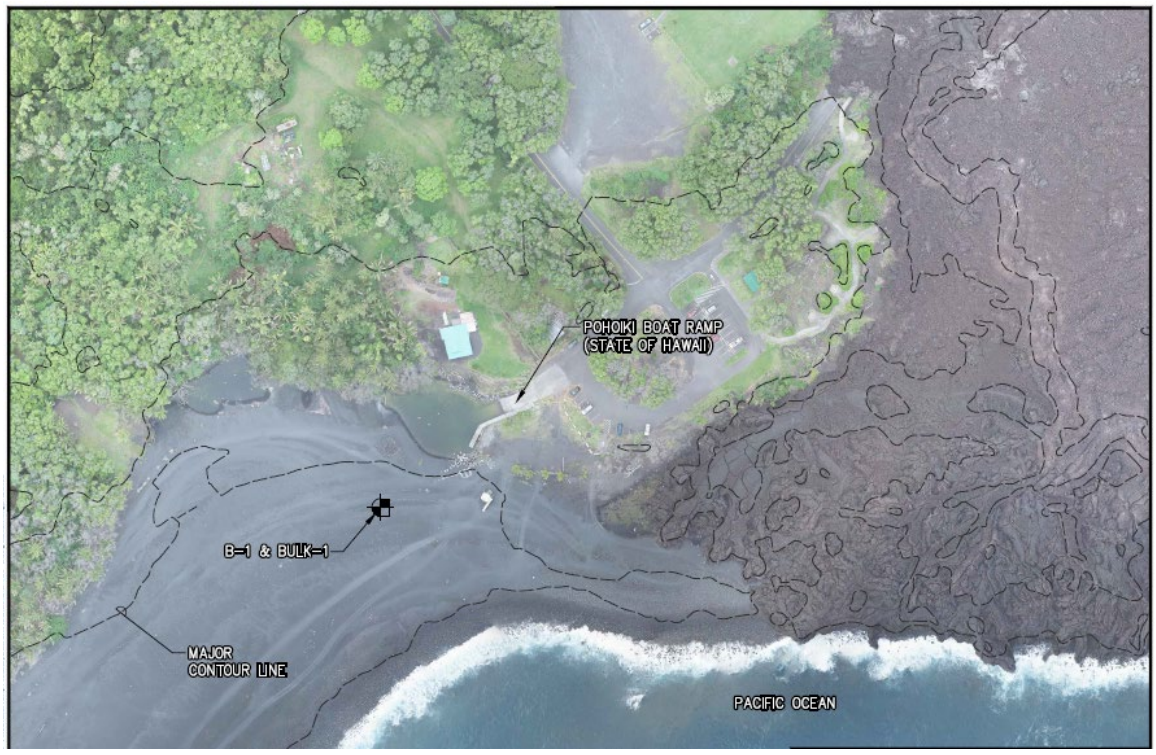
FIGURE 10
SOILS

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

Several ridges were noted on the surface of the beach deposit when Geolabs, Inc. conducted its investigation of subsurface conditions at Pohoiki Bay in May 2022. Geolabs, Inc. believes that these ridges were formed during heavy wave events and the deposition of the beach deposits. The approximate boring and bulk sample locations (see B-1 and Bulk-1) are depicted in Figure 11. Figure 12 provides the soil profile of the materials encountered in the boring. The full report is included as Appendix B.

Figure 11 Boring and Bulk Sample Locations



Note: Boring and bulk sample locations (B-1 and Bulk-1) are depicted on DUDEK LIDAR Imagery (May 2022).

One boring to a depth of 27 feet revealed a beach deposit surface layer about 18 feet thick consisting of loose to very dense sandy gravel with some cobbles. The beach deposit layer is underlain by a shallow marine deposit of medium dense silty sand that extends to a depth of approximately 20.5 feet. A clinker deposit of very dense sandy gravel that is approximately 4 feet thick is below the shallow marine deposit. The underlying layer extending to the maximum depth explored consists of a hard basalt rock formation. The likely composition of the accumulated material in Pohoiki Bay according to Geolabs, Inc. includes sand, gravel, some cobbles and occasional boulders.

GEOLABS, INC.

Geotechnical Engineering

POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII

Log of Boring 1

Laboratory			Field								Approximate Ground Surface Elevation (feet MSL): 12 *
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										GW	Dark gray to black medium to coarse angular **SANDY GRAVEL (BASALTIC)** with some cobbles, loose to medium dense, dry to moist (beach deposit)
Direct Shear	4	109			23						
	4				39					GP	Dark gray **SANDY GRAVEL (BASALTIC)** with some cobbles, dense to very dense, moist to wet (beach deposit)
Direct Shear	5	131			97		5				
			3								
							10				
Sieve - #200 = 0.2%	5				47						
			58				15				
	7				23						
			25				20			SM	Dark gray with trace tan **SILTY SAND (BASALTIC)** with a little sand (coralline) and a little gravel (basaltic), medium dense (shallow marine deposit)
										GW	Gray with some brown **SANDY GRAVEL (BASALTIC)** with a little cobbles and traces of silt, very dense (clinker)
	18				56						
			90	24			25				Gray vugular **BASALT**, moderately to closely fractured, unweathered to slightly weathered, hard (a'a basalt)
											Boring terminated at 27 feet
							30				* Elevation estimated from Topographic Plan received from The Limtiaco Consulting Group on May 31, 2022.
							35				

Date Started:	May 19, 2022	Water Level: ▽ 9.5 ft. 05/19/2022 1435 HRS ▼ 8.5 ft. 05/19/2022 1655 HRS	Plate
Date Completed:	May 19, 2022		
Logged By:	S. Latronic	Drill Rig: MOBILE B-53.1	A - 1
Total Depth:	27 feet	Drilling Method: 4" Solid-Stem Auger & HQ Coring	
Work Order:	8271-00	Driving Energy: 140 lb. wt., 30 in. drop	

FIGURE 12
SOIL PROFILE

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

Laboratory test results for one bulk sample of the near-surface soils indicate that the beach deposit material qualifies for use as Aggregate Subbase, Structural Backfill Material A, Structural Material B, Trench Backfill Material B, and Granular Material for Embankment in accordance with the 2005 DOT Standard Specifications. The beach deposit material also qualifies for use as Select Borrow for Subbase and Borrow in accordance with the County of Hawai‘i Standard Specifications for Public Works Construction, dated September 1986. Some screening of the larger sized materials would be required. Unanticipated soil conditions may be encountered and unforeseen subsurface conditions (e.g., perched groundwater, soft deposits, hard layers or cavities) may occur.

The newly created beach area is fairly level and slopes down near the existing boat ramp facility and at the coastline. The existing ground surface elevations at the fairly level area range from about +10 to +15 feet mean sea level (msl).

2.1.3. Geology and Geomorphology

The Island of Hawai‘i comprises approximately 4,030 square miles and is the largest landmass of the Hawaiian Archipelago. The island was formed by the activities of five shield volcanoes: Kohala, Mauna Kea, Hualālai, Mauna Loa, and Kīlauea. The project area was formed from basaltic lava flows from the Kīlauea Volcano, which is one of the most active volcanoes on Earth. Basalt-based sand is created as mechanical processes erode volcanic headlands. The coastline in the project area is mostly rocky sea cliffs that face southeast. Black sands in Puna were formed as pāhoehoe enters the ocean, explodes, and shatters.

The Pohoiki Bay area is approximately 4 miles from the active East Rift Zone of the Kīlauea Volcano. Lava flows from the 2018 eruption of Kīlauea Volcano inundated several areas along the coastline and formed new land approximately 230 feet from the Pohoiki Boat Ramp facility. The new lava landmass drops off steeply into the Pacific Ocean. Constant wave action against structurally weak and friable (easily crumbled) lava flows produces sand and cobbles which are transported along the coast, especially during large wave events.

In August 2018, the boat ramp was blocked by a sandbar of accumulated volcanic material. The black sand beach that blocked navigational access from the boat ramp to the Pacific Ocean was roughly 200-feet wide and 20-feet thick by March 2019 according to Sea Engineering, Inc. The accumulated material now covers approximately 11.6 acres of Pohoiki Bay, which was approximately 1,000 feet wide at the mouth and extended inland approximately 450 feet.

The breakwater structure has a crest elevation of +12 feet MLLW. Volcanic material has accumulated to a volume such that the material covers a portion of the breakwater structure. The seaward beach crest elevation is about +15 feet MLLW and the toe of

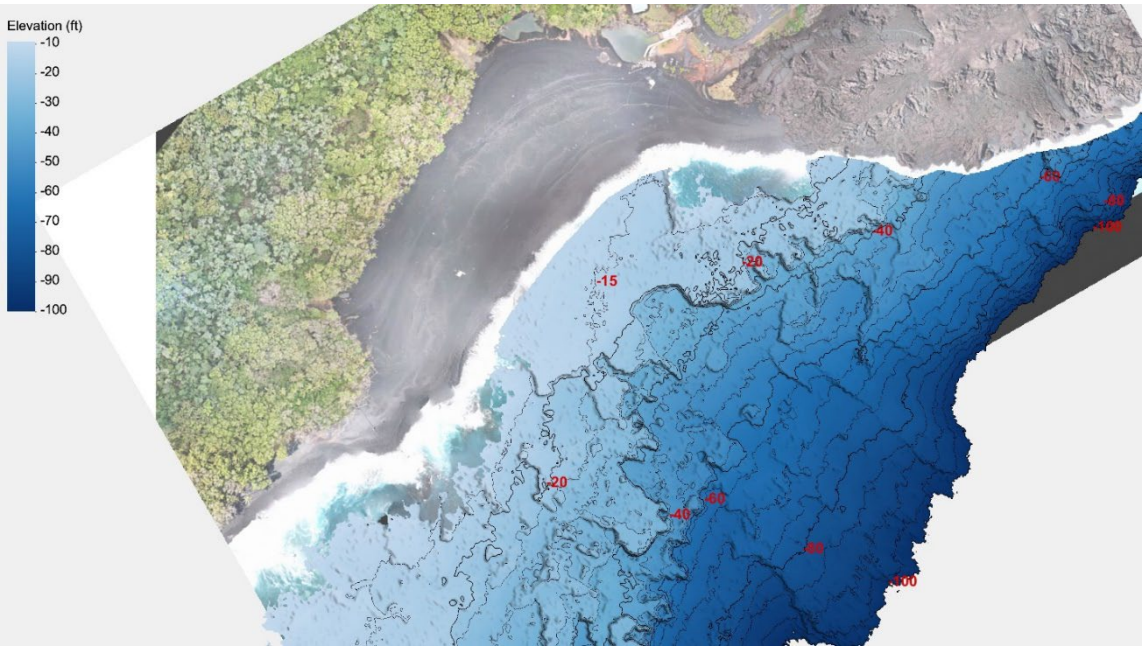
the beach extends to about the -12-foot depth. Two landlocked ponds remain at the back of the newly formed beach in the location of the pre-eruption shoreline. A shallow pond is located southeast of the boat ramp and breakwater structure, and is between the pre-eruption coastline, accretion land, and accumulated material.

2.1.4. Nearshore Bathymetry and Shoreline Conditions

The coastline in the project area is characterized as dynamic and energetic with mostly rocky sea cliffs, deep water close to shore, and relatively high nearshore ground elevations. Pohoiki Bay was one of the few areas of coastline with natural wave protection. The lava flow from the 2018 eruption created a large new land mass to the northeast of the Pohoiki Boat Ramp facility.

The nearshore bathymetry was generated by merging the USACE 2013 LiDAR dataset covering topography and bathymetry and a drone topographic LiDAR survey conducted in May 2022 (see Figure 13). For deeper waters than covered by the 2013 LiDAR dataset, bathymetry was obtained from the Hawaii Mapping Research Group. The nearshore bathymetry is complex, which contributes to a complex nearshore wave environment.

Figure 13 Nearshore Bathymetry Relative to MLLW from 2013 LiDAR Dataset



Note: Elevations from -10 to -100 feet Mean Lower Low Water are from the USACE 2013 LiDAR dataset; image merges the USACE 2013 LiDAR dataset and a May 2022 drone LiDAR survey.

The newly formed beach at Pohoiki Bay exhibits a series of crest ridges marking the progression of the shoreline seaward as sediment infilled the bay and high waves pushed sand and cobbles higher up the beach face. Geotechnical investigations for the project corroborate that the ridges on the surface of the beach deposit formed during large wave events while sand deposition was occurring.

Sediment transport is difficult to model directly according to Sea Engineering, Inc.; however, a reliable proxy for anticipating beach shape change from waves is that the beach will move to be parallel with incoming wave crests. In general, if sand is added to or removed from the beach, the prevailing waves will continue to redistribute the sand to achieve the crescent shape shown by ridges on the surface of the beach. A stable beach shape will resemble the incoming wave crests.

Crest ridge lines are highlighted with a dashed white line on the Google Earth image from May 2019, and represent the natural, equilibrium shape of the beach for different volumes of sediment within the bay (see Figure 14). The crest lines are relatively parallel suggesting a constant forcing of the beach shape by the incident waves. Wave crests are visible in aerial drone imagery courtesy of Dane DuPont/Hawaii Tracker and are in line with the shape of the beach (see Figure 15).

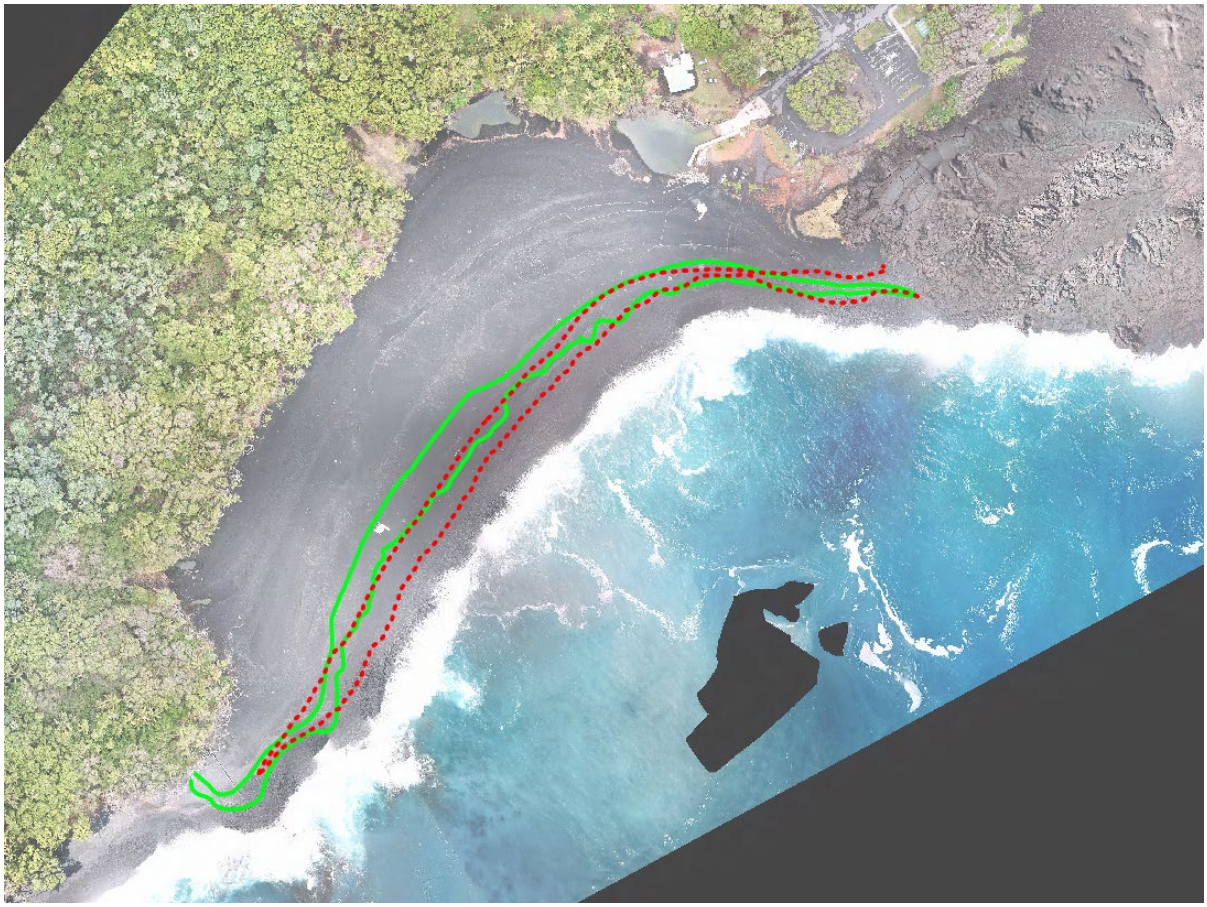
Figure 14 Highlighted Beach Crest Ridges in May 2019 Google Earth Image

Figure 15 Aerial View of North End of the Pohoiki Bay Area, Looking North

Note: Image courtesy of Dane DuPont/Hawaii Tracker.

GPS measurements of the beach crest were taken on May 1, 2019 and March 22, 2022 by Sea Engineering, Inc.; however, the beach crest was not well defined so the upper and lower bounds were recorded (see Figure 16). The results are indicated with a solid green line (for May 2019) and a dashed red line (for March 2022), and suggest that the shape of the beach is stable. From 2019 to 2022, the beach grew in width.

Figure 16 GPS Measurements of Beach Crest in May 2019 and March 2022



Note: The solid green line shows the measured beach crest locations from May 1, 2019 and the dashed red line shows the measured beach crest locations from March 22, 2022; all GPS measurements by Sea Engineering, Inc.

2.1.5. Tide and Water Level Rise

Hawai‘i tides are semi-diurnal with pronounced diurnal inequalities (i.e., two tidal cycles each day with the range of high and low water levels being unequal). The total water depth at a particular location is composed of the depth below the sea level datum, plus factors that add to the still water level (SWL) such as the astronomical tide, mesoscale eddies, wave setup, and potential sea level change over the life of the project. Higher water levels result in higher waves and more wave energy at the shoreline.

Tidal predictions and historical extreme water levels are given by the Center for Operational Oceanographic Products and Services (COOPS), National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA). The

nearest tide station to Pohoiki is at Hilo Bay (Station 16177760). The water level data from this station are as follows, based on the 1983-2001 tidal epoch. Elevations are referenced to the MLLW.

Table 1: Water level data for Hilo Harbor (NOAA Station 16177760)

Datum	*Elevation (ft. MLLW)*	*Elevation (ft. MSL)*
Highest Astronomical Tide	+3.35	+2.20
Mean Higher High Water	+2.40	+1.25
Mean High Water	+1.97	+0.82
Mean Sea Level	+1.15	0.00
Mean Low Water	+0.30	-0.85
Mean Lower Low Water	0.00	-1.15
Lowest Astronomical Tide	-0.85	-2.00

Mesoscale Eddies. Hawai‘i is subject to periodic extreme tide levels due to large oceanic eddies and other oceanographic phenomena that have recently been recognized and that sometimes propagate through the islands. Mesoscale eddies produce tide levels that can be up to 0.5 to 1 foot higher than normal for periods of up to several weeks.

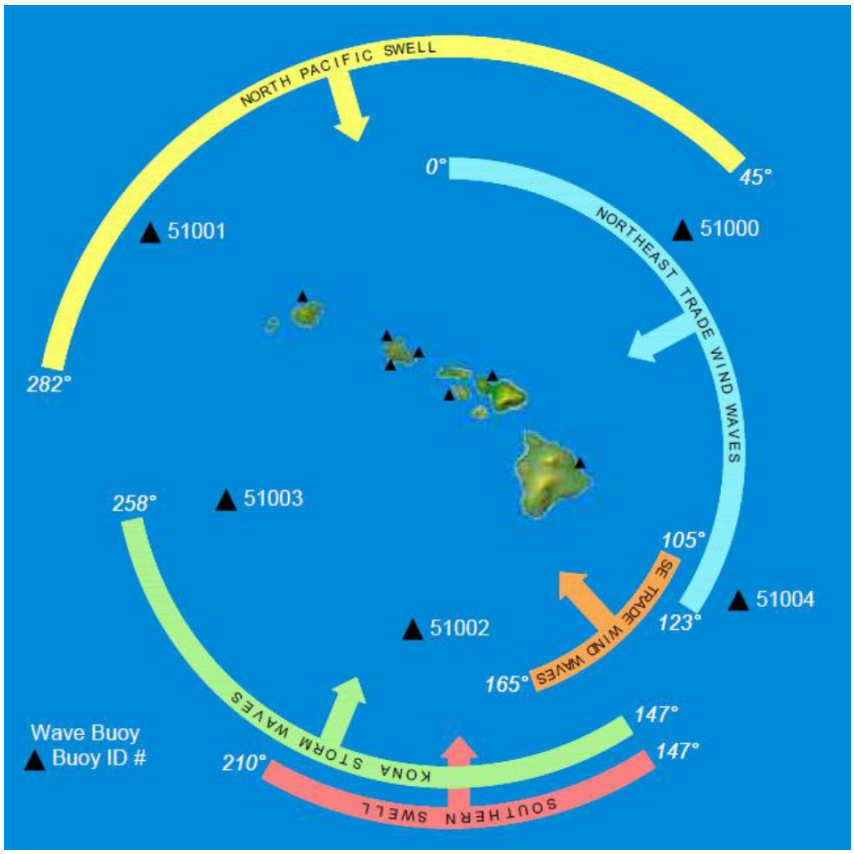
Wave Setup. During high wave events, the water level shoreward of the breaker zone may be elevated above the tide level as a result of the wave breaking process. This water level rise, termed wave setup, may be as much as 10 to 12 percent of the nearshore breaker height.

Sea Level Rise (SLR). The effects of global warming and climate change are causing a global mean rise in sea level. The present rate of global mean SLR appears to be accelerating compared to the mean of the 20th century, but the rate of rise is locally variable. Factors contributing to global SLR include decreased global ice volume and thermal expansion of the ocean due to warming. Recent climate research by the Intergovernmental Panel on Climate Change predicts continued or accelerated global warming for the 21st century, which would cause a continued or accelerated rise in global mean sea-level. Current State guidelines are to plan for 3.2 feet of SLR by 2100.

2.1.6. Winds and Waves

The Pohoiki Bay area is located on the southeast coast of the island of Hawai‘i, and is directly exposed to a wave spectrum that can be classified into a few predominant wave types that range in heights, periods, and directions of approach: northeast trade wind waves, southeast trade wind waves, southern swell, and Kona storm waves. Pohoiki Bay is sheltered from North Pacific swell waves by the island itself. Prevailing wave types and approach directions are illustrated in Figure 17. Tropical storms and hurricanes also generate waves that can approach the Hawaiian Islands from virtually any direction. Any and all of the wave conditions may occur simultaneously.

Figure 17 Prevailing Deepwater Wave Types and Approach Directions



Trade wind waves occur throughout the year and are the most persistent in April through September. They result from the strong and steady trade winds blowing from the northeast quadrant over long fetches of open ocean. Trade wind deepwater waves are typically between 3 to 8 feet in height with periods of 5 to 10 seconds, depending upon the strength of the trade winds and how far the fetch extends east of the Hawaiian Islands. The direction and approach, like the trade winds themselves, varies

between north-northeast and east-northeast and is centered on the northeast direction.

Waves can also be generated by the southeastern trade winds that blow south of the equator and can occur any time during the year. The southeast trade wind swell has small wave heights on the order of 1 foot and typical periods less than 12 seconds. These waves are not typically used for design criteria, but may be important for sediment movement along the shoreline due to their frequency of occurrence.

The southern swell is generated by storms in the southern hemisphere and is most prevalent during the months of April through September. Traveling distances of up to 5,000 miles, these waves arrive with relatively low deepwater wave heights of 1 to 4 feet and long periods of 14 to 20 seconds. Depending on the positions and tracks of the southern hemisphere storms, southern swell approaches from the southeast through southwest directions. Tropical storms and hurricanes often track from east to west and south of the islands, sending large storm waves to east and south shores.

Very recently (July 16-17, 2022), tropical storm Darby with winds of 45 mph passed south of Hawai‘i Island bringing high surf to the east and south shores, while at the same time a “historic” south swell generated by a storm in the South Pacific brought wave heights 20 feet plus to the south shores of all islands. An infrequent confluence of events, but illustrative of the significant exposure of the project site to high wave energy.

For more site-specific offshore wave statistics for waves approaching from the east are calculated from the Coastal Data Information Program (CDIP) Buoy 188 located approximately 9 miles northeast of Hilo (see Figure 18). CDIP 188 provides representative wave data for easterly waves offshore of Pohoiki. The buoy data covers a 10-year period from 2012 to 2022. Return period easterly deepwater wave heights, calculated using the Weibull distribution, are listed in Table 2. A plot of the Weibull distribution and recorded events are shown in Figure 19. The 10 largest recorded easterly waves events are listed in Table 3. These waves are primarily forced by the trade winds though passing hurricanes contribute to some of the events.

Figure 18 Location of CDIP Buoy 188 relative to Pohoiki Boat Ramp

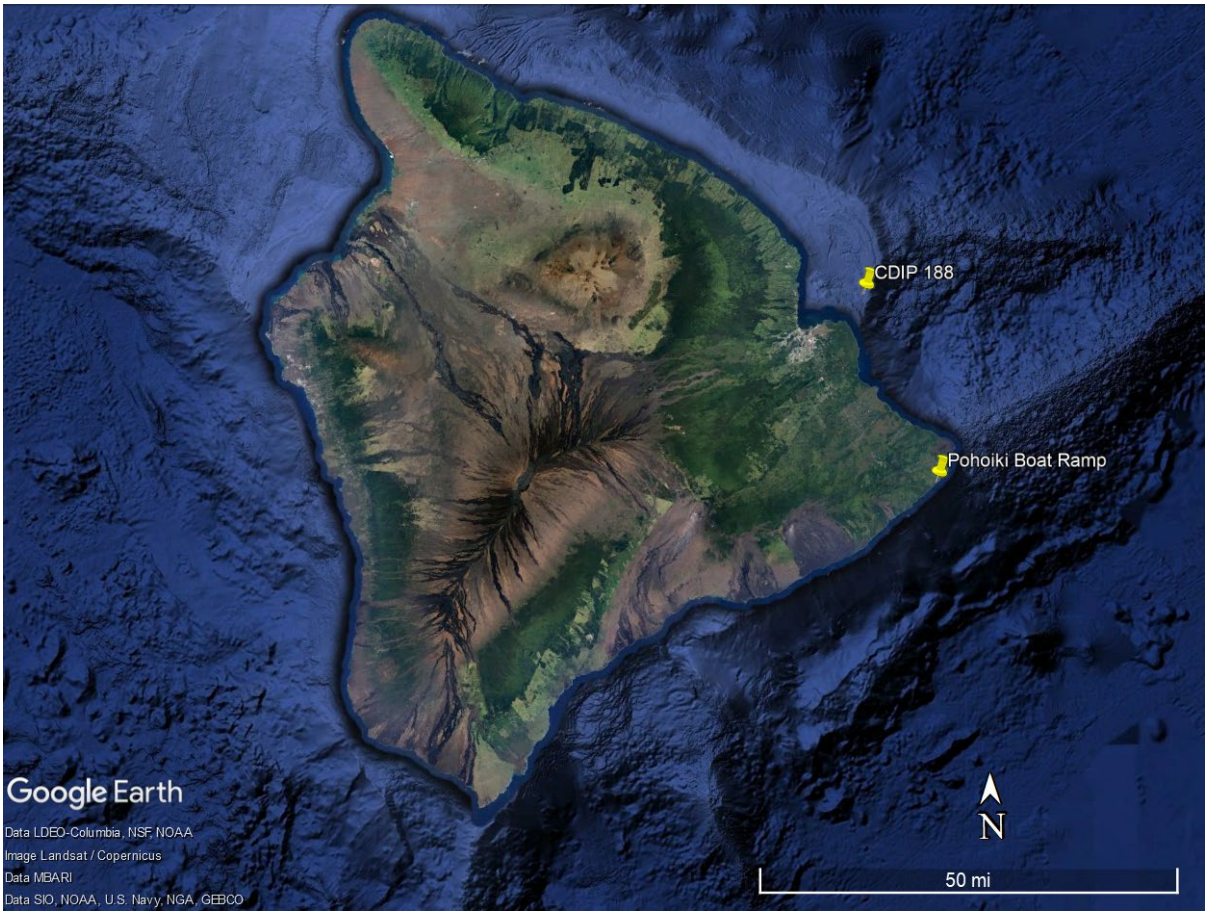


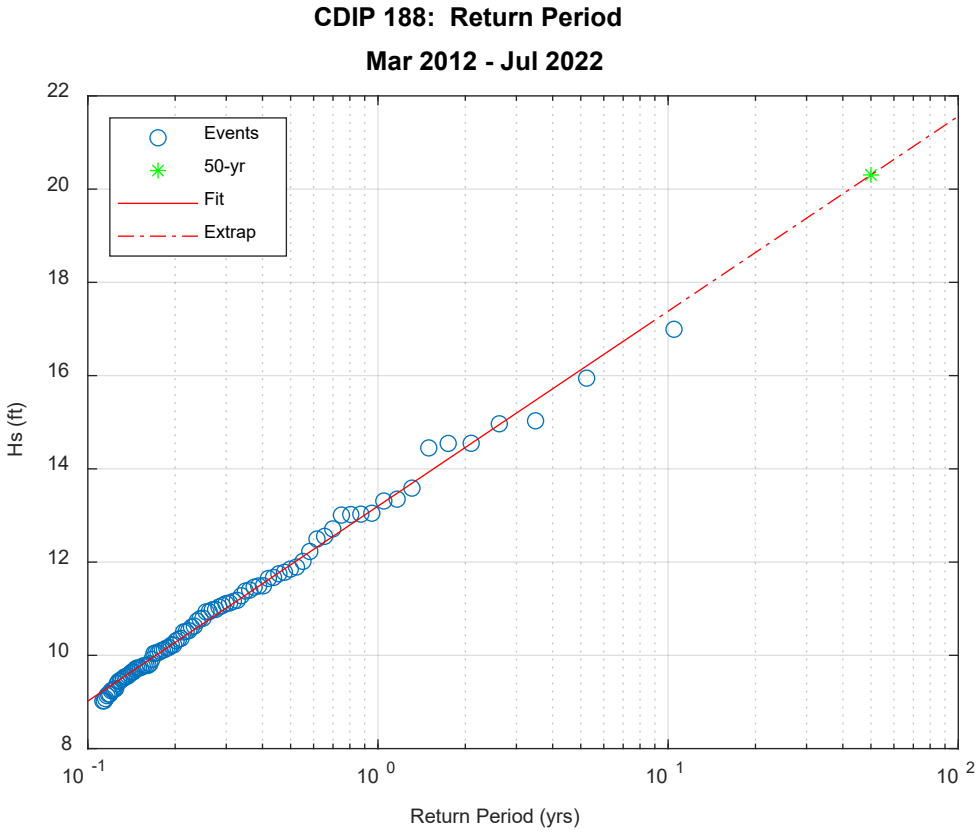
Table 2: CDIP Buoy 188 Deepwater Wave Heights for Easterly Waves

Return Period (years)	Wave Height (ft)
1	13.2
5	16.1
10	17.4
25	19.0
50	20.3

Table 3: Ten Largest Easterly Waves Measured by CDIP Buoy 188

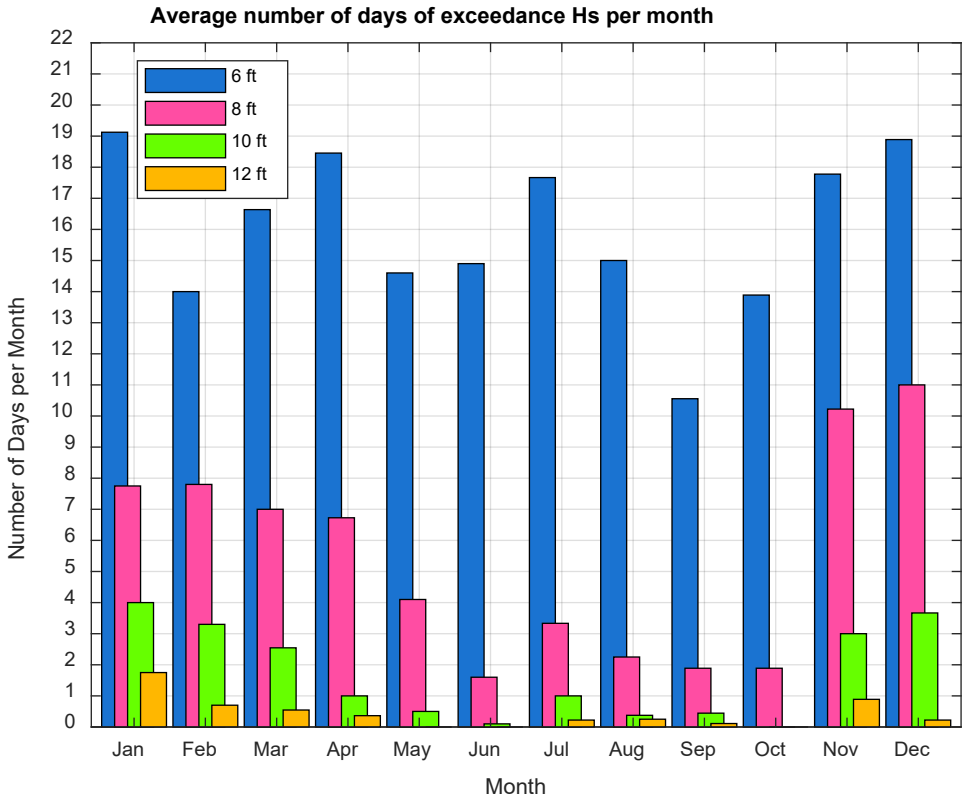
Date (yyyy-mm-dd)	Hs (ft)	Tp (s)	Dp (deg)
2016-08-31	17.0	10.5	79
2016-07-23	15.9	9.9	86
2018-08-24	15.0	9.1	103
2020-01-09	15.0	11.1	78
2018-02-27	14.5	10.5	96
2013-02-19	14.5	9.9	84
2013-01-06	14.4	10.5	74
2019-04-13	13.6	11.1	71
2020-03-03	13.4	11.1	71
2021-01-26	13.3	9.9	77

Figure 19 Weibull Distribution of Return Period Wave Heights



To show the prevalence of energetic wave climate impacting Pohoiki, Figure 20 shows the average number of days per month deepwater wave heights of easterly wind waves exceed 6, 8, 10, and 12 feet at the CDIP 188 buoy.

Figure 20 Deepwater Wave Height Exceedance Days per Month (Average)



The coast is directly exposed to the prevailing trade wind seas, south and southeast swell waves, and waves generated by passing storms. Wave heights in shallow water are a function of water depth. Based on depth-limited wave height criteria provided in the *Coastal Engineering Manual* (2006), the design extreme wave height at the shoreline is estimated as follows:

Water depth at the beach toe	-	10 feet
Stillwater level rise (high tide, wave setup, sea level rise)	-	5 feet
Total water depth (d_s)	-	15 feet
Bottom slope	-	1V:33H
Wave period	-	12 seconds
Breaker height versus water depth (H_b/d_s)	-	1.0
Breaker height (H_b)	-	15 feet

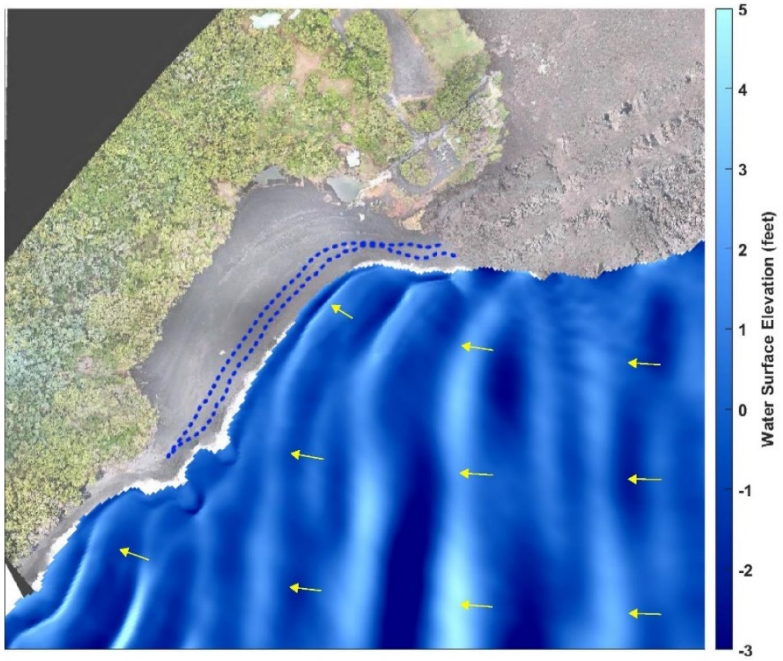
As deepwater waves propagate toward shore, they begin to encounter and be transformed by the ocean bottom. In shallow water, the wave speed becomes related to the water depth. As waves slow down with decreasing depth, the process of *wave shoaling* steepens the wave and increases the wave height. *Wave breaking* occurs when the wave profile shape becomes too steep to be maintained. This typically occurs when the ratio of wave height to water depth is about 0.78 and is a mechanism for dissipating the wave energy. Wave energy is also dissipated due to bottom friction. The phenomenon of *wave refraction* is caused by differential wave speed along a wave crest as the wave passes over varying bottom contours and can cause wave crests to converge or diverge and may locally increase or decrease wave heights. Not strictly a shallow water phenomenon, w*ave diffraction* is the lateral transmission of wave energy along the wave crest and would cause the spreading of waves in a shadow zone, such as occurs behind a breakwater or other barrier.

Numerical models are available that can accurately simulate this complex transformation of deepwater waves as they propagate towards shore. Two wave cases were modeled for the two predominant sources of wave energy at Pohoiki: eastly trade wind waves and south swell. The descriptions of the models are provided in Appendix C.

The nearshore wave pattern for trade wind waves is shown in Figure 21. The photo shows that the incoming wave crests closely parallel the shape of the beach suggesting that trade wind waves are the main driver of the current beach shape. The photo also shows that as the waves round the corner of the new accretion land to the north, they wrap around the steep shoreline creating the potential to erode the friable lava and move more sediment into Pohoiki Bay.

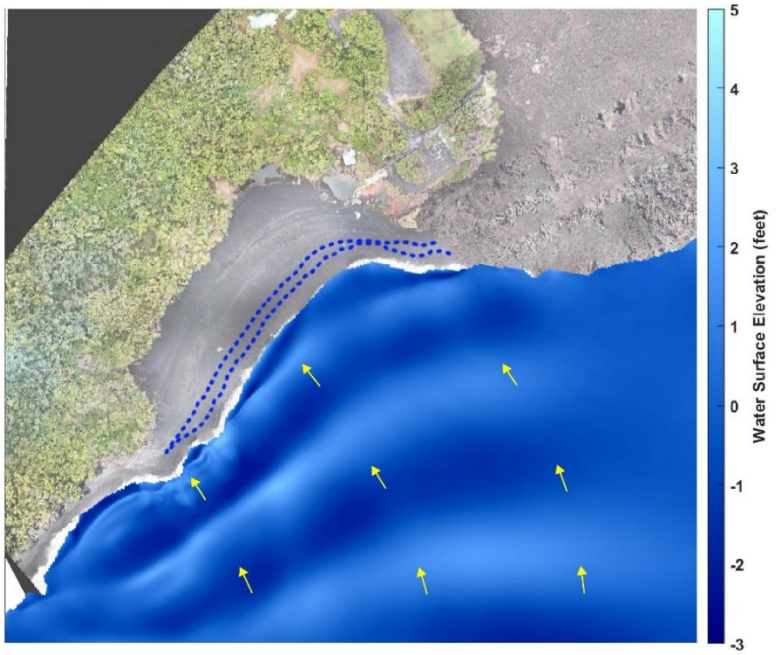
Figure 22 shows the wave pattern for a typical south swell. The model shows that most of the wave energy is refracted toward the shallow reef protruding from shore at the southern end of the beach, but the wave crests that do reach the beach are also relatively parallel to the beach crest and may have the potential to move sediment from south to north along the beach. The wave modeling shows that typically daily prevailing trade wind wave heights at the shoreline are about 3-4 feet, and annual event large trade wind wave breaker heights are about 8 feet.

Figure 21 Wave Pattern from Typical Easterly Trade Wind Waves



Note: Dashed Blue Lines Show the Existing Beach Crest in March 2022 and Yellow Arrows Indicate Wave Direction

Figure 22 Wave Pattern from Prevailing South Swell



Note: Dashed Blue Lines Show the Existing Beach Crest in March 2022 and Yellow Arrows Indicate Wave Direction

Unconsolidated (sand and cobbles) and mobile shorelines tend to align themselves with the incident wave crests, and are most stable when oriented parallel to the nearshore wave crests. The May 2019 Google Earth photograph, previously shown in Figure 14, illustrates wave crest alignment at the shore and a series of progressive beach crest ridges in approximate alignment with the wave crests. It is estimated that an unstabilized sand and cobble shoreline will continue to align itself with the approaching waves. As shown by the wave modeling, prevailing trade wind waves approach the shoreline from the east, thus moving loose material from east to west in Pohoiki Bay. Similarly, south swells approaching from the southwest will move loose material to the east. Both wave types can be expected to quickly fill in discontinuities (such as a dredged cut) in the loose and mobile beach face and align it parallel to the wave crests.

2.2. Social and Economic Resources

The main objective of the proposed project is to restore navigational access to the Pacific Ocean, which is expected to benefit the Puna community as it continues to recover from the 2018 eruption. The removal of accumulated volcanic material from Pohoiki Bay is expected to allow the undamaged boat launch ramp to be utilized by fisherfolk and emergency rescue teams, which represents a return of pre-eruption functions. Outdoor recreation activities such as swimming and surfing, which were popular activities at Pohoiki Bay, may resume as a result of the proposed project. Excavation and dredging that restores Pohoiki Bay to a similar pre-eruption shape and depth would remove newly created beach and increase the area of nearshore water.

DOBOR's project, which utilizes inundated areas for material placement, is unlikely to affect improvements at Isaac Hale Beach Park that would be accomplished by Hawai'i County. The proposed project involves excavation and dredging at Pohoiki Bay, which would create short-term construction jobs but is unlikely to affect population levels or housing. The return of the Pohoiki Boat Ramp facility to productive use is expected to restore economic activities (e.g., commercial fishing and ocean/volcano tours) and fishing for subsistence.

2.2.1. Pohoiki Boat Ramp Facility

The wharf at Pohoiki Bay that Robert Rycroft constructed during the mid-1880s to support his commercial activities was abandoned by the 1940s. In 1963, USACE constructed a boat ramp at the site of the former wharf at Pohoiki Bay. The boat ramp was authorized under Section 107 of the River and Harbor Act of 1960, as amended. DOBOR is the non-Federal sponsor that owns and maintains the Pohoiki Boat Ramp facility. When the facility was operable, it provided amenities to commercial and recreational boaters. Emergency rescue teams also used the facility.

In 1977, DOT requested assistance from USACE because the boat launch ramp at Pohoiki Bay was unprotected from constant wave action and unusable approximately 20 to 25 percent of the time (U.S. Army Engineer District, Honolulu, 1978). Numerous human injuries and damages to boats and trailers were occurring. In addition to fisherfolk, the U.S. Coast Guard and the Hawai‘i County Fire Department rescue team were encountering difficulties when launching vessels to respond to emergencies. Studies conducted in the 1970s included detailed site investigations, topographic and bathymetric surveys, oceanographic analysis, detailed engineering design, economic evaluations, a marine environmental survey, and a cultural reconnaissance report that also summarized an archaeological reconnaissance and historical literature survey.

The study results and alternative plans were presented at a formal public meeting held on November 16, 1977; fishermen and residents who attended the meeting strongly supported the recommended navigation improvements (Ibid.). In 1978, USACE, Honolulu Engineer District published its project report and environmental statement pertaining to the feasibility of constructing navigation improvements at Pohoiki Bay. Construction of the 90-foot-long breakwater structure was completed in 1979.

DOBOR requested assistance from the USACE with maintenance dredging in early 1999. Approximately 300 cubic yards of cinder material was removed from submerged areas in the vicinity of the head of the breakwater and near the Pohoiki Boat Ramp facility. Maintenance dredging was completed in 2001.

In 2008, DOBOR essentially replaced the entire boat ramp facility. A new concrete ramp was constructed along with a new loading dock and pedestrian walkway. Other improvements included a new concrete approach ramp, asphalt paving, and a new rock rip rap revetment to protect the adjacent shoreline.

2.2.2. Isaac Kepo‘okalani Hale Beach Park

The Pohoiki Boat Ramp facility and breakwater structure are located adjacent to Hawai‘i County’s Isaac Hale Beach Park. The park has camping and picnic areas, restrooms, a boat wash area, open grassy spaces, parking lots, and ocean safety facilities. Lava flows from the 2018 eruption entered the ocean roughly 0.9 miles northeast from Pohoiki Bay at ‘Ahalanui Beach Park on July 12, 2018 and a portion of Isaac Hale Beach Park was inundated by August 6, 2018. ‘Ahalanui Park was purchased in 1993 to replace Kaimū Beach Park and Harry K. Brown Park, which were destroyed by lava flows.

The Puna district has fewer beach park resources as a result of recent eruptions. The following description is from the previously prepared report for the County’s 8-inch waterline to Isaac Hale Beach Park (P. Yoshimura, Inc., 1994):

> *The development of a reliable water system to the Isaac Hale Beach Park will increase the use of the park. The park is now extensively utilized for camping, picnicking, fishing, swimming, boating, and social gatherings.*
>
> *The park's social and economic benefits to the Puna community have increased ten-fold as the Puna population is rapidly growing, while shoreline recreational facilities are decreased by lava inundation.*

The report also states that Isaac Hale Beach Park needs to be maintained and expanded to address the community's growing demand for recreational resources (Ibid.). The County's waterline project was developed in anticipation of the long-term usage of Isaac Hale Beach Park as a recreational resource in Puna. The 2018 eruption damaged the waterline to the park, which is expected to be repaired by Hawai'i County.

The 1990 eruption inundated a swimming area at Kalapana. Currently, the Puna community has no safe swim area for beginning swimmers and children. In 2012, the Puna community started a petition which documents public support for a safe swim area at Pohoiki Bay that avoids conflicts with boaters. The Puna community also supports the development of a new boat wash area at Isaac Hale Beach Park that minimizes conflicts with campers. Additional considerations pertaining to recreational activities (e.g., soaking and swimming) are discussed in Section 2.13 Recreational Resources.

The County of Hawai'i Department of Parks and Recreation is allocating $3.1 million of disaster recovery funds to improvements at Isaac Hale Beach Park, which includes recovery funding that was received for 'Ahalanui Beach Park (County of Hawai'i, 2022). The redevelopment of 'Ahalanui Park (which was completely inundated by lava such that shoreline access and coastal recreation no longer exists) is considered to be financially impractical (Ibid.).

2.2.3. Demographics

The Puna District has been identified as an area "that is experiencing the fastest rate of growth of all the districts in the County of Hawai'i" (County of Hawai'i Planning Department, 2008). The 2010 resident population for the Puna region was 45,326 inhabitants, which represented approximately 24 percent of the Hawai'i Island population of 185,079 inhabitants (Hawai'i Department of Business, Economic Development and Tourism, 2021). The 2020 estimated resident population for the Puna region was 51,704 inhabitants, which represented approximately 26 percent of the Hawai'i Island population of 200,629 inhabitants (Ibid.). Between 2020 and 2021, Hawai'i County's population grew from 200,629 to 202,906 inhabitants while Honolulu and Maui counties experienced population loss. (Ibid.).

2.2.4. Socioeconomic and Environmental Justice

Public access to beaches and the ocean is a right that is preserved by the State of Hawai‘i constitution. The operable Pohoiki Boat Ramp facility supported local life, commercial activities including tourism, food subsistence, recreational activities, and emergency rescue services. The Pohoiki Boat Ramp facility is described in *Revitalize Pohoiki* (2022) as “the third most productive across the islands.” The inoperable boat ramp facility curtails commercial, recreational, and food subsistence activities. Local fisherfolk who have launched from Pohoiki Bay and fished in the waters off of Pohoiki for generations have stopped fishing altogether, are incurring higher expenses as a result of launching from Hilo, or continue to adjust profit goals to adjust for rising expenses (Spencer and Hammatt, 2023). Recreational opportunities in the Puna District have been decreasing as a result of lava flows. The demand for outdoor recreational resources in the Puna District as expressed by the public is very high. At this time, the prevailing community sentiment appears to support the return of the Pohoiki Boat Ramp facility to productive use due to the challenges associated with developing a boat launch facility in Puna that replaces the built facility at Pohoiki Bay.

2.3. Water Quality

The pre-eruption marine conditions at Pohoiki Bay were described by the USACE as follows: “the sand and small rock material is constantly in motion or suspension, especially between the launching ramp and the lava shelf extending out near the center of the bay” (U.S. Army Engineer District, Honolulu, 1977). Geological activity in the project area contributes to heated water discharges along the shoreline. The designated Pohoiki Warm Springs site is located approximately 400 feet northwest of the Pohoiki Boat Ramp facility.

The project area includes a nearshore marine environment that was drastically altered by the accumulation of volcanic material that has reduced Pohoiki Bay to a few areas of trapped water. On October 18, 2022, the measured temperatures of the deeper and shallower ponds were 105 and 107 degrees Fahrenheit, respectively (AECOS, Inc., 2023). A deep-water marine environment is along the newly formed shoreline. There are no streams or other water resources (e.g., rivers, wetlands, bogs, etc.) in the vicinity of the Pohoiki Boat Ramp facility.

Coastal waters in the project area are designated as Class AA (Hawai‘i Department of Health, 2014). The stated objective for Class AA is that these marine waters “remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from human-caused source or actions.” Human activities that generate nonpoint sources of pollution such as runoff containing nitrogen, phosphorus, and/or sediments can threaten coastal ecosystems. Discharges of sediments and pollutants from sewage injection wells, cesspools, and defunct septic tanks may further contribute to harmful environmental impacts that may be

noticeable in the nearshore environment. Ocean waters that appear pristine may contain fecal bacteria in areas where cesspools are found (Drewes, 2023).

The Hawai‘i Department of Health (DOH) monitors coastal recreational beaches and uses Environmental Protection Agency (EPA)-approved tests for water quality testing under the Clean Water Act. Testing undertaken by DOH can detect the fecal indicator organism, enterococci; however, there are also natural causes for the presence of enterococci. The cesspool that is closest to Pohoiki Bay is depicted as priority level 3 (lowest contamination hazard) according to the Hawai‘i Cesspool Hazard Assessment and Prioritization Tool (Shuler et al, 2021), which is available from https://seagrant.soest.hawaii.edu/app/. Several cesspools are further upland and along Pohoiki Road according to the input dataset (Ibid.), which is available from https://seagrant.soest.hawaii.edu/app2/. Sea level rise that brings groundwater closer to the surface may allow cesspool effluent to mix with the water table and flow into the ocean (McAvoy, 2023). The State of Hawai‘i continues to struggle with its attempts to eliminate cesspools that can endanger nearshore waters and ground water resources (Terrell, 2023). DOH suspended its water quality testing at Pohoiki when the connection with the Pacific Ocean was severed.

Information pertaining to vibriosis, which is caused by vibrio bacteria, is posted by DOH at https://health.hawaii.gov/docd/disease_listing/vibriosis/. None of the EPA-approved tests utilized by DOH would detect vibrio, which is a naturally occurring pathogen, in water. *Vibrio vulnificus* thrives in warmer temperatures and can cause staph-like infections. Some people will become very seriously ill and others will have minor infections. Paddlers, a septic shock survivor, and an infectious disease specialist were interviewed for the newscast (Martinez, 2023) that is posted at https://www.hawaiinewsnow.com/2023/06/22/thrill-seekers-jumping-into-ala-wai-canal-spark-major-health-concerns/.

Impacts and Mitigation Measures

Temporary impacts to water quality will be expected during the construction period due to turbidity resulting from excavation and dredging activities. The turbidity effects are expected to be temporary, limited to the duration of construction, and less than significant.

A National Pollutant Discharge Elimination System (NPDES) Permit for discharges of pollutants, including storm water runoff is required for the disturbance of one acre or more of total land area pursuant to HAR §11-55, “Water Pollution Control” effective January 15, 2022. Construction activities at the project site will comply with applicable Federal, State and County erosion control rules and regulations.

The construction contractor will be responsible for implementing a storm water management plan to minimize erosion and sediment loss where site work occurs in accordance with State and County regulations. Erosion control measures (e.g., the use of berms, cut-off ditches and silt fences) and Best Management Practices (BMPs) will mitigate stormwater runoff from entering State waters. Any silt fences erected during construction will be continuously inspected and repaired to prevent silt runoff from construction.

Identified nuisances such as areas of trapped water that may be unsanitary may be eliminated as a result of the project. Nearby property owners appear to support this aspect of the project (see Section 2.8. Archaeological and Cultural Resources). Consultations with the USACE are on-going since DOBOR's project would restore the connection to the Pacific Ocean and must be permitted. Federal jurisdiction with regards to the applicability of Individual and/or Nationwide Permits is determined by the USACE and is valid for 5 years.

Water quality testing by DOH is expected resume after the connection between Pohoiki Bay and the Pacific Ocean is restored. The testing effort by DOH fulfills two different EPA requirements: (1) to immediately inform beach users when there is an elevated risk of gastrointestinal illness due to possible fecal contamination, and (2) to assess water quality over time to determine water quality impairment (i.e., does not meet water quality standards). The public is expected to benefit from the resumption of water quality testing by DOH since it notifies the public when there are indicators of public health concerns.

2.4. Air Quality

Air quality in the State of Hawai‘i regularly meets national air quality standards for common air pollutants. The Pohoiki Boat Ramp facility is immediately adjacent to the parking area that is utilized by patrons of Isaac Hale Beach Park. Background air quality may be influenced by pollutant sources such as non-stationary (or nonpoint) transportation emissions from intermittent vehicular activity. Natural pollutants such as plant pollens and spores, airborne dust, and sea spray also contribute air emissions on a periodic basis. The prevailing northeast trade winds can circulate airborne particulates, transport emissions away from the source, and disperse airborne pollutants that would otherwise accumulate during calm conditions.

Impacts and Mitigation Measures

Ambient air quality will be temporarily affected by construction-related vehicles, equipment and activities that would generate fugitive dust and emissions. Construction equipment and vehicles are typically diesel powered and emit exhaust emissions typically high in nitrogen dioxide and low in carbon monoxide; however, these emissions are likely to be dispersed by the

prevailing winds. The construction contractor will be responsible for the implementation of erosion and dust control measures as necessary for compliance with Air Pollution Control standards stated in HAR §11-60.1-33, "Fugitive dust." Exhaust emissions can be reduced by keeping construction equipment and vehicles properly tuned and maintained, and minimizing unnecessary idle time. Fugitive dust concerns fall within the purview of the DOH Clean Air Branch (CAB) Enforcement Section. Construction-related impacts to air quality would cease with the completion of the project.

Air quality is expected to remain in attainment with EPA National Air Attainment Quality Standards as a result of the proposed project, which returns the Pohoiki Boat Ramp facility to productive use. The operable Pohoiki Boat Ramp facility is not expected to generate pollutant emissions that would noticeably affect local or regional air quality. Ocean rescue services, commercial fishing, ocean/volcano tours, recreational activities, and food sustainability practices are expected to resume. Air emissions from vehicles, vessels, and human activity in the project area would likely be transient, highly localized, and dispersed by trade winds. Impacts to air quality are expected to be less than significant, and no mitigation is warranted or proposed.

2.5. Noise

Background noise in the project area is influenced by many types of vehicles traveling on public roads and through the surrounding project area such as private cars, public and commercial buses and vans, cargo trucks and trailers, and agricultural trucks and trailers. Other ambient noise is associated with human activities on the newly formed beach at Pohoiki Bay, along the shoreline, or at Isaac Hale Beach Park.

Impacts and Mitigation Measures

Audible noise in localized areas is expected to fluctuate according to the types of activities, vehicles, and heavy equipment that are utilized during the proposed project. Intermittent and unavoidable noise is anticipated since construction vehicles, heavy equipment and impact tools generate noise as part of normal operations. The mitigation of noisy activities to inaudible levels will not be practical in all cases due to the intensity and exterior nature of the work. Ambient noise levels in the vicinity of the project site will therefore increase from the operation of construction equipment (e.g., trucks, dredging equipment, and generators) as the project proceeds. Construction noise is temporary in nature and will cease upon completion of the project.

The noise regulations pursuant to HAR §11-46, "Community Noise Control" establish maximum permissible sound levels for construction activities occurring within "acoustical" zoning districts. The regulations require a permit

for excessive noise (e.g., noise that exceeds allowable levels stated in the administrative rules for more than 10 percent of the time within any 20-minute period). It shall be the contractor's responsibility to obtain the permit and comply with any attached conditions. The proposed project allows the Pohoiki Boat Ramp facility to return to productive use. DOBOR's facility is existing infrastructure that does not represent a new source of background noise at Pohoiki Bay.

2.6. Floral and Faunal Resources

The project area contains native plant habitat that was intentionally modified to allow for human activities and terrain that was recently affected by natural land formation processes. Biologists from AECOS, Inc. conducted surveys of the project area in October 2022 during weather conditions described as "ideal, with no rain, unlimited visibility, and winds between 1 and 5 kilometers per hour." (David et al., 2022). The survey report is included as Appendix D.

There is no federally designated critical habitat in the project area, and no plant species observed in the project area are listed as endangered or threatened under federal or State of Hawai‘i endangered species statutes. The area immediately surrounding the boat ramp facility is unvegetated to sparsely vegetated with naturally occurring species. Landscaping plants and naturalized species are located in and around the parking area. Pioneer fern species and nut grass are growing on the new ‘a‘a lava flow. Native trees in the project area include Hawaiian screwpine (*Pandanus tectorius*) or *hala* and the Indian tulip tree (*Thespesia populnea*) or *milo*. The most abundant tree in the project area is Alexandrian Laurel (*Calophyllum inophyllum*) or *kamani*, which is an early Polynesian introduced species.

The Blackburn's Sphinx Moth (*Manduca blackburni*) is a federally-listed insect found in Hawai‘i. No tree tobacco (*Nicotiana glauca*) nor any other species in the Family Solanaceae that could be host plants for the Blackburn's Sphinx Moth caterpillar were detected during the survey.

Two existing ponds at the back of the newly created beach were found to have temperatures of 105 degrees Fahrenheit and 107 degrees Fahrenheit, which is not favorable for most aquatic organisms. As previously mentioned in Section 2.3. Water Quality, naturally occurring organisms such as *Vibrio vulnificus* may be found in thermally active areas and can cause staph-like infections.

One native migratory shorebird species – the Pacific Golden-Plover (*Pluvialis fulva*) – and 11 alien (naturalized, non-native) species of birds were recorded during the survey. The plover typically migrates to Hawai‘i and the Tropical Pacific during the fall and winter months, and returns to the Arctic in late April or early May; nesting occurs in the high Arctic during the late spring and summer months. Two non-native species

were 65 percent of the recorded species during station counts, and this result is in keeping with the location and vegetation in the project area.

Federally protected species that are known to occur, or could reasonably be expected to occur in or transit through the project area include one mammal and three Hawaiian seabirds:

Hawaiian hoary bat (*Lasirus cinereus semotus*) or *ʻōpeʻapeʻa*
Hawaiian petrel (*Pterodroma sandwichensis*) or *ʻuaʻu*
Newell's shearwater (*Puffinus auricularis newelli*) or *ʻaʻo*
Band-rumped storm-petrel (*Hydrobates castro*) or *ʻakēʻakē*

The Hawaiian hoary bat was not observed during the survey but may transit through the project vicinity on a seasonal basis. No seabirds or their nests were detected during the survey. Seabirds may transit through the project vicinity in small numbers between April and the middle of December.

The Hawaiʻi Distinct Population Segment of green sea turtle (*Chelonia mydas agassizi*) is federally-listed as a threatened species and as a threatened subspecies under state regulations. The hawksbill sea turtle (*Eretmochelys imbricata*) is federally-listed as endangered and much less common than the green sea turtle in Hawaiian waters. Tagging studies suggest that hawksbill nesting in Hawaiʻi occurs within the main Hawaiian Islands. Approximately 85 percent of all confirmed hawksbill nests in the State of Hawaiʻi have been recorded in the district of Kaʻū, on the southern coast of Hawaiʻi Island. Algal resources consumed by sea turtles do not occur in the nearshore waters of the project area. No evidence of sea turtle usage of the beach was observed during the survey; however, the newly formed beach and shoreline area are suitable for green sea turtle and hawksbill turtle nesting.

The U.S. Fish and Wildlife Service (USFWS) indicates via email sent on May 23, 2023 that an Official Species List should be obtained from the Information for Planning and Consultation online tool for consultation under Section 7 of the Endangered Species Act. Coordination with the USFWS, Pacific Islands Fish and Wildlife Office under the Fish and Wildlife Coordination Act would also occur for work around aquatic environments.

The comments from DLNR - Division of Aquatic Resources (DAR) that were signed on May 22, 2023 (Ref. DAR #6397) mention the naturally formed anchialine ponds and the detection of two native anchialine shrimp species during biological surveys conducted by DAR from 2019 to 2020. The letter from DAR states that it is not opposed to the filling of the ponds at the backshore area in part because the water temperatures increased to over 45 degrees Celsius (or 113 degrees Fahrenheit) and

extirpated native anchialine shrimp species from that habitat. DAR expanded its anchialine surveys into the new lava field north of Pohoiki and recorded new habitat with native anchialine shrimp species including the endemic *Halocaridina rubra* (or ‘ōpae ‘ula) and the indigenous *Metabetaus lohena*.

Impacts and Mitigation Measures

Vegetation in the project area is sparse such that existing trees should be retained and incorporated into the landscaping to the extent possible. The proposed project is not expected to displace federal or State of Hawai‘i listed species from the project area, which has been and is likely to continue to be intentionally disturbed and altered.

Nest predation is thought to be the primary cause of mortality in Hawaiian Petrels and Newell’s Shearwaters in Hawai‘i (USFWS, 1983; Simons and Hodges, 1998; Ainley et al., 2001). Collision with man-made structures is considered the second most significant cause of seabird mortality. No new permanent lighting is anticipated as a part of this project. If permanent lighting at the project site is determined to be necessary, DOBOR will consider the following guidance:

Night-time lighting during the construction period should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground (Reed et al., 1985; Teller et al., 1987).

Deleterious impacts to transiting seabirds can be avoided if Project construction occurs during daylight hours and any outdoor lighting used/installed is fully “dark sky compliant” (HDLNR-DOFAW, 2016).

Avoid nighttime construction during the seabird fledging period, September 15 through December 15 (DLNR, 2016)

The following measures are recommended although the potential disturbance to Hawaiian hoary bats from the removal of vegetation is likely to be minimal:

No woody vegetation taller than 15 feet should be removed during the bat pupping season between June 1 and September 15..

The following measures are recommended based on the known nesting locations on Hawai‘i island for hawksbill sea turtles:

A qualified biological monitor should be on site during dredging operations to ensure that dredging activities do not disturb listed sea turtles.

The USFWS included a list of recommended standard BMPs for avoiding or minimizing impacts to fish and wildlife resources with its May 23, 2023 comments. DOBOR's contractor will be responsible for implementing measures that avoid or reduce the impacts to aquatic habitats from construction-related activities.

In its letter dated May 22, 2023 (Ref. DAR #6397), DAR supports having individuals actively monitoring the area for listed marine species such as green sea turtles and hawksbill turtles. DAR also states in its letter that the filling of anchialine ponds habitats would typically be discouraged based on its efforts to protect these unique habitats; however, the proposed action in this instance is not expected to have measurable impacts to native anchialine species or nearby anchialine or other aquatic habitats.

The proposed project is primarily intended to restore navigational access to the Pacific Ocean, which would allow commercial, recreational and food subsistence activities, and emergency rescue services to resume at Pohoiki Bay. An additional benefit of the project is the potential improvement in nearshore aquatic habitat since volcanic material which has accumulated in Pohoiki Bay would be removed. The project may also benefit the marine ecosystem.

2.7. Natural Hazards

Recent lava flows from the active Kīlauea volcano destroyed built structures and covered roads, which jeopardized access for affected communities. Other natural hazards that may threaten life and property on the Island of Hawai'i include tropical cyclones, earthquakes, floods and tsunami inundation. Sea level rise has the potential to threaten life and property in coastal and low elevation areas. Climate change may affect the frequency and intensity of severe storms that cause flooding. Landslides have destroyed built structures and covered roads, which jeopardized access for affected communities. Heavy rains can cause a rapid rise in the water levels in dams, which may necessitate emergency evacuations. Steep cliffs and areas containing an abundance of dry vegetation may be more susceptible to rockfalls and wildfires, respectively. Recent earthquakes and wind damage from storms have resulted in power outages for extended periods in localized areas on the Island of Hawai'i.

The area of Puna that contains the project site has a high volcanic hazard designation as assessed by the United States Geological Survey. A map of the Hawai'i Island lava-flow hazard zones is included in Appendix E. The high hazard risk assigned to Puna is due to the presence of Kīlauea, which is an active volcano. The project site is located within Zone 2, which represents areas that are adjacent and downslope of the more hazardous zone (Zone 1). The Zone 1 designation includes the summit and rift zones of Mauna Loa and Kīlauea. Fifteen to twenty percent of Zone 2 has been

covered by lava since 1800, and 25 to 75 percent has been covered within the past 750 years.

Many tropical cyclones have passed close enough to affect the State of Hawai‘i since the recording of such events began in the 1950s. Hurricane Iwa in 1982 and Hurricane Iniki in 1992 both brought destructive winds and torrential rains that resulted in significant property damage. Hurricane Iniki was connected to six deaths. Tropical Storm Darby brought winds of 45 miles per hour and high surf to the east and south shores of Hawai‘i Island from July 16 to 17, 2022. The storm coincided with an unusually large south swell, which brought wave heights of 20 feet plus to the south shores of all islands.

An earthquake that had statewide impacts occurred on October 15, 2006. The earthquakes, which occurred off the Kona coast of Hawai‘i, had magnitudes of 6.7 and 6.0. The event caused property damage and triggered an island-wide electrical blackout on O‘ahu. Strong earthquakes can cause settling or sinking and generate tsunamis that inundate the shoreline.

The project will mostly occur within the Zone VE flood designation according to the Flood Insurance Rate Map prepared by FEMA (see Figure 23). The panel numbers for the project area are 1551661211F, 1551661213F, 1551661214F and 1551661435F, for Hawai‘i (effective date September 29, 2017). Roads to the Pohoiki Bay area traverse Zones X and AE.

The Zone X designation refers to areas outside the 0.2 percent annual chance (or 500-year) floodplain. Zones VE and AE are designations for special flood hazard areas (inundation areas) of high-risk. Appendix E contains the Flood Hazard Assessment Report for the affected areas.

The shoreline in the project area is characterized by a moderate to high coastal hazard due to wave and tsunami exposure. The beach and nearshore areas at Pohoiki Bay including the boat ramp facility would be impacted by 3.2 feet of sea level rise, according to the Hawai‘i Sea Level Rise Viewer (Hawai‘i Climate Change Mitigation and Adaptation Commission, 2021).

There are no apparent rockfall hazards in the project vicinity due to terrain and topography. Threats from wildfires are unlikely but possible in areas with abundant vegetation. Drought conditions and high winds could exacerbate the fire hazard.

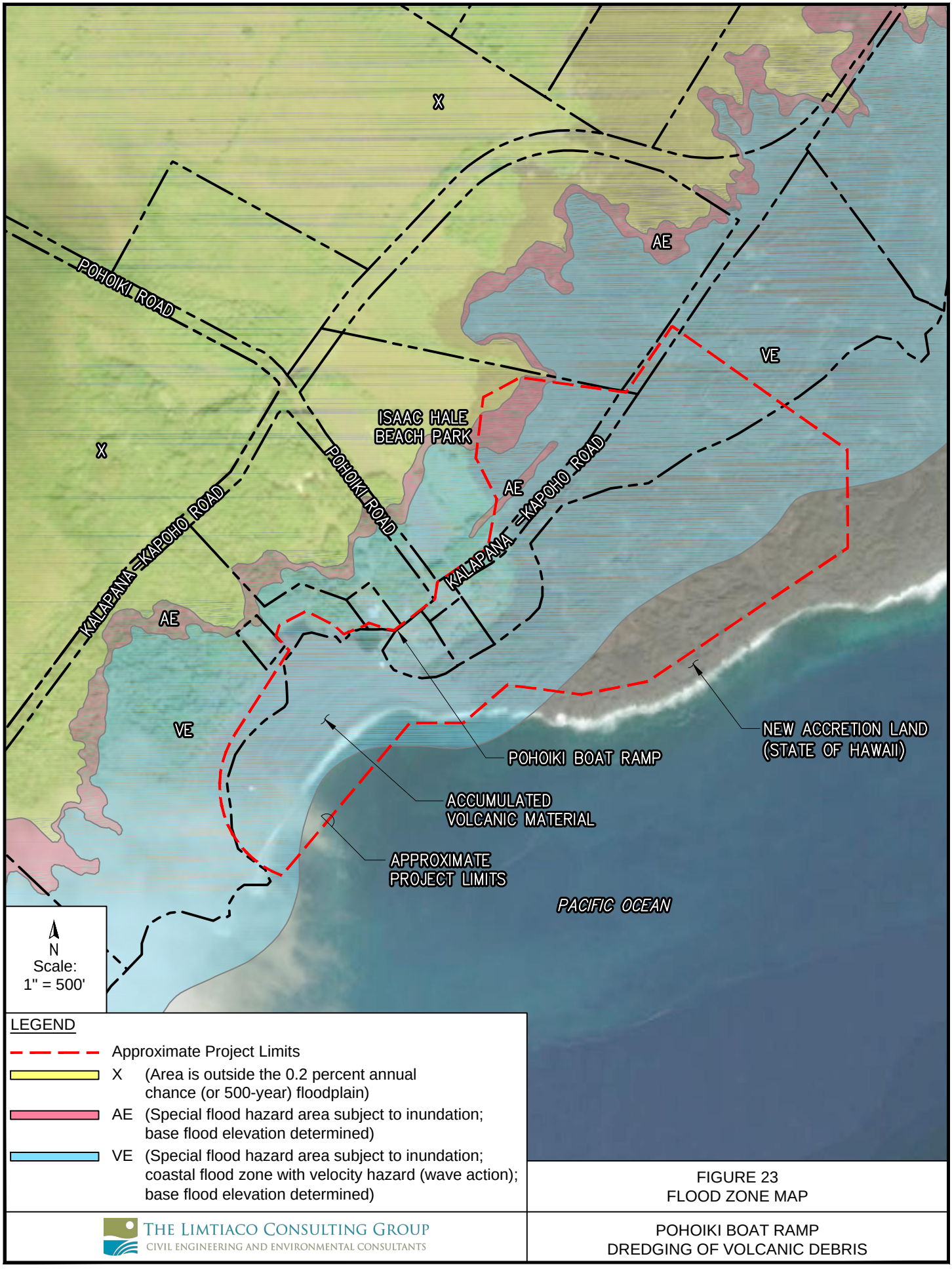


FIGURE 23
FLOOD ZONE MAP

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

Impacts and Mitigation Measures

The threats to humans and property from unpredictable natural events will always be present. The proposed project does not add new infrastructure at Pohoiki Bay and is not likely to influence the probable occurrence of naturally occurring hazards. The letter from the Office of Planning and Sustainable Development (OSPD) dated May 17, 2023 (Ref. DTS DTS 202304270845NA) mentions climate change adaption strategies such as increasing the height of support facilities. Higher ocean levels or coastal inundation may be addressed with future improvements to DOBOR's Pohoiki Boat Ramp facility as necessary.

2.8. Archaeological and Cultural Resources

The project area at Pohoiki has a documented history of prior disturbance and alteration as previously described in Section 1.4. Historical Setting. The modern history of the Pohoiki Bay area includes the development of several facilities such as the boat ramp, Isaac Hale Beach Park, and the breakwater structure. Background research of the project area was conducted by CSH. Two archaeologists from CSH conducted a field inspection of the project area on November 21, 2022. Fieldwork consisted of pedestrian surveys of the former shoreline and adjacent areas, proposed access routes, and the interface of the 2018 lava flow with the county park. Archaeological features were not expected to be present within the infilled bay and new lava land portions of the project area. The existing breakwater structure will not be impacted by the project, and no other submarine archaeological features are known to be present within Pohoiki Bay. The archaeological LRFI report is included with this EA (refer to Appendix F).

Consultation was undertaken to obtain information about cultural and archaeological sites in the project vicinity and concerns about potential impacts from the proposed project. The consultation effort included phone and email correspondences, an online meeting, and a site visit to the project area that was conducted in association with CSH's field inspection on November 21, 2022.

Anticipated activities associated with the proposed project would occur away from the Pohoiki Warm Springs, which are located mauka of the beach and vegetation line at Pohoiki Bay and have an assigned State Inventory of Historic Places (SIHP) number 50-10-46-02510. The ponds that were newly formed as a result of the accumulated material in Pohoiki Bay are located makai of the vegetation line.

CSH identified three previously documented historic properties with assigned SIHP numbers as within or in proximity to the area where proposed activities would occur:

State Site Number	Site Name	Observations
50-10-46-02507	historic habitation complex	Site is located within Isaac Hale Beach Park, away from the area to be dredged, and close to a location for dredged material placement
50-10-46-02530	Old Government Road	Portions of this road have been lost to subsidence/erosion; portions that remain are away from the project area
50-10-46-30141	landscaping complex	Site is on the Kuamoʻo property and in poor to fair condition; a long wall has a jumbled appearance

Four other features of interest were documented by CSH with input from consulted parties:

Site Reference	Site Feature	Observations
CSH-1	rock wall enclosure	Enclosure is located on the Kuamoʻo property, which is the site of the old Pohoiki courthouse and jail. The Kuamoʻo family is concerned about the potential for coastal inundation and further erosion of the property if the bay is dredged.
CSH-2	coastal foot trail	Trail conditions vary from a worn dirt track near the boat ramp to modern modifications with an ili ili pebble surface with intermittent rock lining.
CSH-3	potential road interface	Pohoiki Road may interface with the historic Rycroft Road alignment (SIHP #50-10-46-30137) at this location.
CSH-4	*ahu* used for traditional healing practices	This important cultural feature is described as a *Kahea ahu* used for traditional healing practices and was reportedly constructed during the 1920s or earlier.

CSH contacted and consulted with knowledgeable parties including Native Hawaiian Organizations, agencies such as the State Historic Preservation Division (SHPD) and the Office of Hawaiian Affairs (OHA), community members, and lineal and cultural descendants of the area. Outreach involved letters, telephone calls, email, and video

conference call interviews. Seven parties responded to CSH out of 28 individuals or groups who were contacted: one respondent provided written testimony, four *kamaʻāina* (native-born) and/or *kūpuna* (elder/of the grandparent's generation) met with CSH for more in-depth interviews. The CIA report in Appendix A includes the contributions from willing participants who provided their consent to include their statements. The following descriptions pertaining to cultural beliefs, practices, and resources is from the CIA report unless otherwise noted. The July 2023 version of the CIA report replaces the March 2023 report and includes additional input from one respondent who submitted written comments during the Draft EA review and comment period. The respondent indicates that community members who oppose the proposed project are choosing to remain silent so as not to offend others including family members who support dredging at Pohoiki Bay. It is also stated that the community members who support the project are oftentimes influenced by family members or other recognized community leaders. The July 2023 report includes no additional perspective about cultural practices.

The main continuous cultural practice within the project area is subsistence fishing. Local fishermen who have fished in the waters off of Pohoiki for generations would launch their boats from Pohoiki Bay. The black sand beach, which formed as a result of the 2018 eruption, completely blocks navigational access such that the boat ramp is inoperable; the nearest accessible boat launch facility is 40 miles away. Local fishermen have had to (1) stop fishing altogether, which greatly impacts their livelihood and food subsistence activities; (2) launch from Hilo harbor, which increases expenses such as gas; and (3) adjust profit goals in order to compensate for rising expenses.

CSH noted in its report that several respondents are deeply concerned about specific behaviors that are occurring in the project area (e.g., nude swimming, littering, trespassing on privately-owned property, etc.) that do not relate specifically to cultural practices. Residents and tourists are visiting the hot ponds and black sand beach at Pohoiki. Respondents expressed support for the restoration of navigational access without further delay, material placement that eliminates the nuisance aspects of the hot ponds, and improved security and regulation of visitors to the area. Landowners who have encountered trespassers also support a physical delineation such as a wall between the public and private areas along Pohoiki Bay.

Impacts and Mitigation Measures

Subsistence fishing at Pohoiki is currently curtailed due to the inoperable boat ramp facility. DOBOR's project would restore ocean access for the Puna community, which has a long history of utilizing ocean resources at Pohoiki Bay. The proposed project serves a public purpose and will be designed to avoid important historic resources to the extent possible. Compilance with HRS Chapter 6E will occur separately from the HRS Chapter 343 process, and

DOBOR will consult with SHPD for its determination of historic preservation requirements.

The findings from the LRFI report indicate that five sites should be avoided and are not likely to be directly impacted by the project:

State Site Number	Site Name
50-10-46-02507	historic habitation complex located within Isaac Hale Beach Park that is close to a location for dredged material placement
50-10-46-02530	Old Government Road

Site Reference	Site Feature
CSH-2	coastal foot trail
CSH-3	potential road interface with the historic Rycroft Road alignment (SIHP #50-10-46-30137)
CSH-4	*ahu* used for traditional healing practices that was reportedly constructed during the 1920s or earlier

The two sites listed below have the highest potential for direct impacts from the project. Both sites are located within TMK 1-3-008:013, which is owned by the Kuamoʻo family. The project would traverse the privately-owned parcel if secondary access to Route 137 is needed.

State Site Number	Site Name
50-10-46-30141	landscaping complex on Kuamoʻo property that is in poor to fair condition

Site Reference	Site Feature
CSH-1	rock wall enclosure on Kuamoʻo property

An expressed concern about the proposed project is that the dredging of Pohoiki Bay could subsequently lead to increased erosion or other coastal impacts to the lands and sites located along the bay and to the south. Important resources in these areas include Mahinaʻakaʻaka Heiau and Keahialaka Ponds. Changes to the natural shoreline caused by the 2018 eruption have already caused impacts to some of the sites located along the bay and to the south. Individuals consulted during the LRFI and CIA efforts expressed the importance of the project for the Pohoiki community.

Unanticipated discoveries of historic resources may occur during the various phases of construction. DOBOR is expected to ensure that its contractor will halt construction activities and immediately notify SHPD in the event of a discovery of sites or human remains.

The cultural importance of Pohoiki Bay is not expected to be diminished by the project, which supports ocean rescue services, commercial and recreational activities, food subsistence, and cultural practices.

The following recommendations pertain to an inadvertent discovery of historic remains or other potentially significant subsurface resources: (1) the contractor will be required to halt construction activities and to immediately notify SHPD of the discovery pursuant to HAR §12-280-3; and (2) DOBOR will prevent the disturbance or taking of any discovered archaeological, historic, or cultural resources to the extent possible by instituting the described mitigation measures (i.e., halt construction and immediately notify SHPD) and enforcing their implementation by its contractors.

In the event that *iwi kūpuna* (ancestral remains) are identified, all earth moving activities in the area will stop and the area will be cordoned off. SHPD and the County's Police Department will be notified pursuant to HAR §13-300-40. In the event that iwi kūpuna and/or cultural finds are encountered during construction, the cultural and lineal descendants of the area should be consulted to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

Several opportunities to discuss the project have occurred separately from the LRFI and CIA efforts conducted by CSH (see Section 7.1. Pre-Assessment Consultation). For example, the proposed action and other alternatives were discussed at the community meeting held on August 18, 2022 at the Pāhoa Community Center. There were over 120 participants including fishermen, local residents, and government officials. The overall public sentiment with regards to several alternatives including the dredging of a channel that is narrow or wide, constructing protective jetties, and no action has been unfavorable. The main sentiment expressed during the community meeting was that the boat ramp needs to reopen as soon as possible.

2.9. Visual Resources

The project area contains low density development that is consistent with an outdoor recreation area. The surrounding agricultural land and landscape of old and recent lava flows contributes to the natural scenic character of Pohoiki Bay. As a result of the 2018 eruption, the nearshore waters of Pohoiki Bay have been replaced with a wide expanse of black sand beach. Only a few areas of nearshore water remain at this time.

Impacts and Mitigation Measures

The proposed project does not add new urban structures to the landscape. Dredging that removes the accumulated volcanic material from Pohoiki Bay is expected to improve the visual landscape for people who value the aesthetics of nearshore marine waters against the distant Pacific Ocean. The aesthetics of a wide expanse of black sand beach, which contrasts with the distant Pacific Ocean, will be reduced as a result of the project. Excavated and dredged volcanic material that is placed on newly formed accretion land is expected to be consistent with the existing landscape which includes old and recent lava flows. The stark contrast between lava and black sand, and the nearshore water and distant Pacific Ocean will be available from the Pohoiki Bay area as a result of the proposed project. No mitigation is warranted or proposed because the effects of the project on visual resources are expected to be less than significant.

2.10. Solid Waste and Hazardous Materials

The South Hilo Sanitary Landfill is approximately 10 miles north of Pohoiki Bay. Hawai‘i County continues to explore waste reduction strategies including composting and waste-to-energy facilities to avoid further landfill development. Waste recyclers divert recoverable material from the waste stream. No solid waste is generated by the inoperable boat ramp.

The project area has no known concerns associated with past usage and/or storage of hazardous, toxic or radioactive waste. Hazardous, toxic or radioactive waste is unlikely to be present from or associated with low impact adjacent land uses such as outdoor recreation.

Impacts and Mitigation Measures

Volcanic material in Pohoiki Bay has accumulated since 2018 and may be suitable as fill material. The dredged material may therefore be directed towards a beneficial use that is not known at this time.

Appropriate waste management and disposal practices are expected to be implemented by the construction contractor for solid waste generated during the project. For example, sanitary waste that is generated during the proposed project will be collected as required and directed to a permitted disposal facility.

The presence of hazardous waste is not anticipated but if discovered, the DOH Indoor and Radiological Health Branch will be contacted. Hazardous or toxic waste that is encountered will be addressed and/or remediated in accordance with applicable State and federal laws, pertaining to the handling, treatment, and disposal of contaminated materials.

2.11. Site Access, Circulation and Traffic

Site access to Pohoiki Bay and Isaac Hale Beach Park is primarily from Pohoiki Road and Kalapana-Kapoho Beach Road (Route 137). A 16-foot-wide easement traverses TMK 1-3-008:097 (which is owned by Hawai‘i County) and provides access from Route 137 to TMK 1-3-008:013, which is a privately owned parcel along the pre-eruption Pohoiki Bay shoreline.

The County of Hawai‘i provides island-wide commuter and limited fixed-route bus services. The Hele-On bus operates two circuitous routes to the Puna area: Hilo-Volcano-Ka’u and Hilo-Pahoa-Pohoiki.

Bicycle and pedestrian facilities within Puna are limited. There is an overall lack of roadway connectivity between the various subdivisions in Puna that discourages walking and bicycling.

Impacts and Mitigation Measures

Residents and tourists who currently travel to the Pohoiki Bay area are utilizing the undamaged portion of Pohoiki Road and Kalapana-Kapoho Beach Road. Site access to Isaac Hale Beach Park and Pohoiki Bay will remain unchanged as a result of the project. FEMA has obligated disaster funding to Hawai‘i County for the repairs to roadways such as Pohoiki Road that were damaged by the 2018 eruption. The timing for the completion of roadway improvements is unknown. DOBOR is not proposing improvements to Pohoiki Road or Kalapana-Kapoho Beach Road as part of its project.

DOBOR will acquire easements with affected landowners for temporary construction access as part of the project if necessary. The transportation of equipment and material to the site along with the removal of debris and construction waste from the site may cause intermittent and temporary inconveniences to residents who live in the immediate vicinity. The construction contractor shall not close, block, or otherwise obstruct streets, parking lots, or other occupied facilities without prior acceptance by authorities having jurisdiction. Acceptable alternate routes around work that obstructs the existing pedestrian and vehicular traffic ways will be provided by the contractor.

Construction-related traffic will be restricted to only stabilized construction areas. Construction work and the moving of heavy equipment or construction-related supplies is expected to occur during daytime hours (as opposed to night work). At night and when work is not occurring, all associated construction equipment will be secured and appropriately sited to prevent obstructions to traffic.

The transport of oversized and/or overweight materials and equipment on State highway facilities requires a permit from DOT. The construction contractor is expected to apply for the permit if the operation or transportation of any oversized and/or overweight vehicles and loads is required during construction.

2.12. Utilities (Water, Wastewater, Power and Communications)

The Pohoiki Boat Ramp facility does not receive utility services. Isaac Hale Beach Park did receive municipal water service; however, the 2018 eruption damaged the water line. The previously prepared report (U.S. Army Engineer District, Honolulu, 1978) indicates that the park and privately-owned parcels are served by cesspools; however, the existing comfort station at Isaac Hale Beach Park has an individual wastewater system. No electrical power or communications services are available at Isaac Hale Beach Park or Pohoiki Bay.

Impacts and Mitigation Measures

The damaged water line to Isaac Hale Beach Park is expected to be repaired by Hawai‘i County and is not part of DOBOR’s project. No potable water, wastewater service, electrical power or communications services to the Pohoiki Boat Ramp facility will be requested as part of DOBOR’s project.

2.13. Recreational Resources

MacKenzie State Recreation Area, which provides day use recreational opportunities (e.g., shore fishing, hiking, sightseeing, picnicking, etc.), is located within the Puna District and approximately 2.1 miles southwest of Pohoiki Bay. As discussed previously in Section 2.2.2. Isaac Kepo‘okalani Hale Beach Park, recreational opportunities in the Puna District have been decreasing as a result of lava flows. The 1990 eruption inundated outdoor recreation resources including a swimming area at Kalapana. ‘Ahalanui Park was purchased in 1993 to replace Kaimū Beach Park and Harry K. Brown Park, which were destroyed by lava flows. The 2018 eruption inundated ‘Ahalanui Park and portions of Isaac Hale Beach Park. Swimming and surfing at Pohoiki Bay is curtailed because the nearshore waters have been reduced to small ponds at the back of the newly created black sand beach.

The existing waterline to Isaac Hale Beach Park was damaged by the 2018 lava flow, and the park has been closed for camping since the eruption. The existing boat ramp at Pohoiki Bay is a public facility that has provided amenities to commercial and recreational boaters since 1963. As mentioned previously in Section 1.4. Historical Setting, the boat ramp was developed at the site of the former wharf. Robert Rycroft constructed the wharf at Pohoiki Bay during the mid-1880s to support his commercial activities and he allowed public use of the wharf, which was abandoned by the 1940s.

The inoperable Pohoiki Boat Ramp facility is severely impacting Puna's fishing community. Littering, trespassing on privately-owned property, and public nudity is reportedly occurring. Written comments that describe the recreational activities at Pohoiki Bay were provided during the comment period for the Draft EA and are included in Appendix H. The accumulated volcanic material allows for easy and convenient access for people with disabilities from the existing parking area at Isaac Hale Beach Park to the beach. Many individuals have stated that the ponds in the backshore area are utilized by adults and children for recreational purposes such as soaking and swimming, which are popular activities at Pohoiki Bay while the boat ramp facility is closed. It was also stated that the users of the boat ramp created more trash. The ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members.

Impacts and Mitigation Measures

Proposed excavation and dredging would allow the existing Pohoiki Boat Ramp facility to return to productive use for ocean rescue services, commercial and recreational fishing, ocean/volcano tours, food subsistence activities, and cultural practices. As a result of the proposed project, the newly created ponds that are makai (or seaward) of the vegetation line would be eliminated. Written comments provided during the Draft EA comment period suggest that the ponds are a safe area for recreational activities such as swimming; however, DOBOR does not support this viewpoint based on the information discussed in this EA (refer to Section 2.3. Water Quality).

DOBOR acknowledges that the demand for outdoor recreational resources in the Puna District has been expressed by the Puna community and is very high. It is also noted that Hawai'i County envisions a different location for a safe swim area that is close to the existing parking area (see Section 3.8. Other Considered Plans). FEMA has obligated disaster funding for park improvements, and Hawai'i County will undertake site improvements at Isaac Hale Beach Park. The funding that Hawai'i County receives for its projects will not be utilized for DOBOR's proposed project.

The affected ecosystem and aquatic life at Pohoiki Bay may have the opportunity to recover from the 2018 eruption as a result of DOBOR's project, which does not involve the placement of new infrastructure at Pohoiki Bay. The proposed project would reduce the wide expanse of new black sand beach at Pohoiki Bay and increase the area of nearshore marine waters. No mitigation is warranted or proposed because the project strives to restore a public facility that is currently restricted by accumulated volcanic material.

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3. RELATIONSHIP TO PLANS, POLICIES, AND CONTROLS

3.1. State Land Use District

The State Land Use Law (HRS §205) is intended to preserve, protect, and encourage the development of lands in the State for uses which are best suited to the public health and welfare for Hawaii's people. All lands in the State are classified into four land use districts by the State of Hawai'i, Land Use Commission: Urban, Agricultural, Conservation, and Rural. The proposed project, which serves a public purpose, will occur in the Conservation District. The lands within Conservation districts contain important natural resources essential to the preservation of natural ecosystems and the sustainability of the water supply. The rules and regulations that apply to the use of lands within Conservation districts are HRS §183C, and HAR §13-5.

3.2. Hawai'i Coastal Zone Management Program

Hawai'i's Coastal Zone Management (CZM) Program, established pursuant to HRS §205A, as amended, is administered by the State of Hawai'i, Office of Planning and Sustainable Development. The CZM program provides for the beneficial use, protection, and development of the State's coastal zone. The CZM area consists of the entire State of Hawai'i since there is no point of land more than 30 miles from the ocean. The objective of the act is to protect, preserve, and restore recreational, historic, and scenic resources as well as implement the state's ocean resources management plan and protect coastal ecosystems. The CZM Act involves a system of permits, including the SMA use permit, to manage development within coastal areas and encourage public participation. Any significant development within the SMA requires permit approval from the appropriate County. For the County of Hawai'i, the SMA permit process is administered by the Department of Planning. The project area is within the SMA. Per Rule 9. SMA for Hawai'i County, which applies to all shoreline development, "Development" does not include the following uses, activities or operations:

> *(R) Plan, design, construct, operate and maintain any lands or facilities under the jurisdiction of the Division of Boating and Ocean Recreation of the State Department of Land and Natural Resources.*

The project supports several policies and objectives of the CZM from HRS §205A-2.

1. *Recreational Resources*

Objectives. Provide coastal recreational opportunities accessible to the public.

Policies. Improve coordination and funding of coastal recreational planning and management; and

Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

(ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;

(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

(v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

(vi) Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of section 46-6.

Coastal recreational opportunities are currently curtailed as a result of the 2018 volcanic eruption and inoperable boat ramp facility. The proposed project restores navigational access and returns the Pohoiki Boat Ramp facility to productive use. Coastal water quality will be protected since appropriate erosion control BMPs will be implemented during construction.

2. *Historic Resources*

Objectives. Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies. Identify and analyze significant archaeological resources;

Maximize information retention through preservation of remains and artifacts or salvage operations; and

Support state goals for protection, restoration, interpretation, and display of historic resources.

No known historic resources would be endangered by the project. DOBOR shall require its contractor to comply with all State and County rules and laws pertaining to historic preservation. Construction activities will be halted and SHPD will be notified in the event any unanticipated archaeological or historic sites are encountered.

3. *Scenic and Open Space Resources*

Objectives. Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies. Identify valued scenic resources in the coastal zone management area;

Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and

Encourage those developments that are not coastal dependent to locate in inland areas.

The project involves dredging and is not expected to diminish coastal scenic view areas or open space resources.

4. *Coastal Ecosystems*

Objectives. Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies. Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

Improve the technical basis for natural resource management;

Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

The project is not expected to disrupt or degrade coastal water ecosystems. DOBOR's construction contractor will be responsible for implementing a storm water management plan and controlling runoff that can transport loose soil, excess nutrients, and other pollutants. A NPDES permit will be required to ensure compliance with BMPs during construction.

5. *Economic Uses*

Objectives. Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies. Concentrate coastal dependent development in appropriate areas;

Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

(i) Use of presently designated locations is not feasible;
(ii) Adverse environmental effects are minimized; and
(iii) The development is important to the State's economy.

The project involves dredging and does not involve new coastal development; therefore, the policies pertaining to coastal economic development do not apply.

6. *Coastal Hazards*

Objectives. Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

Policies. Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;

Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

Prevent coastal flooding from inland projects.

Coastal hazards are not expected to be exacerbated by the project. The construction contractor must implement BMPs that address the quality and

quantity of stormwater leaving the affected area, which would help to reduce nonpoint source pollution into streams.

7. *Managing Development*

Objectives. Improve the development review process, communication, and public participation in the management of coastal resources and hazards.
Policies. Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;
Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and
Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

The project does not impact or influence the development review process. The environmental review process includes opportunities for public participation and comments pertaining to a variety of issues and topics including coastal resources and hazards.

8. *Public Participation*

Objectives. Stimulate public awareness, education, and participation in coastal management.
Policies. Promote public involvement in coastal zone management processes;
Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and
Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

The environmental review process provides public participation opportunities.

9. *Beach Protection*

Objectives. Protect beaches for public use and recreation.
Policies. Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;
Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to

erosion at the sites and do not interfere with existing recreational and waterline activities; and

Minimize the construction of public erosion-protection structures seaward of the shoreline.

Public access to beach areas will remain as a result of the project, which allows the Pohoiki Boat Ramp facility to return to productive use. The project does not involve the construction of erosion-protection structures seaward of the shoreline.

10. Marine Resources

Objectives. Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies. Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

The project involves dredging to restore navigational access. The Pohoiki Boat Ramp facility would return to productive use, which is expected to benefit the Puna community.

3.3. Hawai‘i State Plan

The Hawai‘i State Plan (HRS §226) outlines broad goals, policies and objectives to serve as guidelines for the future growth and development of the State. The excerpts below are pertinent Hawai‘i State Plan objectives, policies, and priority guidelines that pertain to DOBOR’s project.

§226-9 Objective and policies for the economy--federal expenditures

(a) 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 Hawaii's economy.

(b) To achieve the potential growth and innovative activity objective, it shall be the policy of this State to:

(3) Promote the development of federally supported activities in Hawaii that respect statewide economic concerns, are sensitive to community needs, and minimize adverse impacts on Hawaii's environment.

(6) Strengthen federal-state-county communication and coordination in all federal activities that affect Hawaii.

§226-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.

(a) Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:

(1) Prudent use of Hawaii's land-based, shoreline, and marine resources.

(2) Effective protection of Hawaii's unique and fragile environmental resources.

(b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:

(2) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.

(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.

(6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.

(8) Pursue compatible relationships among activities, facilities, and natural resources.

(9) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.

§226-13 Objectives and policies for the physical environment--land, air, and water quality.

(a) 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 Hawaii's land, air, and water resources.

(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:

(2) Promote the proper management of Hawaii's land and water resources.

(3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.

§226-14 Objectives and policies for facility systems--in general.

(a) 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.

(b) To achieve the general facility systems objective, it shall be the policy of this State to:

(1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.

(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.

(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.

(5) Identify existing and planned state facilities that are vulnerable to sea level rise, flooding impacts, and natural hazards.

(6) Assess a range of options to mitigate the impacts of sea level rise to existing and planned state facilities.

§226-23 Objective and policies for socio-cultural advancement--leisure.

(a) 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.

(b) To achieve the leisure objective, it shall be the policy of this State to:
(1) Foster and preserve Hawaii's multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities.
(2) Provide a wide range of activities and facilities to fulfill the cultural, artistic, and recreational needs of all diverse and special groups effectively and efficiently.
(3) Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities, and improved facility design and maintenance.
(4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.
(5) Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.
(6) Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.

§226-27 Objectives and policies for socio-cultural advancement--government.
(a) Planning the State's socio-cultural advancement with regard to government shall be directed towards the achievement of the following objectives:
(1) Efficient, effective, and responsive government services at all levels in the State.
(2) Fiscal integrity, responsibility, and efficiency in the state government and county governments.
(b) To achieve the government objectives, it shall be the policy of this State to:
(1) Provide for necessary public goods and services not assumed by the private sector.
(5) Assure that government attitudes, actions, and services are sensitive to community needs and concerns.

The proposed project will return the Pohoiki Boat Ramp to productive use. The restoration of navigational access at Pohoiki Bay represents the utilization of state-owned land and funds to address the expressed needs of the local community. The project could also help the nearshore marine ecosystem at Pohoiki Bay recover from the disruptive effects of the Kīlauea Volcano eruption of 2018.

3.4. County of Hawai‘i General Plan

The *County of Hawai‘i General Plan* (2005 edition, amended in 2014) is the policy document that encompasses the long-range goals, policies, standards, and courses of action for comprehensive physical development on the Island of Hawai‘i. The proposed project which restores navigational access at Pohoiki Bay supports the goals and policies listed below.

General Plan - Natural Beauty

Goals:

Protect, preserve and enhance the quality of areas endowed with natural beauty, including the quality of coastal scenic resources.

Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.

Policies:

Protect the views of areas endowed with natural beauty by carefully considering the effects of proposed construction during all land use reviews.

General Plan - Natural Resources and Shoreline

Goals:

Provide opportunities for recreational, economic, and educational needs without despoiling or endangering natural resources.

Protect and promote the prudent use of Hawaii’s unique, fragile, and significant environmental and natural resources.

Ensure that alterations to existing land forms, vegetation, and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation, or failure in the event of an earthquake.

Policies:

Coordinate programs to protect natural resources with other government agencies.

General Plan - Public Facilities

Goals:

Encourage the provision of public facilities that effectively service community and visitor needs and seek ways of improving public service through better and more functional facilities in keeping with the environmental and aesthetic concerns of the community.

Policies:

Continue to seek ways of improving public service through the coordination of service and maximizing the use of personnel and facilities.

Coordinate with appropriate State agencies for the provision of public facilities to serve the needs of the community.

General Plan – Recreation

Goals:

Maintain the natural beauty of recreation areas.

The use of land adjoining recreation areas shall be compatible with community values, physical resources, and recreation potential.

The LUPAG map serves as a guide for the direction of future developments and indicates the general location of various land uses in relation to each other. The state-owned parcel that contains the Pohoiki Boat Ramp facility is within an area designated as OA - Open on the LUPAG map. Portions of Isaac Hale Beach Park may be traversed as part of the project. Some park areas are designated as EA - Extensive Agriculture and IAL - Important Agricultural Land.

3.5. Puna Community Development Plan

The *Puna Community Development Plan* (2008, amended in 2011) includes the vision for managing growth and reshaping the development pattern within Puna to avoid negative consequences. Hawaii County owns smaller shoreline parks in Puna such as Isaac Hale Beach Park and ʻAhalanui Park. In 1993, ʻAhalanui Park was purchased to replace Kaimū Beach Park and Harry K. Brown Park, which were destroyed by lava flows. The development plan indicates that Puna will need to expand its parks and recreation facilities as the population grows. The proposed project is consistent with the goals identified below because Pohoiki Bay would retain its scenic character and cultural value.

Historic, Cultural, and Scenic Resources

Goals:

Areas of scenic and cultural interest are accessible to the public in a manner that does not detract from their aesthetic, natural and cultural value.

> *Land Use Pattern*
>
> *Goals:*
>
> *Services and community facilities are more accessible in village/town centers that are distributed throughout the region, including the underserved subdivisions that have been experiencing higher levels of development growth.*
>
> *Parks and Recreation*
>
> *Goals:*
>
> *Puna offers a variety of public recreational areas, reflecting the beauty and diversity of the natural setting, and recreational programs for people of all ages and physical abilities that are not currently available.*

More than half the land area in Puna is zoned for agriculture and the Puna district is a center for agricultural activity. DOBOR's proposed project does not change existing land uses and does not conflict with the general principle of retaining agriculture as a viable economic land use in Puna.

3.6. County of Hawai'i Land Use Ordinance

Hawai'i County's Land Use Ordinance (LUO) regulates land use in accordance with adopted land use policies, including the County's General Plan and Community Development Plans. DLNR's project is a public use on state-owned property in accordance with the following description from the LUO:

> *Public uses, structures and buildings and community buildings are permitted uses in any district, provided that the director has issued plan approval for such use.*

The zoning designation for the state-owned parcel is O - Open District. There are no setbacks or height restrictions per the Hawai'i County LUO. Portions of Isaac Hale Beach Park may be traversed as part of the project. Some areas of the park are in the A-1a - Agricultural District (minimum building site of 1 acre).

3.7. Special Management Area Permit

As mentioned previously in Section 3.2 Hawai'i Coastal Zone Management Program, the SMA permit process for the County of Hawai'i is administered by the Department of Planning. Rule 9. SMA for Hawai'i County applies to all shoreline development:

> *(2)* "Development" does not include the following uses, activities or operations:

(R) Plan, design, construct, operate and maintain any lands or facilities under the jurisdiction of the Division of Boating and Ocean Recreation of the State Department of Land and Natural Resources.

3.8. Other Considered Plans

Hawai‘i County’s disaster recovery efforts began in June 2018 and are guided by a Recovery and Resilience Plan, Volcanic Risk Assessment, and an Economic Recovery Plan. Federal and state resources are being utilized to repair or replace damaged public infrastructure including roads and waterlines.

Revitalize Pohoiki (2022) is a published plan that was developed with the community’s input to help guide improvements at Isaac Hale Beach Park. As stated in the plan, FEMA funds must be spent on physical park improvements. The County’s Department of Parks and Recreation has identified improvements that would restore portions of Isaac Hale Beach Park that were not inundated by the 2018 lava flow. Proposed improvements that would be accomplished by the County would not affect boat access since the Pohoiki Boat Ramp facility falls within DOBOR’s jurisdiction.

The 2022 park improvements plan identifies the following proposed amenities at Isaac Hale Beach Park: a pavilion, covered or shaded areas for gatherings, barbeque pits, picnic tables on concrete pads, accessible paths, a paved parking area, camping areas, and an administration building. Electrical power to Isaac Hale Beach Park would also be restored as part of the County’s proposed improvements. A safe swim area and boat wash facilities mentioned in *Revitalize Pohoiki* (2022) are expected to require additional State funding, which is not yet available. The safe swim area as indicated in the plan would be close to an existing parking area that is close to the Pohoiki Boat Ramp facility. The restoration of water service to Isaac Hale Beach Park would be accomplished by the County’s Department of Water Supply, which is expected to receive approximately $40 million in Federal and State recovery assistance funds for water infrastructure improvements.

Stated goals in *Revitalize Pohoiki* (2022) that pertain to park maintenance, security services, place-based educational opportunities, and community-based stewardship programs for the Pohoiki area are expected to require additional funding resources and partnerships. The plan acknowledges the need for collaborative actions that involve residents, area ‘ohana, schools, community-based organizations, local institutions, and government.

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4. POSSIBLE ALTERNATIVES

The project area at Pohoiki Bay has experienced land alteration and disturbance from natural geologic processes that periodically reshape the terrain. Federal, state, and county agencies are advancing recovery efforts that address the lingering impacts from the most recent eruptive phase of Kīlauea Volcano (which was active from 1983 to 2018). Lava inundation from the 2018 eruption destroyed homes, roads, and infrastructure including a waterline that provided municipal water service to Isaac Hale Beach Park. The project is proposed at this time because the Kīlauea eruption recovery effort provides the opportunity to consider effective actions that contribute to the restoration of important resources in Puna such as the undamaged Pohoiki Boat Ramp facility. All of the alternatives are exposed to seismic and volcanic hazards due to the physical setting.

4.1. Alternate Locations Along the Puna Coastline

No new boat launch areas along the Puna coastline have been established to replace the Pohoiki Boat Ramp facility. Previous inundation in 1994 (at Kalapana) led to increased usage at Pohoiki Bay, which was historically "utilized for small fishing vessels to gain access to the open ocean, or for shoreline retrieval" (Tom Callis, Hawaii Tribune-Herald, 2013). The area south from Pohoiki Bay to Kalapana (for a distance of approximately 10 miles) has rocky shoreline conditions characterized by elevations of +20 to +30 feet relatively close to the waterline. The development of a boat ramp facility at an undeveloped location would require substantial excavation and dredging. Strong wave energy creates additional challenges for designing a facility with an entrance channel and ramp basin that is sufficiently protected during periods of high tides and from waves that overtop rocky sea cliffs along the shoreline. The discussion of alternate locations in this EA adds new information and recognizes the expressed opposition from community members to locations beyond Pohoiki Bay.

Kapoho Bay (3.5 miles north of Pohoiki Bay) was described in the previously prepared environmental study as one of the few naturally protected bays within a reasonable distance of Pohoiki and the fishing grounds. The description below is excerpted from the study (U.S. Army Engineer District, Honolulu, 1978):

> *Kapoho Bay is a considerably larger embayment than Pohoiki Bay. A shallow lava ledge at the mouth of the bay restricts wave energy entering the bay. The old fishponds are no longer used, and the inner ponds and shoreline areas are overgrown with mangroves. Coral coverage is low, possibly as a result of extremely high (100 F) water temperatures during a 1960 lava flow. Kapoho Bay has a depauperate fauna when compared with Pohoiki and other shallow water sites on the Puna Coast. Much of the land around the bay is developed, and there is no public access.*

Boaters “stated that navigation was dangerous in Kapoho Bay because of the many shoal areas and large boulders” (Ibid.). It was noted that Kapoho Bay would not provide greater natural protection as compared to Pohoiki Bay. Kapoho Bay was considered an unsuitable alternate location in part because of the high cost of relocating the launch facilities and the lack of public access.

On June 3, 2018, lava from Kīlauea Volcano entered the ocean at Kapoho Bay and inundated the embayment. The eruptive process resulted in a vast inundation area and new accretion land. Kapoho Bay is currently a desolate and isolated area that is unsuitable for further consideration as an alternate location for boat launch facilities.

Kaʻakepa (2.5 miles south of Pohoiki Bay) is also known as Malama Flats. This location was identified in 2019 using Google Earth Pro, which provides an image of the coastline and approximate shoreline elevations. The land is State-owned and under the jurisdiction of DLNR Land Division. A preliminary conceptual analysis was provided to DOBOR to assist with feasibility considerations pertaining to potential alternatives. The nearshore elevation at Kaʻakepa as determined from available imagery is +10 feet. Sea Engineering, Inc. visited the site in 2019. LIDAR elevation data indicates the low-lying coastal area at Kaʻakepa has elevations of +6 to +10 feet and extends about 500 feet inland.

The development of a ramp facility is technically possible at Kaʻakepa since deep water extends close to shore with the -10-foot contour approximately 20 to 40 feet seaward of the waterline. The deep water makes construction of a protective breakwater impractical, however the site is suitable for an entrance channel and ramp basin excavated inland. A channel excavated inland replaces the need for a breakwater structure. There is an existing 4-wheel drive track from the coastal highway to Kaʻakepa, however it will require extensive grading to be passable by a towed boat trailer. There are no existing nearby utilities such as water and electricity. According to Sea Engineering, Inc., a boat launch facility at Kaʻakepa would be exposed to wave energy that may result in ramp operational difficulties.

An alternative location that would require intensive alterations in an undeveloped area is not favorable from DOBOR’s perspective. The 2018 eruption inundated vast areas along the coastline, which affords more importance to the remaining natural areas. In light of these considerations, Kaʻakepa is eliminated from further consideration as a suitable alternative.

The relocation of the Pohoiki Boat Ramp facility to an unspecified area inundated by lava with a steep drop off was suggested during the Draft EA comment period. This suggestion implies that an undeveloped lava flow area would be developed, and boats would enter the ocean where there is very limited or no protection from wave action. No further consideration by DOBOR is warranted since this suggestion is not more

favorable than the use of built infrastructure (i.e., the existing boat ramp which is protected by the breakwater structure).

Suggested site improvements that would transform the privately-owned Punalu‘u Wharf (refer to Figure PS 1) into a more robust facility are also not suitable for further consideration from DOBOR’s perspective. The Punalu‘u Wharf is a historic property with a shoreline ramp built in 1916 and a heiau nearby (Pacific Media Group, 2017).

4.2. Channel Restoration Alternatives

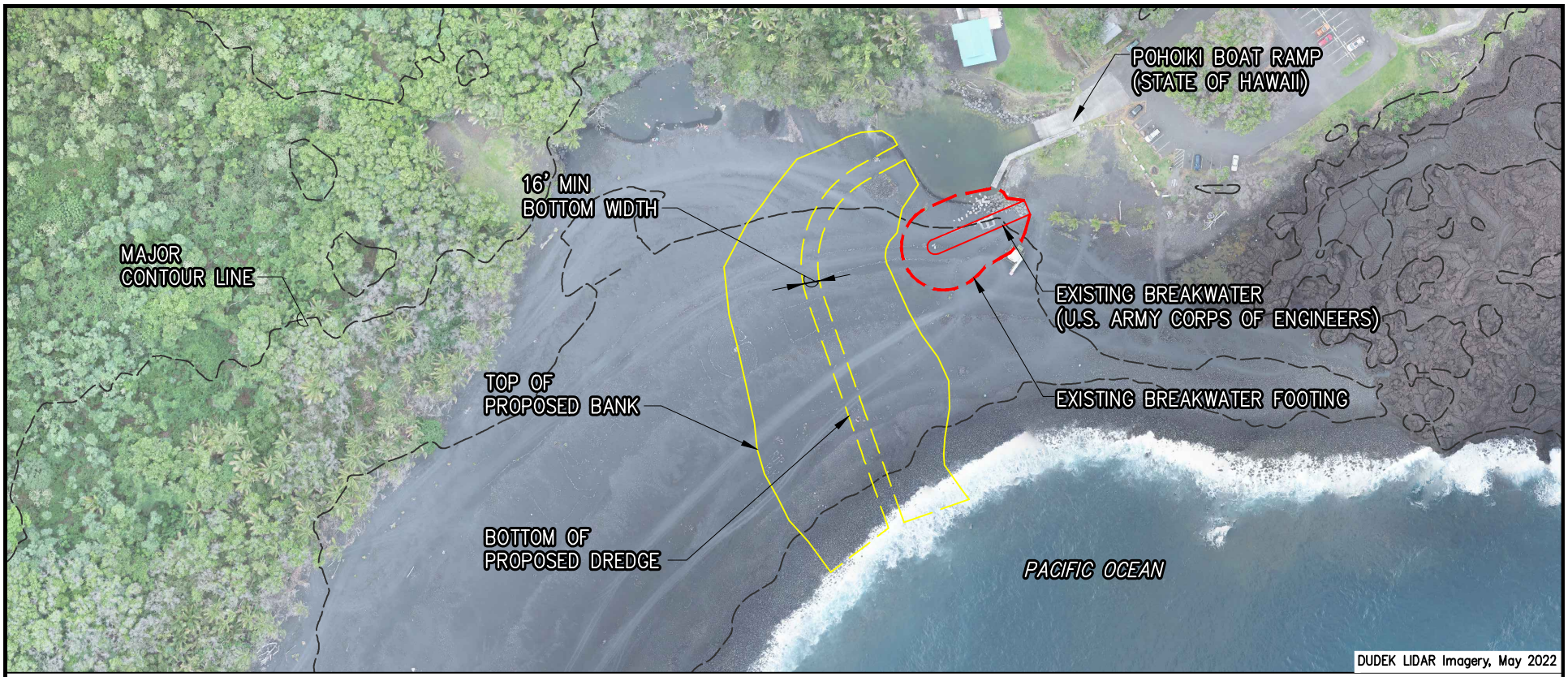
The channel restoration alternatives would utilize the same material placement locations for dredged volcanic material. One location is at the back of the newly formed beach, and the second location is on accretion land near the Pohoiki Boat Ramp facility. Dredged material would be placed away from the Pacific Ocean.

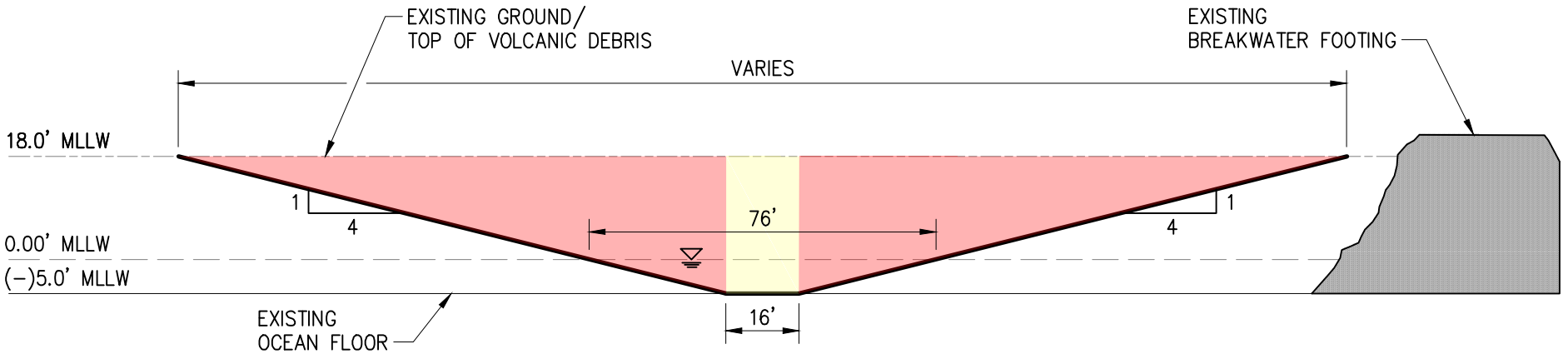
For all of the channel restoration alternatives, an identifiable barrier is recommended to deter trespassing on private property and to delineate a walking path for public access to the shoreline and beach area to the west of the boat ramp. The barrier could consist of a short, grouted rock wall (reusing onsite stones and rocks) or fence or vegetation. Consultation with state and county agencies is expected to be required to ensure compliance with applicable rules pertaining to shoreline areas. An easement may be necessary to facilitate construction of improvements intended to improve pedestrian access.

4.2.1. Narrow Channel (Alternative 1)

For this alternative, a narrow channel would be excavated and dredged through a portion of the volcanic material to reestablish ocean access from Pohoiki Boat Ramp (see Figure 24). The proposed channel would be approximately 415 linear feet from the existing boat ramp to the ocean and have a bottom width of 16 feet with channel sides sloped at 4H:1V (4 feet horizontal for every 1 foot vertical) to match the existing sand elevation. The channel bottom would match the existing ocean floor, varying in elevation from approximately -5 feet MLLW at the boat ramp to approximately -11 feet MLLW at the mouth of the channel.

Debris would be removed through on-land excavation and dragline dredging before being transported via trucks to nearby material placement locations (see Figure 25). Heavy equipment utilized for the project will avoid traveling near the existing breakwater structure. Instead, settled sand and cobbles on the breakwater may be manually removed with the use of hand tools to ensure that it is not damaged. Slope stabilization systems that aim to preserve channel integrity and ocean access is discussed further in Section 4.2.4. Slope Stabilization Considerations.





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Scale

FIGURE 24
ALTERNATIVE 1 - PLAN VIEW AND TYPICAL SECTION

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

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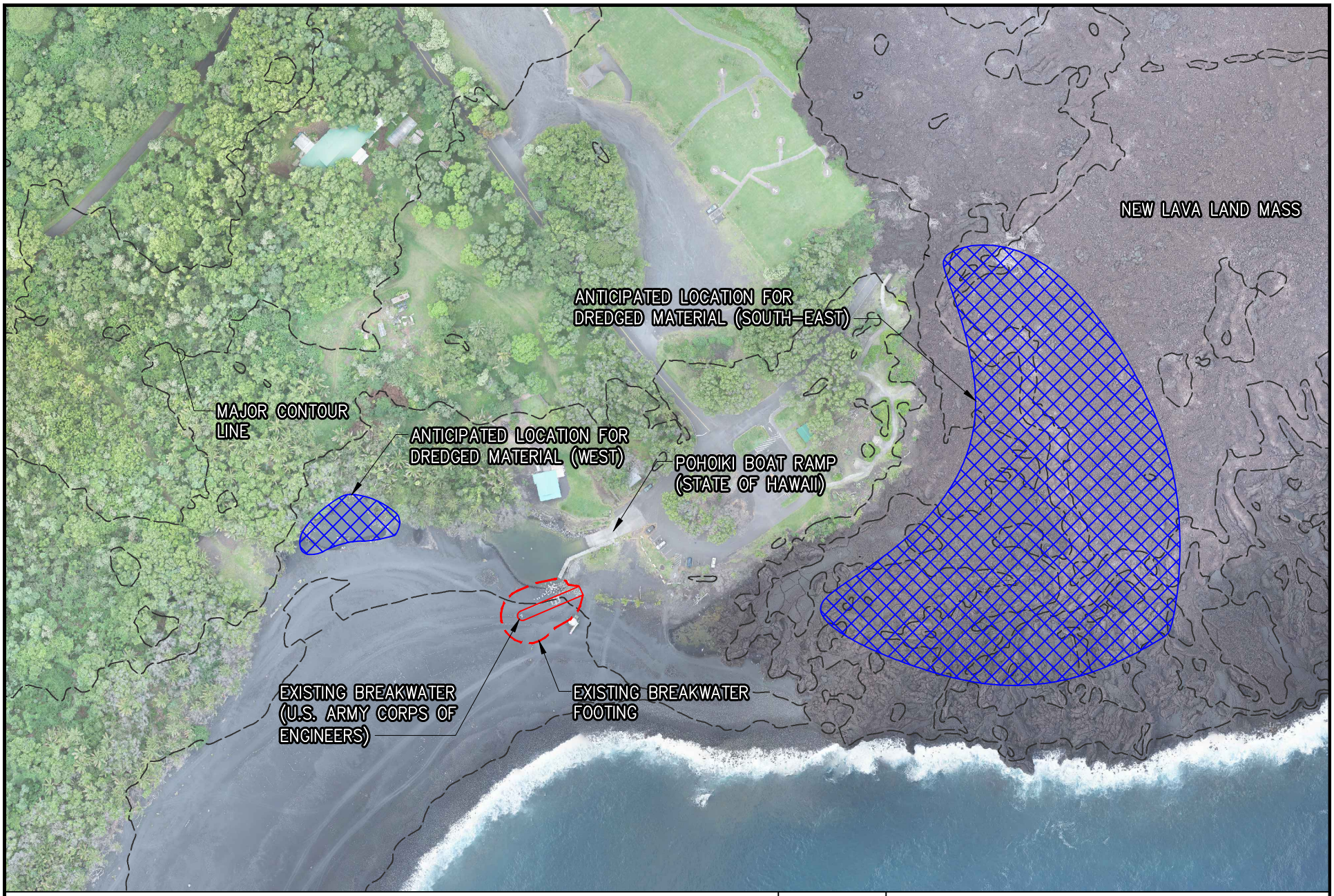

DUDEK LIDAR Imagery, May 2022

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N
Scale:
1" = 200'

FIGURE 25
ALTERNATIVE 1 - MATERIAL PLACEMENT LOCATIONS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

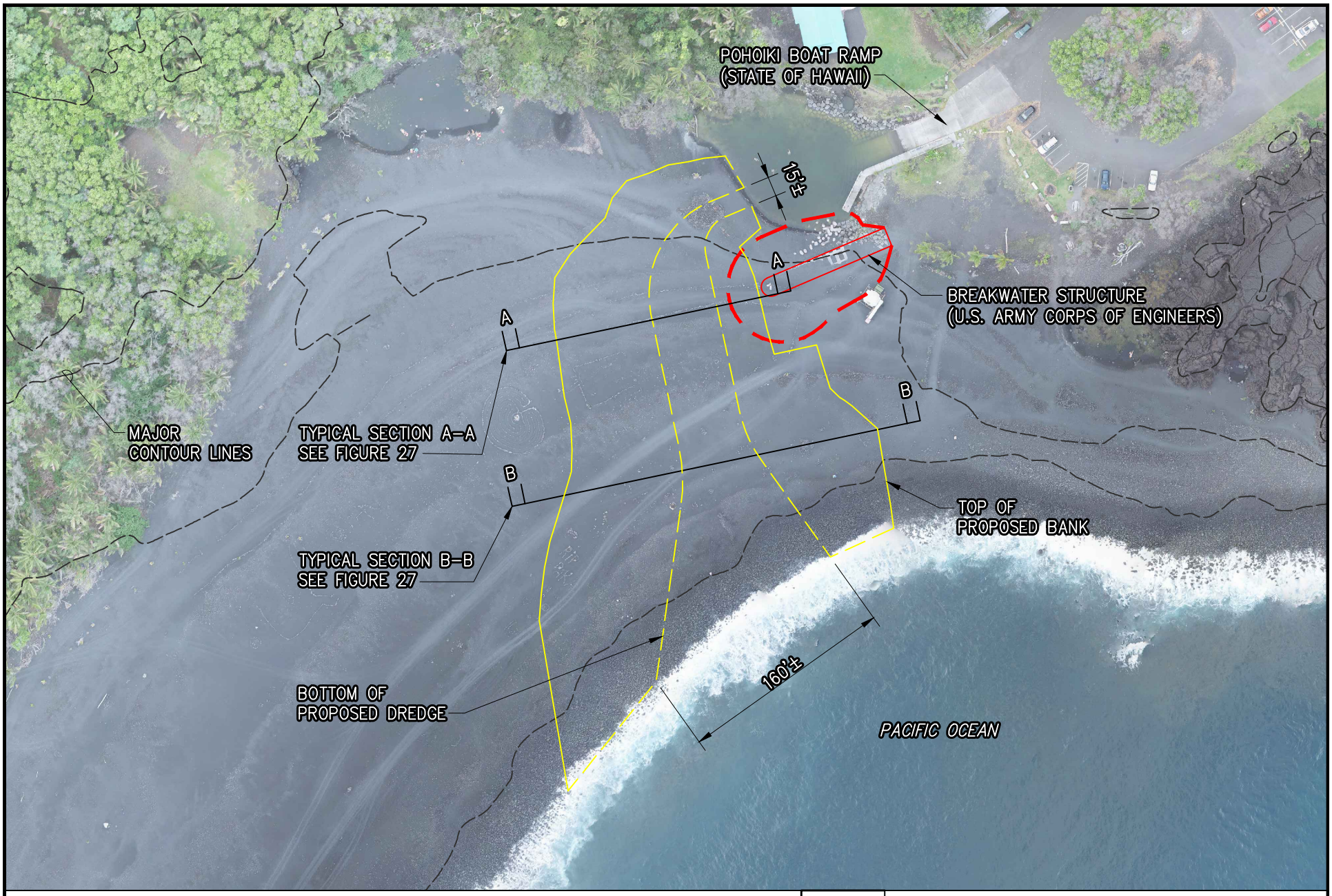
The layout for Alternative 1 would create approximately 22,300 cubic yards of excavated material which would be distributed across approximately 5.5 acres to level areas of the surrounding debris, neighboring properties, and the lava land mass and accretion land to the east. Backfill on the lava land mass and accretion land would be in 1- to 2-foot-thick layers and would maintain a consistent top elevation with slopes to match surrounding elevations. A 50-foot buffer would be maintained along the ocean side of the backfill area to ensure excavated material does not erode into the ocean. Temporary paths constructed from the backfill would also be implemented to facilitate access to the flattened areas. These paths would range from 100 to 340 feet in length and have a slope no greater than 10 percent.

4.2.2. Wide Channel (Alternative 2)

Figures 26 and 27 depict Alternative 2, which consists of a channel approximately 325 feet long that would be excavated and dredged through a portion of the existing volcanic material. The navigable channel will have an initial bottom width of 15 feet near the boat ramp and open to approximately 160 feet at the mouth to allow for easier entry from the ocean. The west bank of the channel would have a 4H:1V slope while the east bank would start with a 2H:1V slope as it curves around the breakwater structure whereafter it would transition into a 4H:1V slope. The channel bottom would match the existing ocean floor varying in elevation from approximately -5 feet MLLW at the boat ramp to approximately -11 feet MLLW at the mouth of the channel.

Debris would be removed through on-land excavation and dragline dredging before being transported via trucks to nearby material placement locations (see Figure 28). Heavy equipment utilized for the project would avoid traveling near the existing breakwater structure. Instead, settled sand and cobbles on the breakwater may be manually removed with the use of hand tools to ensure that it is not damaged. Slope stabilization systems that aim to preserve channel integrity and ocean access is discussed further in Section 4.2.4. Slope Stabilization Considerations.

The wide channel layout will result in approximately 31,000 cubic yards of excavated material which will be distributed across approximately 11 acres to level areas of the surrounding debris, neighboring properties, and the lava land mass and accretion land to the east. Backfill on the lava land mass and accretion land will be in 1- to 2-foot-thick layers and will maintain a consistent top elevation with slopes to match surrounding elevations. A 50-foot buffer would be maintained along the ocean side of the backfill area to ensure excavated material does not erode into the ocean. Temporary paths constructed from the backfill would also be implemented to facilitate access to the flattened areas. These paths would range from 100 to 340 feet in length and have a slope no greater than 10 percent.



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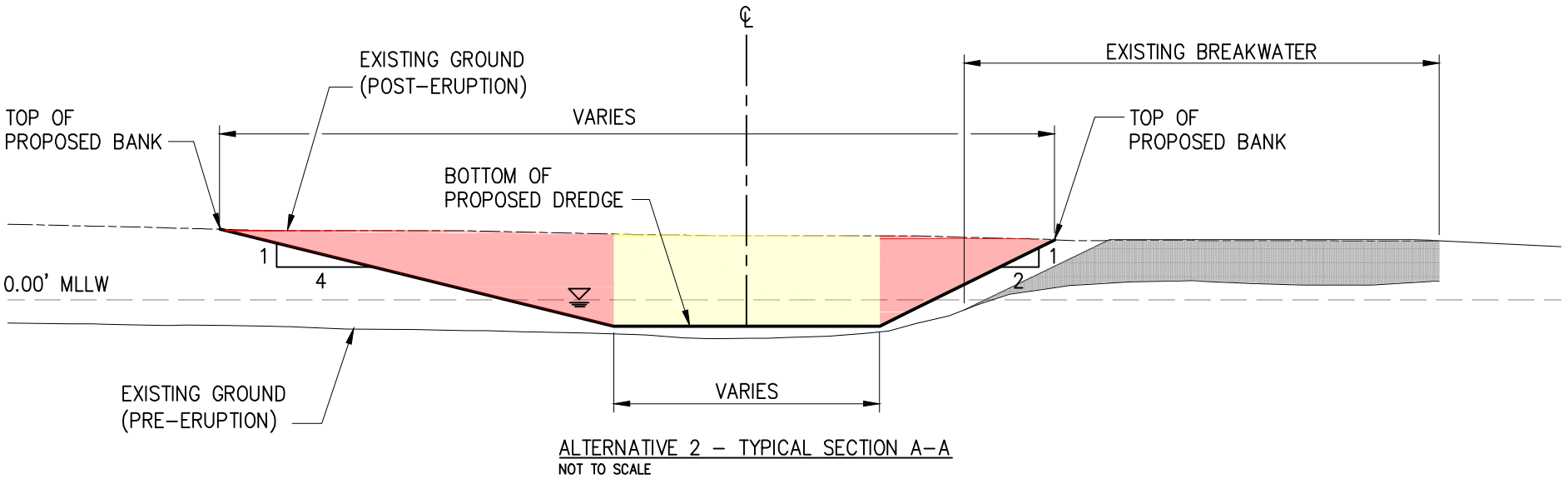
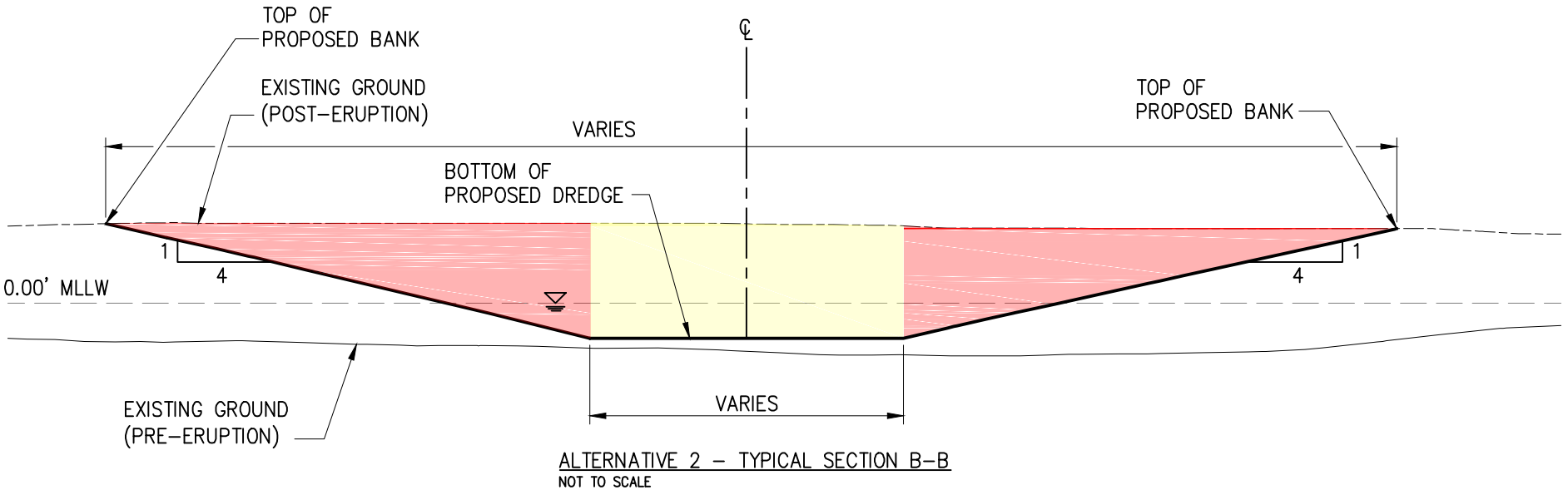
N
Scale:
Not to
Scale

FIGURE 26
ALTERNATIVE 2 - PLAN VIEW

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS



ALTERNATIVE 2 – TYPICAL SECTION A–A
NOT TO SCALE



ALTERNATIVE 2 – TYPICAL SECTION B–B
NOT TO SCALE

FIGURE 27
ALTERNATIVE 2 - TYPICAL SECTIONS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

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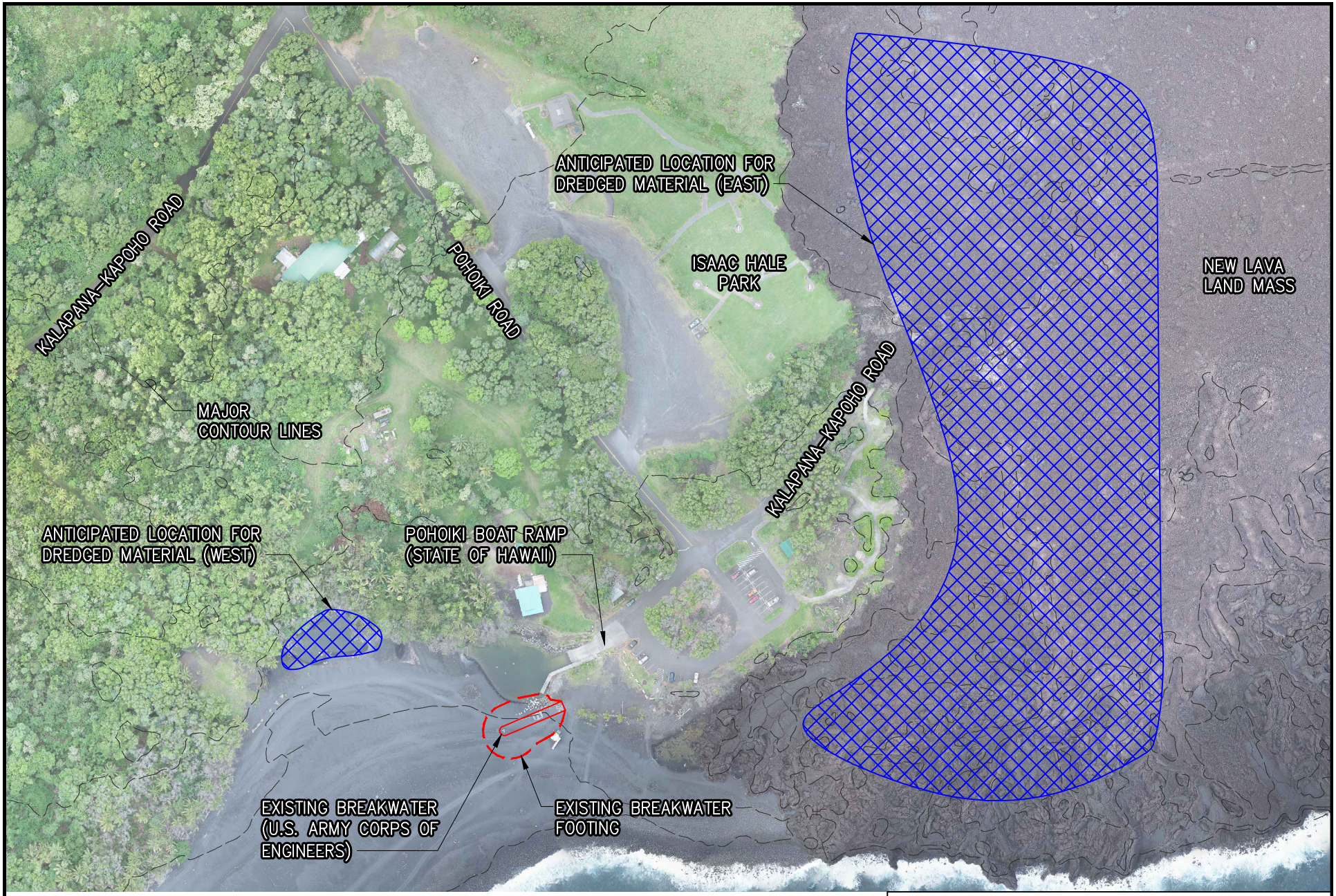

DUDEK LIDAR Imagery, May 2022

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FIGURE 28
ALTERNATIVE 2 - MATERIAL PLACEMENT LOCATIONS

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

4.2.3. Channels and Jetties (Alternative 3)

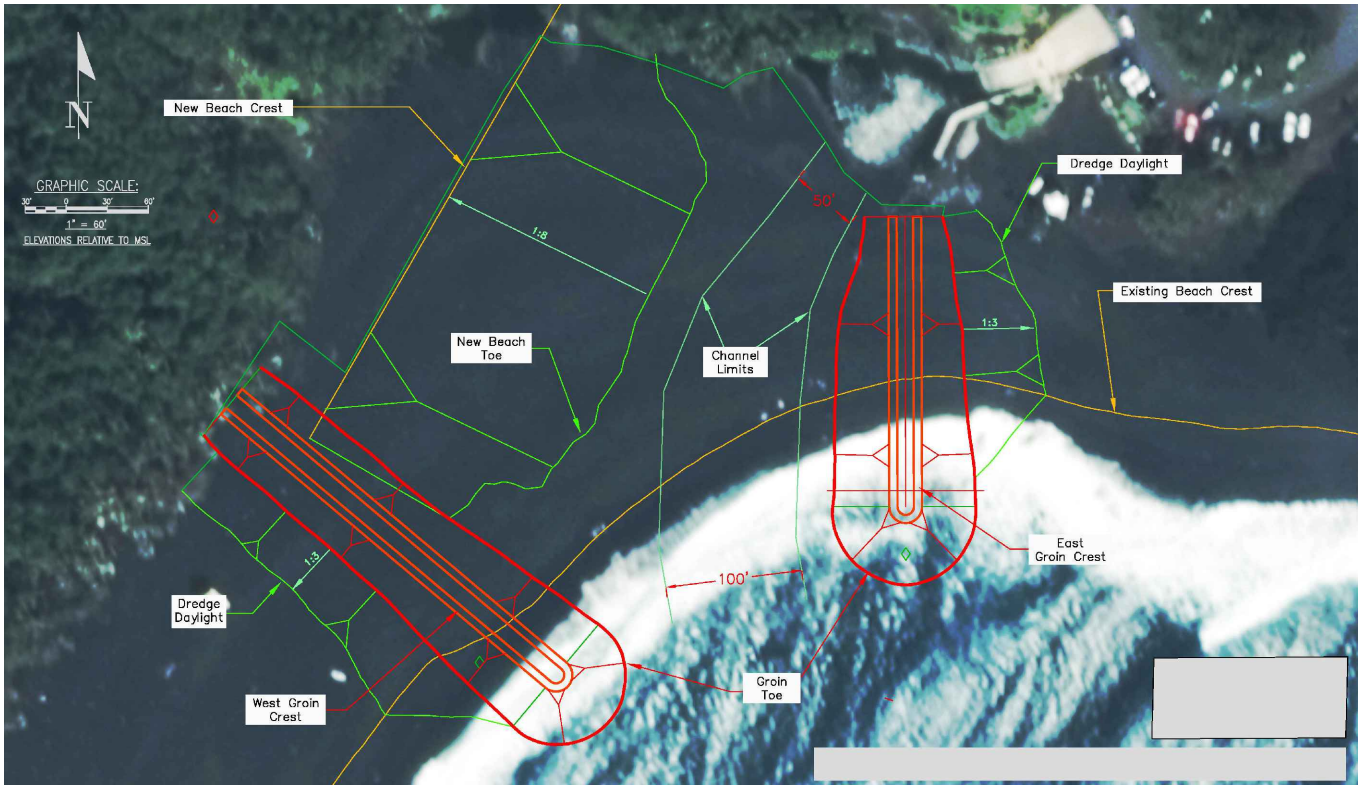
Figure 29 depicts a conceptual plan view and typical jetty section prepared by Sea Engineering, Inc. for Alternative 3, which adds more public infrastructure at Pohoiki Bay. Alternative 3 consists of dredging and disposing of approximately 105,000 cubic yards of backfill to construct east and west jetties in addition to a channel. Excavation between the jetties would provide access to the ramp on the former shoreline. The channel limits would have a depth of 6 feet and a width of 50 feet at the ramp, opening up to 100 feet at the seaward end. Debris would remain along the shoreline landward of the channel, with an 8H:1V beach face. The east and west jetties would be 210 feet and 310 feet in length, respectively, and reinforced with Core-Loc armor and stone before being topped with a concrete crest cap.

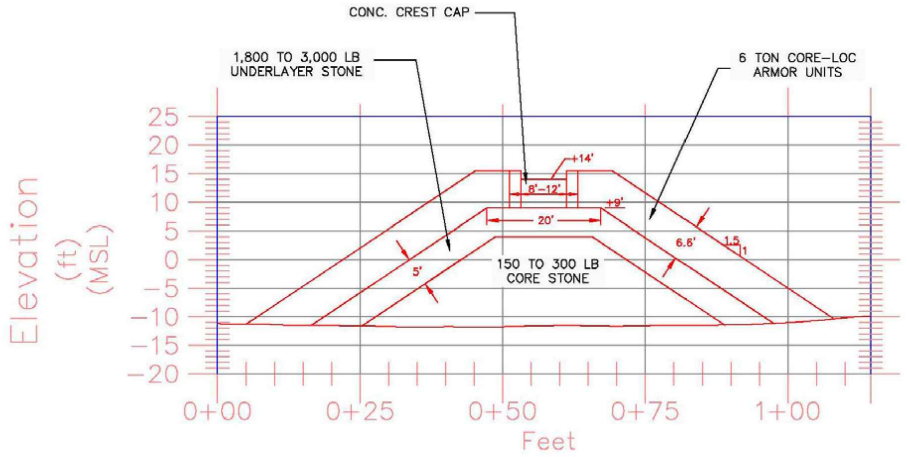
Excavated material would be distributed across approximately 20 acres to level areas of the new beach, and the lava land mass and accretion land to the east. Backfill on the lava land mass and accretion land would be in 1- to 2-foot-thick layers and would maintain a consistent top elevation with slopes to match surrounding elevations. A 50-foot buffer would be maintained along the ocean side of the lava rock backfill area to ensure excavated material does not erode into the ocean. Temporary access paths would be constructed from excavated material to facilitate access to the backfill areas. These paths would range from 100 to 340 feet in length and have a slope no greater than 10 percent.

4.2.4. Slope Stabilization Considerations

Alternatives 1 and 2 which are narrow and wide channel options, respectively, are expected to require channel bank stabilization to ensure the longevity of a newly dredged channel against the energetic coastal conditions at Pohoiki Bay. Possible solutions to fortify the channel slopes were explored but may not be feasible due to technical or budget limitations. Additionally, the difficulty in modeling and predicting the extent of volcanic debris production and transport leaves the future of a dredged channel ambiguous.

Marine mattresses, which are rock-filled containers constructed of high-strength geogrid, were considered as a possible bank stabilization technique. Figure 30 shows marine mattresses utilized for shore protection. The USACE has published a Technical Note discussing how the product can be used on coastal projects (Uses for Marine Mattresses in Coastal Engineering, ERDC/CHL CHETN-III-72, February 2006). Guidelines are provided in the technical note, and the desired stabilization for narrow and wide channels was assessed. It was determined that the marine mattresses would greatly exceed the typical maximum mattress length and weight such that hoisting and placing the mattresses without exceeding the geogrid strength would be problematic.





Sea Engineering Inc., Pohoiki Boat Ramp Repair Relocation Study Report, "Figure 2-11 Typical Jetty Section"

Sea Engineering Inc., Pohoiki Boat Ramp Repair Relocation Study Report, "Figure 2-12 PBR Re-Opening Concept"

FIGURE 29
ALTERNATIVE 3 - PLAN VIEW AND TYPICAL JETTY SECTION

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

Figure 30 Marine Mattress Shore Protection, ERDC/CHL CHETN-III-72

In consideration of the significant prevailing wave action at Pohoiki Bay, maintaining the stability of the mattresses would be difficult. Furthermore, through discussions with the Triton Marine Mattress manufacturer, it was indicated that their product was not suitable for the project's intended use due to the high wave energy, material abrasion concerns, and anchoring issues. In summary, given the relatively extreme wave conditions at the site which greatly exceed recommended design conditions for the use of marine mattresses, and the thickness, length, and weight required for stability, the option to use marine mattresses at or near the shoreline (beach/water interface) does not appear to be feasible.

Items such as concrete armor units may withstand the design wave height, however, the placement of the units should extend and abut into a hard, non-erodable surface; otherwise, flanking erosion could quickly result failure of the structure. For this reason, armor units are typically used on self-standing structures such as jetties (used in Alternative 3), and carry a significant construction cost. Placement only along the channel slopes and channel mouth would not prevent sand infill, channel shoaling, and beach formation across the mouth of the channel, rendering the channel unusable.

The production and transport of more volcanic material is difficult to model and predict. In the worst-case scenario, new volcanic material would continue to be produced and transported to Pohoiki Bay. New volcanic material is likely to accumulate in a newly dredged channel. The accretion land to the east is generally friable and is a protrusion in the coastline. The erosion and deposition of the accretion land may be the greatest during heavy wave events. Therefore, future deposition of volcanic material within the dredged area may occur subsequent to the completion of a channel dredging project.

Alternative 3 (channels and jetties) would be efficient in stabilizing the existing material, but is impracticable due to high construction cost estimates well above the approximate project construction budget. In general, and where possible, locating harbor facilities behind sandy shorelines is avoided due to the difficulty of preventing sand infill and shoaling of the entrance channel. Where harbors are located landward of a sandy shoreline, jetties (shore perpendicular structures) engineered for the site wave and coastal conditions are used to stabilize the channel sides and prevent sand infill.

Jetties come in different sizes, lengths, and construction materials depending on the site conditions. The bigger the design wave conditions, the bigger and more robust the jetties must be, particularly the jetty heads at the beach-water interface where direct wave attack occurs. As discussed previously, the project site is an open coastal area, exposed to significant prevailing wave energy as well as passing severe storms and hurricanes. Typically, the prevailing trade wind wave heights at the shoreline are about 3 to 4 feet, and annual trade wind wave breaker heights are about 8 feet. The design storm breaking wave height for jetty structure design is estimated to be 15 feet, which is a relatively large design wave height. Construction of appropriately designed jetties would be an effective means of stabilizing and maintaining a newly dredged channel through the wide sand beach into the ramp. However, the jetties at Pohoiki Bay would need be long and large due to the wide beach and high design wave heights, and consequently, very expensive.

The construction of two jetties vastly changes the intensity of the project, and consequently, may disqualify the project from coverage under the USACE Nationwide Permit (NWP). An individual permit would need to be applied for, which is likely to extend the overall project schedule and increase project costs.

4.3. No Action

No action does not achieve the stated objective of restoring navigational access. The no action alternative implies that the accumulated volcanic material in Pohoiki Bay would remain and navigational access to the Pacific Ocean would not be restored; therefore, the existing undamaged Pohoiki Boat Ramp facility would remain landlocked and inoperable. As a result of no action, fishermen and boaters who live in the Puna community would need to travel outside of the district to utilize an operable

boat launching facility. Ocean rescue services would not be available from Pohoiki Bay, and there would be fewer opportunities in the Puna District for food sustainability practices and ocean recreation. The construction-related activities described in this EA would not occur for the foreseeable future and there would be no commitment of funding or capital improvements costs as a result of no action.

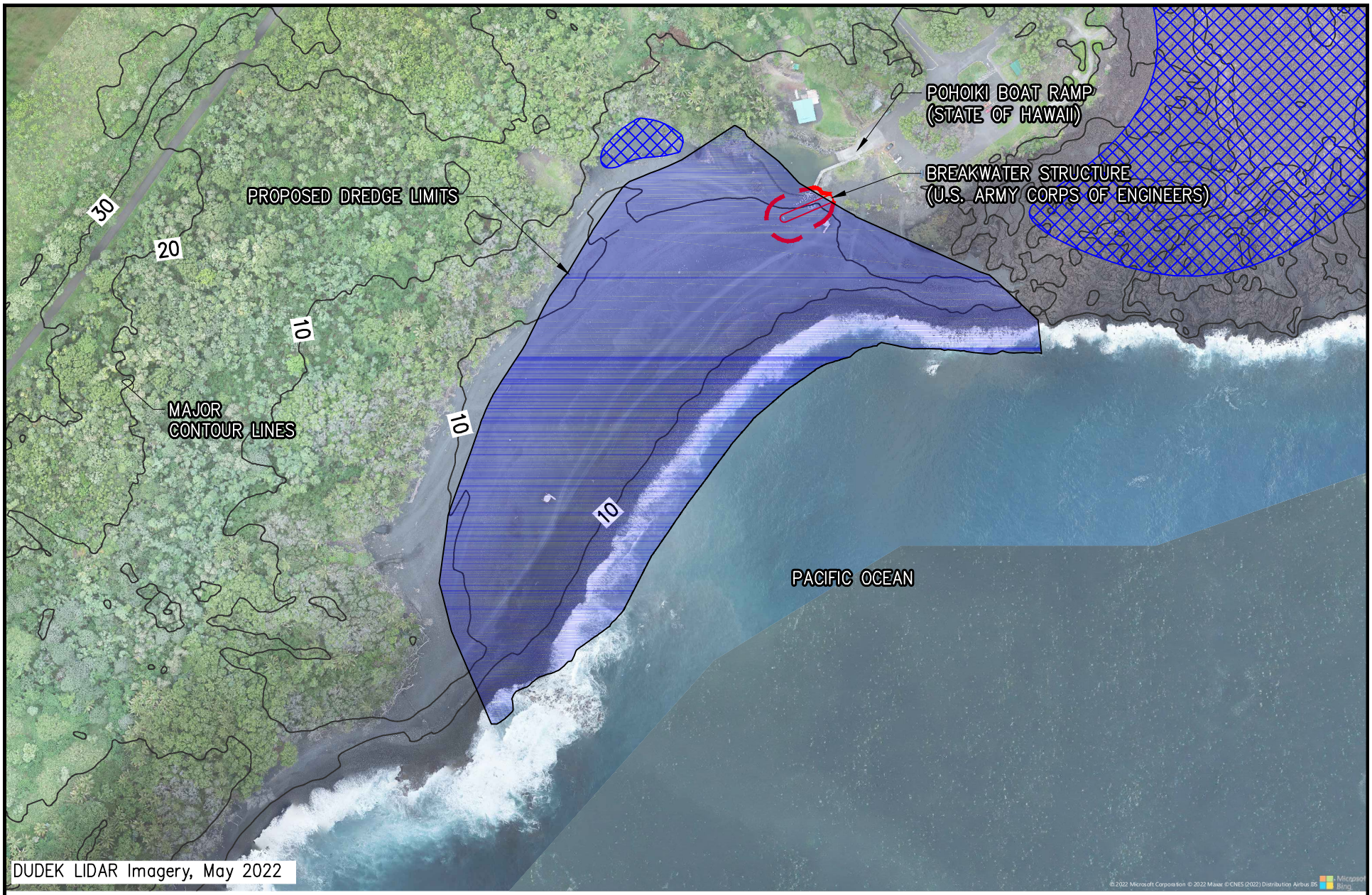
In the long-term, the Pohoiki Boat Ramp facility will continue to age. The nearshore aquatic habitat that existed in the pre-eruption Pohoiki Bay may be irreparably harmed. From the perspective of DOBOR, no action is an unacceptable alternative that would not address the expressed local needs of the Puna community. No action would conflict with DOBOR's mission and responsibilities pertaining to its facilities.

4.4. Restore Pre-Eruption Shape and Depth (the Preferred Alternative)

The proposed project would remove accumulated volcanic material from Pohoiki Bay through on-land excavation and dragline dredging to restore navigational access from the Pohoiki Boat Ramp facility to the Pacific Ocean. Figures 31 and 32 depict the initial concepts for the proposed action, which were then refined to the approximate project limits shown in Figure 5. The proposed action would be designed to restore Pohoiki Bay to a shape and depth that resembles pre-eruption conditions to the extent possible with available funding. Some accumulated volcanic material along the vegetation line of the pre-eruption shoreline is expected to remain as a result of the proposed project.

A fully funded project has the potential to remove approximately 175,000 cubic yards of volcanic material over an area of approximately 11 acres (refer to Figure 5). While the intent of DOBOR's project is to dredge to the pre-eruption ocean floor within the bay, residual material may remain. Redistribution of this residual material toward the west/south-west area of the boat ramp may occur as natural wave action reinforces a beach shape that matches the incoming wave crest lines. Bottom elevations in Pohoiki Bay would be similar to pre-eruption conditions and would range from approximately -5 feet MLLW inland to -14 feet MLLW towards the Pacific Ocean.

Volcanic material that is removed from Pohoiki Bay would be transported via trucks to nearby material placement locations such as on new lava land to the east of the Pohoiki Boat Ramp facility and near the back of the existing beach. Heavy equipment utilized for the project would avoid traveling and working on or near the existing breakwater structure. Settled sand and cobbles on the breakwater may be manually removed with the use of hand tools to ensure that the breakwater structure is not damaged.



LEGEND

PROPOSED DREDGE AREA

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FIGURE 31
DREDGE ENTIRE BAY (INITIAL CONCEPT)

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

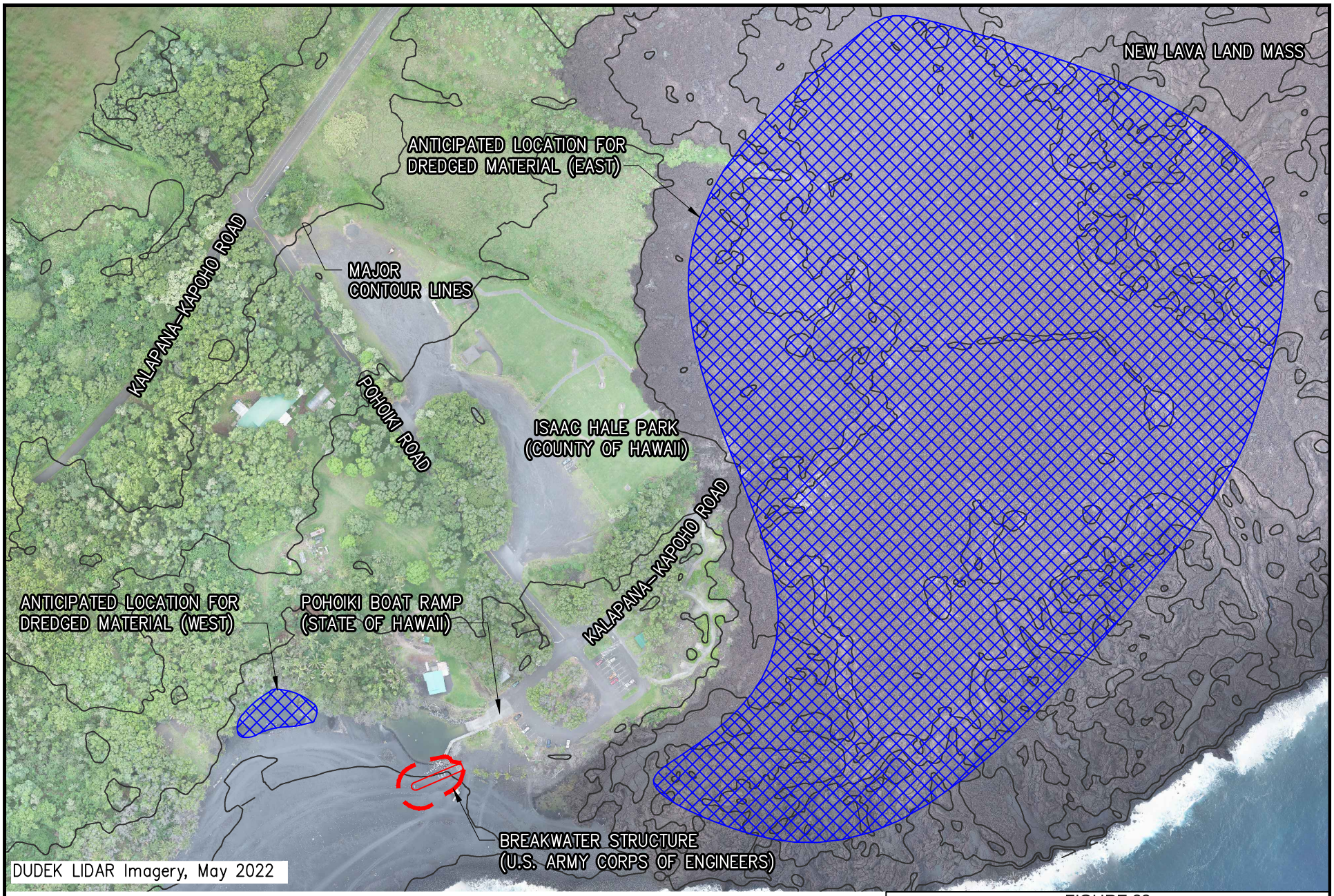

FIGURE 32

DREDGE ENTIRE BAY - MATERIAL PLACEMENT LOCATIONS (INITIAL CONCEPT)

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS

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Excavation and dredging of the material would start inland from the mauka side of Pohoiki Bay and uniformly progress towards its makai side. USACE has jurisdiction over navigable waters. Consequently, DOBOR would coordinate its project with the USACE to ensure that the project is permitted before work begins.

Excavated material would be distributed across approximately 35 acres to level areas of the surrounding debris, and the newly created lava flows to the east of the boat ramp. Backfill on the lava land mass and accretion land would be in 1- to 2-foot-thick layers and would maintain a consistent top elevation with slopes to match surrounding elevations. A 50-foot buffer would be maintained along the makai side of the backfill area to ensure excavated material will not erode into the ocean. Temporary paths constructed from the backfill would facilitate access to the flattened areas. These paths would range from 200 to 250 feet in length and have a slope no greater than 10 percent.

The proposed action removes more material than all of the channel alternatives and has a higher potential for extending the period of navigable access. Removing accumulated volcanic material in Pohoiki Bay to the fullest possible extent would not require slope stabilization since there is no channel through loose material, which is the similar characteristic of the wide or narrow channel alternatives. In other words, channel failure that would result in the ceasing of ocean access would not be a threat with the proposed action. Less material remaining within Pohoiki Bay reduces the likelihood of material being redistributed to again impede access to the ocean from the Pohoiki Boat Ramp. The proposed action does not propose any new built structures, such as the jetties in Alternative 3, to protect against new eroded material that may settle in the bay. Consequently, future maintenance dredging of additional volcanic material is likely to be needed.

The proposed action would restore Pohoiki Bay to a shape and depth that resembles pre-eruption conditions such that the wave environment, including wave height and runup is expected to be similar to pre-eruption conditions. The protruding accretion shoreline, however, may provide some additional protection to the interior areas of the bay compared to the previously occurring conditions. In addition, sand below a depth of -14 feet MLLW would not be dredged which may help dissipate wave energy. For all of these reasons, the proposed dredging alternative is not expected to result in increased flooding or wave energy at the shoreline compared to pre-eruption conditions. The main disadvantage of the proposed action is the high estimated construction costs, which are similar to Alternative 3 (channel and jetties). The proposed action is not expected to require additional permitting, which helps to expedite the project schedule and the reopening of the Pohoiki Boat Ramp facility.

If there are insufficient funds to fully restore Pohoiki Bay to pre-eruption conditions, then the proposed action would be modified to dredge the most area that funds allow.

A modified action would restore navigable access to Pohoiki Bay and is expected to maximize the time that the boat ramp remains operable. The anticipated impact and dredged volume of a modified project would presumably be higher than Alternative 2 (wide channel) but would not exceed the unmodified proposed action.

An identifiable barrier is recommended to deter trespassing on private property and delineate a walking path for public access to the shoreline and beach area to the west of the boat ramp. The barrier could consist of a short, grouted rock wall (reusing onsite stones and rocks) or fence or vegetation. Consultation with the state and county agencies is expected to be required to ensure compliance with applicable rules pertaining to shoreline areas. An easement may be necessary to facilitate construction of improvements intended to improve pedestrian access.

Due to various uncertainties, it is difficult to predict or quantify the actual sediment accumulation rate and subsequent maintenance dredging intervals once dredging is completed. To establish starting values, the following activities are recommended:

- An initial maintenance dredging interval of 5 years based on the assumption that the potential future sediment accumulation rate is 5 percent of the dredged quantity. This equates to approximately 5,500 cubic yards of new sediment accumulating in Pohoiki Bay per year.
- Annual bathymetry surveys of the bay to monitor elevation changes of the bay floor along with consistent visual inspections of the bay between surveys.
- Adjustments to the maintenance dredge interval as necessary and in response to a better understanding of the actual sediment accumulation rate within the bay under post-construction conditions.

Anticipated site work would create opportunities for erosion and sedimentation; however, the project includes the implementation of BMPs such as erosion and drainage control to minimize environmental harm. Construction activities are expected to generate short-term environmental impacts such as fugitive dust, noise, potential disruptions to traffic, and solid waste that would cease upon project completion. The potential for encountering buried historic properties during construction is low but exists; therefore, DOBOR is expected to ensure that its contractor will halt construction activities and immediately notify SHPD in the event of a discovery. The proposed action would return the Pohoiki Boat Ramp facility to productive use whereas the existing facility is currently landlocked and inoperable, which curtails emergency rescue services and commercial, recreational, and food subsistence activities. Proposed mitigation that addresses anticipated construction impacts is identified in this EA. The proposed action is therefore the preferred alternative that represents DOBOR’s commitment to restoring navigational access at Pohoiki Bay.

4.5. Comparison of Alternatives

A summarized comparison of alternatives presented in this section does not include alternative locations that provide no apparent environmental advantages. There is expressed opposition from community members to locations beyond Pohoiki Bay. No action is also not included since it does not achieve the stated objective of restoring navigational access. Appendix G contains the pre-design report and documents the considerations that contributed to the development of the proposed action to restore the pre-eruption shape and depth of Pohoiki Bay to the extent possible.

Alternative	Advantages	Disadvantages
Narrow Channel	a. Lowest construction cost b. Shortest construction schedule c. Smallest dredged volume	a. Wave energy a threat to channel failure b. May be filled with new material in the shortest period of time c. Narrowest channel width d. Narrowest channel opening
Wide Channel	a. Next lowest construction cost b. Next shortest construction schedule c. Widest channel width d. Widest channel opening	a. Wave energy a threat to channel failure b. May be filled with new material c. Medium dredged volume
Channel and Jetties	a. Best alternative for keeping the boat ramp open for the longest period of time	a. Highest project cost (by far) b. Longest project schedule; will require additional permitting c. Largest dredged volume d. Most construction impacts
Restore pre-eruption shape and depth (preferred alternative)	a. Does not require slope stabilization b. Next best alternative for keeping the boat ramp open c. Most closely restores the bay back to pre-eruption conditions	a. High construction cost b. Long construction schedule c. May be filled with new material d. Largest dredged volume

Note: Alternative locations are opposed by the community and are not compared; no action is not compared since it does not achieve the stated objective of restoring navigational access.

4.6. Other Considerations

This section documents several considerations including suggested design alternatives that warrant no further discussion, and additional features that are beyond the objectives of DOBOR's proposed project at this time.

4.6.1. Boat Ramp Placed on Beach

DOBOR received written comments during the Draft EA comment period that suggest the use of Marston mats or a similar rollout system that is placed on or across the beach. Marston mats (or pierced steel planking) were utilized during the 1940s primarily for the rapid construction of temporary runways and landing strips. In Hawai'i, pierced steel planking was utilized for a temporary runway at Morse Field - South Point, Hawai'i according to notations at https://imagesofoldhawaii.com/marston-mats/. The Kualoa Airfield at Kaneohe Bay had a Marston mat ramp, and Kahuku Army Air Base started as a Marston mat runway that was later paved. The mats generally require a stabilized sub grade for anchoring whereas the material that has accumulated at Pohoiki Bay is loose and erodible. The following link was provided to DOBOR as an example of available boat ramp products: https://shop.mobimat.com/.

A concrete ramp or pad placed on or across the beach was also suggested. This suggestion would require a stabilized sub grade whereas the material that has accumulated at Pohoiki Bay is loose and erodible such that normal daily wave action would undermine the concrete ramp panels or pad.

The suggested alternatives of mats, ramps or pads consisting of different materials that are laid on or across the beach imply that boats would enter the water where strong wave action occurs. No further consideration by DOBOR is warranted since the suggested mats, ramps or pads laid on or across the beach are not more favorable than the use of permanent infrastructure (i.e., the existing boat ramp which is protected from strong wave action by the breakwater structure).

4.6.2. Dredge and Retain Pond

Written comments that DOBOR received during the comment period for the Draft EA (see Appendix H) describe recreational activities at Pohoiki Bay. Many individuals have stated that adults and children are utilizing ponds of trapped water for activities such as swimming and soaking while the boat ramp facility is closed. The accumulated volcanic material allows for easy and convenient access for people with disabilities from the existing parking area at Isaac Hale Beach Park to the beach.

Dredging that restores navigational access from Pohoiki Bay to the Pacific Ocean will necessarily affect the largest pond of trapped water in the boat ramp area and remove existing beach area that is easily accessible from the existing parking area. Written comments suggest that a pond in the backshore area could be retained, which would

allow recreational activities such as swimming and soaking to continue. The comments state that the pond could serve as the safe swim area at Pohoiki Bay.

The expressed community sentiment throughout the EA process indicates that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. DOBOR does not support the viewpoint of utilizing ponds of trapped water for a safe swim area due to the considerations described in this EA. Section 2.3. Water Quality describes the concerns pertaining to cesspools and vibrosis. Hawai‘i County envisions a different location for a safe swim area as stated in Sections 2.13. Recreational Resources and 3.8. Other Considered Plans. As indicated in *Revitalize Pohoiki* (2022), which is a published plan to help guide improvements at Isaac Hale Beach Park, the safe swim area would be close to an existing parking area near the boat ramp. For all of these reasons, no further consideration by DOBOR is warranted.

4.6.3. Safe Swim Area

For decades, community members have requested a safe swim area at Pohoiki that avoids conflicts with boaters. As a result of the lava inundation at Kalapana in 1990, the Puna community lacks a safe swim area for beginning swimmers and children. A petition was started in 2012 for the purpose of initiating public outreach and to document community consensus and public support for a public swimming area as part of the Phase II Pohoiki Regional Park. The petition effort documented support for the safe swim area from adjacent landowners, fishermen, kūpuna, lifeguards, educators and administrators, community leaders, and Pohoiki families, surfers and youth.

There was no legal swim area at Pohoiki Bay but the boat ramp area was used by children and surfers due to easy accessibility to the water. A recognized hazard was created when boats entered or left the ocean since both children and motorboats would be moving in the water and in close proximity while waters were surging. Increased use of the boat ramp by boaters, swimmers and surfers increased the safety hazard.

As previously indicated in Section 3.8. Other Considered Plans, the published plan for guiding site improvements at Isaac Hale Beach Park includes a safe swim area. Proposed improvements to Isaac Hale Beach Park facilities are expected to be undertaken by Hawai‘i County (which has jurisdiction over the park) whereas the Pohoiki Boat Ramp facility is under DOBOR’s jurisdiction.

4.6.4. Boat Wash Area

Phase 1 of the development of Isaac Hale Beach Park did not include adequate boat wash accommodations due to funding constraints. Boaters would wash their boats in areas close to campers, which was not ideal. The 2018 eruption destroyed utilities including the waterline to the beach park. Restoration of the waterline is expected to be accomplished by Hawai‘i County. Community members have requested the development of a boat wash area and separation of runoff that does not conflict with camping.

5. PERMITS AND APPROVALS

Although exact permitting and approval requirements will be determined during the design phase, the following list contains permits and approvals that may be required for the proposed project:

Federal

- U.S. Army Corps of Engineers Individual or Nationwide Permit

State of Hawai‘i

- Conservation District Use Permits
- National Pollutant Discharge Elimination System Permits
- Community Noise Permit, Community Noise Variance, Notification of the Intent to Construct, Application for Stationary Sources, Application for Construction Activities
- Routine Construction/Excavation within State Highway Permits
- Non-Covered and/or Covered Source Permit (Air Quality)
- Lane Use Permits for Construction Work
- Oversized and Overweight Vehicles on State Highways Permits
- State Historic Preservation Division Review

County of Hawai‘i

- Building Permits
- Grading, Grubbing, and Stockpiling Permits
- Erosion Control Plan/Best Management Practices
- Trenching and Dewatering Permits
- Permits to Work Within County Right-of-Way
- Plan Approval

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6. DETERMINATION

The proposed project is not likely to have a significant impact on the physical or human environment based on the analysis presented in this document. In consideration of the potential environmental effects and consultations with governmental agencies and interested parties, a Finding of No Significant Impact (FONSI) has been determined for the project by DOBOR. The supporting rationale for this finding as set forth in HAR §11-200.1-13 is discussed below.

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

No new facilities at Pohoiki Bay are proposed. The project would restore navigational access to the Pacific Ocean which would allow the existing Pohoiki Boat Ramp facility (which is permanent infrastructure) to return to productive use. DOBOR will ensure that its contractor stops work and contacts SHPD immediately if any unanticipated buried archaeological or cultural resources are encountered during construction.

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

DOBOR's Pohoiki Boat Ramp facility is currently landlocked and inoperable, which curtails commercial, recreational, cultural, and food subsistence activities. Completion of the proposed project would restore beneficial uses of the nearshore marine environment. The project would return Pohoiki Bay to a shape and depth that is similar to pre-eruption conditions to the extent possible. The removal of accumulated volcanic material from Pohoiki Bay may allow the nearshore ecosystem to recover from the 2018 eruption of Kīlauea Volcano.

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

The proposed project is consistent with the State's environmental policies or long-term environmental goals established by law as documented in this EA.

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

The proposed project does not substantially or negatively affect the economic or social welfare and cultural practices of the community or State. The project creates short-term jobs for people in design and construction. Completion of the proposed project supports the resumption of ocean rescue services, commercial fishing, ocean/volcano tours, food sustainability practices of the Puna community, and recreational opportunities at Pohoiki Bay.

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

Short-term and temporary effects such as fugitive dust, surface runoff, turbidity, noise, solid waste, and potential disruptions to traffic are expected to cease upon project completion. The implementation of appropriate mitigative measures as described in this EA will minimize temporary construction impacts.

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

No adverse secondary impacts such as population shifts are anticipated from the proposed project, which would return the Pohoiki Boat Ramp facility to productive use. The project would not change the function of the boat ramp facility. The Kīlauea Volcano eruption of 2018 disrupted the use of the Pohoiki Boat Ramp facility in the Puna District, and the nearest operable boat ramp is Wailoa Sampan Basin and Boat Harbor in Hilo, which is approximately 40 miles away.

(7) Involves a substantial degradation of environmental quality;

The proposed project is not expected to degrade environmental quality and provides the opportunity to address the devastating effects of the 2018 eruption on aquatic habitat at Pohoiki Bay. Environmental impacts that may occur during the various phases of construction will be mitigated through the implementation of construction BMPs, as appropriate. Appropriate mitigation measures have been identified throughout this EA.

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

The proposed project represents a long-term commitment by DOBOR to provide ocean access at Pohoiki Bay. The project is designed to restore navigational access (which previously existed) from the Pohoiki Boat Ramp facility to the Pacific Ocean as described in this EA. Dredging the volcanic material that accumulated in Pohoiki Bay is considered to be the action with less environmental harm as compared to other described alternatives.

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

No substantial adverse effects to rare, threatened, or endangered species are anticipated. The affected project area does not contain and is unlikely to substantially impact rare, threatened, or endangered species or their habitat.

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

Short-term impacts to air quality, water quality or ambient noise levels may occur during construction. The implementation of construction BMPs is expected to avoid the exceedance of Federal or State air quality, noise and water quality standards. Environmental impacts will be mitigated through proper construction techniques and compliance with permits and applicable DOH rules and regulations.

(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;

The Pohoiki Boat Ramp facility is existing permanent infrastructure that was necessarily developed along the coastline due to its purpose. The proposed project involves dredging and does not add new infrastructure at Pohoiki Bay.

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

The proposed project involves dredging Pohoiki Bay, which is unlikely to have a substantial adverse effect on scenic vistas and view planes.

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

The proposed project is not anticipated to cause a substantial increase in energy consumption or greenhouse gases due to energy consumption because the Pohoiki Boat Ramp facility has no requirements for power.

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7. PUBLIC AGENCY REVIEW AND CONSULTATION

7.1. Pre-Assessment Consultation

Consulted agencies, organizations, and individuals are listed below. Six (6) interested parties including agencies provided formal correspondence in response to the pre-assessment consultation effort, as indicated by the ✓ below. Comments and responses are included in Appendix H.

Federal Agencies

U.S. Department of the Interior
Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office
U.S. Army Corps of Engineers, Honolulu District Regulatory Office
U.S. Coast Guard, Hawaii and the Pacific (District 14)

State of Hawai'i

Department of Accounting and General Services, Public Works Division
Department of Transportation
Statewide Transportation Planning Office
Department of Land and Natural Resources
Land Division
State Historic Preservation Division - Hawaii Island
Aha Moku Council
Department of Health
Clean Air Branch
Clean Water Branch
Environmental Health Administration
✓ Environmental Management Division
Indoor and Radiological Health Branch
Safe Drinking Water Branch
Solid and Hazardous Waste Branch
Wastewater Branch
Department of Business, Economic Development and Tourism
✓ Office of Planning and Sustainable Development
Office of Planning and Sustainable Development, Coastal Zone Management
Department of Education - Hawaii District
Office of Hawaiian Affairs
East Hawaii (Hilo)

County of Hawai'i

Office of the Mayor
Kilauea Eruption Recovery
Civil Defense Agency
Department of Environmental Management
  Solid Waste Division
Department of Public Works
  Administration Division
  Building Division
  Engineering Division
  Highway Division
Department of Parks and Recreation
Department of Planning
✓ Department of Water Supply
✓ Fire Department
✓ Police Department

Elected Officials

Senate District 1 (Senator Lorraine R. Inouye)
Senate District 2 (Senator Joy A. San Buenaventura)
Senate District 3 (Senator Dru Mamo Kanuha)
House of Representatives District 2 (Representative Richard H.K. Onishi)
House of Representatives District 3 (Representative Chris Todd)
House of Representatives District 4 (Representative Greggor Ilagan)
House of Representatives District 5 (Representative Jeanne Kapela)
Council District 2 (Councilmember Jenn Kagiwada)
Council District 3 (Councilmember Susan Lee Loy)
Council District 4 (Councilmember Ashley Kierkiewicz)
Council District 5 (Councilmember Matt Kanealii-Kleinfelder)

Property Owners, Interested Parties, Community Groups, Etc.

✓ TMK 1-3-008:013
TMK 1-3-008:034
TMK 1-3-008:086
Bobby Camara
Lena Carver/Kuamoo Family
Alohalani Hope Cermelj
Kuulei Kealoha Cooper
Dane DuPont

Property Owners, Interested Parties, Community Groups, Etc. (continued)

Leslie Enriquez
Leah Gouker
Randall Harris
Luana Jones
Anna Kon-Kapukini
Leila Kealoha
Jon Olson
Earl Veloria
Sierra Club of Hawaii, Moku Loa Group
East Hawaii Island Outdoor Circle

There were several opportunities during the EA process to ask questions and hear information about the proposed project. The Limtiaco Consulting Group (TLCG) is DOBOR's consultant and has participated in the following meetings and discussions:

Date	Meeting Type	Est. No. of Attendees
Jul. 24, 2020	In-person	60
Feb. 21, 2021	Online (BLNR Board)	
Apr. 20, 2021	Online (County Council)	
Jun. 9, 2021	In-person Workshop (Revitalize Puna at Leilani Estates)	60 (3 sessions, 20 per session)
Jan. 11, 2022	Online (Revitalize Puna)	
Mar. 22, 2022	Site visit at Pohoiki Boat Ramp	25
Apri.11, 2022	In-person Workshop (Revitalize Puna at Sure Foundation Church)	200
Aug. 18, 2022	In-person at Pahoa Community Center	120
Aug. 24, 2022	Online	
Oct. 11, 2022	In-person Workshop (Revitalize Puna at Pahoa Gym)	200
Feb. 4, 2023	In-person Workshop (Revitalize Puna at Pahoa Gym)	250

7.2. Public Review

The Environmental Review Program (ERP) maintains an online library of published reports and published a notice of availability for the Draft EA and Anticipated Finding of No Significant Impact (DEA-AFONSI) in the April 23, 2023 issue of *The Environmental Notice*. The published notice initiated the statutory 30-day public review and comment period. Copies of the DEA-AFONSI were available at the Pāhoa, Mountain View, Kea'au, and Hilo public libraries on Hawai'i Island and at the Hawai'i State Library in Honolulu, O'ahu from April 23, 2023 until the comment period ended on May 23, 2023. ERP. The DEA-AFONSI is downloadable from the following link: https://files.hawaii.gov/dbedt/erp/Doc_Library/2023-04-23-HA-DEA-Pohoiki-Boat-Ramp-Dredging-of-Volcanic-Debris.pdf.

TLCG facilitated a virtual public meeting held on May 10, 2023 that provided the opportunity for interested parties to ask questions and provide testimony to DOBOR on the DEA-AFONSI and proposed project. There were approximately 130 attendees, and the meeting was recorded. The presentation and recorded meeting were available from the following links at the time of this writing:

https://dlnr.hawaii.gov/dobor/files/2023/05/Pohoiki-DEA-Public-Meeting-Presentation-20230510.pdf; and

https://dlnr.hawaii.gov/dobor/pohoiki-draft-ea-meeting-held-on-5-10-2023/.

DOBOR received written comments from 36 parties during the comment period. The substantive comments were reviewed, evaluated, and incorporated into the Final EA as appropriate. The comments are generally characterized as follows:

<u>Responded with information, recommendations or indicated no comments</u>

- U.S. Fish and Wildlife Service
- Department of Accounting and General Services
- Department of Land and Natural Resources, Engineering Division, Land Division - Hawai'i District, Division of Aquatic Resources, and Office of Conservation and Coastal Lands
- Office of Planning and Sustainable Development
- County of Hawai'i, Department of Water Supply
- Interested party (S.R.S.)
- Interested party (J.C.H.)
- Interested party (J.C.)
- Interested party (B.C.)

Supports project

- Interested party (A.M.)
- Interested party (G.A.)
- Interested party (L.K.)

Opposes project (i.e., prefers no action or a different project)

- Interested party (J.T.)
- Interested party (L.C.)
- Interested party (M.P.)
- Interested party (V.C.)
- Interested party (R.C.)
- Interested party (J.G.)
- Interested party (R.G.)
- Interested party (J.N.)
- Interested party (Z.H.)
- Interested party (G.D./E.D.)
- Interested party (L.Q.T.)
- Interested party (A.I.)
- Interested party (H.G.)
- Interested party (A.M.)
- Interested party (L.H.)
- Interested party (L.A.S.)
- Interested party (P.E.)
- Interested party (P.G.)
- Interested party (N.J.M.)
- Interested party (F.R. or A.R.)
- Interested party (K.R.)

Substantive comments were reviewed, evaluated, and incorporated into this Final EA. Corrections identified by interested parties and minor revisions, such as the use of volcanic *material* instead of volcanic *debris* do not change the discussions of existing conditions. More notable revisions are described below.

A page of new narrative is included after the introductory project summary, and a new figure depicts the location of Hawai‘i Island small boat harbor facilities. Section 2.3. Water Quality includes additional background information pertaining to water quality testing, cesspools and vibrio. Information provided by government agencies is included in Sections 2.6. Floral and Faunal Resources, and 2.7. Natural Hazards.

The discussion in Section 2.8. Archaeological and Cultural Resources includes additional narrative from the July 2023 version of the CIA report, which replaces the March 2023 version in Appendix A. The descriptions of existing recreational activities at Pohoiki Bay from written comments are included in Section 2.13. Recreational Resources.

Several suggested alternatives are described in the written comments that DOBOR received during the Draft EA comment period. Additional suggested locations for a boat ramp facility are discussed in Section 4.1. Alternate Locations Along the Puna Coastline. Suggested alternatives from written comments are also discussed in Sections 4.6.1. Boat Ramp Placed on Beach and 4.6.2. Dredge and Retain Pond, which are new sections in the Final EA.

Section 8.0 References contains six new entries. Appendix E includes a map of lava flow hazard zones for Hawai‘i Island. The written comments and the responses are included in Appendix H. DOBOR and TLCG will continue to coordinate and consult with governmental agencies during the EA process.

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APPENDIX A

Cultural Impact Assessment
by Cultural Surveys Hawai‘i, Inc.

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Cultural Impact Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris Project, Keahialaka, Pohoiki, and Oneloa Ahupua‘a, Puna District, Hawai‘i Island TMKs: (3) 1-3-008:013 por., 014 por., 016 por., 021 por., 033, 034 por., 097 por., 999 por. (Kalapana-Kapoho Beach Road); 1-4-093:038 por., 048 por., 999 por. (Kalapana-Kapoho Beach Road)

Prepared for

The Limtiaco Consulting Group on behalf of the

Department of Land and Natural Resources, Division of Boating and Ocean Recreation

Prepared by
Chantellee Konohia Spencer, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.
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(Job Code: POHOIKI 2)

July 2023

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Management Summary

Reference	Cultural Impact Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris Project, Keahialaka, Pohoiki, and Oneloa Ahupua‘a, Puna District, Hawai‘i Island, TMKs: (3) 1-3-008:013 por., 014 por., 016 por., 021 por., 033, 034 por., 097 por., 999 por. (Kalapana-Kapoho Beach Road); 1-4-093:038 por., 048 por., 999 por. (Kalapana- Kapoho Beach Road) (Spencer and Hammatt 2023)
Date	July 2023
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: POHOIKI 2
Agencies	Federal Emergency Management Agency (FEMA); Hawai‘i State Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR); State Historic Preservation Division (SHPD); The Environmental Review Program (ERP)
Land Jurisdiction	State of Hawai‘i, County of Hawai‘i, Private
Project Location	The project area is located at Pohoiki Bay in the district of Puna on the windward side of Hawai‘i Island, approximately 11.6 km (7.2 miles) southeast of the town of Pāhoa. The project is situated within and along the former shoreline area of Pohoiki Bay, where the existing boat access ramp was inundated with sand and volcanic debris following the 2018 eruption of Kīlauea. The project area is accessed primarily from Kalapana-Kapoho Beach Road (Route 137) and Pohoiki Road, with a secondary access route crossing TMKs: (3) 1-3-008:013 (private property) and 097 (county property). The project area is shown on a portion of the 1995 Kapoho U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle on Hawai‘i Island.
Project Description	The State Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR) is moving forward with the restoration of the existing Pohoiki Bay boat ramp. Pohoiki Bay has filled in with black sand and cobbles as a result of the 2018 volcanic eruption. Thus, the Pohoiki boat ramp is land-locked and unusable. Currently, DOBOR’s proposed action is to dredge as much material from the bay as possible to restore pre-eruption depths. Dredged volcanic debris would be distributed along the former shoreline of the bay and/or on newly formed lava land beyond the reach of tidal waves. The proposed project would necessitate depositing most or all of the dredged material on the jagged area of newly formed lava land to the east of the existing boat ramp. The project area comprises approximately 50.3 acres and accounts for dredging activity, access,

	staging, and deposit of dredge material. The overall public sentiment with regards to several alternatives (including the dredging of a channel that is narrow or wide, constructing protective jetties, and no action) has been unfavorable. The proposed action consisting of dredging the vast majority of accumulated volcanic debris from Pohoiki Bay was discussed at the community meeting held on 18 August 2022 at the Pāhoa Community Center. The over 120 participants included fishermen, local residents, and government officials. The main sentiment expressed during the meeting was that the boat ramp needs to reopen as soon as possible.
Project Acreage	The project area is 50.29 acres (20.35 hectares), which comprises the infilled Pohoiki Bay, deposit area for dredged material, and area for access and staging.
Document Purpose and Regulatory Context	This cultural impact assessment (CIA) supports compliance for the Pohoiki Boat Ramp Dredging of Volcanic Debris project with: • The National Environmental Protection Act (NEPA), which requires consideration of a proposed project's environmental impacts; • The National Historic Preservation Act (NHPA), which requires consideration of a proposed project's potential impacts to historic properties and resources; • The mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, Hawai‘i Revised Statutes (HRS), and Hawai‘i Administrative Rules (HAR) and other Hawai‘i State laws requiring government agencies to promote and preserve cultural beliefs, practices. and resources of Native Hawaiians and other ethnic groups; • the State of Hawai‘i's environmental review process under HRS §343, which requires consideration of the proposed project's potential effects on cultural practices and cultural features in order to "promote responsible decision making" (HRS §343); • and the State of Hawai‘s historic preservation review process under HAR §13-275-6 and §13-284-6, which requires the identification and mitigation of adverse effects proposed by a potential project in order to "promote the use and conservation of historic properties for the education of the citizens of Hawai‘i" (HAR §13-275-6) This CIA contains information gathered from archival research and consultation, compiled in order to "analyze the impact of a proposed action on cultural practices and features associated with the project area" (Environmental Council 1997). Cultural practices and cultural features may include traditional cultural properties (TCPs), designated significant historic properties under State of Hawai‘i significance

	Criterion e, pursuant to HAR §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that "have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity" (HAR §13-275-6 and §13-284-6).
Results of Background Research	Background research for the proposed project yielded the following information: 1. The project area is located in the Puna District on the eastern, windward side of Hawai‘i Island. The project area is located within the *ahupua‘a* (traditional land division usually extending from the mountains to the sea) of Keahialaka, Pohoiki, and Oneloa, which are among approximately 50 *ahupua‘a* in Puna (Maly 1998:9). 2. In the tradition of Hawaiian naming practices, the winds of and surrounding Keahialaka, Pohoiki, and Oneloa are Ulumano, ‘Awa, Pu‘ulena, Moani‘ala, Kuamoa‘e, Moa‘e, Apaiahaa, Kāpae, and ‘Unuloa (Nakuina 1902:53; Nakuina 1992:46–47; Alvarado 2005) and the rains specific to these *ahupua‘a* are called Alanilehua (also Wailehua), ‘Awa‘awa, Līhau, Lokuhala, Moanianilehua (also Moanilehua), Noenoe (also Noe), and Polohīnano (also Polopuahīnano) (Akana and Gonzalez 2015:2– 3, 17, 19, 153, 166, 176, 212, 237). 3. Traditional accounts provide an understanding of an early time when the district of Puna was famous for its associations with the rising sun and the god Kāne, as well as its long stretch of sand, fertile plains, *hala* (*pandanus*) trees, and *‘awa* (*Piper methysticum*) (e.g., Beckwith 1970; Handy and Handy 1972; Pukui 1983). 4. Many *‘ōlelo no‘eau* (proverbs) and *ka‘ao* (legends) describe Pele's devouring of land by causing lava to cover either large areas of the region or more limited sections of it (Pukui 1983:11, 191, 210; Thrum 1907:39–42; Maly 1998:15–16). 5. Two *heiau* (pre-Contact place of worship) were identified in Puna: O‘olo at Pohoiki and Mahina‘akaka at Keahialaka (Thrum 1907:39; 1908:39). 6. The fishing ground of Kupakea in Puna is mentioned in the *mo‘olelo* (story) of ‘Ai‘ai, son of Ku‘ula (Thrum 1907:249). 7. There were two main types of dryland farming in Hawai‘i, either in field systems or in scattered fields. One of these field systems stretched from Kaimū almost to Kapoho on the southeastern coast of Puna, and thus encompassed the Pohoiki Bay area (Newman 1971).

	8. In the Māhele the *ahupua‘a* of Keahialaka, Pohoiki, and Oneloa were awarded to the *ali‘i* (royalty) William Charles Lunalilo, who would later become King of Hawai‘i; Oneloa was also awarded to the *wahine* (woman) Laumaka (Barrère 1994). Keahialaka was retained by Lunalilo, but Pohoiki and Onela were returned as commutation and retained by the government. 9. One of the earliest endeavors in Puna was the harvesting of *pulu*, the soft yellow wool from the base of the tree fern used for stuffing mattresses and pillows. Shipments were first sent to California in 1847; the industry peaked in 1860 and had declined significantly by the mid-1880s (Thrum 1911:10). The *pulu* trade generally had a negative effect on the Native Hawaiians it employed (Shipman 1860). 10. In 1877 a man named Robert Rycroft began leasing land in Pohoiki and purchased a store and several outbuildings on a parcel adjacent to Pohoiki Bay (Maly 1998:48). At first Rycroft went into the *‘awa* shipping business. He constructed a wharf during the mid-1880s, which he agreed to allow for public use (Int. Dept. Book 30:206 in Maly 1998:52). Rycroft’s *‘awa* business was successful and so he increased his land holdings and created a small cattle ranch (*Honolulu Advertiser* 3 February 1909:5 in Maly 1998:71). 11. Rycroft subsequently turned his efforts to coffee. By 1894 Rycroft was growing coffee in upland Pohoiki, and he constructed a new mill for processing at the bay (Rycroft 1894:99). The wharf was used to ship out the milled coffee. The fledgling coffee industry of Puna could not compete with similar growers in the Kona region, and coffee operations in Puna declined after 1905 and disappeared completely by 1927 (University of Hawai‘i 1927 in Cordy 1977:4). 12. In May 1899 Olaa Sugar Company leased 3,812 acres of land in ‘Ōla‘a (Pāhoa up to Mountain View) from W.H. Shipman for a term of 40 years (Maly 1999:59). Subsequent development and expansion of the plantation led to extensive land clearing and alteration for planting fields and construction of a mill, village, and labor camps in the ‘Ōla‘a area (Hurst 1994:15). The First Puna Sugar Company was also established around this time (Dorrance and Morgan 2000:107). 13. In 1975 an earthquake caused the coastline at Pohoiki to subside by over a foot (Hawaiian Volcano Observatory 1995). In 1979 the USACE constructed a 90-ft-long protective breakwater at the Pohoiki Boat Ramp (U.S. Army Corps of Engineers 2023), which exacerbated coastal erosion along some of the properties fronting the bay.

	14. Agriculture continues to be a main economic driver for the area, though many farms were inundated or otherwise impacted by the 2018 eruption. Puna’s fishing community has been severely impacted by the loss of the boat ramp. Isaac Hale Beach Park, once a bustling hub for fishermen, surfers, and other local community users is now primarily frequented by tourists curious to see the dramatically changed landscape.
Results of Community Consultation	CSH attempted to contact Hawaiian organizations, agencies, and community members as well as cultural and lineal descendants in order to identify individuals with cultural expertise and/or knowledge of the project area and vicinity. Community outreach letters were sent to 28 individuals or groups; seven responded, one provided written testimony, and four of these *kama‘āina* (native-born) and/or *kūpuna* (elder/of the grandparent’s generation) met with CSH for more in-depth interviews. Consultation was received from: 1. Ku‘ulei Cooper-Kealoha, *Kama‘āina* 2. Leila Kealoha, *Kama‘āina* 3. Mililani Trask, *Kama‘āina* 4. Larry Kuamo‘o, *Kama‘āina*/Property owner 5. Bobby Camara, *Kama‘āina,* retiree of Hawai‘i Volcanoes National Park
Identification of Cultural Practices	Consultation identified the following cultural, historical, and natural resources where cultural practices (including traditional and customary Native Hawaiian rights) are being exercised in Keahialaka, Pohoiki, and Oneloa Ahupua‘a: 1. Marine resources Based on the results of community consultation and background research conducted as part of this CIA, CSH has identified the following cultural practices within Keahialaka, Pohoiki, and Oneloa Ahupua‘a: 1. Fishing 2. Burial practices 3. Subsistence farming 4. Historic trails Two ongoing cultural practices were identified within the project area during background research and community consultation.
Identification of Impacts to Cultural Practices	Impacts to ongoing cultural practices were identified within the project area during community consultation for this CIA. Consultation identified a number of concerns related to the environment and the broader community:

	The most prominent ongoing cultural practice within the project area is subsistence fishing. The 2018 eruption has created a natural beach and sand bar at Pohoiki. This beach completely blocks access and utilization of the harbor and boat ramp. As a result, local fishermen that have launched from Pohoiki and that have fished in the waters off of Pohoiki for generations have had to: 1. Stop fishing altogether, greatly impacting their livelihood and means of survival 2. Launch from the Hilo harbor, significantly increasing expenses for gas 3. Adjust profit goals, in order to compensate for rising expenses
Mitigation Possibilities Identified During Background Research and Consultation	The results of community consultation, underscored by background research conducted for this CIA, inform the following mitigation possibilities promoting and preserving cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups: 1. A number of concerns expressed by the community during consultation do not relate specifically to ongoing cultural practices within the project area, but nonetheless should be considered during project planning and development. These concerns include: a. Security and regulation of visitors to the area: Leila Kealoha and Ku‘ulei Kealoha-Cooper are deeply concerned with people who visit the hot ponds and beach and often leave trash behind. Also, beach-goers have started swimming in the nude at Pohoiki which Ku‘ulei shares is illegal under State law. They’d like to monitor and reduce impacts by both residents and visitors. 2. Mr. Kuamo‘o was asked that his lot be used as an access way to and from the project area, to access, move sand, etc. In exchange for this access, Mr. Kuamo‘o asked to have a retaining wall built at the front of his property to protect his property from further erosion. This request has not yet been considered. 3. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* (ancestral remains) are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department

	will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended. 4. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

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Section 1 Introduction

1.1 Project Description

At the request of The Limtiaco Consulting Group and on behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this cultural impact assessment (CIA) report for the Pohoiki Boat Ramp Dredging of Volcanic Debris Project, Keahialaka, Pohoiki, and Oneloa Ahupua‘a, Puna District, Hawai‘i Island, TMKs: (3) 1-3-008:013 por., 014 por., 016 por., 021 por., 033, 034 por., 097 por., 999 por. (Kalapana-Kapoho Beach Road); 1-4-093:038 por., 048 por., 999 por. (Kalapana-Kapoho Beach Road). The project is located at Pohoiki Bay and the adjacent County of Hawai‘i Isaac Hale Beach Park. It is accessed primarily from Kalapana-Kapoho Beach Road (Route 137) and Pohoiki Road, with a secondary access route crossing both county and private lands. The project area is depicted on a portion of the 1995 Kapoho U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), tax map plats (Figure 2 and Figure 3), and a 2019 aerial photograph (Figure 4).

The State Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR) is moving forward with restoration of the existing Pohoiki Bay boat ramp. Pohoiki Bay has filled in with black sand and cobbles as a result of the 2018 volcanic eruption. Thus, the Pohoiki boat ramp is land-locked and unusable. Currently, DOBOR’s proposed action is to dredge as much material from the bay as possible to restore pre-eruption depths.

Dredged volcanic debris would be distributed along the former shoreline of the bay and/or on newly formed lava land beyond the reach of tidal waves. The proposed project would necessitate depositing most or all of the dredged material upon the jagged area of newly formed lava land to the east of the existing boat ramp. The project area, depicted in Figure 2, comprises approximately 50.3 acres and accounts for dredging activity, access, staging, and deposit of dredge material. The overall public sentiment with regards to several alternatives (including the dredging of a channel that is narrow or wide, constructing protective jetties, and no action) has been unfavorable. The proposed action consisting of dredging the vast majority of accumulated volcanic debris from Pohoiki Bay was discussed at the community meeting held on 18 August 2022, at the Pāhoa Community Center. The over 120 participants included fishermen, local residents, and government officials. The main sentiment expressed during the meeting was that the boat ramp needs to reopen as soon as possible.

1.2 Regulatory Context

This CIA supports compliance for the Pohoiki Boat Ramp Dredging of Volcanic Debris project with:

- The National Environmental Protection Act (NEPA), which requires consideration of a proposed project’s environmental impacts;
- The National Historic Preservation Act (NHPA), which requires consideration of a proposed project’s potential impacts to historic properties and resources;
- The mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, Hawai‘i Revised Statutes (HRS), and Hawai‘i Administrative Rules

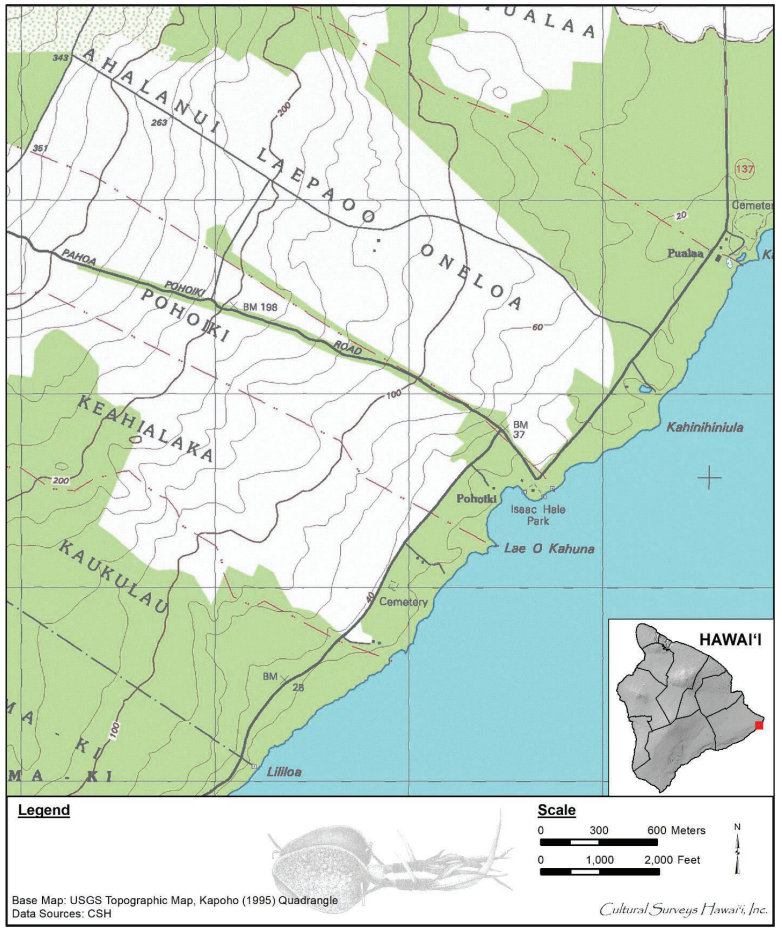

Figure 1. Portion of the 1995 Kapoho USGS 7.5-minute topographic quadrangle showing the location of the project area

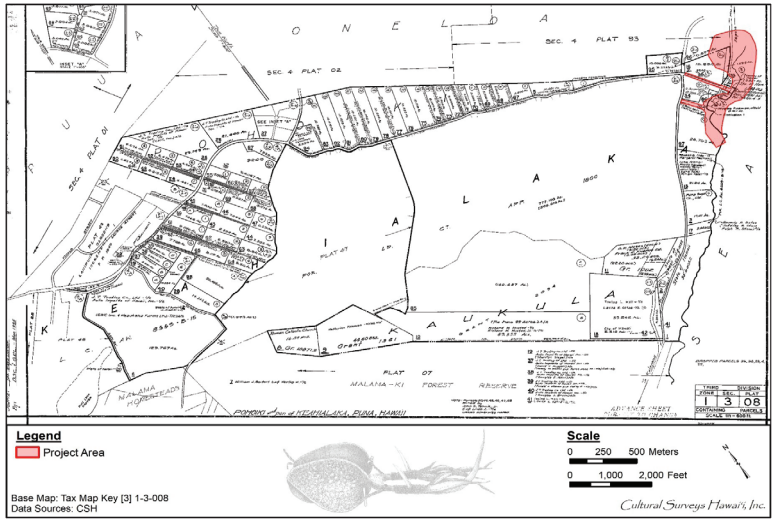

Figure 2. Tax Map Key (TMK) (3) 1-3-008 showing the project area (Hawai'i TMK Service 2014)

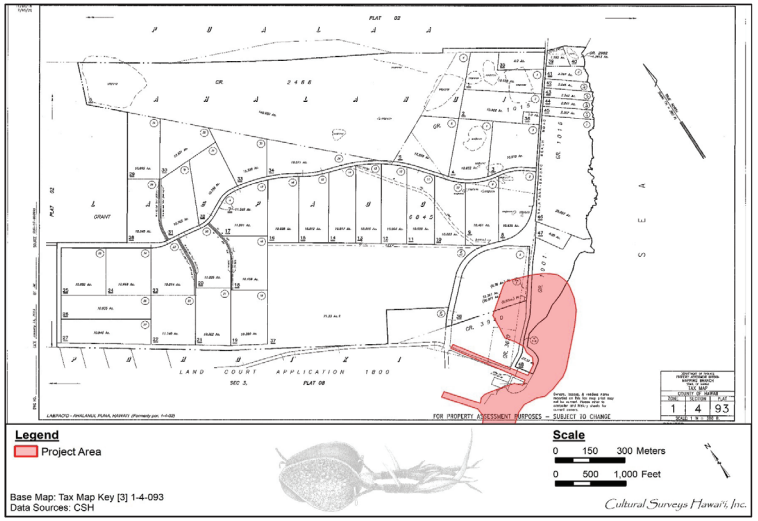

Figure 3. TMK: (3) 1-4-093 showing the project area (Hawai'i TMK Service 2010)

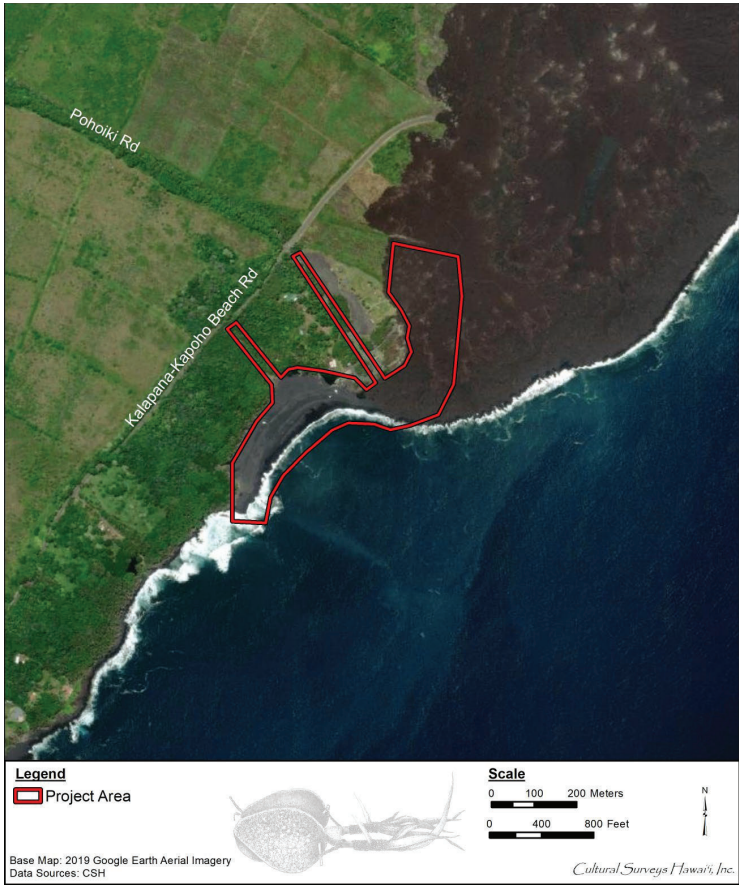

Figure 4. Aerial photograph of the project area (ESRI 2019)

- (HAR) and other Hawai‘i State laws requiring government agencies to promote and preserve cultural beliefs, practices. and resources of Native Hawaiians and other ethnic groups;
- the State of Hawai‘i’s environmental review process under HRS §343, which requires consideration of the proposed project’s potential effects on cultural practices and cultural features in order to “promote responsible decision making” (HRS §343);
- and the State of Hawai‘s historic preservation review process under HAR §13-275-6 and §13-284-6, which requires the identification and mitigation of adverse effects proposed by a potential project in order to “promote the use and conservation of historic properties for the education of the citizens of Hawai‘i” (HAR §13-275-6)

1.3 Document Purpose

This CIA contains information gathered from archival research and consultation, compiled in order to “analyze the impact of a proposed action on cultural practices and features associated with the project area” (Environmental Council 1997). Cultural practices and cultural features may include traditional cultural properties (TCPs), designated significant historic properties under State of Hawai‘i significance Criterion e, pursuant to HAR §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that “have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity” (HAR §13-275-6 and §13-284-6).

1.4 Natural Environment

The project area is located in the Puna District on the eastern, windward side of Hawai‘i Island. The project is located approximately 0-11 m (0-35 feet [ft]) above mean sea level (amsl), not accounting for the height of the new lava land area. The average annual rainfall in the vicinity of the project area is between 80 and 100 inches (Juvik and Juvik 1998:57). Temperatures in this area of the Puna District are usually 60–80 degrees Fahrenheit. As expected, the cooler temperatures and heavier rainfall occur in the winter months (October through April) and warmer temperatures and lighter rainfall occur during the summer months (May–September).

No perennial waterways are located near or within the project area. Abundant water flowing underground usually exits at or near the ocean via springs. These underground sources of water are known to be quite pristine, having been filtered through miles of lava rock. In the Pohoiki vicinity spring waters are often warm to hot in temperature, having been geothermically heated, and there are several small warm-water pools located near the shoreline.

The project area has been subjected to significant prior disturbance. The natural terrain within the Isaac Hale Beach Park grounds was extensively altered by development of the park. The surrounding topography slopes gently toward the coast. The main access point into Pohoiki Bay has been impacted by past development of boat ramps and dredging within the bay, as well as

construction of the Army Corps of Engineers (ACOE) breakwater in 1979. The 2018 eruption resulted in the subsequent natural infilling of Pohoiki Bay with volcanic black sand and cobbles; this portion of the project area is currently an undulating, rocky black sand beach. The barren 2018 lava flow dominates the landscape northeast of the bay.

The forest surrounding the undeveloped areas around the bay is a dense canopy of native and introduced species. The park area and private property within the secondary access route have been planted with coconut, ornamentals, and fruit trees. Coconut has also been planted along the back of the new black sand beach.

1.4.1 *Nā Lepo* (Soils)

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Sato et al. (1973), the project area is underlain by Malama extremely stony muck, 3 to 15% slopes (rMAD) and Opihikao extremely rocky muck, 3 to 25% slopes (rMAD) (Figure 5). Malama extremely stony muck and Opihikao extremely rocky muck are well-drained, thin, organic soils formed over lava flows. Malama soils are underlain by fragmental *'a'ā* lava while Opihikao soils are underlain by *pāhoehoe* lava bedrock; the two lava types are typically found beneath both soil types at depths ranging from 2 to 8 inches. The Malama soil type is generally used for woodland, pasture, and orchards, and Opihikao soils are in native forest or used for pasture (Sato et al. 1973:37, 43).

Figure 6 depicts the extent of the 2018 lava flow areas in relation to the project area. These 2018 lava flows are of the *'a'ā* lava type, characterized as a "rough and broken […] mass of clinkery, hard, glassy, sharp pieces piled in tumbled heaps" with generally no soil covering or vegetation (Sato et al. 1973:34). The 2018 flow inundated areas approximately 0.5 miles south of and immediately northeast of Pohoiki Bay and overlapped portions of Isaac Hale Beach Park. The 2018 flow did not extend over the lands surrounding Pohoiki Bay to the north, west, and south; these areas comprise Kīlauea lava flows dating from 200–1,500 years before present. Given the active volcanic nature of the area, lava tube caves are common.

1.4.2 *Nā Ua* (Rains)

Precipitation is a major component of the water cycle and is responsible for depositing *wai* (fresh water) on local flora. Pre-Contact *kānaka* (Native Hawaiians) recognized two distinct annual seasons. The first, known as *kau* (period of time, especially summer) lasts typically from May to October and is a season marked by a high-sun period corresponding to warmer temperatures and steady trade winds. The second season, *ho'oilo* (winter, rainy season) continues through the end of the year from November to April and is a much cooler period when trade winds are less frequent, and widespread storms and rainfall become more common (Giambelluca et al. 1986:17). Each small geographic area had a Hawaiian name for its own rains. According to Akana and Gonzalez (2015),

> Our kupuna had an intimate relationship with the elements. They were keen observers of their environment, with all of its life-giving and life-taking forces. They had a nuanced

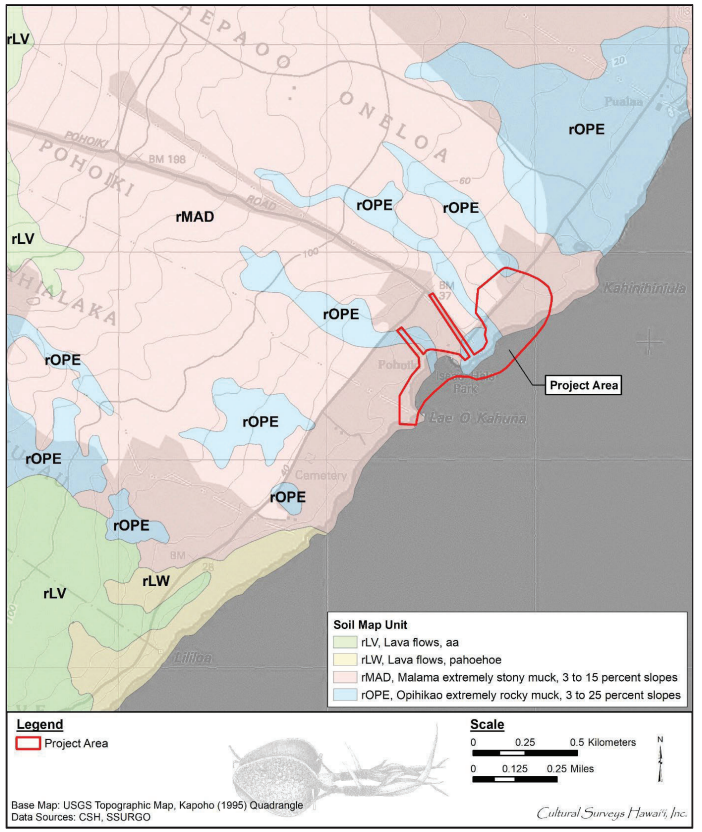

Figure 5. Overlay of *Soil Survey of the Island of Hawaii* (Sato et al. 1973), indicating soil types within and surrounding the project area (USDA SSURGO 2001); note, this data does not account for the new (2018) lava land within the northeastern portion of the project area

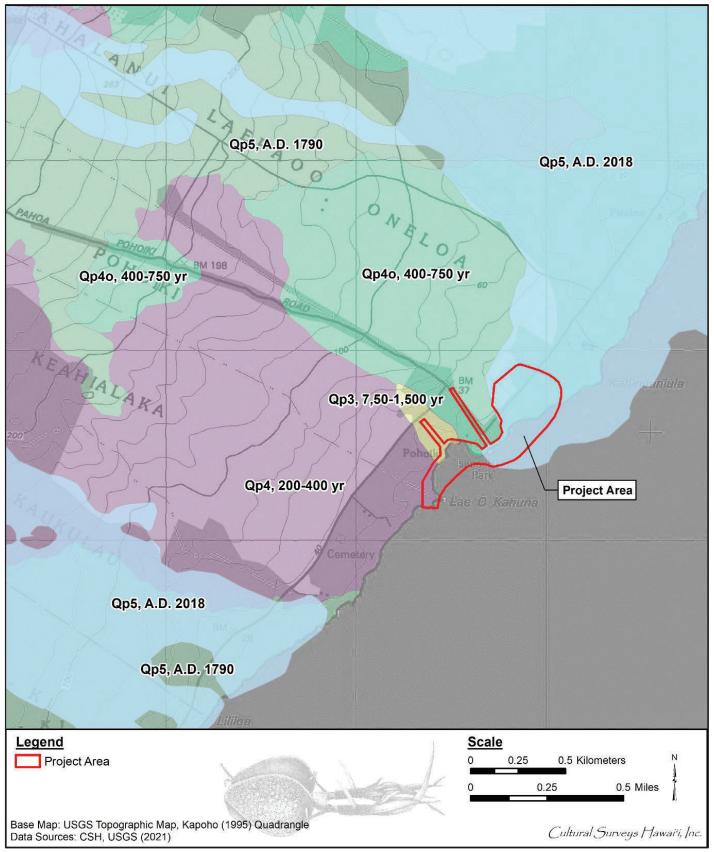

Figure 6. Portion of the 1995 Kapoho USGS 7.5-minute topographic quadrangle overlain with geological data (Sherrod et al. 2008/USGS 2021), indicating geological map units in the vicinity of the project area; note the light blue indicates areas inundated and/or created by the 2018 eruption of Kīlauea

understanding of the rains of their home. They knew that one place could have several different rains, and that each rain was distinguishable from another. They knew when a particular rain would fall, its color, duration, intensity, the path it would take, the sound it made on the trees, the scent it carried, and the effect it had on people. [Akana and Gonzalez 2015:XV]

This section presents the rains of this region as collected through historical documents. The focus is on the *ahupua‘a* of Keahialaka, Pohoiki, and Oneloa but expands to include rain of the Puna district nearest to the project area.

1.4.1.1 Alanilehua (also Wailehua)

This is a rain associated with both Puna and Hilo. The following is described by Lilia H. Richards when traveling the uplands in Puna in 1876 (Akana and Gonzalez 2015:3).

Ua kapa ‘ia nō ho‘i kēia ua i kekahi manawa, ‘o Wailehua; ua pili nō ia i ka wai o nā pua lehua. E ho‘omaka nō kēia ua e hele mai, mai nā ‘ae kai mai o Hā‘ena, a mai luna a‘e o ko laila lewa lani, e hele an ia i ke komohana, e kilihune ana i nā liko hīnano o Puna, a e loku ana ho‘i i luna o nā pōhai lehua o Pana‘ewa; ‘a‘ole nō ‘o ia e lihi launa mai i ke town, akā, e puka mai nō ia mau paka ua ma waho nei o ka ‘ao‘ao komohana o Pana‘ewa, a laila, huli aku nō a hele pō‘ai i ka hema e pi‘i ana i ka uka o Pā‘ie‘ie, a nalo aku ho‘i i loko o nā ‘ohu wai o ka nahele. He lahilahi wale nō kona kūlana, a he kāka‘ikahi nō ho‘i kona ‘ike ‘ia ‘ana mai, a ma waena wale nō o ka hora 10 a me 12 o ke kakahiaka kona wā e ‘ike ‘ia ai.

This rain is sometimes called Wailehua. It is associated with the nectar of lehua blossoms. When this rain starts to come from the water’s edge at Hā‘ena and from above the upper heavens of that place, it will travel to the west, spinkling the buds of Puna’s hīnano blossoms and pouring down over the clusters of Pana‘ewa’s lehua trees. It won‘t ever come close to town, but these raindrops will appear outside of the western border of Pana‘ewa. Then it turns and circles to the south, ascending the uplands of Pā‘ie‘ie, and disappering within the watery mists of the forest. It has a delicate nature, is rarely seen, and is visible only between the hours of 10 and 12 in the morning. [Akana and Gonzalez 2015:2–3]

1.4.1.2 ‘Awa‘awa

This rain is associated with Puna and found on other parts of Hawai‘i. Translated, it can mean “bitter” and can also refer to grief or tragedy (Akana and Gonzalez 2015:17).

The following verse is taken from a *mele* (song) by Kamapua‘a to Pele after seeing Pele’s brother, Lonomakua, light a fire to consume him (Akana and Gonzalez 2015:19).

Pō Puna i ka ua a ka ‘Awa‘awa	Puna is obscured by the rain of the ‘Awa‘awa

Pāku‘i i ka uahi a ka lua	Foul-smelling from the smoke of the pit
Hauna i ka uahi a Pele lā ē	Reeking from the smoke of Pele
Aloha ka wahine o ka lua	Aloha to the woman of the pit

[Akana and Gonzalez 2015:19]

The next verse is taken from a *mele* by Hi‘iakaikapoliopele when she sees her dear friend Hōpoe destroyed by Pele:

Pō Puna i ka ua ‘Awa‘awa	Puna is obscured by the ‘Awa‘awa rain
Pōhina Puna i ka ua Noenoe	Puna is hazy in the Noenoe rain

[Akana and Gonzalez 2015:19]

This last verse is from a *mele* written for Victoria Kamāmalu:

‘O ‘oe ia, e nani kauona Puna i ka hala	It is you, O beautiful one, like the fragrant hala of Puna
Hiehie ‘oko‘a nō i ka ‘Awa‘awa	Standing majestically in the cold [‘Awa‘awa] rain

[Akana and Gonzalez 2015:19]

1.4.1.3 Līhau

This is a gentle, cool rain associated with Pāhoa.The following section is taken from an article of condolence for Mrs. Hannah Kaunukapu Kaloi Kamelamela and mentions the Līhau rain of Pāhoa (Akana and Gonzalez 2015:153).

> *He kupa ‘o ia, a kulaiwi, no kēia hapa o Puna paia ‘ala i ka hala, a me ka hīnano mai ka pali o Hōlei a ke ‘ala līpoa o Kaimū, a ho‘okama‘āina pū me ka ua Līhau o Pāhoa.*
>
> She was a native with deep roots from this half of Puna, with its hala-scented walls, and the hīnano flowers from the cliff of Hōlei to the līpoa fragrance of Kaimū, and she became well-acquainted with the Līhau rain of Pāhoa.
>
> [Akana and Gonzalez 2015:153]

1.4.1.4 Lokuhala

The word Lokuhala means to “drench hala trees” (Akana and Gonzalez 2015:166). The following *mele* is taken from “He inoa no Kaiulani” by Leleiōhoku.

Aia i laila ke aloha	There is the love
Aia i laila ka ‘ano‘i	There is the desire
Aia i laila ka pilina	There is the union
Me ka ua Lokuhala o Puna	With the Lokuhala rain of Puna

[Akana and Gonzalez 2015:166]

1.4.1.5 Moanianilehua (also Moanilehua)

This rain is associated with Puna, Hawai‘i and means “wafted lehua fragrance” (Akana and Gonzalez 2015:176). The following is a traditional saying that mentions this rain:

> *Ka Ua Moanianilehua o Puna.*
>
> The [Moanianilehua] rain that brings the fragrance of the lehua to Puna.
>
> [Akana and Gonzalez 2015:176]

1.4.1.6 Noenoe (also Noe)

This is a misty rain associated with Puna, Hawai‘i. The following verse is taken from a *mele* titled “O kaaukuku kukuku ku a ua [*sic*]” (Akana and Gonzalez 2015:212):

Lī mala anu ka mauna i ka noenoe	Cold, chilled, aching is the mountain in the noenoe mist
Naenae anu i ka ua pū‘uki‘uki	Panting, cold in the pū‘uki‘uki rain
Ka nonole iwi ha‘iha‘i o ka pua	The pliable bones of the flower are broken
Ua ‘ehan nō, malakia i ka Pu‘ulena	Pained, bruised by the Pu‘ulena wind
Ka malahia lau ahe a ka moani	The aching caused by the many soft breaths of the breeze

[Akana and Gonzalez 2015:212]

1.4.1.7 Polohīnano (also Polopuahīnano)

This is rain is associated with Puna and mean “white hīnano blossom with its stem” (Akana and Gonzalez 2015:236). The following verse was included in an obituary for Mary K Pe‘a.

> *‘Ae; no Puna paia ‘ala i ka ua Polohīnano no ku‘u pōki‘i i hānau ai, akā na‘e ho‘i, na ka ua Kanilehua o Hilo ‘o ia i hānai a nui. He milimili a he lei ‘ā‘ī ‘o ia na Laika Nawailau i ka ua Pōpōlehua—ua lū lau lehua o Hilo ē!*

> Yes, my younger sister was born in Puna of the fragrant walls in the Polohīnano rain. However, it was the Kanilehua rain of Hilo that raised her. She was a favorite, a beloved child of Laika Nawailau in the Pōpōlehua rain—rain that scatters the leaves of the ‘ōhi‘a of Hilo!
>
> [Akana and Gonzalez 2015:237]

1.4.3 *Nā Makani* (Winds)

Similar to rain, *makani* (wind) were named for various reasons such as describing the intensity or direction of the wind, relating the wind to a story, or even relating the wind to the landscape. David Malo, a Native Hawaiian historian, explains some general terms related to wind:

> […] There was the *kona*, a wind from the south, of great violence and of wide extent. It affected all sides of an island, east, west, north, and south, and continued for many days […] The *kona* wind often brings rain, though sometimes it is rainless […] The *hoolua*, a wind that blows from the north, sometimes brings rain and sometimes is rainless […] The *hau* is a wind from the mountains, and they are thought to be the cause of it, because this wind invariably blows from the mountains outwards towards the circumference of the island. [Malo 1951:14]

Malo has supplied a foundation of names for winds, however, there is an abundance of names in various stories and chants. The *mo‘olelo* (story) called “The Wind Gourd of La‘amaomao” tells the story of Pāka‘a and his son Kuāpāka‘a who are descendants of the wind goddess La‘amaomao. With their possession of this special wind gourd, they could control and call forth the winds of Hawai‘i. Pāka‘a’s chant traces the winds of and surrounding Keahialaka, Pohoiki, and Oneloa. Pāka‘a’s chant is listed below:

[…] He Ulumano, he Awa, he Puulena,	[…] Ulumano, ‘Awa, Pu‘ulena,
He Moaniala ko Puna	Moani‘ala are of Puna,
Hoakoakoa i ka makani a Kuamoae	The winds of Kuamoa‘e have gathered,
Moae ka‘u malaia ka makani	My Moa‘e, the wind that is swelling,
Apaiahaa i Kanakaloloa […]	Apaiahaa is at Kanakaloloa, […]
[Nakuina 1902:53]	[Nakuina 1992:46-47]

In addition to these winds, Alvarado (2005) also includes Kāpae and ‘Unuloa.

1.5 Built Environment

The project area is at Isaac Hale Beach Park, approximately 11.6 km (7.2 miles) southeast of the town of Pāhoa in the district of Puna on Hawai‘i Island. The park includes the subject boat ramp, a breakwater, camping and picnic areas, restrooms, a boat wash area, open grassy spaces, parking lots, and Ocean Safety facilities. The Hale residence is situated just *mauka* (inland) of the boat ramp and is bounded by remnants of the old Rycroft coffee mill facility to the north and west. The areas surrounding the park not inundated by the 2018 lava flow contain scattered residences and agricultural plots.

The two proposed project access corridors are generally along existing transportation routes. The primary access along Pohoiki Road is an asphalt-paved, two-lane roadway with graded shoulders. The secondary access route follows an unimproved, two-track dirt driveway that crosses through county-owned parcel TMK: (3) 1-3-008:097 to a small oceanfront parcel (TMK: [3] 1-3-008:013) owned by the Kuamo‘o family. This small parcel was the site of the former historic-era Pohoiki courthouse and jail; it is enclosed by a dry-stacked rock wall and remnants of the former courthouse foundation are present near the *makai* (seaward) edge of the property.

Section 2 CIA Methods

2.1 Archival Research

Research centers on Hawaiian activities including *ka‘ao* (legends), *wahi pana* (storied places), *‘ōlelo no‘eau* (proverbs), *oli* (chant), *mele* (songs), traditional *mo‘olelo*, traditional subsistence and gathering methods, ritual and ceremonial practices, and more. Background research focuses on land transformation, development, and population changes beginning with the early post-Contact era to the present day.

Cultural documents, primary and secondary cultural and historical sources, historic maps, and photographs were reviewed for information pertaining to the study area. Research was primarily conducted at the CSH library. Other archives and libraries including the Hawai‘i State Archives, the Bishop Museum Archives, the University of Hawai‘i at Mānoa’s Hamilton Library, Ulukau, The Hawaiian Electronic Library (Ulukau 2014), the State Historic Preservation Division (SHPD) Library, the State of Hawai‘i Land Survey Division, the Hawaiian Historical Society, and the Hawaiian Mission Houses Historic Site and Archives are also repositories where CSH cultural researchers gather information. Information on Land Commission Awards (LCAs) were accessed via Waihona ‘Aina Corporation’s Māhele database (Waihona ‘Aina 2021), the Office of Hawaiian Affairs (OHA) Papakilo Database (Office of Hawaiian Affairs 2015), and the Ava Konohiki Ancestral Visions of ‘Āina website (Ava Konohiki 2015).

2.1.1 *Nā Nūpepa ‘Ōlelo Hawai‘i* (Hawaiian Language Newspapers)

Hawaiians lived in an advanced, oral society in which genealogies, stories, and chants— nearly their entire history—was learned and passed down through memorization and oration. In January 1822, printing was introduced to the Islands (Dibble 1843:192) and the first item printed was an instructional book produced for and by the Lahainaluna Seminary. The preface of this book reads as follows:

> Perhaps the Sandwich Island’s Mission owes an apology to the literary world for having reduced to writing a language of such variety and extent as the Hawaiian, and published so many books in it, without having given any account either of the genius structure or peculiarities of the language. [Andrews 1836]

By September 1823, several hundred Hawaiians were making progress in learning to read (Dibble 1843:197). More instructional material for Lahainaluna was printed as well as Bibles and hymn books to assist missionaries in their teachings. Nearly ten years after printing’s introduction to the Islands, the first Hawaiian language newspaper, *Ka Lama Hawai‘i,* was produced by the Lahainaluna Seminary (Dibble 1843:331). This newspaper could be compared to a school newsletter that published school announcements and featured “miscellaneous instruction for the school” (Dibble 1843:331).

It should be noted that all the materials printed at this time were written without any Hawaiian diacritics such as the *‘okina* (glottal stop) and *kahakō* (macron). Though this was probably for ease

of production, this also helped Hawaiians in learning to read. Dibble explains,

> The missionaries adopted also the simple method of avoiding all arbitrary spelling. Every word is spelled precisely as it is pronounced, so that to teach spelling is scarcely an object. Every one who can combine two letters in a syllable and put two syllables together can both read and spell with readiness. The art of reading, therefore, is very easily acquired. I think I am safe in saying that the children of Hawaii learn to read their language in a much shorter time than our children do in English. [Dibble 1843:193]

The success of printing at Lahainaluna and the speed with which Hawaiians learned to read brought more printing presses to the Islands and birthed new newspapers. The Hawaiian electronic library, Ulukau, has a database of old Hawaiian newspapers. Forty-eight newspapers are available on this site, though one paper, *The Liberal*, published only in 1893, is in English. The articles printed in these papers were far more detailed and unfiltered than what we read today. Horrific accidents, causes of death, and personal advertisements are just a few examples of what they contained. A great deal can be learned about a place or time through these newspapers. They are utilized in this report to understand the daily realities of *kama‘āina* (native born) living in the *ahupua‘a.*

CSH utilizes Ulukau’s Hawaiian Language Newspaper database to find articles that mention the *ahupua‘a* or *moku* (district) of the proposed project area. Information can be found by entering keywords, like place names. To narrow down searches, as many *wahi pana* throughout Hawai‘i share the same name, newspapers are categorized by name and the date published.

2.2 Consultation

Throughout the course of this assessment, an effort was made to contact and consult with Native Hawaiian Organizations (NHO), agencies, and community members including descendants of the area, in order to identify individuals with cultural expertise and/or knowledge of the Keahialaka, Pohoiki, and Oneloa Ahupua‘a.

2.2.1 Community Outreach, Interview, and Transcription Methods

2.2.1.1 Scoping for Participants

We begin our consultation efforts with utilizing our in-house contact list from previous outreach efforts to facilitate the interview process. This list often includes *kūpuna*, *kama‘āina*, cultural practitioners, lineal and cultural descendants, Native Hawaiian Organizations (NHOs; includes Hawaiian Civic Clubs and those listed on the Department of Interior’s NHO list), and community groups. We also contact agencies such as SHPD, OHA, and the appropriate Island Burial Council where the proposed project is located for their response to the project and to identify lineal and cultural descendants, individuals and/or NHO with cultural expertise and/or knowledge of the study area. CSH is also open to referrals and new contacts.

2.2.1.2 “Talk Story” Sessions

Prior to the interview, CSH cultural researchers explain the role of a CIA, how the consent process works, the project purpose, the intent of the study, and how their *'ike* (insight) and *mana'o* (opinion) will be used in the report. The interviewee is given an Authorization and Release Form to read and sign.

"Talk Story" sessions range from the formal (e.g., sit down and *kūkākūkā* [consultation, discussion] in participant's choice of place over set interview questions) to the informal (e.g., hiking to cultural sites near the study area and asking questions based on findings during the field outing). In some cases, interviews are recorded and transcribed later.

CSH also conducts group interviews, which range in size. Group interviews usually begin with set, formal questions. As the group interview progresses, questions are based on interviewee's answers. Group interviews are always transcribed and notes are taken. Recorded interviews assist the cultural researcher in 1) conveying accurate information for interview summaries, 2) reducing misinterpretation, and 3) providing missing details for *mo'olelo*.

CSH seeks *kōkua* (assistance) and guidance in identifying past and current traditional cultural practices of the study area. Those aspects include general history of the *ahupua'a*; past and present land use of the study area; knowledge of cultural sites (for example, *wahi pana*, archaeological sites, and burials); knowledge of traditional gathering practices (past and present) within the study area; cultural associations (*ka'ao* and *mo'olelo*); referrals; and any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the study area.

2.2.1.3 Interview Completion

After an interview, CSH cultural researchers transcribe and create an interview summary based on information provided by the interviewee. Cultural researchers give a copy of the transcription and interview summary to the interviewee for review and ask them to make any necessary edits. Once the interviewee has made those edits, we incorporate their *'ike* and *mana'o* into the report. When the draft report is submitted to the client, cultural researchers then prepare a finalized packet of the participant's transcription, interview summary, and any photos taken during the interview. We also include a thank you card and honoraria. This is for the interviewee's records.

It is important that CSH cultural researchers cultivate and maintain community relationships. The CIA report may be completed, but CSH researchers continuously keep in touch with the community and interviewees throughout the year—such as checking in to say hello via email or by phone, volunteering with past interviewees on community service projects, and sending holiday cards to them and their *'ohana* (family). CSH researchers feel this is an important component to building relationships and being part of an *'ohana* and community.

"*I ulu no ka lālā i ke kumu*—the branches grow because of the trunk," an *'ōlelo no'eau* (#1261) shared by Mary Kawena Pukui with the simple explanation: "Without our ancestors we would not be here" (Pukui 1983:137). As cultural researchers, we often lose our *kūpuna* but we

do not lose their wisdom and words. We routinely check obituaries and gather information from other informants if we have lost our *kūpuna*. CSH makes it a point to reach out to the *'ohana* of our fallen *kūpuna* and pay our respects including sending all past transcriptions, interview summaries, and photos for families to have on file for genealogical and historical reference.

Section 3 Archival Research Results

3.1 Traditional Accounts

Hawaiian storytellers of old were greatly honored; they were a major source of entertainment and their stories contained teachings while interweaving elements of Hawaiian lifestyles, genealogy, history, relationships, arts, and the natural environment (Pukui and Green 1995:IX). According to Pukui and Green (1995), storytelling is better heard rather than read for much becomes lost in the transfer from the spoken to the written word and *ka'ao* are often full of *kaona* or double meanings.

Ka'ao are defined by Pukui and Elbert as a "legend, tale […], romance, [and/or], fiction" (Pukui and Elbert 1986:108). *Ka'ao* may be thought of as oral literature or legends, often fictional or mythic in origin, and have been "consciously composed to tickle the fancy rather than to inform the mind as to supposed events" (Beckwith 1970:1). Conversely, Pukui and Elbert define *mo'olelo* as a "story, tale, myth, history, [and/or] tradition" (Pukui and Elbert 1986:254). The *mo'olelo* are generally traditional stories about the gods, historic figures or stories that cover historic events and locate the events with known places. *Mo'olelo* are often intimately connected to a tangible place or space.

In differentiating *ka'ao* and *mo'olelo* it may be useful to think of *ka'ao* as expressly delving into the *wao akua* (realm of the gods), discussing the exploits of *akua* (gods) in a primordial time. However, it is also necessary to note there are exceptions, and not all *ka'ao* discuss gods of an ancient past. *Mo'olelo* on the other hand, reference a host of characters from *ali'i* (royalty), to *akua* and *kupua*, to finally *maka'āinana* (commoners), and discuss their varied and complex interactions within the *wao kānaka* (realm of man). Beckwith elaborates, "In reality, the distinction between ka'ao as fiction and mo'olelo as fact cannot be pressed too closely. It is rather in the intention than in the fact" (Beckwith 1970:1). Thus, a so-called *mo'olelo*, which may be enlivened by fantastic adventures of *kupua*, "nevertheless corresponds with the Hawaiian view of the relation between nature and man" (Beckwith 1970:1).

Both *ka'ao* and *mo'olelo* provide important insight into a specific geographical area, adding to a rich fabric of traditional knowledge. The preservation and passing on of these stories through oration remains a highly valued tradition. Additionally, oral traditions associated with the study area communicate the intrinsic value and meaning of a place, specifically its meaning to both *kama'āina* as well as others who also value that place.

The following section presents traditional accounts of ancient Hawaiians living in the vicinity of the project area. Many relate an age of mythical characters whose epic adventures inadvertently lead to the Hawaiian race of *ali'i* and *maka'āinana*. The *ka'ao* in and around the project area shared below are some of the oldest Hawaiian stories that have survived; they still speak to the characteristics and environment of the area and its people.

3.1.1 Nā Ka'ao a me Nā Mo'olelo (Legends and Stories)

3.1.1.1 Pele and Kahawali

This story tells about Kahawali, a chief of Puna who angered Pele by beating her in a *holua* race. Angered in her defeat, Pele changed form from human to deity and chased after Kahawali:

> [...] She called, and fire and liquid lava arose, and, assuming her supernatural form, with these irresistible ministers of vengeance, she followed down the hill. When Kahawali reached the bottom, he arose, and on looking behind saw Pele, accompanied by thunder and lightning, earthquake, and streams of burning lava, closely pursuing him. He took up his broad spear which he had stuck in the ground at the beginning of the game, and, accompanied by his friend, fled for his life. [...] They ran till they came to an eminence called Puukea. Here Kahawali threw off his cloak of netted ki leaves and proceeded toward his house, which stood near the shore. He met his favorite pif and saluted it by touching noses, then ran to the house of his mother, who lived at Kukii, saluted her by touching noses, and said: *'Aloha ino oe, eia ihonei paha oe e make ai, ke ai mainei Pele.'* (Compassion great to you! Close here, perhaps, is your death; Pele comes devouring.) Leave her, he met his wife, Kanakawahine, and saluted her. The burning torrent approached, and she said: 'Stay with me here, and let us die together.' He said: 'No; I go, I go.' He then saluted his two children, Poupoulu and Kaohe, and said *'Ke ue nei ia olua.'* (I grive for you two.) The lava rolled near, and he ran till a deep chasm arrested his progress. He laid down his spear and walked over on it in safety. His friend called out for his help; he held out his spear over the chasm; his companion took hold of it and he drew him securely over. By this time Pele was coming down the chasm with accelerated motion. He ran till he reached Kula. Here he met his sister, Koai, but had only time to say, *'Aloha oe!'* (Alas for you!) and then ran on to the shore. His younger brother had just landed from his fishing-canoe, and had hastened to his house to provide for the safety of his family, when Kahawali arrived. He and his friend leaped into the canoe, and whit his broad spear paddled out to sea. Pele, perceiving his escape, ran to the shore and hurled after him, with prodigious force, great stones and fragments of rock, which fell thickly around but did not strike his canoe. When he had paddled a short distance from the shore the *kumukahi* (east wind) spring up. He fixed his broad spear upright in the canoe […] and he soon reached the island of Maui, where they rested one night and then proceeded to Lanai. The day following they moved on to Molokai, thence to Oahu, the abode of Kolonohailaau, his father, and Kanewahinekeaho, his sister, to whom he related his disastrous perils, and with whom he took up his permanent abode. [Thrum 1907:39–42]

3.1.1.2 The story of Ka‘ehuikimanōopu‘uloa

This is the story of a shark reared by humans. He was named after the shark goddess, Ka‘ahupāhau, of Pu‘uloa, O‘ahu. He is met by challenges and other fearless sharks when he decides to journey away from home:

> Ka-ehu-iki-mano-o-Pu‘uloa (The little brown shark of Pearl harbor) is born at Panau in Puna, Hawaii, and named after the red hair of the shark goddess Kaahu-pahau. For ten days his father Kapukapu feeds him on awa and his mother Holei on her milk. He is then put into the sea while his parents return to the uplands. He puts out to sea and pays a visit to each of the king sharks of Hawaii in turn, all of whom he wins by his deference. Ke-pani-la of Hilo, Kane-ilehia of Kau, Kua of Kona, Mano-kini of Kohala, Kupu-lena of Hamakua join him on his projected tour to Kaula and thence to Kahiki and return. The fierce king shark of Maui, who assumes a threatening attitude, is slain by the little shark entering his wide-mouth and devouring his inwards. Ka-moho-ali‘i, overgrown with sea moss, meets them kindly and consents to adopt the little red-haired shark. An elaborate ceremony takes place which gives Ka-ehu power to change into a hundred forms. The party visit Molokai and Oahu, where the adventure with Mokololou takes place and Kaahu-pahau gives them a token which will pass them safely by Ku-hai-moana, king shark of Kauai and Ni‘ihau. After a round of the South Sea islands, of which the Marquesas, Tahiti, and the Dutch Indies are mentioned, and a bath in the Yellow river of Kahiki [can this be an allusion to the Chinese river of death?] they return home and, as they arrive off Waikiki, encounter the man-eater Pehu on the watch for ‘crabs’ and lure him inshore, where the natives put him to death. Arrived at Puna, the young hero is welcomed by his upland parents with appropriate feasting. Many local legends are told of shark-men, always to be known by the mark of a shark's mouth upon the back, who can change form from man to shark and who for a long time go undetected until it is noticed that an apparently disinterested warning to swimmers is always followed by a fatal attack by a man-eating shark. Thus Kawelo (Kawelo-mahamahaia) of Kauai; Pau-walu of Wailua, Maui; Nenewe of Waipio on Hawaii; Kaai-po‘o of Kapaahu in Puna, Hawaii; another unnamed at Kawai-uhu in Kaalualu, Ka-u district, of Hawaii; Mano-niho-kahi at Laie, Oahu; Kamaikaahui of Maui. [Beckwith 1970:139–140]

3.1.1.3 Ke Awa O Pele, The Canoe Landing of Pele

This story follows Pele to Hawai‘i from her ancestral land. In her journey to Hawai‘i, she lands at Koa‘e in Puna. Kepā Maly (1998) provides a summary of this journey:

> When Pele came to the Hawaiian islands from Tahiti Pakapaka-ua, she landed at various places on the islands searching out a suitable home. Pele first sought out a home for her family on ka moku kā‘ili lā (the island that snatches the sun), which is also called Kamāwaelualani or Kāwili; and known today as Kaua‘i, ka mokupuni kīhāpai ua (the garden island). On Kaua‘i, Pele dug at a few places seeking a home for herself and her family. She dug into the earth at Ka‘inapele, Pu‘uopāpa‘i, and Leleiwi at Pu‘ukāpele, but none of the places were suitable.
>
> Pele-Honuamea (Pele of the red earth) then moved to the island of O‘ahu-a-Lua, and for a short time she dwelt at ‘Aliapa‘akai and Kalua‘ōlapa. Because Pele was not satisfied on O‘ahu, she departed and went to Moloka‘i-nui-a-Hina, where she dug a new home at Kauhakō. But there, she struck water. Pele then moved once again, and dwelt at Honokalani, Maui, and she dug a new home for herself at Haleakalā.
>
> It is at this point that some stories differ. Some people say that Pele was killed at Haneo‘o and that she left her body at Ka-iwi-o-Pele (The-bones-of-Pele), at a hill near the pond of Haneo‘o, between Hāmoa and Ka‘uiki. Though another story states that Pele was not killed, but that she dwelt with her sister Kapo-kohelele, and that when she left Maui, she built the hill Kaiwiopele, which is also called Pu‘u-a-Pele (Hill-made-by-Pele).
>
> Before Pele-Honuamea departed from Honokalani, Maui, she sent one of her sisters, Hi‘iaka-pa‘i-kauhale (Hi‘iaka-who-thatches-the-house) to find a home for her on the island of Hawai‘i. The first place that this Hi‘iaka arrived at was Kona, and she dwelt at a cape, which came to be called Hi‘iaka-noho-lae (Hi‘iaka-who dwells-at-the-point). That is why to this day, the place is still Hi‘iaka-noho-lae.
>
> Because of the long delay in Hi‘iaka’s return, Pele journeyed to Puna, near Pū‘ula (Red-conch-shell), Koa‘e, and landed at the place called Keawaopele. From Pū‘ula, Pele dug the hills above Poho-iki (Little-depression or Littlehollow) and Ke-ahi-a-Laka (The-fire-of-Laka). From there, she moved up to He‘eia (To be washed away or to have slipped away) and on to Ka‘auea, where she looked upon Kīlauea and made her royal home at Moku‘āweoweo. [Maly 1998:15–16]

3.1.1.4 Pele and Kamapua‘a

This Pele and Kamapua‘a legend was written in serial form in the Hawaiian newspaper *Ka Leo O Ka Lāhui* from 22 June 1891 to 23 July 1891, and portions were recently compiled and translated by Lilikalā K. Kame‘eleihiwa (1996).

Kamapua‘a traveled to the Puna District in Hawai‘i to seduce the Hawaiian goddess Pele, but she spurned him and tried to chase him away with her lava flows.

> Then Kamapua‘a began to run in this pig form. He sprang forward through the great lehua forest, from the mountains to the sea. […] Pele began to eat. All of these trees were destroyed in the mystical eating by Pele. The upper heavens became very dark with smoke. No one could be seen. Kamapua‘a could only cling to a clump of ‘ama‘uma‘u fern. The fires burned until they found the bristles that are the curly pig bristles. The stench of burning pig bristles went out and surrounded the island.

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Kamapua‘a escaped to another area of Puna, where the people were enjoying riding down a *hōlua* slide, but Pele soon followed:

> Pele saw her opponent run into the distant forest, so she sent her fire on before her with great force. It chased after this little pig until he was very close to the water's edge. There was no hope for his life.
>
> This one [Kamapua‘a] leaped into the sea, changing his body into the humuhumuāpua‘a (a variety of triggerfish). Pele's people, the Hi‘iaka sisters, stood upon the plain. Pele's people had indeed been thwarted. [Kame‘eleihiwa 1996:95, 103]

3.1.1.5 Kumukahi from Kahiki

The characters in this legend are named after famous place names in the district of Puna. Kumukahi, the easternmost cape of Hawai‘i Island, is named for a migratory hero from Kahiki who stopped here and who is represented by a red stone. Two of his wives, also in the form of stones, manipulate the seasons (Pukui et al. 1974:124):

> **Kumukahi** and his brother Palamoa came from Kahiki to Hawai‘i long ago in the time when the gods still walked on earth. Some say he was a relative of Pele (Beckwith 1970:119). Others say he came with his older brother, the great chief Moikeha (Fornander 1918:4:114). With their sister Kahikinaakala 'the sunrise', they took the form of mortals and settled in Puna at the most easterly point of land in the Hawaiian Islands, Cape Kumukahi. [Komori 1987:17]
>
> **Kumukahi** had four wives: Kanono, Pa‘upo‘ulu, **Ha‘eha‘e**, and Kanaka‘ulua. (Some say **Ha‘eha‘e** was **Kumukahi's** youngest brother [Fornander 1918:4:114]) The wives manipulated the seasons by pushing the sun back and forth. They were later seen as four large stones spaced evenly apart at Cape **Kumukahi**, and were used to calculate the solstices of the sun. The literal translation of '**Kumukahi**' is 'first beginning.' [Pukui et al. 1974:124]
>
> Sun worshipers brought their sick to be healed at Cape **Kumukahi**. Along with the lake at **Kapoho** Crater, **Kawaiapele**. It was one of the stops on the 'journey of health' frequently made by those who had recovered from illness. [Westervelt 1916:28–29]
>
> At some point Pele destroyed **Kumukahi** and his family as mortal beings. However, they were powerful ‘aumakua. **Kumukahi** could take the form of a man or a kolea bird (the migrant plover). Palamoa could take the form of a rooster. [Komori 1987:17]

3.1.1.6 Legend of Kumukahi, Chief of Puna

A chief of Puna who delights Pele and later ridicules her is covered by lava and formed into Cape Kumukahi:

> Kumukahi, the chief of Puna was a handsome man who loved the ancient games. Pele found great delight in this man and his love for the ancient games. When Pele came before him as an old woman expecting to join the games he began to ridicule her. Pele's anger raged and covered him with lava turning him into the cape called Kumukahi. [Westervelt 1916:27–28]

3.1.1.7 Legend of Papalauahi

Pele rages again upon another chief of Puna, Papalauahi. Defeated in a sled race by the chief, Pele transforms him, neighboring chiefs, and spectators into pillars of stone:

> The chief of Puna, Papalauahi, was also challenged to a holua race by Pele, appearing this time in the form of a beautiful woman. He won and Pele stamped on the ground, letting loose floods of lava. Paplauahi and many of the neighboring chiefs attending the games were destroyed as they fled, and the spectators on the plains below were turned into pillars of lava. [Westervelt in Komori 1987:18]

3.1.1.8 Legend of Kaliikuku

This legend gives a glimpse into the abundance of natural beauty that once covered Puna—a land once ladened with beautiful *‘ōhi‘a* and *hala* trees, a land where everything grew. Chief Kaliikuku, so fond of his homelands, boasts to a prophet of Pele on the beauty of his lands. Later he is ridiculed by the prophet that Pele has devoured his lands and all on it:

> This legend tells of a chief of Puna, Keliikuku, who is very proud of his homeland. While on O‘ahu he boasts to a prophet of Pele, Kaneakalau, 'My country is charming. Abundance is found there. Rich, sandy plains are there, where everything grows wonderfully' (Westervelt 1916:31). The prophet ridicules him, saying that Pele has desolated Puna. 'The trees have descended from the mountains to the sea. The ohi‘a and puhala are on the shore. The houses of your people are burned. Your land is unproductive. You have no more people.' (Westervelt 1916:31-32). Keliikuku heads home. He comes around the eastern side of Hawai‘i, lands his canoe, and climbs the highest point for a view of Puna. He sees his fertile plains covered with black lava still pouring out clouds of smoke. The remnant of forests is still burning. Pele had heard Keliikuku boasting and had demonstrated that the land around her pit of fire is not secure against her will. Keliikuku hangs himself. [Westervelt in Komori 1987:19]

3.1.1.9 Pōhaku-o-Hanalei and Pōhaku-o-Lēkia

The following *mo‘olelo* was related to Mary Kawena Pukui by "old lady Kanaloa" of Pāhoa, Puna (Pukui and Green 1995:21,113).

> I ka hele ‘ana mai o Pele a me kona ‘ohana mai Kahiki mai, ‘o ka Pōhakuohanalei, Pōhakuolekia, Pōhakuokua, Pōhakuomalei, Pōhakuoka‘a, Pōhakuokane, Pohakuloa a me Pohakuolono kekahi i hele pū mai me lakou i nā moku O Hawai‘i nei.

Noho ‘o Pōhakuohanalei i Kaua‘i, a ‘o Pōhakuolēkia i Kapoho, Puna, a ‘o Pōhakuokua a me ka Pōhakuolono i Ka‘ū, Hawai‘i. ‘o Pōhakuloa i ‘Ōla‘a, Hawai‘i, a ma hope mai ‘o ia i hele hou mai ai i ka mokupuni ‘o O‘ahu. A ‘o ka Pōhakumālei ho‘i, i Makapu‘u, O‘ahu. ‘o ka Pōhakuoka‘a, he pohaku kaka‘a ia ma nā wahi āna e makemake ai. No laila, ua hiki ‘ole ke hō‘ike akaka ‘ia kona wahi noho pa‘a. A i Kona i noho ai ka pōhakuokane. ‘o kēia mo‘olelo, no ka Pōhakuohanalei a me ka Pōhakuolekia.

I ka hele ‘ana o Pele a noho pa‘a i nā kuahiwi o Hawai‘i, hū a‘ela kona aloha iā Pohakuohanalei e noho ana ma Kaua‘i; no laila, ki‘i aku nei ‘o ia ia ia e ho‘ a‘e rna kona wahi noho ma Hawai‘i. Ho‘i aku nei ka Pōhakuohanalei a noho pū me Pele a me kona ‘ohana i luna o Moku‘āweoweo.

I kekahi manawa nō ho‘i, hele lākou i Puna i ka ‘au‘au kai, ka he‘e holua, a me nā le‘ale‘a ‘ē a‘e o ia wa. I na wahi a lākou e hele ai i nā le‘ale‘a, ‘o ka Pohakuolēkia

kekahi i hele pū me lākou. No ka ho‘ohihi o ka Pohakuolēkia i ka u‘i o ka Pohakuohanalei, noi aku nei ‘o ia iā Pele e ‘ae mai i ko lāua ho‘āo. ‘Ike aku nei ‘o Pele i ko lāua makemake loa o kekahi i kekahi a hā‘awi maila ‘O ia i kona ‘ae.

I ko lāua ho‘āo ‘ana, ho‘i aku nei laua i kahi o ka Pohakuolēkia i wae ai i home no lāua. Eia no lāua ke ku nei ma kela pu‘u a hiki i kēeia la. ‘o ka mo‘olelo o lāua me ke kupua Kālaikini, he mo‘olelo ia i kama‘āina i ko Puna po‘e. [Pukui and Green 1995:113]

Translation:

When Pele and her immediate family came from Tahiti, certain rock *kūpua* accompanied her to the islands of Hawai‘i, namely Rock of Hanalei, Rock of Lēkia, Rock of Kua, Rock of Mālei, Rock of Ka‘a, Rock of Kāne, Long Rock, and Rock of Lono. Rock of Hanalei lived at Hanalei, Kaua‘i; Rock of Lēkia lived in Kapoho, Puna; Rock of Kua and Rock of Lono both dwelt in Ka‘ū, Hawai‘i. Long Rock lived for a time in ‘Ōla‘a, Hawai‘i, but later moved to the island of O‘ahu. Another one of the group who lived on O‘ahu was Rock of Mālei, at Makapu‘u. Rock of Ka‘a was a rolling rock, going wherever he willed; therefore, one cannot clearly state where his home was. And Rock of Kāne made his home in Kona. This story is concerned with Rock of Hanalei and Rock of Lēkia. When Pele came to live permanently in the mountains of Hawai‘i, her heart ached for Rock of Hanalei, who was still living on Kaua‘i. Pele sent for her to become one of her household at Moku‘āweoweo, and Rock of Hanalei accepted the invitation.

Sometimes they all went down to Puna for bathing in the sea, sledding, and other pastimes of the old days. Rock of Lēkia always accompanied these pleasure parties. He was carried away with the beauty of Rock of Hanalei and asked Pele if he might win her as his wife. Pele, seeing how fond they were of each other, consented.

After the marriage, the couple returned to the place which Rock of Lēkia had chosen for their home. There they stand on the hill to this day. The story about them and the *kupua* Kālaikini is well known to all the old inhabitants of Puna district. [Pukui and Green 1995:21]

3.1.2 *Nā Wahi Pana* (Storied Places)

Wahi pana are legendary or storied places in a landscape. These legendary or storied places can be a variety of natural or human-constructed features. Oftentimes dating to the pre-Contact period, many but not all *wahi pana* are connected to particular *mo‘olelo*. Dr. Davianna McGregor outlines the types of natural and human-made structures that may constitute *wahi pana*:

> Natural places have mana or spiritual power, and are sacred because of the presence of the gods, the akua, and the ancestral guardian spirits, the ‘aumakua. Human-made structures for the Hawaiian religion and family religious practices are also sacred. These structures and places include temples, and shrines, or heiau, for war, peace, agriculture, fishing, healing, and the like; pu‘uhonua, places of refuge and sanctuaries for healing and rebirth; agricultural sites and sites of food production such as the lo‘i pond fields and terraces slopes, ‘auwai irrigation ditches, and the fishponds; and special function sites such as trails, salt pans, hōlua slides, quarries, petroglyphs, gaming sites, and canoe landings. [McGregor 1996:22]

As McGregor makes clear, *wahi pana* can refer to natural geographic locations such as streams, peaks, rock formations, ridges, offshore islands and reefs, or they can refer to Hawaiian land divisions such as *ahupua‘a* (traditional land division, typically running from the mountains to the sea) or *‘ili* (a land division within an *ahupua‘a*), and man-made structures such as fishponds. In this way, the *wahi pana* of Pālā‘au tangibly link the *kama‘āina* of Pālā‘au to their past. It is common for places and landscape features to have multiple names, some of which may only be known to certain *‘ohana* or even certain individuals within an *‘ohana*, and many have been lost, forgotten, or kept secret through time. Place names also convey *kaona* and *huna* (secret) information that may even have political or subversive undertones. Before the introduction of writing to the Hawaiian Islands, cultural information was exclusively preserved and perpetuated orally. Hawaiians gave names to literally everything in their environment, including individual garden plots and *‘auwai* (waterway or ditch), house sites, intangible phenomena such as meteorological and atmospheric effects, *pōhaku* (stone), *pūnāwai* (freshwater springs), and many others. According to Landgraf (1994), Hawaiian *wahi pana* “physically and poetically describes an area while revealing its historical or legendary significance” (Landgraf 1994:v).

3.1.2.1 Nā Inoa ‘Āina (Place Names)

In the preface of *Place Names of Hawaii* (Pukui et al. 1974:x), Samuel Elbert offers the following description regarding place names:

> Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and heiau, 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.
>
> Place names are far from static […] names are constantly being given to new houses and buildings, land holdings, airstrips, streets, and towns and old names are replaced by new ones […] it is all the more essential, then to record the names and the lore associated with them [the ancient names] now. [Pukui et al. 1974:x]

Inherent in Elbert's statements is knowledge that the oldest place names held meaning and told the story of an area prior to European Contact. The place names of Keahialaka, Pohoiki, and Oneloa are presented in the tables below and may provide insight into the area prior to Western Contact.

The following sections provide a general overview of place names and *wahi pana* for each Keahialaka, Pohoiki, and Oneloa. Definitions of place names (if available) and details were collected through Soehren's *A Catalog of Hawaiian Place Names* (2019) compiled from the Records of the Boundary Commission and The Board of Commissioners to Quiet Land Titles of the Kingdom of Hawai‘i. If a definition detail of a place name was unavailable, that particular area is left blank.

Table 1. Place names of Keahialaka

Place name	Meaning	Feature	Notes
Holua	Hōlua, sled	Boundary point/*Pali* (cliff)	The Keahialaka/Kaukulau boundary runs "along the pahoehoe to Holua, a pali" between Pohoiki and Kalehuapaee.
Kaainui	Ka‘ainui, the principal or staple food; to eat a lot.	Boundary point/place	Course 2 of the Keahialaka/ Pohoiki boundary runs to "pile of stones in Kaainui," between Kukuikiikii and Kawauulu. Elev. 102 ft.
Kahuwai Crater	Kahuwai, water tender	Pit crater	Pit crater in the Kilauea Prehistoric Volcanic Series. Elev. 769 ft. on east rim.

Place name	Meaning	Feature	Notes
Kakapuhi	–	Boundary point/ *o‘io‘ina* [*sic*; *‘oi‘oina* meaning point, peak, cape]	The Keahialaka/Kaukulau boundary runs mauka to "oioina Kakapuhi" between Kalehuapaee and Pahee; the north corner of Kaukulau. Elev. about 335 ft.
Kalanihale	–	Boundary point/*kauhale* (group of houses comprising a traditional Hawaiian home)	The Keahialaka/Pohoiki boundary runs mauka to ahu pohaku "at old kauhale in Kalanihale" (BC) Elev. 320 ft.
Kalehuapaee	Kalehuapā‘ē‘ē	Boundary point/place	The Keahialaka/Kaukulau boundary runs mauka to Kalehuapaee, between Holua and Kakapahi. Quad uncertain.
Kamakana	Kamakana, the gift	Place	Course 12 of the Keahialaka/ Kaniahiku boundary runs "thourgh [*sic*] the woods of Kamakana." (BC) "From Papalauahi boundary runs mauka to Kamakana, name of place where we used to go after mamake, and if outsiders came after mamake there, Keahialaka people would take mamake away from them." (BCT)
Kamimi	Kamimi, the urine	Forest	"...the woods to the south of [Kilohana] belong to Keahialaka and it is called Kamimi." (p.40) "Kamimi is a forest. From Kamimi boundary of Keahialaka runs on to Kapahulu. The tall trees belong to Kauaea [*sic*; Waiakahiula] and pahoehoe to Keahialaka." (p.121)

Place name	Meaning	Feature	Notes
Kamokuna Grove	The border, division, section	Grove	–
Kanamanu	–	*Kauhale*	“Kanamanu belonged to land of Keahialaka where we get mamake [...] Two hundred or more people of Keahialaka were living at Kanamanu, and used to go to Omao to get food.” (p.123) “Kanamanu is half a mile or so toward Kau of Kamakana [q.v.].” (p.124)
Kaniau	–	Boundary point/place	The northwest corner of Keahialaka where Waiakahiula and Kaniahiku join. Elev. 740 ft.
Kawauula	Kāwa‘u‘ula, red kāwa‘u (a native tree or shrub)	Boundary point/place	Course 3 of the Keahialaka/ Pohoiki boundary runs to “pile of stones in Kawauula,” between Kaainui and Mokuola. Elev. 160 ft.
Keahialaka	Keahialaka, the fire [made] by Laka (a *hula* goddess)	*Ahupua‘a*	Retained by Lunalilo (LCAw 8559-B:15) at the Māhele
Kiapu	Kī‘apu, ti-leaf drinking cup	Cone	Cinder cone in the Kilauea Preshistoric Volcanic Series. Elev. 700+ ft.
Kilohana	Kilohana, lookout point	Boundary point/place	The Keahialaka/Kaniahiku “boundary runs along the edge of the pahoehoe [see Papalauahi], which belongs to Keahialaka, and the trees to Kapoho [Kaniahiku is an *‘ili kūpono* of Kapoho], to Kilohana at the road from Kaimu to Hilo.”

Place name	Meaning	Feature	Notes
Kuihala	–	Boundary point [*‘oi‘oina*]	The Keahialaka/Kaniahiku boundary runs mauka “to Kuihala. There is (an oioina) a resting place, a knoll in middle of pahoehoe” field called Papalauahi.
Kukuikiikii	Kukuiki‘iki‘i, leaning candlenut tree	Boundary point/*ahu* (mound)	The Keahialaka/Pohoiki “boundary runs mauka to a lapa crossing the Govt. road, thence mauka to ahu pohaku called Kukuikiikii.” (BCT) Elev. 80 ft. Between Lae o Kahuna and Kaainui.
Lae o Kahuna	Lae o Kahuna, point of the secret place	Boundary point	“The boundary between [Keahialaka and Pohoiki] at the shore is at a point called Kahuna.” (BCT)
Laupapai	Laupapa‘i, leaf package, bundle	Place	“We went after banana, yams and aweo (kalo) at Omao and Laupapai.” (BCT 5:116)
Loli	Loli, sea slug	Boundary point	“Kaukulau joins Keahialaka at the sea shore [...] at a place called Loli [...] a rocky point in the sea.”
Mahinaakaaka	Mahinaakaaka, clear moon	*Heiau*	A high platform heiau of waterworn boulders. Said to have been for human sacrifice and dedicated to Kamehameha’s god, Kā‘ili. (Stokes 1991:149–151)
Mokuola	Mokuola, healing island	Boundary point/place	Course 4 of the Keahialaka/ Pohoiki boundary runs to “pile of stones in aa flow in Mokuola,” between Kawauula and Kalanihale. Elev. 295 ft.

Place name	Meaning	Feature	Notes
Ohiakihele	‘Ōhi‘akīhele	Boundary point [*‘oi‘oina*]	“From Pahulu boundary runs on mauka to where lava flow comes out at place called Ohiakihele, an oioina, a sharp knoll, a resting place on Keahialaka [...] where the lava flow of Nanawale (1840 flow) comes out of the gouund [*sic*].”
Omao	‘Ōma‘o, green	Place	“[...] Omao a part of Keahialaka is on the other side” of an aa ridge separating Kauaea and Keahialaka. “I have been to [...] Omao to get food Aweo (kalo) as there was no kalo growing on our land, and wild kalo was growing at Omao.” (p.116) “Omao is a belt of forest.” (p.124) “Omao is where Kaniahiku joins Puua.” (p.437) Cf. Omaolaulau.
Pahee	Pahe‘e, slippery, slide	Boundary point/place	The Keahialaka/Malama boundary runs “along Malama to Pahee on Keahialaka, the road being the boundary” between Kakapuhi and Pukakoolau.
Pakepake	Pakēpakē, friable	*Kīpuka* (opening in a forest, especially a clear place within a lava bed where there may be vegetation)	“Pakepakee [*sic*] [...] is a kipuka in woods where ki, ferns and kukaepuaa grass are growing, an ancient trail there [...] runs from Malama and through mauka edge of kipuka.”
Papalauahi	Papalauahi, flat [destroyed] by lava	Boundary point/place	“[...] a pahoehoe field about a mile broad” (p.123) on Keahialaka, between Pakoi and Kamakana on the Kaniahiku boundary. Also written “Kipapalauahi.” (p.116)

Place name	Meaning	Feature	Notes
Pawai	Pāwai, water enclosure	Place	“I [Kapukini] was born on Keahialaka at place called Pawai, it is about a mile from [...] on road that runs from water pond at shore to Malama.” Cf. Pawai Crater.
Pawai Crater	Same as above	Pit crater	Pit crater in the Kilauea Prehistoric Volcanic Series. Elev. 560+ ft. on west rim.
Pohoiki	Pohoiki, small depression	Boundary point/place	The Keahialaka boundary runs mauka from Loli “up along Kaukulau to place called Pohoiki.”
Poka	–	Point	–
Pukakoolau	Pukako‘olau	Boundary point/Forest	The Keahialaka/Malama boundary runs mauka “to ohia woods called Pukakoolau” between Pahee and Puu Lena.
Punanaio	–	Boundary point/place	The Pohoiki/Keahialaka boundary runs mauka “to place called Pakoi [...] This place is mauka of place called Punanaio.” Between Pakoi and Puu Pilau. A Hawaiian Government Survey station named “Puunanaio” is mentioned in BC 173, course 7.
Puu Hauoa	Pu‘u Hau‘oa	Place	“It is said that part of Puuhauoa belongs to Kapoho and part to Keahialaka.” (p.126) “Pahoehoe commences above Paakoi, it extends up road to Puuhauoa, there it is called Papalauahi.” (p.125) It is unclear whether this is a variant spelling of Puuoahaua/ Puuohaua.

Place name	Meaning	Feature	Notes
Puulena Crater	Pu‘ulena, yellow hill	Pit crater	Pit crater in the Kilauea Prehistoric Volcanic Series. Elev. 740+ ft. on west rim.
Puu Pahoehoe	Pu‘u Pāhoehoe, hill [of] flat, smooth lava	Boundary point	Corner of Keahialaka and Waiakahiula. Elev. 1100 ft.
Puu Pilau	Pu‘u Pilau, malodorous hill	Cone	Cinder cone in the Kilauea Prehistoric Volcanic Series. Elev. 600+ ft.
Puu Ulaula	Pu‘u ‘Ula‘ula, red hill	*Pu‘u* (hill)	Course 7 of the Keahialaka boundary runs “along Grant [3209] to [...] pile of stones mauka of Puuulaula [...]”
Wahinepilau	Wahinepilau, stinking woman	Place	“Kuihala [...] is toward Hilo of place called Wahinepilau. The old houses used to be below Wahinepilau.”

Table 2. Place names of Pohoiki

Place name	Meaning	Feature	Notes
Isaac Hale Park	–	Park	County beach park and launching ramp. “[...] named in 1951 for Isaac Hale of Puna, Hawai‘i, killed in action in Korea.” (PEM)
Kaumaumahoohoo	–	*Ahu*, Boundary point	The Pohoiki/Keahialaka boundary runs “mauka and onto aa to place called Kaumaumahoohoo to an old pile of stones” between Pokole and Kalanihale.
Mahuwai	–	Boundary point, water hole	The Pohoiki/Keahialaka boundary runs “mauka to ahu pohaku at waterhole called Mahuwai” between Kalanihale and Ohiahuli

Place name	Meaning	Feature	Notes
Ohiahuli	‘Ōhi‘ahuli, overturned ‘ōhi‘a tree	Boundary point/*lae* (cape)	The Pohoiki/Keahialaka boundary runs “mauka to ahu at point of ohia woods [lae ohia] called Ohiahuli” between Mahuwai and Punanaio.
Palipoko	Palipoko, Short cliff	*Pali* (cliff)	Along the shore at Pohoiki/Oneloa boundary.
Pohoiki	Pohoiki, small depression (Pele is said to have dug a crater here) [Not within today’s boundaries of Pohoiki]	*Ahupua‘a*, Place	Returned by Lunalilo, retained by aupuni at the Māhele. Pohoiki “has ancient fishing rights extending out to sea.” (BCT) Listed among “hemo lands (which do not pay tribute to konohikis).” (IDLM)
Pokole	Pōkole, short	Boundary point/place	The Pohoiki/Keahialaka boundary runs mauka “to aa called Pokole, the boundary being along Hilo edge of aa” between Kukuikiikii and Kaumaumahoohoo.
Puoalaau	Pū‘o‘alā‘au	Point	–

Table 3. Place names of Oneloa

Place name	Meaning	Feature	Notes
Kahinihiniula	Kahinihini‘ula, the upland moss	Point	Boundary between Oneloa and Laepaoo at the shore

Place name	Meaning	Feature	Notes
Niheu	Nīheu, fancy or unusual style of hair dressing. Also, a trickster demigod, younger brother of Kana	Cove	–
Oneloa	Oneloa, long sand	*Ahupua‘a*	Returned by Lunalilo and Laumaka, retained by aupuni at the Māhele.

3.1.3 Nā ‘Ōlelo No‘eau (Proverbs)

Hawaiian knowledge was shared by way of oral histories. Indeed, one’s *leo* (voice) is oftentimes presented as *ho‘okupu* (“a tribute or gift” given to convey appreciation, to strengthen bonds, and to show honor and respect); the high valuation of the spoken word underscores the importance of the oral tradition (in this case, Hawaiian sayings or expressions), and its ability to impart traditional Hawaiian “aesthetic, historic, and educational values” (Pukui 1983:vii). Thus, in many ways these expressions may be understood as inspiring growth within reader or between speaker and listener:

> They reveal with each new reading ever deeper layers of meaning, giving understanding not only of Hawai‘i and its people but of all humanity. Since the sayings carry the immediacy of the spoken word, considered to be the highest form of cultural expression in old Hawai‘i, they bring us closer to the everyday thoughts and lives of the Hawaiians who created them. Taken together, the sayings offer a basis for an understanding of the essence and origins of traditional Hawaiian values. The sayings may be categorized, in Western terms, as proverbs, aphorisms, didactic adages, jokes, riddles, epithets, lines from chants, etc., and they present a variety of literary techniques such as metaphor, analogy, allegory, personification, irony, pun, and repetition. It is worth noting, however, that the sayings were spoken, and that their meanings and purposes should not be assessed by the Western concepts of literary types and techniques. [Pukui 1983:vii]

Simply, *‘ōlelo no‘eau* may be understood as proverbs. The Webster dictionary notes it as “a phrase which is often repeated; especially, a sentence which briefly and forcibly expresses some practical truth, or the result of experience and observation.” It is a pithy or short form of folk wisdom. Pukui equates proverbs as a treasury of Hawaiian expressions (Pukui 1995:xii). Oftentimes within these Hawaiian expressions or proverbs are references to places. This section draws from the collection of author and historian Mary Kawena Pukui and her knowledge of Hawaiian proverbs describing *‘āina* (land), chiefs, plants, and places.

The following *‘ōlelo no‘eau* all mention Puna and give detail to landmarks, *wahi pana*, historical events, and place names most closely associated with the project area.

3.1.2.1 ‘Ōlelo No‘eau #79

‘Āina i ka houpo o Kāne.

Land on the bosom of Kāne.

Puna, Hawai‘i. It is said that before Pele migrated there from Kahiki, no place in the islands was more beautiful than Puna. [Pukui 1983:11]

3.1.2.2 *‘Ōlelo No‘eau* #127

‘A‘ohe ‘alawa wale iho ia Mali‘o.

Not even a glance at Mali‘o.

Said of a haughty person. Pele was once so annoyed with Mali‘o and her brother Halaaniani that she turned them both into stone and let them lie in the sea in Puna, Hawai‘i. It was at the bay named after Halaaniani that clusters of pandanus were tossed into the sea with tokens to loved ones. These were borne by the current to Kamilo in Ka‘ū. [Pukui 1983:16]

3.1.2.3 *‘Ōlelo No‘eau* #148

‘A‘ohe ‘ike wale iho ia Mali‘o, i ka huhuki laweau a Uwekahuna.

Mali‘o is not recognized because Uwekahuna is drawing her away.

Said of one who refuses to recognize old friends and associates or is snubbed by friends because they have interests elsewhere. Mali‘o was a mythical woman of Puna whom Pele once snubbed. Uwekahuna is the bluff overlooking the crater of Kīlauea. [Pukui 1983:19]

3.1.2.4 *‘Ōlelo No‘eau* #233

‘Apiki Puna i Lele‘apiki, ke nānā la i Nānāwale.

Puna is concerned at Lele‘apiki and looks about at Nānāwale.

The people are but followers and obedient to their rulers. The people of Puna were not anxious to go to war when a battle was declared between Kiwala‘o and Kamehameha; it was the will of their chief. Lele-‘apiki (Tricky-leap) and Nānā-wale (Just looking) are places in Puna. [Pukui 1995:27]

3.1.2.5 *‘Ōlelo No‘eau* #246

‘Awa kau lā‘au o Puna.

Tree-growing ‘awa of Puna.

Tree-grown ‘awa of Puna was famous for its potency. It was believed that birds

carried pieces of 'awa up into the trees where it would grow. [Pukui 1983:29]

3.1.2.6 *'Ōlelo No'eau* #255

E ake ana e inu i ka wai hū o Ko'olihilihi.

Eager to drink of the gushing spring of Ko'olihilihi.

Eafter to make love. Ko'olihilihi (Prop-eyelashes) is a spring in Puna. When royal visitors were expected, the people attached lehua blossoms to the makaloa sedge that grew around the spring so that when their guests stooped to drink, the lehua fringes touched their cheeks and eyelashes. The last person for whome the spring was bedecked was Keohokalolo, mother of Lili'uokalani. [Pukui 1983:32]

3.1.2.7 *'Ōlelo No'eau* #260

E ala e Ka'ū, kahiko o Mākaha; e ala e Puna, Puna Kumākaha; e ala e Hilo na'au kele!

Arise, O Ka'ū of ancient descent; arise, O Puna of the Kumākaha groups; arise, O Hilo of the water-soaked foundation!

A rallying call. These names are found in Ka'ū and Puna chants of the chiefs. The Mākaha and Ku-mākaha (Like-the-Mākaha) were originally one. Some moved to Puna and took the name Kumākaha. [Pukui 1983:32]

3.1.2.8 *'Ōlelo No'eau* #334

E Lēkia e, 'onia i pa'a.

O Lēkia, move that you may hold fast.

Make a move to give yourself a secure hold. Lēkia and Pōhaku-o-Hanalei are stones in Puna. When the demigod Kaleikini came to the district, he dug around Lēkia with the intention of toppling it off the hill. Before he could uproot it, he got hungry and departed. It was then that the other stone, Pōhaku-o-Hanalei, cried out, *'E Lēkia e, 'onia i pa'a.'* Lēkia moved downward and held fast. Kaleikini tried in vain after that and was unable to remove Lēkia. [Pukui 1983:41]

3.1.2.9 *'Ōlelo No'eau* #360

E nihi ka helena i ka uka o Puna; mai pūlale i ka 'ike a ka maka.

Go quietly in the upland of Puna; do not let anything you see excite you.

Watch your step and don't let the things you see lead you into trouble. There is an abundance of flowers and berries in the uplands of Puna and it is thought that picking any on the trip up to the volcano will result in being caught in heavy rains; the picking is left until the return trip. Also said to loved ones to imply, 'Go carefully and be mindful.' [Pukui 1983:44]

3.1.2.10 *'Ōlelo No'eau* #381

'Eu kōlea i kona puapua; 'eu ke kanaka i kona hanu.

A plover stirs its tail; a man stirs because of the breath within.

Said by Ka'iana, who led an army in battle under Kamehameha I. When the Puna fighters refused to battle against Keouakuahu'ula because of the close kinship between their own district and Ka'ū, Ka'iana said this to urge them to thing of themselves and their own lives. Encouraged, the warriors resumed fighting and won the victory for Kamehameha. [Pukui 1983:46]

3.1.2.11 *'Ōlelo No'eau* #397

Ha'alele i Puna na hoaloha e.

Left in Puna are the friends.

Said of one who has deserted his friends. Originally said of Hi'iaka when she left Puna. [Pukui 1983:49-50]

3.1.2.12 *'Olelo No'eau* #400

Ha'alele wale iho no i ke kula o Pū'ula.

For no reason he leaves the plain of Pū'ula.

He goes off in a huff for no reason at all. A play on pu'u, or pu'u ka nuku (to pout). Pū'ula is a place in Puna, Hawai'i. [Pukui 1983:50]

3.1.2.13 *'Ōlelo No'eau* #474

Hao'e na 'ale o Hōpoe i ka 'ino.

The billows of Hōpoe rise in the storm.

His anger is mounting. Hōpoe, Puna has notoriously high seas. [Pukui 1983:57]

3.1.2.14 *'Ōlelo No'eau* #625

He iki huna lepo mai kēia e pula ai ka maka.

This is a small speck of dust that causes a roughness in the eye.

One may be small but he can still cause distress. This was the retort of Ka'ehuiki, a shark-god of Puna, when he was taunted for his small size by Kai'anuilalawalu, a shark-god of Kīpahulu, Maui. [Pukui 1983:71]

3.1.2.15 *'Ōlelo No'eau* #755

Hele no ka wai, hele no ka 'alā, wali ka 'ulu o Halepua'a.

The water flows, the smooth stone [punder] works, and the breadfruit of Halepua'a is well mixed [into *poi*].

Everything goes smoothly when one is prosperous. A play on *wai* (water) and *‘alā* (smooth stone). *‘Alā* commonly refers to cash. In later times, *Hele no ka wai, hele no ka ‘alā* came to refers to a generous donation. Halepua‘a is a place in Puna, Hawai‘i. [Pukui 1983:83]

3.1.2.16 *‘Ōlelo No‘eau* #826

He moku ‘āleuleu.

District of ragamuffins.

Said by Kamehameha‘s followers of Ka‘ū and Puna because the people there, being hard-working farmers, lived most of the time in old clothes. [Pukui 1983:90]

3.1.2.17 *‘Ōlelo No‘eau* #857

He ‘oi wale aku no o Hua‘ā.

Great indeed was Hua‘ā.

A sarcasm. Hua‘ā was a chief of Puna on Hawai‘i. When the chief of another district threatened to war against him, he hastily sent a word to Kamehameha for protection. The latter ordered the war-minded chief to cease his threats. [Pukui 1983:93]

3.1.2.18 *‘Ōlelo No‘eau* #990

Hiki mai ka lā ma Ha‘eha‘e, maluna mai o Kuki‘i.

The sun rises at Ha‘eha‘e, above Kuki‘i.

Ha‘eha‘e in Puna, Hawai‘i, is often called the gateway of the sun. Kuki‘i is a place in Puna. [Pukui 1983:106]

3.1.2.19 *‘Ōlelo No‘eau* #994

Hilina‘i Puna, kālele ia Ka‘ū.

Puna leans and reclines on Ka‘ū.

Said of one who leans or depends on another. The ancestors of these two districts were originally of one extended family. The time came when those of each district decided to have a name of their own, without breaking the link entirely. Those in Ka‘ū referred to themselves as the Mākaha and those in Puna as the Kumākaha. These names are mentioned in the chants of the chiefs of Ka‘ū. [Pukui 1983:107]

3.1.2.20 *‘Ōlelo No‘eau* #1113

Hōpoe, ka wahine lewa i ke kai.

Hōpoe, the whoman who dances in the sea.

Hōpoe was a dancer of Kea‘au, Puna, in that long ago day when gods mingled with men. Because of her dancing and her kindly nature, Hōpoe was taken by the goddess Hi‘iaka as a favorite friend. When Pele sent Hi‘iaka to Kaua‘i to fetch Lohi‘au, the first request Hi‘iaka made to Pele was to be kind to her friend, Hōpoe. After a time, when Hi‘iaka did not return as expected, Pele in a fit of rage destroyed Hi‘iaka‘s grove and the beloved Hōpoe. The latter was changed into a balancing stone that seemed to dance in the sea. [Pukui 1983:119]

3.1.2.21 *‘Ōlelo No‘eau* #1278

Ka ‘alā pa‘a o Kaueleau.

The hard rock of Kaueleau.

A dollar, or a hard, unyielding person. There is a rock at Kaueleau, Puna, Hawai‘i, called the *‘alā pa‘a.* [Pukui 1983:140]

3.1.2.22 *‘Ōlelo No‘eau* #1281

Ka ‘awa lena o Kali‘u.

The yellowed ‘awa of Kali‘u.

Refers to Kali‘u, Kilohana, Kaua‘i. People noticed drunken rats in the forest and discovered some very potent ‘awa there. There is a Kali‘u in Puna, Hawai‘i, where good ‘awa is also grown. [Pukui 1983:140]

3.1.2.23 *‘Ōlelo No‘eau* #1300

Kahauale‘a i ke kūkae kupu.

At Kahauale‘a, where the dung sprouts.

The people of Kahauale‘a, Puna, were said to eat *noni* fruit, seeds and all. The seeds would sprout wherever the people excreted. [Pukui 1983:142]

3.1.2.24 *‘Ōlelo No‘eau* #1405

Ka ‘ili‘ili o ‘Ā‘alāmanu.

Pebbles of ‘Ā‘alāmanu.

‘Ā‘alāmanu is in Puna, Hawai‘i. The best pebbles of this district were found here and were much liked by the chiefs for the game of *kōnane.* [Pukui 1983:152]

3.1.2.25 *‘Ōlelo No‘eau* #1458

Ka makani hali‘ala o Puna.

The fragrance-bearing wind of Puna.

Puna, Hawai‘i, was famed for the fragrance of *maile, lehua,* and *hala.* It was said that when the wind blew from the land, fishermen at sea could smell the fragrance

of these leaves and flowers. [Pukui 1983:158]

3.1.2.26 *‘Ōlelo No‘eau* #1567

Ka ua kiawe lehua o Hōpoe.

The rain that sets the lehua of Hōpoe to swaying.

When the rain patters down, the *lehua* of Hōpoe, Puna, gently sway to and fro. [Pukui 1983:169]

3.1.2.27 *‘Ōlelo No‘eau* #1582

Ka ua Līhau o Pāhoa.

The Līhau rain of Pāhoa.

The icy cold rain of Pāhoa, Puna, Hawai‘i. [Pukui 1983:170]

3.1.2.28 *‘Ōlelo No‘eau* #1587

Ka ua moaniani lehua o Puna.

The rain that brings the fragrance of the lehua of Puna.

Puna is known as the land of fragrance. [Pukui 1983:172]

3.1.2.29 *‘Ōlelo No‘eau* #1706

Keiki kāohi lā o Kumukahi.

The lad that holds back the sun at Kumukahi.

Praise of an outstanding youth of Puna. Kumukahi is the eastern point of Hawai‘i, the place where the sun comes up. [Pukui 1983:184]

3.1.2.30 *‘Ōlelo No‘eau* #1777

Ke one lau‘ena a Kāne.

The rich, fertile land of Kāne.

Puna, Hawai‘i, was said to have been a beautiful, fertile land loved by the god Kāne. Pele came from Kahiki and changed it into a land of lava beds, cinder, and rock. [Pukui 1983:191]

3.1.2.31 *‘Ōlelo No‘eau* #1950

Lauahi Pele i kai o Puna, one ‘ā kai o Malama.

Pele spreads her fire down in Puna and leaves cinder down in Malama.

There are two places in Puna called Malama, one inland and one on the shore where black sand (*one ‘ā*) is found. [Pukui 1983:210]

3.1.4 Nā Mele (Songs)

The following section draws from the Hawaiian art of *mele*, poetic song intended to create two styles of meaning:

> Words and word combinations were studied to see whether they were auspicious or not. There were always two things to consider the literal meaning and the *kaona*, or ‘inner meaning.’ The inner meaning was sometimes so veiled that only the people to whom the chant belonged understood it, and sometimes so obvious that anyone who knew the figurative speech of old Hawai‘i could see it very plainly. There are but two meanings: the literal and the *kaona*, or inner meaning. The literal is like the body and the inner meaning is like the spirit of the poem. […]
>
> The Hawaiians were lovers of poetry and keen observers of nature. Every phase of nature was noted and expressions of this love and observation woven into poems of praise, of satire, of resentment, of love and of celebration for any occasion that might arise. The ancient poets carefully selected men worthy of carrying on their art. These young men were taught the old *meles* and the technique of fashioning new ones. [Pukui 1949:247]

3.1.4.1 Ke ha‘a lā Puna i kamakani

This *mele hula* can be found in the saga, *Hi‘iakaikapoliopele.* The youngest sibling, Hi‘iaka, performs this *mele hula* for Pele when called upon. An analyzation of this song and its deep connection to Puna is expressed eloquently below:

> Puna is the source of regenerative energy. Some examples of this facts are Puna‘s eastern location, which welcomes the rising sun; its proximity to the volcano, which results in the creation of new land; its origination of the Moa‘e wind sources; and its sustained growth of new vegetation on new land. [...]
>
> Puna produces sounds with the beating of the sea on the cliff. This sound is magnified through groves of hala. The hala grove becomes the resonator. The sea of Puna heaves, rolls, dashes, splashes, sprays, and vibrates, producing various distinct sounds and chords. The various sounds emanating from the hala grove are emblematic of the sounds reproduced by the hula implement, which excites and provokes movement for the dancer. [Kanahele 1989:112, 116]

Ke ha‘a lā Puna i ka makani	Puna dances in the wind
Ha‘a ka ulu hala i Kea‘au	Moving through the hala grove at Kea‘au
Ha‘a Hā‘ena me Hōpoe	Hā‘ena and Hōpoe dance
Ha‘a ka wahine	The female sways
‘Ami i kai o Nanahuki	Revolving at the sea of Nanahuki
Hula le‘a wale	Perfectly pleasing, the dancing

I kai o Nanahuki	At the sea of Nanahuki
‘O Puna kai kuwā i ka hala	Puna‘s sea resounds in the hala
Pae ka leo o ke kai	The voice of the sea is carried
Ke lū lā i nā pua lehua	The lehua blossoms are scattered
Nānā i kai o Hōpoe	Look toward the sea of Hōpoe
Ka wahine ‘ami i kai o Nanahuki	The dancing woman at the sea of Nanahuki
Hula le‘a wale	Perfectly pleasing, the dancing
I kai o Nanahuki	At the sea of Nanahuki
	[Kanahele 1989:110–111]

3.1.4.2 Puna Paia ‘A‘ala

This love song, written by Queen Lili‘uokalani, is set in Puna.

Iā Puna paia ‘a‘ala	Puna’s bowery walls of fragrance are
Pili mau na ke onaona	Groves laden with sweet flowers
I laila ke kāunu ana	There is where my heart yearns to be
Kau pono ana na ka mana‘o	To dwell there is my sincere desire
Puna paia ‘a‘ala	Puna’s shaded bowery walls
Kilihea i ke onaona	Pleasant and redolent with perfume
Ona wela i ke aloha	Sweet language, full of love
Ua lawa iā ‘oe me a‘u	Binding you to me, forever
Ho‘ohihi i ka nani	I long to see you
Pua mai a ka lehua	Flower of the lehua
Ānehe au e ki‘i	Let me take you and pluck you
I pua kau no ku‘u umauma	And press you close to me
‘O ka ‘ike kēia	Now that I know
‘O wau nō kou hoa like	That you and I are alike

Pelā iho ho‘i kāua	Let us wait a while
Ke ano la‘i mai ne ka ‘ōpua	As the cloud bank reposes in serenity
Hai lohi ka mana‘o	The thought is slow to conjure
Loli‘i nā pua i ka ‘iu	As the blossoms above repose
Kali ana ho‘olono i ka leo	Awaiting, listening for your voice
A hea mai e ho‘okomo wau	To call one to come in
	[Huapala:n.d.]

3.1.4.3 Noho nō i Puna ka Nani me ka Maika‘i (In Puna dwells beauty and goodness)

There was a certain man living in Puna who had a wife and then afterwards his friend took away his wife. The husband then went to Honolulu and lived in Mānoa alone. There was living at that time in Mānoa a great chanter by the name of Kū. It was his custom to chant when he had *‘awa*, fish, and *poi*, and every time he chanted, the boy would cry. One day Kū asked him the trouble, so he related the story of how he lost his wife. Kū took all this down and composed this *mele hula ho‘āeae* or love chant and told him to go back to Puna and that if he would chant it, his wife would surely come back to him. It so happened that he returned to Puna and chanted the *mele*, and the result was that his wife returned to him and they lived happily ever after (Pukui 1995:82–83).

Noho nō i Puna ka nani me ka maika‘i,
He hale kipa ia no ke ‘ala me ke onaona,
Onaona ka maile me ka hala o Kea´au.
Aloha ‘ino ke kupa Kaniahiku,
Kū mai ka ua nahunahu ki‘eki‘e i luna,
Ho`okakano lua i ka la‘i o Wahinekapu,
Puapua‘i maila nā leo ‘awahia a ka anu,
Nā kauna ‘ōlelo o ka Pu‘ulena i ka uka,
Ka ‘ī mai nō ua lilo o Ma‘olala iā Pana‘ewa.
He aha nō lā ka hewa ke ‘ai ‘ia ka‘u hakina,
He koena ia na ka manu i ‘ai a ha‘alele,
Ke pane maila e Hō`ā`ā ke kono Waianuhea,
Peulaka ū ka hau anu a Kawaiapo,

‘O ka‘u hana ‘ike ‘ia, ‘o ke kōnane,
Helu `ekahi au ma ka pūlapu.
I lono ‘oe ‘o ‘oe nō ka ‘ole he mā‘uka‘uka,
He kela ‘oe no mua he huki kaula kau hana,
He pūlumi ‘oe no ka ‘oneki o ka papahele.
‘O wau mai nō ka ona, ka haku o ko‘u waiwai,
He wahi aloha no puīa i ke onaona,
Ke ‘ala ka paia o Puna

Translation:

In Puna dwells beauty and goodness,
A house in which fragrance and sweetness dwell,
Fragrant are the maile and hala of Kea‘au.
Woe betide the native son of Kaniahiku,
When the stormy rains gather high overhead,
Threatening the peace of Wahinekapu.
Gradually louder grew the harsh voices of the birds,
And the many unkind words of the Pu‘ulena breeze of the upland,
Telling me that Ma‘olala was taken away by Pana‘ewa.
What matters if my leftover food is being eaten,
It is just a remnant eaten by the bird and left,
The answer left the Waianuhea wind in concentration,
Penetrated to the core with the cold dew of Kawaiapo,
I am skilled in the game of kōnane,
And also excel in the art of fooling my opponent.
Now listen you, you are but a worthless person,
A sailor near the prow who merely pulls on ropes,
One who sweeps the deck.
I am the owner, the lord of my possessions,
With love for the gently wafted fragrance,

The fragrance of the groves of Puna.
[Pukui 1995:82–83]

3.1.4.4 Puka mai ana ka Lā ma Puna (The sun appears in Puna)

Puka mai ana ka Lā ma Puna (The sun appears in Puna) is a *He pule no ka po‘e puka mai* (prayer chant) which is often used as an entrance dance (Pukui 1995:104–105):

Puka mai ana ka lā ma Puna.
Ea mai ana ma Ha‘eha‘e,
Ma luna mai o Kūki‘i.
Ua hiki ka lā, aia i Hawai‘i,
He ‘awamea ua na Pele, na Hi‘iaka.
Ke kakali lā i loko o ke kai ka ‘alā ku‘i o Kaueleau.
Ho‘olono ka luahine i uka o ka ua,
Kia‘i wai Pu‘ulena, ‘ūlili, kōlea,
He kanaka la‘ila‘i ia ka lā.
He ‘kua, ‘o Hi‘iaka paha ia e hele a‘ela lā ē,
‘O Hi`iaka, ‘o Hi‘iaka, ‘o ka wahine hele mauna,
Nāna i hehi ke po‘o o Hue‘hu‘e,
‘O Hu‘ehu‘e-a-e.

Translation:

The sun appears in Puna,
It rises at Ha‘eha‘e,
Above Kūki‘i.
The sun has come to Hawai‘i,
Brightening the home of Pele, of Hi‘iaka.
Waiting for it in the sea are the sea-pounded rocks of Kaueleau.
The old woman listens, up in the Pit,
To the guardians of the water, the sandpiper and plover,
Who warn of the approach of men.
Perhaps that is the goddess Hi‘iaka passing by,

Hi‘iaka, the woman who travels the mountains,
She it is, who steps on the summit of Hu‘ehu‘e,
Of Hu‘ehu‘e.
[Pukui 1995:104–105]

3.1.4.5 No Luna ka Hale Kai nō e Kama‘alewa (From the root-matted mountain retreat)

In one version, it is the *lehua* that fear men and go below, but according to some *hula* masters, it is the reverse. According to the latter, the *lehua* was *kapu* for the gods and caused rain when plucked. Hence men left them alone (Pukui 1995:112, 113).

No luna ka hale kai nō e kama‘alewa,
Nānā nā maka iā Moananuikalehua,
A noi au i ke kai lā e mali‘o.
Kū a‘e ana he lehua i laila
Hōpoe lehua a ki‘eki‘e.
E maka‘u ke kanaka i ka lehua,
Lilo i lalo e hele ai.
A i lalo.
‘O Kea‘au ‘ili‘ili nehe i ke kai,
Ho‘olono ke kai o Puna i ka ulu hala,
Kai ko‘o Puna,
Puna a kai ko‘o ia.
Nene‘e mai ana kāua e ke hoa,
Ia pili ke waiho ‘ē mailia ‘oe.
Eia ka mea ‘ino lā he anu.
‘A‘ohe anu!
Mehe mea lā ōlua i waho lā e ke hoa,
Mehe wai i lā kō kāua ‘ili.

Translation:

From the root-matted mountain retreat,
My eyes look out at Moananuikalehua,

And I beg the sea to be calm.
The lehua trees tall grow there by the sea
The tall lehua trees of Hōpoe.
Men fear the lehua blossoms and go below,
They walk the ground below.
The pebbles at Kea‘au grind in the surf.
The sea at Puna seems to shout to the hala groves,
‘Rough is the sea of Puna,’
That is Puna of the rough sea.
Move close to me, O companion,
You keep away so.
Here is the evil thing, the cold.
There is no cold!
Yes, there is—when you remain away, O companion;
Our skins become clammy and cold.
[Pukui 1995:112, 113]

3.2 Archaeological and Historical Narrative

3.2.1 Pre-Contact and Early Post-Contact Period

Traditional accounts provide an understanding of an early time when the district of Puna was famous for its associations with the rising sun and the god Kāne, as well as its long stretch of sand, fertile plains, *hala* (*pandanus*) trees, and *‘awa* (*Piper methysticum*) (e.g., Beckwith 1970; Handy and Handy 1972; Pukui 1983). Many *‘ōlelo no‘eau* and legends also describe Pele’s devouring of land by causing lava to cover either large areas of the region or more limited sections of it. Traditions imply Puna was one of Hawai‘i’s wealthiest agricultural regions. It is only in relatively recent times that volcanic eruptions have destroyed much of Puna’s best land. The *mo‘olelo* or narrative stories of Puna also emphasize the area’s familial, genealogical, and political connections to the neighboring districts of Ka‘ū and Hilo.

The project area is located within the *ahupua‘a* of Keahialaka, Pohoiki, and Oneloa, which are among approximately 50 *ahupua‘a* in Puna (Maly 1998:9). Very few legendary accounts speak specifically about the *ahupua‘a* of the project area or the other individual *ahupua‘a* of Puna. Barrère (1971:11) has speculated that the reason for the relatively small amount of traditional literature about Puna was the “remarkably successful” conversion of the natives to Christianity. This effort began when the Reverend William Ellis’ missionary party visited the district in 1823 and was continued and strengthened under Rev. Titus Coan’s management of the mission district beginning in 1835. In 1841, Wilkes noted, “Almost all the hills or craters of any note [in Puna] have some tradition connected with them; but I found that the natives were now generally unwilling to narrate these tales, calling them ‘foolishness’” (Wilkes 1845:[4]186).

In the early history of Hawai‘i there were many chiefs, each ruling one or several *ahupua‘a*, entire districts, or several districts. Emory et al. (1959) provide an explanation as to why there is also a comparative lack of traditional political history surrounding Puna:

> We find that Puna, as a political unit, played an insignificant part in shaping the course of the history of Hawai‘i island. Unlike the other districts of Hawai‘i, no great family arose upon whose support one or another of the chiefs seeking power had to depend for his success. Puna lands were desirable, and were eagerly sought, but their control did not rest upon the conquering of Puna itself, but rather upon control of the adjacent districts, Ka‘ū and Hilo. An attempt to follow in detail the course of Puna’s history is bound up with the fortunes of the ruling families on either side of her. [Emory et al. 1959:15]

Maly (1998:7–8) offers the following settlement pattern synthesized from multiple sources which applies to the project area vicinity: 1) initial settlement by the twelfth-thirteenth centuries, with subsistence based on near-residence agriculture and collection of marine resources; 2) by the fourteenth-sixteenth centuries, expansion of agriculture systems into upland areas to accommodate increased populations, accompanied by development of the *‘ohana* (extended family) value system linking coastal and upland inhabitants; 3) by the seventeenth-eighteenth centuries, increasingly formalized systems of land use and governance and expansion of

settlement into more arid coastal regions. The *ahupua‘a* system provided inhabitants with all the resources needed to survive, from offshore fisheries into the upland agricultural lands and forest regions above, where timber and other plant and avian resources were obtained.

3.2.2 Early Historic Period

The first foreigners to see the Puna coast were crewmembers of Captain Cook’s third voyage to the Pacific in 1779. They were the first to note the differences in population and cultivation between the southwestern section of Puna and the more easterly area:

> The East part of Opoona [Puna] is flat, covered with Coco nut trees, and the land far back is of a Moderate height. As well as we could judge this is a very fine part of the Island, perhaps the best.
>
> On the SW extremity of Opoona the hills rise abruptly from the Sea side, leaving but a narrow border, and although the sides of the hills have a fine verdure, yet they do not seem Cultivated and when we sailed pretty near and along this end of Opoona, we did not observe that it was equally populous with the eastern parts. [Beaglehole 1967:606]

In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (ABCFM), including Asa Thurston and Artemas Bishop, toured the island of Hawai‘i. After visiting Ka‘ū District, they made a side trip inland to Kīlauea Crater, then returned back to shore near the Ka‘ū/Puna border, traveling west to east. Ellis kept a detailed journal of his travels and was the second foreigner to note the differences in population and cultivation in the various areas of Puna. Several specific *ahupua‘a a*nd villages of Puna are named in Ellis’s account; at several of the more populous villages the company delivered sermons. In proximity to the project area, these included the villages of ‘Opihikao, Kauaea, Keahialaka, and Pū‘āla‘a (Ellis 1963:200–201). Keahialaka was noted to be the residence of the chief Kinao, who was governor of Puna at that time. Ellis (1963:201–202) described this area of Puna as “much more populous than any we had passed since leaving Kona […]” Pohoiki was not mentioned.

T. Stell Newman (1971) reviewed the journal of William Ellis for his 1823 tour of Hawai‘i Island to reconstruct the environmental characteristics of aboriginal agricultural lands on different parts of the island. Based on Ellis’ early observations, there were two main types of dryland farming in Hawai‘i, either in field systems or in scattered fields. As seen on Newman’s map (Figure 7), one of these field systems stretched from Kaimū almost to Kapoho on the southeastern coast of Puna, and thus encompassed the Pohoiki Bay area.

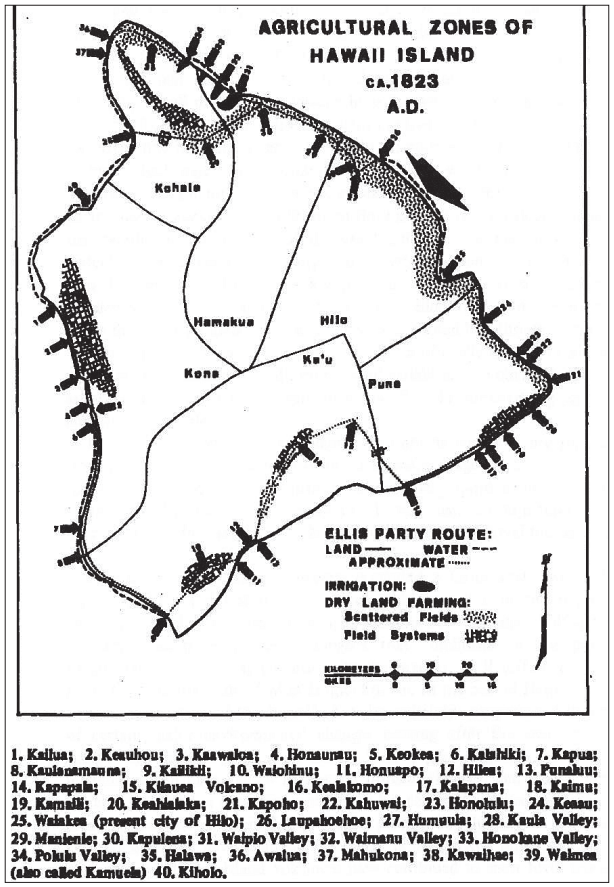


Figure 7. Newman's (1971) map of the Ellis party route, showing the vicinity of the project area (indicated generally by location 20, Keahialaka Village) within a dryland field system

Later in 1823, a mission station opened in Hilo, which was responsible for the districts of Hilo, Puna, and part of Ka'ū. The missionary Titus Coan became head of the Hilo Station in 1835. In describing the district of Puna, Coan emphasized the abundant rainfall, subterranean waters, evidence of volcanic activity, and the fields of vegetables and fruits:

> Its [Puna's] shore line, including its bends and flexures, is more than seventy miles in extent. For three miles inland from the sea it is almost a dead level, with a surface of pahoehoe or field lava, and a-a or scoriaceous lava, interspersed with more or less rich volcanic soil and tropical verdure, and sprinkled with sand- dunes and a few cone and pit-craters […] The rains are abundant, and subterranean fountains and streams are numerous, carrying the waters down to the sea level, and filling caverns, and bursting up along the shore in springs and rills, even far out under the sea […]
>
> Puna has many beautiful groves of the cocoa-palm, also breadfruit, pandanus, and ohia, and where there is soil it produces under cultivation, besides common vegetables, arrowroot, sugar-cane, coffee, cotton, oranges, citrons, limes, grapes, and other fruits. On the highlands, grow wild strawberries, cape gooseberries, and the ohelo, a delicious berry resembling our whortleberry. [Coan 1882:26]

Handy and Handy (1972) note the importance of breadfruit as a staple in Puna: "Except in Puna, Hawaii, breadfruit was wholly secondary to taro and sweet potato as a staple. We are told that in Puna in a good year, breadfruit may be eaten for eight months of the year, beginning with May" (Handy and Handy 1972:152).

The first specific written mention of Pohoiki comes from a report by Chester Lyman written following a trip with Rev. Coan to Puna in 1846. Lyman describes the natural setting of the bay and the people in attendance at the church service there:

> Our stopping place for the night was Pohoiki, about 7 miles from Koae and nearly the same distance S.W. from the Eastern point of the island. The natives brought us the Ki or Ti root baked – it was very sweet & juicy. There are fine groves of cocoanut and the situation of the hamlet on an inlet of the sea is very pleasant […]
>
> Friday July 10th. At low water a small spring of warm water issues from the beach – the temperature I found to be 90º.
>
> Mr. Coan began his meeting in the church at 8. There being much preliminary business I did not go in till 9. There were several infants baptized, and I noticed a greater proportion of old people than I had observed before. About 200 people were present – mostly seated on the ground, as is usually the case except in the larger and more central churches […] [Lyman 1924:96–97]

In addition to the church, a school was also present at Pohoiki. In 1848 Kanono, the teacher at Pohoiki, reported 52 students attending classes (State Archives Series 262 in Maly 1998:34).

Most of the early visitors to Puna followed an ancient coastal foot trail, which in the late

nineteenth century was made into a horse trail called the “Old Government Road” (Lass 1997:15). To improve these paths for horses, the variously spaced paving stones that marked the foot trail were removed, and curb stones to mark the edges of the trail and guide the horses were added. It is uncertain exactly when the foot trail was altered into an “improved road.” Alfred Hudson thought it was constructed right before the Wilkes Expedition of 1840-1841, since Wilkes (1845) states, “In some places they have taken great pains to secure a good road or walking path; thus, there is a part of the road from Nanavalie [Nānāwale] to Hilo which is built of pieces of lava. […]” However, Lass does not believe this was a horse trail, since Wilkes also states, “[T]he road is exceedingly fatiguing to the stranger, as the lumps are so arranged that he is obliged to take a long and a short step alternatively, but this the natives do not seem to mind, and they pass over the road with great facility […]” (Wilkes 1845:191). This suggests the trail was made of variously spaced paving stones. During a tour of Puna in 1848 by the missionaries Henry Lyman and Titus Coan, no mention is made of an improved road. Lass (1997:17) believes the present form of the Old Government Road was constructed around the early 1870s.

3.2.3 Puna in the Newspaper

The following section highlights Puna as it appeared in Hawaiian language newspapers of long ago. This work was compiled by the brilliant Kepā Maly (Maly and Maly 2021) and featured in his work *He Wahi Mo‘olelo no Kumakahi ma Kula.* Community consultant Mililani Trask, for whom this work was completed, strongly urged CSH to utilize his findings in this report. All translations and all articles compiled were done so by Maly. Maly shares, “When primary Hawaiian language narratives are cited, we have done our best to provide accurate translations or a synthesis of significant subject matter related to the ‘āina and kama‘āina” (Maly and Maly 2021:33). The printed articles share treasured *‘ike* and *mana‘o* forever recorded for generations to come.

3.2.3.1 *Nupepa Kuokoa*, Okatoba 1, 1861 (aoao 3)

He moolelo e paipai aku an ia	A story to encourage
oukou e ka poe e makemake mai	you people who desire
ana e lawe i ‘Ka Nupepa Kuokoa.’	to subscribe to the ‘Kuokoa Newspaper.
E Hawaii o Keawe.	Hail of Hawai‘i of Keawe.
Aloha oukou a pau, na hoalauna	Greeting to all of you companions
ma ka naauao. O Oukou no ka poe	of knowledge. Those of us

o kakou ka pomaikai, no ka mea,	who are blessed for
aia no oukou ke noho la ma	you are there, residing at
Kumukahi—	Kumukahi—
Ma kahi a ka la i puka mai ai,	From where the sun arrives,
Ma ka hikina i Haehae;	in the east at Ha‘eha‘e;
Malaila no na lehua o Malio;	There are found the lehua of Mali‘o (in the light of dawn);
Me ka hooku i ka ua o Nahunahu;	Standing in the biting rains;
E nana mai ana i na ki o Wahinekapu;	Gazing upon the kī (ti plants) of Wahinekapu;
Me ka makani he moani Puulena;	With the gentle Pu‘ulena breeze;
E lu ana i na lehua o Hiulani;	Scattering the lehua blossoms of Hi‘ulani;
E nana ia ana e Pahuluhala;	Gazing at Pahuluhala;
Hala Malama ka aina o Pele;	Past Mālama the land of Pele;
Me na pu-e uai o Pu-a-laa;	And the moveable planting mounds of Pū‘āla‘a;
Me ka Ulu hua i ka hapapa;	The breadfruit which fruits on the flats;
Me ka poho o Kawaiwelawela;	With the hollow of Kawaiwelawela;
E ka Milo-holu i Waiakaea;	O Miloholu at Waiaka‘ea;
O ka ipo hala o Pohina;	The beloved hala of Pōhina;
O ka hala i Halaaniani;	The hala at Hala‘ani‘ani;

Me ka wahine ai laau o Puna;	And the woman who eats the forests of Puna;
Me ka pali haili kanaka,	The cliffs upon which people are indistinct,
amuamu kanaka o Holei;	Grumbling people of Hōlei;
Me na kanaka alualu la hopuhopu	And the people who pursue, seeking to grasp
la o Kumukahi.	the sun at Kumukahi.
Ho‘okahi no mea a kākou e alu ai, e kokua ai, e hiipoi ai, e hooipo ai e hookane ai... W.N. Pualewa	There is but one that we should pursue, lend support to, cherish, love, and take on as a friend... W.N. Pualewa

3.2.3.2 *Ka Elele Poakolu*, Aperila 20,1881 (aoao 2)

He Inoa no Kalakaua (A Name Chant for King Kalakaua)

Auhea wale oe e ka liko,	Where are you o budding leaf,
E ke koolua a o ka lehua,	Constant compassion of the lehua blossoms.
Homai ke aloha ia nei,	Love descends here,
A i honi kuwili ia aku,	Embraced in a kiss,
Ke hoomau ae nai hoi,	It persists here,
I ke onaona la oia pua,	The fragrance of that flower,
A‘u i kui ai a lawa,	Which I have made into a garland,
I lei no‘u no ka Hikina,	A garland for me in the East,
No ka la hiki ma Kumukahi,	For the sun that arises at Kumukahi,
Kahiko ae la i Haehae,	An adornment for Ha‘eha‘e,
O ka wela ka i Kuaokala,	Warming Kuaokalā,
Hulili i ka Pahoehoe,	Glistening on the Pāhoehoe,
Nonono ka pua o ka lehua,	Deep red blossomsof the lehua,
Luhiehu i ke kula o Malama,	Beautiful on the plain of Mālama,
I ka hoope ia e ka ua...	Drenched in the rains...

3.2.3.3 *Nupepa Kuokoa*, Iune 9, 1883 (aoao 1)

Mele Inoa No Keelikolani (A Name Chant Lamentation for Keelikolani)

... A ka lai au i Mauliola	I am at peace at Mauliola,
I ka la hiki mai ma Haehae	Where the sun arises at Ha‘eha‘e,
Ke hoi ae la i Hanakaulua	And then returns to Hanaka‘ulua,
Elua pua oi ma ka hikina	Two exceptional blossoms in the east,
O Kumukahi la o Makanoni	Kumukahi and Makanoni,
Na Lehua o Malio i ka Ehukai	The lehua blossoms of Mali‘o in the ocean spray,
I ka lae hala o Kookoolau	At Laehala, Ko‘oko‘olau,
Holu ana ka milo i Waiakaea	The milo sways at Waiaka‘ea
Nape ana i ka wai koolihilihi	Bending over to the waters of Ko‘olihilihi,
Wai makaikai a ka malihini	Waters visited by many travelers,
Haina ka pua i kaulana	Spoken for the famous offspring,
O Keanolani no he inoa...	Keanolani is her name...

3.2.4 The Māhele and the Kuleana Act

In the mid-nineteenth century, during the time of Kamehameha III, a series of legal and legislative changes were brought about in the name of land reform (see the works of Jon Chinen 1958, 1971 for a thorough and well-written explanation). Before the Māhele, all land belonged to the *akua* (gods), held in trust for them by the paramount chief, and managed by subordinate chiefs.

Following the enactment of a series of new laws from the mid-1840s to mid-1850s, Kamehameha III divided the land into four categories: Crown Lands reserved for himself and the royal house; Government Lands for the government; Konohiki Lands claimed by *ali‘i* and their *konohiki* (supervisors); and *kuleana*, small plots claimed by the *maka‘āinana* (commoners) (Chinen 1958:8–15). These claims are described in Land Commission Award (LCA) testimony from the claimants and witnesses. A Royal Patent (RP), which quit-claimed the government’s interest in the land, was issued on most Land Commission Awards (Chinen 1958:14). In some cases, more than one RP number was issued for an LCA, especially in cases where there were several widely separated *‘āpana* (lots), such as an award with agricultural land in one *ahupua‘a* and a house lot in another.

Ali‘i were required to pay a commutation fee to the government for their confirmed Konohiki

Land titles; this payment could be in cash or in the return of land to the government or crown. Many *ali‘i* elected to return substantial portions of their awarded lands to avoid the one-third commutation cash fee. The Kuleana Act of 1850 allowed *maka‘āinana*, in principle, to own land parcels where they were currently and actively cultivating and/or residing. In 1851, certain Government Lands became available for purchase in lots of 1 to 50 acres in fee simple; this new category of land ownership became known as Royal Patent Grants or Land Grants.

In the Māhele the *ahupua‘a* of Keahialaka, Pohoiki, and Oneloa were awarded to the *ali‘i* William Charles Lunalilo, who would later become King of Hawai‘i; Oneloa was also awarded to the *wahine* (woman) Laumaka (Barrère 1994). Keahialaka was retained by Lunalilo, but Pohoiki and Onela were returned as commutation and retained by the government.

Although many Hawaiians did not submit or follow through on claims for their lands, the distribution of LCAs can provide insight into patterns of residence and agriculture. Many of these patterns probably had existed for centuries past. Examining the patterns of *kuleana* LCA parcels in the vicinity of the project area provides insight into the likely intensity and nature of Hawaiian activity in the area. However, very few *kuleana* were awarded in all of Puna. None were claimed in Keahialaka or Oneloa (Clark et al. 2014:29; Maly 1998:38). Two *kuleana* were claimed in Pohoiki but not awarded: LCA 2557 claimed by Nalima, and LCA 8748 claimed by J.B. Kane. These claims consisted of adjacent house lots at the coast; testimony relating to Kane’s claim indicates Nalima’s lot was enclosed by a fence and Kane’s by a stone wall (Clark et al. 2014:30).

3.2.5 Mid- to Late 1800s

The mid-1800s were marked by a decline in population throughout Hawai‘i. Soon after Contact, people began to move to port cities or other trading areas. Since Puna had no good harbor, it lost a large portion of its population to out-migration. The missionary Rev. Titus Coan estimated the population of Puna was 4,371 in the year 1841, which stayed constant until at least 1846, when Chester Lyman visited the area. However, in a second journey to the area in 1871, Lyman (1924:103) noted a rapid depopulation: “There are but few people in this region […] miserably poor and for some time past have been almost in a state of famine.” Decreasing population was also the result of the introduction of many foreign diseases, to which the Native Hawaiians had no natural immunity. Four epidemics occurred in 1848 and 1849, killing at least 1,000 people in the Hilo and Puna Districts (Coan 1882:260; Crozier and Barrère 1971:7; Lyman 1906:168–169). Furthermore, destructive earthquakes in the spring of 1868 caused a 75-mile stretch of the Puna-Ka‘ū coastline to subside and a tsunami destroyed numerous coastal homes and villages (Coan 1882:314–316), which likely exacerbated out-migration.

By 1860, the population of Puna was only 2,200 people, and by 1890, it had decreased to only 800 people (Schmitt 1968:71). Titus Coan wrote in 1882, “Our people are now greatly diminished by death, and by being drawn away to the numerous plantations of the islands, upon ranches, in various industries with foreigners, and by hundreds into Honolulu, and on board vessels […]” (Coan 1882:121). Also visiting in the 1880s, Captain Dutton noted, “The native

[Puna] population is somewhat scanty and has undergone a great decrease within the present century, as in all other parts of the island” (Dutton 1884:147).

A number of early commercial ventures took place in Puna—and the Pohoiki vicinity—during this time period. One of the earliest endeavors in Puna was the harvesting of *pulu*, the soft yellow wool from the base of the tree fern used for stuffing mattresses and pillows. Shipments were first sent to California in 1847; the industry peaked in 1860 and had declined significantly by the mid-1880s (Thrum 1911:10). The *pulu* trade generally had a negative effect on the native Hawaiians it employed (Shipman 1860).

In 1877 a man named Robert Rycroft began leasing land in Pohoiki and purchased a store and several outbuildings on a parcel adjacent to Pohoiki Bay (Maly 1998:48). At first Rycroft went into the *‘awa* shipping business. He constructed a wharf during the mid-1880s, which he agreed to allow for public use (Int. Dept. Book 30:206 in Maly 1998:52). Rycroft’s *‘awa* business was successful and so he increased his land holdings and created a small cattle ranch (*Honolulu Advertiser* 3 February 1909:5 in Maly 1998:71). According to Whitney (1895:66), a sawmill had also been established at Pohoiki “[…] and a quantity of lumber is exported to Honolulu.”

In 1878 J.S. Emerson surveyed Pohoiki with Rycroft and made the following remarks:

> The only landing between Hilo & Keauhou [Ka‘ū] is in the little bay makai of this land. The whole country here is fearfully rough on shoe leather. Scarce any soil. Cocoanuts, potatoes, breadfruit & awa do well. The best awa in the country. The timber would be valuable if it were accessible […] [Hawai‘i State Archives in Maly 1998:61]

Rycroft subsequently turned his efforts to coffee. By 1894 Rycroft was growing coffee on about 35 acres at approximately 450–500 ft amsl in upland Pohoiki, and he constructed a new mill for processing at the bay (Rycroft 1894:99). The wharf was used to ship out the milled coffee. An 1895 map (Figure 8) depicts both the “Old Mill” and “Rycroft’s New Mill” in relation to roadways and the wharf. Also shown are several enclosures and structures around the bay including a courthouse and jail in the vicinity of the secondary access route, and the church and boat shed along the southern side of the bay. Eventually Rycroft had three hundred acres under coffee cultivation (*Honolulu Advertiser* 3 February 1909:5 in Maly 1998:71).

Government lands in Ola‘a were also developed into homesteads intended for coffee cultivation, but the project was a failure (McEldowney 1979:40). Rycroft similarly found little success. The fledgling coffee industry of Puna could not compete with similar growers in the Kona region, and coffee operations in Puna declined after 1905 and disappeared completely by 1927 (University of Hawai‘i 1927 in Cordy 1977:4). Coffee trees continued to grow in scattered clumps in the Pohoiki area, but local informants who lived in the area in the mid-twentieth century said the beans were not harvested (Kennedy et al. 1991:20).

During this time travel in Puna was conducted over a few well-established roads and smaller lateral trails. The “Puna Road” or Old Government Road ran from Hilo along the Puna coast to Kahaualea where it then turned upslope and back up to the summit of Kīlauea. This road in the

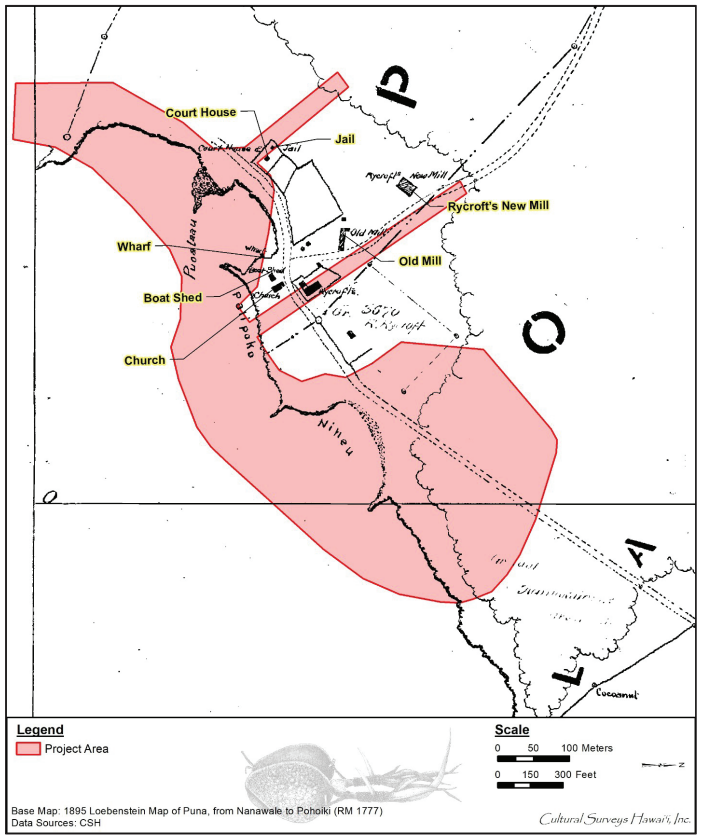


Figure 8. Portion of the 1895 Lobenstein map of Puna, from Nanawale to Pohoiki, showing the project area in relation to features such as the courthouse and jail, old and new mills, wharf, boat shed, and church

Pohoiki Bay vicinity is shown crossing through portions of the project area on the 1895 map (see Figure 8); the *mauka-makai* road depicted on the map accessed Rycroft's upland coffee plantation and was the precursor to the current Pohoiki Road.

The establishment of homesteads and improved access in Puna toward the end of the nineteenth century also provided economic opportunity for small-scale farmers. Soon, however, economic activity in Puna would become focused around a new "king crop," sugar. While much of this activity was concentrated to the north, it would also impact portions of the Pohoiki area, as Rycroft sold his interests there to the newly formed Puna Sugar Company before moving to Honolulu (*Honolulu Advertiser* 3 February 1909:5 in Maly 1998:71).

3.2.6 Early 1900s

Around the turn of the century there was no longer a church building (or school) present at Pohoiki; by 1907 a summer house had been erected in its former vicinity by J.P. Kuiaoholani, in addition to Rycroft's wharf and boat house and a warehouse (Hawai'i State Archives in Maly1998:73). A 1906 map (Figure 9) shows the nearest schools at Malama to the south and Kapoho to the north, though a village is still noted at Keahialaka. The extent of the new homestead settlement tracts in Oneloa, Laepāo'o, and Ahalanui to the north is also visible.

The major change in Puna during this period was the establishment of sugar plantations. In May 1899 Olaa Sugar Company leased 3,812 acres of land in 'Ōla'a (Pāhoa up to Mountain View) from W.H. Shipman for a term of 40 years (Maly 1999:59). Subsequent development and expansion of the plantation led to extensive land clearing and alteration for planting fields and construction of a mill, village, and labor camps in the 'Ōla'a area (Hurst 1994:15). The First Puna Sugar Company was also established around this time:

> The same people who incorporated Olaa Sugar Company also founded the first Puna Sugar Company in 1900. By 1905 its harvests were being ground at the Olaa mill. To all intents and purposes, Puna Sugar Company operated as a division of Olaa Sugar Company. The merger was made official in 1936, when the latter company purchased the assets of the former at auction. However, the 1955 lava flow removed any possibility of harvesting cane again on the former Puna Sugar Company lands. [Dorrance and Morgan 2000:107]

The 1906 map (see Figure 9) indicates several areas planted in sugarcane by the Puna Sugar Company in upland Keahialaka and Kapoho above Pohoiki and Oneloa.

In December 1899 a 40-ft-wide right-of-way from Kea'au to Hilo was granted to the Hilo Railway Company by Shipman for development of a railroad to service the plantations (Hurst 1994:15). In 1900, a 17-mile coastal extension was constructed to the sugarcane fields near Kapoho. Spurs were built inland to additional fields in Pāhoa and Kama'ili. The rail transportation occurred primarily from the 'Ōla'a, Pāhoa, and Kapoho fields and was used to haul sugar to the mill in 'Ōla'a.

In 1914, the Hilo Railway Company went into receivership and was reorganized as the

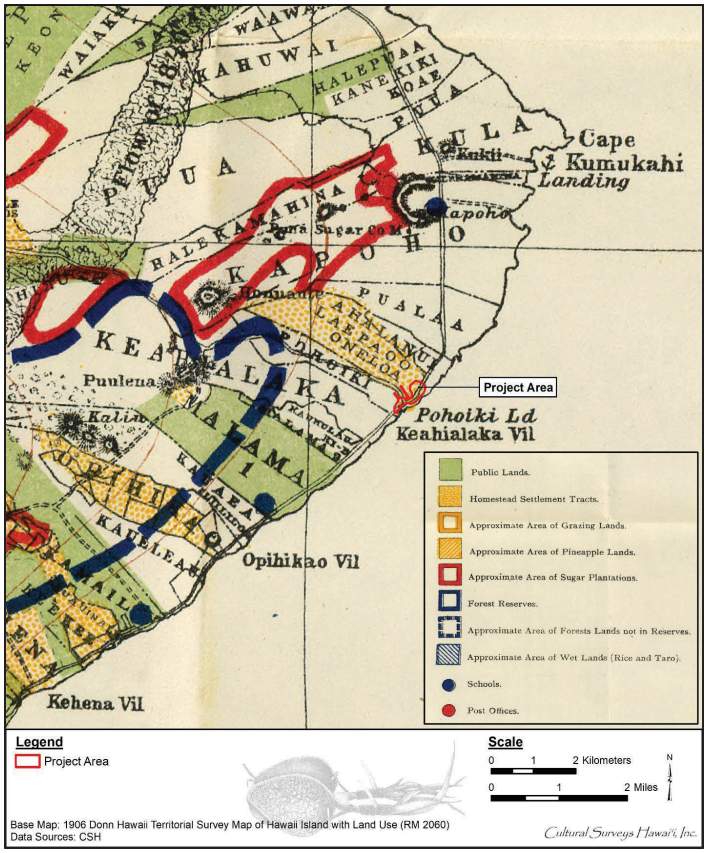


Figure 9. Portion of the 1906 Donn Hawaii Territory Survey map of Hawaii Island showing land use in the vicinity of the project area

Hawai'i Consolidated Railway. A portion of the railroad is visible upslope of the project area in the 1930 USGS topographic map (Figure 10). Portable tracks were used in the cane fields until 1945; Figure 11 shows the extent of the railway at that time. Prior to using the portable tracks, loaded carts were pulled by mule to the main line. On 1 April 1946 a tsunami inundated the railway on the Hāmākua Coast and in Hilo, forcing the Hawaii Consolidated Railway Company out of business (Condé and Best 1973:99, 211, 388). However, portions of the Puna Division continued to be operated by the Olaa Sugar Company until 1948, when trucks took over the transportation of the sugarcane (Treiber 2005:59).

3.2.7 Mid- to Late 1900s

The former Pohoiki school lot became the site of the first Pohoiki Park around 1940; by this time the wharf facilities at the old landing had been abandoned (Cordy 1977:4). In 1941 the lot containing the former courthouse and jail was deeded to Moses Kuamo'o (Clark et al. 2014:65).

A 1939 map (Figure 12) shows the location of the enclosed courthouse and jail, as well as the school lot across the bay. A driveway is shown leading *mauka* from the courthouse to the "Pohoiki-Opihikao Gov't. Main Road," and a "Government Trail" is shown passing the *makai* end of the lot. This trail extended around the bay where it accessed dwellings and connected to the "Old Beach Road." Annie Kuakai, niece of Moses Kuamo'o, was interviewed for the Clark et al. (2014) study and recalled the following information about the Kuamo'o property and the old courthouse:

> Mrs. Kuakai, who grew up in Malama and spent much of her childhood at the Pohoiki property, recalled that her Dad, a policeman, and her uncle, a merchant marine, had purchased the property together for the sum of $200. There were three buildings on the property at that time, but the wood from one was used to build a kitchen and bedroom in the former courthouse structure, which had been open on the inside. There used to be a canoe landing in front of the Kuamo'o property, and fishing was the only activity practiced in the water at that time, no one swan [sic] there. As a child she recalled going to the shore early in the morning and helping her father fish from the canoe before going to school. The canoes would be hauled up onto the land when not in use. The Old Government Road used to pass in front (*makai*) of the Kuamo'o property, and she used to travel along it to Malamakī, where a trail went *mauka* to her family's land in Malama. The Old Government Road in front of the property (along with a portion of the Kuamo'o parcel) was submerged as a result of coastal subsidence caused by the 1975 Kalapana earthquake. Mrs. Kuakai is concerned about losing more land to the ocean, and she expressed her desire to build a sea wall in front of the parcel to stop the coastal erosion.
>
> Nearby the Kuamo'o property, Mrs. Kuakai recalled that there were formerly two additional ponds in the vicinity of the Pohoiki Warm Spring; one has been filled in with beach cobbles, and another is now covered over and used as a well by the

Figure 10. Portion of the 1930 Kapoho USGS topographic quadrangle showing the project area in relation to the Hawaii Consolidated Railway located upslope

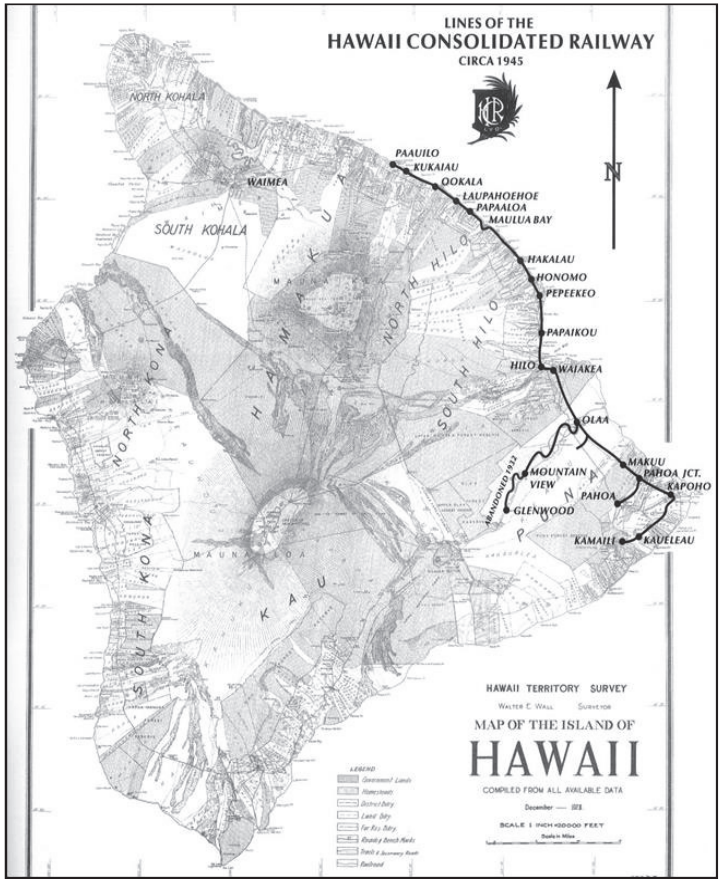


Figure 11. 1928 Territory Survey map of Hawai'i Island by Walter E. Wall, overlain with the route of the Hawai'i Consolidated Railway ca. 1945 (figure from Treiber 2005)

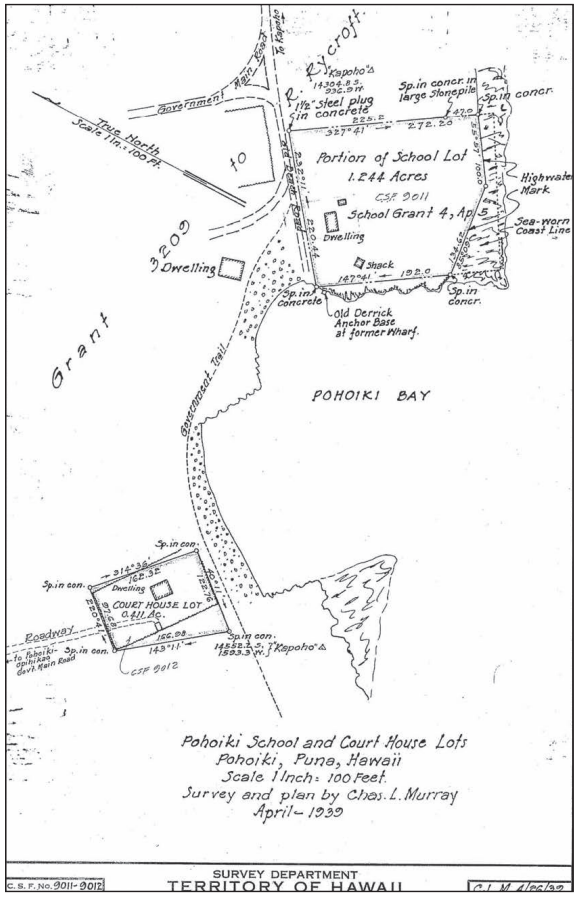


Figure 12. 1939 Murray map of Pohoiki School and Courthouse Lots

Smiths. While she recalled that several families lived on the *makai* lands nearby the study *ahupua'a* when she was a child, she did not recall any agricultural activities occurring there during her time (she thought that some taro and bananas had previously been grown near her family's property in Pohoiki), and said that all the families had gardens in the more *mauka* regions of the *ahupua'a*. The old Pohoiki Courthouse building accidently burned down in ca. 1958-1959. Following the destruction of the original building a new structure was erected on the property that also burned down, followed by a third structure that was destroyed by fire in ca. 2000. The family did not rebuild after the third fire. [Clark et al. 2014:78–79]

The site of the old Rycroft coffee mill was maintained by John Hale until the 1950s and then fell into disrepair (Devereaux et al. 1998:50). In 1963 the U.S. Army Corps of Engineers (USACE) constructed a boat ramp at the site of the former wharf. The 1963 USGS topographic map (Figure 13) illustrates limited development in the vicinity of the project area during this time period. "Isaac Hale Park" is shown, reflecting the renaming of Pohoiki Park in honor of Korean War casualty Private Isaac Kepookani Hale of Kapoho. A series of roadways are also visible in upper Keahialaka, Pohoiki, Oneloa, and Laepāo'o, related to agricultural development.

In 1975 an earthquake caused the coastline at Pohoiki to subside by over a foot (Hawaiian Volcano Observatory 1995). A 1977 aerial photograph (Figure 14) shows the extent of agricultural development surrounding the Pohoiki Bay area. In 1979 the USACE constructed a 90-ft-long protective breakwater at the Pohoiki Boat Ramp (U.S. Army Corps of Engineers 2023), which exacerbated coastal erosion along some of the properties fronting the bay.

3.2.8 Contemporary Land Use

Isaac Hale Beach Park was expanded and improved in the modern era to include additional facilities on lands *mauka* of Kaimu-Kapoho Road (also known as Kalapana-Kapoho Road) that were formerly under papaya cultivation. Agriculture continues to be a main economic driver for the area, though many farms were inundated or otherwise impacted by the 2018 eruption. Puna's fishing community has been severely impacted by the loss of the boat ramp. Isaac Hale Beach Park, once a bustling hub for fishermen, surfers, and other local community users is now primarily frequented by tourists curious to see the dramatically changed landscape.

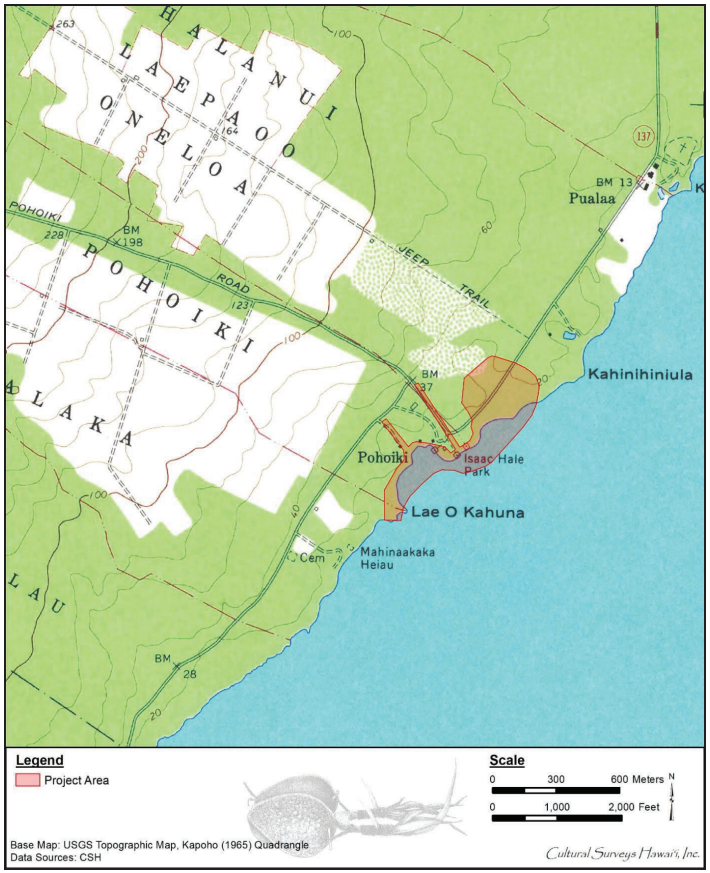


Figure 13. Portion of the 1965 Kapoho USGS topographic quadrangle showing "Isaac Hale Park" and some roadway development upslope of the project area

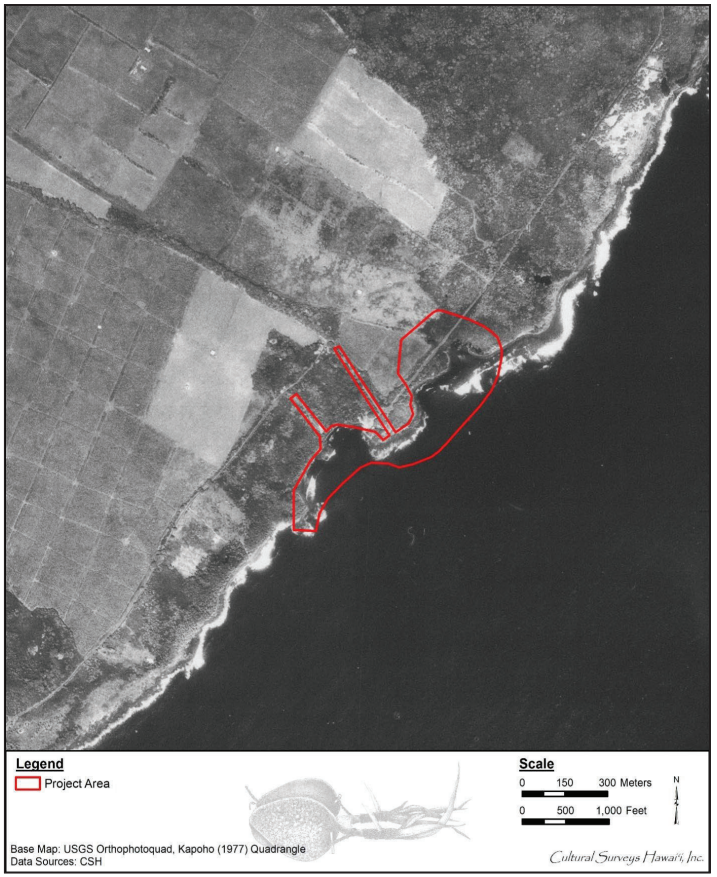


Figure 14. Portion of the 1977 USGS orthophotoquad aerial photo (Kapoho quadrangle), showing the project area in relation to agricultural developments

3.3 Previous Archaeological Research

Research indicates 11 prior archaeological studies have been conducted in the vicinity of Pohoiki Bay. These studies are summarized in Table 4. The earliest studies were island or district-wide surveys of *heiau* (pre-Christian places of worship) and the coast (Hudson 1932; Stokes 1919; Thrum 1907); subsequent studies were conducted within more clearly delineated boundaries and are illustrated in relation to the project area in Figure 15. Of these more recent studies, five overlap with or are surrounded by the current project area limits: Bevaqua and Dye (1972), Cordy (1977), Devereux et al. (1998), Clark and Rechtman (2005), and Clark et al. (2014). These five studies are discussed in greater detail below. Historic properties previously documented in the vicinity of the project area are shown in Figure 16.

3.3.1 Bevaqua and Dye 1972

In 1972 the Bishop Museum conducted an archaeological reconnaissance for the proposed Kapoho-Kalapana (Kaimu-Kapoho) Highway (Bevacqua and Dye 1972; see Figure 15). Forty-eight sites were documented along a 15-mile stretch between Kapoho and Kalapana and assigned State Inventory of Historic Places (SIHP) numbers. Of these, seven sites were located in the vicinity of Pohoiki Bay (see Figure 16): SIHP #s 50-10-46-02507, a complex of habitation enclosures and surrounding agricultural features; -02508, a square-shaped enclosure; -02509, an irregularly shaped enclosure used as an animal pen; -02510, a natural warm spring pool; -02511, the old Rycroft coffee mill; -02515, a complex comprising an enclosure, stone-lined well, wall, and platform; and -02530, the “King’s Highway” or “King’s Trail” (also known as the Old Government Road). Bevaqua and Dye (1972:20) describe SIHP # -02530 as “a curbed trail for two horses that was probably built in the late 1860s by prison labor.” Three more sites were documented just *mauka* of Route 137 in Pohoiki (SIHP #s -02512 through -02514, two enclosures and a platform, respectively), and Mahina‘aka‘aka Heiau (SIHP # -02517) and the Keahialaka Ponds (SIHP # -02518) were documented to the south of Pohoiki Bay in Keahialaka (see Figure 16). Note the name for Mahina‘aka‘aka is given as Mahina‘akaka in some other sources; consultation with *heiau* architect Keone Kalawe indicates the correct spelling is Mahina‘aka‘aka.

3.3.2 Cordy 1977

In 1977, an archaeological inventory survey (AIS) was conducted for the Pohoiki Bay Navigation Improvement project by the U.S. Army Corps of Engineers, focused around the existing boat ramp area (Cordy 1977; see Figure 15). Two metal poles were documented in the water near the boat ramp, interpreted as remnants of the landing dating to the Rycroft era when coffee was shipped from the bay (mid-1890s; Cordy 1977:6). No SIHP designation was assigned for the poles. Oral testimonies collected from Pohoiki resident John Hale and Wayne Naiga also indicated the park had been the site of an historic fishing village that included two houses (Cordy 1977:2).

3.3.3 Devereux et al. 1998

In 1998 CSH completed an AIS at Ahalanui Park and Pohoiki (Isaac Hale) Park (Devereux et al. 1998). While the Ahalanui Park study area was well north of the current project area, the Pohoiki Park study area overlaps the limits of the current project area (see Figure 15).

Table 4. Previous archaeological studies in the vicinity of the project area

Reference	Type of Study	Location	Results (SIHP # 50-10-46-*****)
Thrum 1908	Survey of *heiau*	Island-wide	Documented two *heiau* in general vicinity of current project area: O‘olo in Pohoiki, described as destroyed; and Mahina‘aka‘aka in Keahialaka
Stokes 1919 (see Stokes and Dye 1991)	Survey of *heiau*	Island-wide	Documented one *heiau* in general vicinity of current project area: Mahina‘aka‘aka in Keahialaka
Hudson 1932	Archaeological survey	Coastal East Hawai‘i	Documented two historic properties in general vicinity of current project area: SIHP #s -00145, a possible house site located approx. 1.2 km northeast of Pohoiki; and -00147, described as possible habitation platforms “a few hundred yards” south of Pohoiki; Hudson (1932:366) also noted “Around the boat landing at Pohoiki and for some distance up and down the coast are evidence of former extensive occupancy. The lines of old walls can be followed although the stones have been removed and there are traces of former platforms and paving on the beach.”

Reference	Type of Study	Location	Results (SIHP # 50-10-46-*****)
Bevacqua and Dye 1972	Archaeological reconnaissance	Kapoho-Kalapana (Kaimu-Kapoho) Hwy	Documented seven historic properties in general vicinity of current project area: SIHP #s -02507 (habitation complex); -02508 (enclosure); -02509 (enclosure); -02510 (warm spring), -02511 (old Rycroft coffee mill), -02515 (complex), -02516, -2530, King's Rd/Old Government Rd; of these, only a portion of SIHP # -02530 indicated within/ overlapping current project area
Cordy 1977	Archaeological inventory survey	Pohoiki Bay	Documented two metal poles located in water near existing Pohoiki boat ramp; no SIHP # assigned
Kennedy et al. 1991 and Dunn et al. 1994	Archaeological inventory survey	Ahalanui, Oneloa, and Laepao‘o Ahupua‘a, TMKs: (3) 1-4-002:013, 014, 024, 069, and 070	Documented 48 sites comprising 26 complexes and 22 single feature sites (SIHP #s -11565, -11574, -11899, -11926, -12007, -12124 through -12141, -12143 through -12147, -12153, -12154, -12156 through -12162, -12185, -12188, -12572, -12668, -12699, -12704, -12724, -12726, -12774, and -16178); site types included alignment, cave, C-shape, enclosure, hearth, indeterminate agriculture, modified outcrop, mound, platform, terrace, trail and wall; functional categories identified include agricultural, habitation, ancillary habitation, temporary habitation, boundary wall, burial, animal husbandry, and transportation; sites represented remnants of Pū‘āla‘a Village; all sites inundated by 2018 lava flow

Reference	Type of Study	Location	Results (SIHP # 50-10-46-*****)
Hunt 1996	Archaeological inventory survey	4.54-acre parcel in Keahialaka Ahupua‘a, TMK: (3) 1-3-008:003	No historic properties documented; lack of archaeological features attributed to extensive past land alteration
Devereux et al. 1998	Archaeological inventory survey	Ahalanui Park at TMKs: (3) 1-4-002:005, 006, and 061; and Pohoiki (Isaac Hale) Park at TMKs: (3) 1-3-008:016 and 013, and 1-4-002:008	Documented two historic properties: previously identified SIHP # -02507 (historic habitation complex) in Pohoiki; and newly identified SIHP # -21352 (historic well) in Ahalanui; SIHP # -21352 inundated by 2018 lava flow
Clark and Rechtman 2005	Archaeological inventory survey	Kapoho-Kalapana Rd (Route 137) near Pohoiki Bay, Oneloa Ahupua‘a, TMKs: (3) 1-4-002:009, 013 and 1-3-008:016	Within study area documented five features of previously identified SIHP # -12157 (agricultural and habitation complexes); also documented locations of two previously identified sites located outside but near study area, including SIHP #s -12153 (burial platform), and -12156 (lava blister with burials); all sites inundated by 2018 lava flow
Clark et al. 2014	Archaeological inventory survey	35.5-acre parcel at Pohoiki Bay; Pohoiki and Keahialaka Ahupua‘a, TMK: (3) 1-3-08:034	Documented five previously identified historic properties (SIHP #s -02510, -02511, -02515, -02516, and -02530) and 22 newly identified archaeological sites assigned as SIHP #s -30129 through -30150; sites associated primarily with agriculture and historic-era activity; two sites indicated to overlap current project area, including a portion of SIHP #s -02530 (Old Government Rd) and -30141 (historic/modern landscaping complex); one additional site (SIHP # -30137, Rycroft's Rd alignment) may interface current project area along Pohoiki Rd

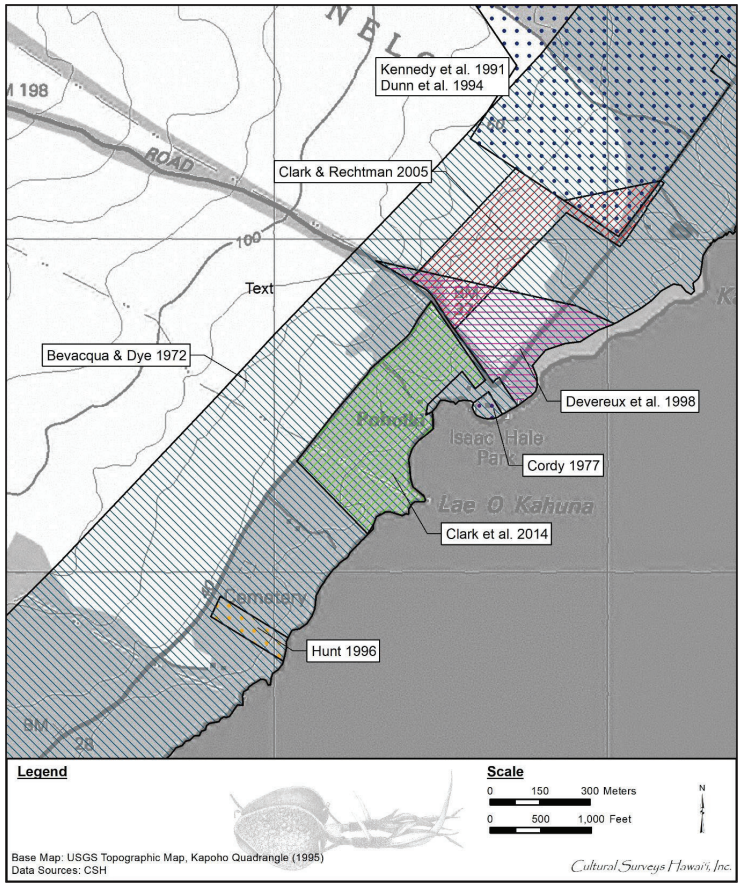


Figure 15. Portion of the 1995 Kapoho USGS 7.5-minute topographic quadrangle showing the location of previous archaeological studies in the vicinity of the project area

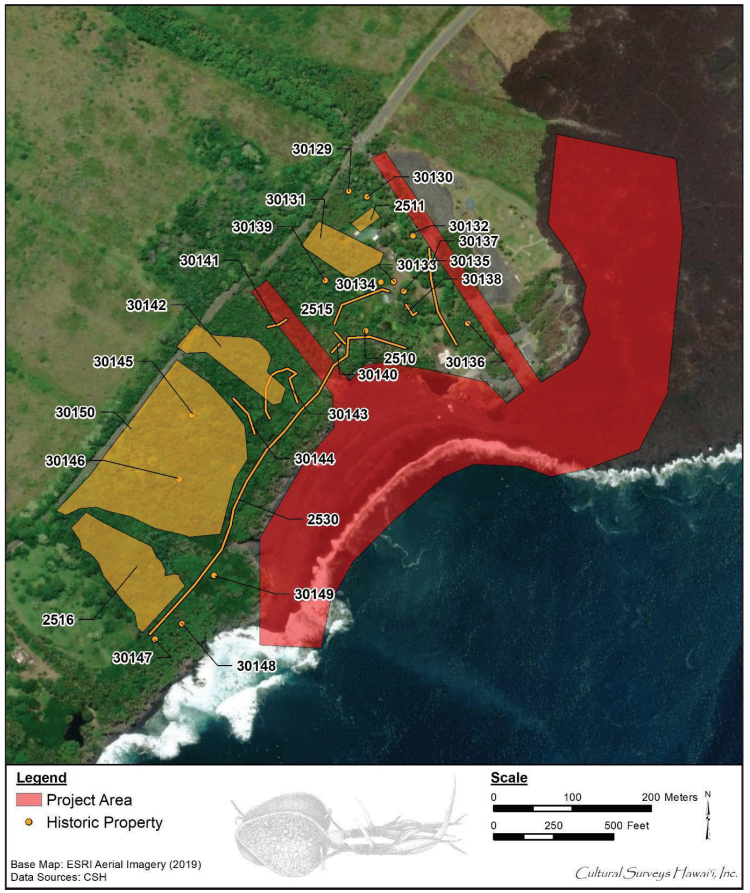


Figure 16. Aerial imagery (ESRI 2019) showing the location of previously documented historic properties in the vicinity of the project area

One historic property was documented within the Ahalanui Park study area (SIHP # 50-10-46-21352, a well), and a coconut grove was noted but not designated as an archaeological site. One historic property was also identified within the Pohoiki Park study area (SIHP # -02507, habitation complex previously documented by Bevaqua and Dye 1972; see Figure 16). Devereux et al. (1998:29–30) described SIHP # -02507 as a complex of two habitation-related enclosures situated on the *mauka* side of Kaimu-Kapoho Road near the junction with Pohoiki Road, likely constructed in association with the mid-1900s Land Grant 1001 awarded to Kamakuakane. Both SIHP #s -02507 and -21352 were recommended for preservation; SIHP # -21352 was later inundated by the 2018 lava flow.

SIHP #s -02508 and -02509, previously documented by Bevaqua and Dye (1972) in the Pohoiki Park vicinity, were not confirmed during the AIS. Devereux et al. (1998:26) note the general area of these sites—currently part of the boat parking area—had been bulldozed for a papaya field in the past.

3.3.4 Clark and Rechtman 2005

In 2005 Rechtman Consulting undertook an AIS for the Pohoiki Road Realignment project, overlapping a portion of the proposed access route along Pohoiki Road (Clark and Rechtman 2005; see Figure 15). The majority of the study area was found to have been mechanically altered in the past for papaya cultivation. Five features of SIHP # 50-10-46-12157 (agricultural and habitation complex) previously identified by Dunn et al. (1994) were confirmed and documented within the triangular, northeastern portion of the study area, which had not been impacted by papaya cultivation. The specific locations of these features are not included in the report and therefore they do not appear on Figure 16. Two additional sites previously identified by Dunn et al. (1994) located outside but near the study area were also investigated, including SIHP #s -12153 (burial platform), and -12156 (lava blister with burials). The study concluded the project would have no direct impact on any known archaeological sites (Clark and Rechtman 2005:13). All three sites were inundated by the 2018 lava flow.

3.3.5 Clark et al. 2014

In 2014 ASM Affiliates undertook an AIS of a 35.5-acre parcel located at Pohoiki Bay, overlapping portions of the current project area along the former shoreline and proposed secondary access route (Clark et al. 2014; see Figure 15). The AIS was completed in association with the subdivision of parcel TMK: (3) 1-3-008:034 to facilitate the county's purchase of a 26.782-acre portion under the Public Access, Open Spaces, and Natural Resource Preservation Commission (PONC) program (current parcel TMK: [3] 1-3-008:097). The other 8.785 acres would remain under the ownership of landowners Merrill and Ida Smith.

The AIS documented 27 historic properties comprising over 70 individual features. Of the 17 documented sites, five were previously recorded by Bevaqua and Dye (1972), including SIHP #s 50-10-46-02510 (Pohoiki Warm Spring), -02511 (historic mill complex), -02515 (a pre-Contact to early historic habitation complex), -02516 (agricultural complex), and -02530 (a portion of the old coastal Government Road). The 22 newly recorded sites were assigned as

SIHP #s 50-10-46-30129 through -30150 and included several enclosures and alignments, two concrete cisterns, two concrete foundations, four core-filled wall segments, a stone-lined pit, free-standing concrete oven and smokestack, the former Rycroft's Road alignment, stepping-stone trail segment, anchialine pond, and habitation and agricultural complexes. While the majority of the sites were found to be associated with historic-era land use, some evidence of pre-Contact habitation and agriculture was also observed. Figure 16 indicates two of documented sites overlap with the current project area, both in the vicinity of the proposed secondary access route. These include a portion of the Old Government Road (SIHP # -02530) and the majority of SIHP # -30141, a complex comprising two alignments and an enclosure associated with historic/modern landscaping. Additionally, the former Rycroft's Road alignment (SIHP # -30137) may interface with the project area where it terminates along the current Pohoiki Road corridor (see Figure 16).

Fourteen of the 27 documented historic properties were situated in the portion of the study area to be purchased by the county. Clark et al. (2014:242) recommended preservation for all 14 of these sites, and also data recovery at one site (SIHP # -02516, agricultural complex) to obtain additional information about its functional nature and temporal development. In the portion of the study area to be retained by the Smith family, two sites (SIHP #s -02515 and -30131) were recommended for preservation and the remaining 11 sites were recommended for no further work.

Section 4 Consultation Results

4.1 Introduction

Throughout the course of this assessment, an effort was made to contact and consult with NHO, agencies, and community members including descendants of the area, in order to identify individuals with cultural expertise and/or knowledge of the *ahupua‘a* of Keahialaka, Pohoiki, and Oneloa. CSH initiated its outreach effort in January 2023 through letters, emails, and/or telephone calls.

4.2 Community Outreach Letter

Two sets of letters along with maps and project figures were sent out to the community. There was a slight change to the first round of letters that were sent and a second round of a newly drafted letter (Figure 17 through Figure 19) was sent with the following text:

> With this letter, Cultural Surveys Hawai‘i (CSH) humbly requests your *mana‘o* and *‘ike* (experience, insights, and perspectives) regarding past and ongoing cultural, practices, beliefs, and resources within the Pohoiki Ahupua‘a.
>
> Consultation with traditional cultural practitioners, *kūpuna*, *kama‘āina*, and Hawai‘i’s diverse ethnic communities is an important and deeply valued part of our work and the environmental review process for proposed projects in Hawai‘i. Your contributions will revitalize and keep alive knowledge of cultural practices, storied places, and life experiences that will remind Hawai‘i’s children of their history for generations to come.
>
> Project Description
>
> At the request of The Limtiaco Consulting Group on behalf of the Department of Land and Natural Resources (DLNR), Division of Boating and Ocean Recreation (DOBOR) , CSH is conducting a cultural impact assessment (CIA) for the Pohoiki Boat Ramp Dredging of Volcanic Debris and Slope Stabilization Project. The location and boundaries of the proposed project area is depicted on a portion of the 1995 Kapoho U.S. Geological Survey (USGS) 7.5-minute series topographic quadrangle (Figure 1) and a 2019 ESRI aerial image (Figure 2) attached to this invitation.
>
> The State Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR) is moving forward with the restoration of the existing Pohoiki Bay boat ramp. Pohoiki Bay has filled in with black sand and cobbles as a result of the 2018 volcanic eruption. Thus, the Pohoiki boat ramp is land-locked and unusable. Currently, DOBOR’s proposed action is to dredge as much material from the bay as possible to restore pre- eruption depths.

> Dredged volcanic debris would be distributed along the former shoreline of the bay and/or on newly formed lava land that is beyond the reach of tidal waves. The proposed project would necessitate depositing most or all of the dredged material upon the jagged area of newly formed lava land to the east of the existing boat ramp. The project area, depicted in Figure 2, comprises approximately 50.3 acres and accounts for dredging activity, access, staging, and deposit of dredge material. The overall public sentiment with regards to several alternatives including the dredging of a channel that is narrow or wide, constructing protective jetties, and no action has been unfavorable.
>
> Purpose of this Study
>
> The purpose of a CIA is to gather information on Hawai‘i’s cultural resources, practices, or beliefs that have occurred or still occur within the proposed project area and the Pohoiki Ahupua‘a. This is accomplished through consultation and background research using previously written documents, studies, and interviews. This information is used to assess potential impacts by the proposed project to the specific identified resources, practices, and beliefs in the project area and throughout the Pohoiki Ahupua‘a. As a traditional cultural practitioner and holder of long-term knowledge, your insight, input, and perspective provide a valuable contribution to the assessment of potential effects of this project and an understanding of how to protect these resources and practices.
>
> Insights focused on the following topics in the project area (shown on the attached Figures 1 and 2) are especially helpful and appreciated:
>
> - Your knowledge of traditional cultural practices of the past within the proposed project area and the Pohoiki Ahupua‘a
> - Your specific traditional cultural practice and its connection to the proposed project area and the Pohoiki Ahupua‘a
> - The different natural resources associated with your specific traditional cultural practice
> - Legends, stories, or chants associated with your specific traditional cultural practices and their relationships to the proposed project area and the Pohoiki Ahupua‘a
> - Referrals to other *kūpuna*, *kama‘āina*, and traditional cultural practitioners knowledgeable about the proposed project area and the Pohoiki Ahupua‘a
> - Your comments or thoughts on the potential impacts the proposed project may have on your ongoing traditional cultural practices and natural resources within the proposed project area and the Pohoiki Ahupua‘a
> - Your knowledge of cultural sites and *wahi pana* (storied places) within the

proposed project area and the Pohoiki Ahupua‘a

- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed project area and the Pohoiki Ahupua‘a

Consultation Information

Consultation is an important and deeply valued part of the CIA and environmental review process. Your contributions will revitalize and keep alive our combined knowledge of past and ongoing cultural practices, historic places, and experiences, reminding our children of their history generation after generation.

With your agreement to participate in this study, your contributions will become part of the comprehensive understanding of traditions of the area, and part of the public record; they will be available for future access through the Environmental Review Program (https://planning.hawaii.gov/erp/) and at the State Historic Preservation Division Library (https://dlnr.hawaii.gov/shpd/about/research- resources-library).

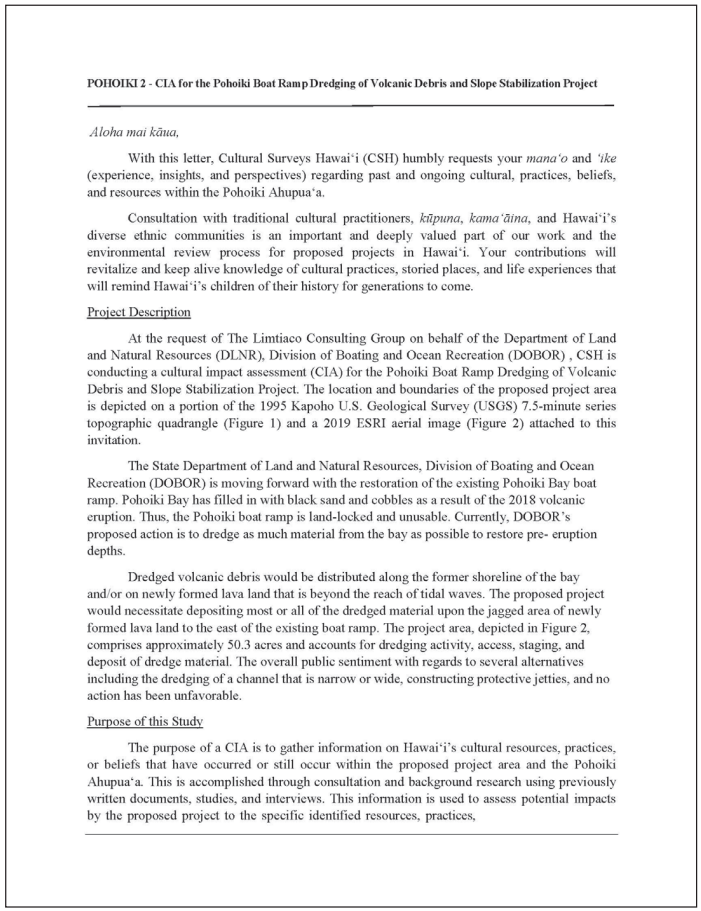
As a part of this process, your knowledge may be used to inform future CIAs and other heritage studies of cultural practices and resources that need protection from impacts of proposed future projects. If you engage in consultation, and the *mana‘o* and *‘ike* you provide appears in the study, we would like to recognize your contribution by including your name. If you prefer not to allow your name to be included, your information can be attributed to an anonymous source.

The consultation interview structure and format are flexible. We will accommodate your preference on how to get together; talk story, over the phone, by email correspondence, remotely via Zoom, MS Teams, Google Chat or other remote meeting platforms.

Your knowledge of the resources and potential effect of the project on traditional practices in the project area and the Pohoiki Ahupua‘a focusing on the topics in the bullet points above can also be submitted in a written statement. CSH will provide return postage of your written statement on request.

CSH is happy to provide a list of topics for discussion, a more structured questionnaire of interview questions, or any other assistance that might be helpful.

If you have questions regarding consultation, or are interested in participating in this study, please contact CSH Cultural Researcher Chantellee Spencer by email at [...]or phone at [...].



POHOIKI 2 - CIA for the Pohoiki Boat Ramp Dredging of Volcanic Debris and Slope Stabilization Project

Aloha mai kāua,

With this letter, Cultural Surveys Hawai‘i (CSH) humbly requests your *mana‘o* and *‘ike* (experience, insights, and perspectives) regarding past and ongoing cultural, practices, beliefs, and resources within the Pohoiki Ahupua‘a.

Consultation with traditional cultural practitioners, *kūpuna*, *kama‘āina*, and Hawai‘i’s diverse ethnic communities is an important and deeply valued part of our work and the environmental review process for proposed projects in Hawai‘i. Your contributions will revitalize and keep alive knowledge of cultural practices, storied places, and life experiences that will remind Hawai‘i’s children of their history for generations to come.

Project Description

At the request of The Limtiaco Consulting Group on behalf of the Department of Land and Natural Resources (DLNR), Division of Boating and Ocean Recreation (DOBOR) , CSH is conducting a cultural impact assessment (CIA) for the Pohoiki Boat Ramp Dredging of Volcanic Debris and Slope Stabilization Project. The location and boundaries of the proposed project area is depicted on a portion of the 1995 Kapoho U.S. Geological Survey (USGS) 7.5-minute series topographic quadrangle (Figure 1) and a 2019 ESRI aerial image (Figure 2) attached to this invitation.

The State Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR) is moving forward with the restoration of the existing Pohoiki Bay boat ramp. Pohoiki Bay has filled in with black sand and cobbles as a result of the 2018 volcanic eruption. Thus, the Pohoiki boat ramp is land-locked and unusable. Currently, DOBOR’s proposed action is to dredge as much material from the bay as possible to restore pre- eruption depths.

Dredged volcanic debris would be distributed along the former shoreline of the bay and/or on newly formed lava land that is beyond the reach of tidal waves. The proposed project would necessitate depositing most or all of the dredged material upon the jagged area of newly formed lava land to the east of the existing boat ramp. The project area, depicted in Figure 2, comprises approximately 50.3 acres and accounts for dredging activity, access, staging, and deposit of dredge material. The overall public sentiment with regards to several alternatives including the dredging of a channel that is narrow or wide, constructing protective jetties, and no action has been unfavorable.

Purpose of this Study

The purpose of a CIA is to gather information on Hawai‘i’s cultural resources, practices, or beliefs that have occurred or still occur within the proposed project area and the Pohoiki Ahupua‘a. This is accomplished through consultation and background research using previously written documents, studies, and interviews. This information is used to assess potential impacts by the proposed project to the specific identified resources, practices,

Figure 17. Community consultation letter, page one

POHOIKI 2 - CIA for the Pohoiki Boat Ramp Dredging of Volcanic Debris and Slope Stabilization Project

Page 2

and beliefs in the project area and throughout the Pohoiki Ahupua'a. As a traditional cultural practitioner and holder of long-term knowledge, your insight, input, and perspective provide a valuable contribution to the assessment of potential effects of this project and an understanding of how to protect these resources and practices.

Insights focused on the following topics in the project area (shown on the attached Figures 1 and 2) are especially helpful and appreciated:

- Your knowledge of traditional cultural practices of the past within the proposed project area and the Pohoiki Ahupua'a
- Your specific traditional cultural practice and its connection to the proposed project area and the Pohoiki Ahupua'a
- The different natural resources associated with your specific traditional cultural practice
- Legends, stories, or chants associated with your specific traditional cultural practices and their relationships to the proposed project area and the Pohoiki Ahupua'a
- Referrals to other *kūpuna*, *kama'āīna*, and traditional cultural practitioners knowledgeable about the proposed project area and the Pohoiki Ahupua'a
- Your comments or thoughts on the potential impacts the proposed project may have on your ongoing traditional cultural practices and natural resources within the proposed project area and the Pohoiki Ahupua'a
- Your knowledge of cultural sites and *wahi pana* (storied places) within the proposed project area and the Pohoiki Ahupua'a
- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed project area and the Pohoiki Ahupua'a

Consultation Information

Consultation is an important and deeply valued part of the CIA and environmental review process. Your contributions will revitalize and keep alive our combined knowledge of past and ongoing cultural practices, historic places, and experiences, reminding our children of their history generation after generation.

With your agreement to participate in this study, your contributions will become part of the comprehensive understanding of traditions of the area, and part of the public record; they will be available for future access through the Environmental Review Program (https://planning.hawaii.gov/erp/) and at the State Historic Preservation Division Library (https://dlnr.hawaii.gov/shpd/about/research-resources-library).

As a part of this process, your knowledge may be used to inform future CIAs and other heritage studies of cultural practices and resources that need protection from impacts of proposed future projects. If you engage in consultation, and the *mana'o* and *'ike* you provide appears in the

Figure 18. Community consultation letter, page two

POHOIKI 2 - CIA for the Pohoiki Boat Ramp Dredging of Volcanic Debris and Slope Stabilization Project

Page 3

study, we would like to recognize your contribution by including your name. If you prefer not to allow your name to be included, your information can be attributed to an anonymous source.

The consultation interview structure and format are flexible. We will accommodate your preference on how to get together; talk story, over the phone, by email correspondence, remotely via Zoom, MS Teams, Google Chat or other remote meeting platforms.

Your knowledge of the resources and potential effect of the project on traditional practices in the project area and the Pohoiki Ahupua'a focusing on the topics in the bullet points above can also be submitted in a written statement. CSH will provide return postage of your written statement on request.

CSH is happy to provide a list of topics for discussion, a more structured questionnaire of interview questions, or any other assistance that might be helpful.

If you have questions regarding consultation, or are interested in participating in this study, please contact CSH Cultural Researcher Chantellee Spencer by email at cspencer@culturalsurveys.com or phone at 808-965-6478.

Mahalo a nui,

Chantellee Konohia Spencer

CSH Cultural Researcher

Figure 19. Community consultation letter, page three

4.3 Community Outreach Table

Below in Table 5 are names affiliations, dates of contact, and comments from NHOs, individuals, organizations, and agencies contacted for this project. Results are presented below in alphabetical order.

Table 5. Community contact table

Name	Affiliation	Notes
Alvarez, Keoni Kealoha	NHO	Initial consultation letter sent via email on 4 January 2023 Revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Ayau, E. Halealoha	*Kumu,* Hui Iwi Kuamo’o	Initial consultation letter sent via email on 4 January 2023 Revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Burgess, Kau‘i N.	Director of Community and Government Relations, Kamehameha Schools	Initial consultation letter sent via email on 4 January 2023 Revised letter sent out via email on 16 January 2023 Mrs. Burgess responded same day and forwarded the email to Jason Jeremiah, Natalie Kurashima, and Jon Tulchin of Kamehameha Schools.

Name	Affiliation	Notes
Dedman, Palikapu	President, Pele Defense Fund	Initial consultation letter sent via email on 4 January 2023 Revised letter sent out via email on 16 January 2023 Mr. Dedman replied 16 January 2023: *“Burials should remain in place if found. Pele defense fund most concern. Would like to be notified if burials are found. Mahalo.”* CSH replied 7 February 2023: “Aloha e Palikapu, Mahalo for your response. Your message has been noted regarding burials. Please let me know if you have other concerns. Mahalo a nui.”
Dunn, Andrew	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
DuPont, Dane	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Enriquez-Rosehill, Leslie	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Evans, Mika	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Farden, Hailama	President, Association of Hawaiian Civic Clubs (AHCC)	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Fergerstrom, Hanalei	Spokesperson, Na Kupuna Moku O Keawe	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023

Name	Affiliation	Notes
Hussey, Sylvia M.	Ka Pouhana (CEO) and Washington DC Bureau Chief (Acting), Office of Hawaiian Affairs (OHA)	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Jackson, Anela	President, ‘Aha Mālama Corp	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Kalawe, Keone	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Kealoha, Daniel	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Kealoha, Leila	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Zoom meeting on 17 January 2023
Kealoha-Cooper, Ku‘ulei	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Zoom meeting on 17 January 2023 Ms. Kealoha-Cooper called on 16 March 2023 about the status of the project
Kon, Ana	*Kama‘āina*	First round revised letter sent out via email on 17 January 2023 Ana responded on 18 January 2023: *Please include me, and inform on this process. I am available for discussion and would like to give direction to ohana that may have mana‘o as well. Your phone number doesn’t work.* *Please feel free to contact me either way email or my number […].* CSH responded same day: *E kala mai, I only just got your email address yesterday from Leila. She also gave some recommendations on who should be*

Name	Affiliation	Notes
		contacted. I look forward to your recommendations as well. Would you like to schedule a time and day to wala‘au? Ana responded on 22 January 2023: *Yes let’s schedule!* CSH sent an email on 7 March 2023: *Aloha e Anna,* *What’s your availability this month to wala‘au?* Ana responded on 15 March 2023: *Please send me some dates to work with. Mahalo* CSH responded same day: *Aloha and thank you for getting back to me. I’m available all next week between 9am and 2pm. Please let me know what day works best for you and I can send a zoom invite or give you a call.* *Mahalo!* CSH sent a follow-up email on 21 March 2023: *Aloha Anna,* *Checking back with you on your availability to meet this week. Standing by…mahalo!*
Kuahiwinui, Berna	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Kuahiwinui, Berna	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Kuahiwinui, Berna	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023

Name	Affiliation	Notes
Olson, Jon	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023 Mr. Olson responded via email same day: *Received, thank you.*
Ong, Philip	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Paik, Linda Kaleo	Aha Wahine	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Quartero, Alona	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Ritte, Walter	Executive Director, ‘Āina Momona	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Steiner, William W. Moekahi	Member, Pacific Agricultural Land Management Systems	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023
Trask, Mililani		Ms. Trask called on 16 March 2023 and wanted to talk about the discussion CSH had with John Kirihara and about the project.
Veloria, Hannah	*Kama‘āina*	First round revised letter sent out via email on 16 January 2023 Second round letter and figures sent out via email on 3 March 2023

4.4 *Kama‘āina* Interview Discussions

4.4.1 Leila Kealoha and Ku‘ulei Cooper

On 17 January 2023, CSH conducted an online interview with Leila Kealoha and Ku‘ulei Kealoha-Cooper regarding the Pohoiki Boat Ramp Dredging of Volcanic Debris and Slope Stabilization project.

The Kealoha family has resided in the district of Puna for seven generations. Ms. Kealoha-Cooper’s papa and tutu’s lands, for generations, is the largest landowner adjacent to the park with a total of 510 acres from *mauka* to *makai*.

Mrs. Kealoha emphasized throughout the interview that her main concern or rather, the main impact to the area is not the dredging of the bay, it’s the people who traverse to the hot ponds and beach. People will often leave their rubbish, which in the view of Ms. Kealoha-Cooper is a cultural disaster. Ms. Kealoha-Cooper also expressed her concern for naked people showing up at Pohoiki and its becoming another Kehena Beach, which is illegal under state law. Within the last week there was a woman who wouldn’t put her clothes on and fought with the lifeguards and security, stating that she wanted to “exercise her rights.” Ms. Kealoha-Cooper continued and stated, “This is another portion of the *pilau* that continues to infiltrate what’s for us, *kapu*.”

Both Mrs. Kealoha and Ms. Kealoha-Cooper expressed their concern for the security and regulation of the influx of people coming to the area. Ms. Kealoha-Cooper discussed how the Department of Land and Natural Resources (DLNR), DOBOR, and the community need more people to manage the area. The new coastline from the recent volcanic eruption in 2018 has created seven new beaches that are under State jurisdiction. A new road will open in February which will result in an influx of people. Ms. Kealoha-Cooper added that the boat ramp being restored will in turn help protect the family lands because access will be restricted, and people won’t be traversing their lands.

There is no security, other than the lifeguards, for the boat ramp. There is 24-hour security for the park, however, there is no security for the boat ramp because it is managed by the State. Mrs. Kealoha discussed how herself and Anna Kon are currently working on a community-based security program manual through cultural-based education that should be completed in September:

> […]the reason being we need to ensure that we have stewardship from our families in place, for this place, to ensure that the impacts to the place are cared for […] the long-term vision for this space is to ensure that these impacts by residents and visitors are monitored. Without us being present in this space, to monitor the impacts, it’s going to be impacted just like it right now. It’s going [to] help setup a model for our other ‘āina on the coastline.

Ms. Kealoha-Cooper wants the people who are utilizing the hot ponds to stand down because all it does is encroach on their families’ properties. She expressed that no one else has an issue with the dredging of the bay other than those who do not want the hot ponds covered. Those who will be affected by the project when the material is moved will have a barrier placed in front of their property to help keep people out.

Mrs. Kealoha and Ms. Kealoha-Cooper do not wish this project to be delayed any further than it already is. This project has been delayed for four and half years even though there was the funding to proceed. The community is tired of waiting and are concerned for their fishermen

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and their livelihood. Mrs. Kealoha stated, "[…] That is our cultural practice, going out on the boat, getting the fish, and feeding our families from those waters."

Mrs. Kealoha states the following:

> It's been a good time for the place to rest, but just yesterday, down at our place that we malama and take care of, I seen three boats, which is rare to see boats out there to begin with. All three of those boats were not our fishermen that were down in those waters. I know what our fishermen's boats look like because there's only a handful of them that are still fishing down there because it's so damn expensive to get out of Hilo and come back.

In terms of burials or cultural sites, Mrs. Kealoha wants them to be preserved in place if any are discovered. However, Ms. Kealoha-Cooper discussed that cultural sites or burials not already designated with a SIHP number are located outside the project area, more up *mauka* and not by the oceanside.

A final point that was made by both consultants is that people who are not from the area should have no say about what occurs. Not only does it not directly affect those people, but traditionally you do not *maha'oi* where you do not come from. Consultation should be focused on people who have been in the area for generations or who have learned from the *kupuna*.

4.4.2 Mililani Trask

The following testimony was submitted to CSH on 22 March 2023.

> Response CSH/Limtiaco Consulting Group for information re: Pohoiki, Hawaii Island Cultural Impact Study
>
> 1. This response is submitted on behalf of myself as a cultural practitioner of Pohoiki, and my ohana (family) and does not reflect the position of the State Office of Hawaiian Affairs.
> 2. Pohoiki is a renowned fishing area on the eastern most point of Hawaii Island. From time immemorial it has been used by Hawaiian fishermen from Pohoiki & elsewhere on our island, as a launching and mooring site for inshore & offshore fishing. In addition, it is one of the most significant sites for Hawaiian Pacific voyagers. Pohoiki is part of a complex which also includes Kumukahi, a higher mountain across the bay, where the lower fire was lit & tended by fishing families throughout the night in order to guide boats home. Sailors returning from sea would follow the lower fire and upon reaching the shoreline, when Pohoiki was insight, steer left to reach the shore.
> 3. Kumu Pono Associates: Mailing Address […]
>
>   Kumu Pono Associates (KPA) has a long & distinguished record in researching & information from all sources on Hawaiian places & locations.

> Their work is comprehensive and may be accessed online. I recommend CHS [*sic*] & John Kitahara contact KPA to discuss their need for data and consider retaining them for the purpose of contracting their assistance to reach out to the families of those interviewed in the past to facilitate the CHS [*sic*] contract.
>
> In the late 1990's KPA spent months contacting & interviewing Hawaiians from the area about their use of Pohoiki & the fishing practices there. These data need to be included in the CSH study and may need to be updated because older fishing kupuna may have passed but their family members are likely still fishing there. These folks will be able to identify the methods of fishing used, the species caught and the fishing methods used (spear, throw net, lay net etc.) CHS [*sic*] should also speak with KPA about the recent study they completed for Kumukahi and the critical relationship between Kumukahi & Pohoiki And traditional fishing practices in the area. It is widely known that the light of Kumukahi is the beacon used by fishermen of today and voyagers of the past to guide vessels to the Pohoiki mooring site.
>
> 4. Hawaiian uses of Pohoiki:
>
>   Fishing for numerous species & gathering stones & food (opelu) from the seashore.
>
>   Spear fishing as well as line & net fishing were undertaken.
>
>   Mooring canoe & fishing boats.
>
> 5. Persons with knowledge of Pohoiki:
>   a. Kuulei Kealoha Cooper: Land Owner […]
>   b. Lono Lyman: Land owner […]
>   c. Michael Trask: Fisherman […]
>
>   I recommend that John Kitahara, Kuulei Cooper & Lono Lyman call a meeting at the fishing families in the area to facilitate gathering their information. This has been done in the past and over 100 people attended.

4.4.3 Larry Kuamo'o

Mr. Larry Kuamo'o is the property owner of the lot fronting Pohoiki Bay. A brief conversation with him brought forth the following concerns:

1. Mr. Kuamo'o was asked that his lot be used as an access way to and from the project area, to access, move sand, etc. In exchange for this access, Mr. Kuamo'o asked to have a retaining wall built at the front of his property to protect his property from further erosion. This request has not yet been considered.

2. Regarding the dredging of the sand, Mr. Kuamo‘o supports the dredging and the opening of the harbor to allow local fishermen to launch from Pohoiki. He did, however, state, “if the sand is there on the bank, the ocean is gonna bring it back here…unless they have something to stabilize the sand…[something] that will keep the sand away from forming back in.” He also said that if the ramp is dredged “straight out to the ocean,” every boat coming out of the harbor will have to fight every wave to get out. His thought would be to dredge “diagonal towards Kalapana” so the wave wouldn’t come directly at the boat and it would be easier to launch from or return to the harbor.
3. Lastly, regarding uninvited visitors on his property, though he is against trespassing, Mr. Kuamo‘o does not want to be liable if someone happens on his property and gets hurt or injured. He mentioned, family members who have camped on his property have been disturbed by trespassers which he says is “uncalled for.”

Mr. Kuamo‘o gave verbal permission to include his testimony in this report.

4.4.4 Bobby Camara

On 23 May 2023, Mr. Camara submitted comments on the Draft EA for the Pohoiki Boat Ramp Dredging of Volcanic Debris and Slope Stabilization Project. On 31 May 2023, CSH spoke with Mr. Camara where he further elaborated on his comments to the Draft EA. His comments are included below with correspondence from the telephone conversation.

Mr. Camara was born and raised in Honoka‘a. He worked at Hawai‘i Volcanoes National Park for 30 years and retired 10 years ago. He has done extensive work in the field of Natural Sciences: Geology, Botany, Cultural Sciences, Archaeology, and Ethnographic Research.

In addition to his comments to the EA, one of the main points Mr. Camara wanted to share was in regards to community participation and the lack of response from community members. He shared that the people who are in opposition, which there are many, don’t speak up as to not offend those who are in favor of dredging, most likely family members. So, to keep the peace within the family and the community, those in opposition choose to stay silent. Also, those who are in favor, are oftentimes influenced by family members or other recognized community members. This should be considered when reviewing community responses or lack thereof.

Below are Mr. Camara’s comments to the EA:

> Starting out with an Anticipated Finding Of No Significant Impact (AFONSI) causes a reader to wonder whether or not the environmental assessment is actually that, or is it a document assembled with information intended to support a FONSI?
>
> Below: the statement is indeed how black sand is created. It seems that an entire 11 acre beach might be diifferent than a “sandbar”. **“...Fresh black sand that was created as molten lava was chilled and shattered by the surf was transported by wave currents to Pohoiki Bay. On August 13, 2018, the boat ramp was blocked by a sandbar of accumulated volcanic material in Pohoiki Bay.**

> “... the lava flow formed a new land mass consisting of a new lava layer on existing land and accretion land consisting of entirely new land that extends into the Pacific Ocean. **Constant wave activity at the accretion land and ocean interface continuously produces sand, rock, and cobbles.** ... at Pohoiki Bay, which was approximately 1,000 feet wide at the mouth and extended inland approximately 450 feet. **Loose material transported along the coast by prevailing wave direction and ocean currents has accumulated in Pohoiki Bay since 2018**, such that the undamaged boat ramp facility remains landlocked.”
>
> I believe that it‘s extremely likely that said “loose material”, or black sand, will continue to be transported by longshore drift currents from places adjacent to 2018 lava flows, and will accumulate on the shore of the former bay. It seems very likely that any material removed to create a channel, or if the beach is removed, will simply be replaced by additional sand carried by longshore currents.
>
> **“.. Community members most impacted by the inoperable boat ramp have been adamant about the need to re-open the Pohoiki Boat Ramp facility, which is owned and maintained by the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DLNR - DOBOR).”**
>
> I am amazed that no information about numbers of Commercial Fisher Permits, catch totals, etc., is presented in the EA. How many people will benefit from the millions of dollars to be spent? The information presented in this EA is poorly researched, often contradictory, and preparers seem oblivious about the obvious environmental histories of Puna ma kai, including repeated lava flows, severe earthquakes, and episodes of coastal subsidence. The latter is demonstrated in the place names Poho-iki and Ka-poho. “Poho”, in the Hawaiian Dictionary by Pukui and Elbert:
>
> “**poho** 1. n. Hollow or palm of the hand, hollow of the foot**, depression, hollow;** container, receptacle, pouch, as for tobacco; box, as for matches; hollow of a canoe, divided into three parts (mua, waena, hope). See ex. below. Poho kai, hollow where sea remains at low tide.”
>
> We‘ve witnessed such subsidence after severe earthquakes in 1975, and in 1989. Though subsidence was relatively minor at Pohoiki and Kapoho in 1989, it was sufficient to flood the coastal road NE of Pohoiki at high tides, as well as oceanfront properties and roads in Kapoho.
>
> Characterizing a big new beach of black sand and cobbles, created by the direct action of Pelehonuamea as massive quantities of her lava flowed into the Pacific in Summer 2018 as “Volcanic Debris” is supremely insulting to those who understand and appreciate that without the untiring and relentless work of Pele producing untold episodes of molten lava flows, Hawai‘i nei would not exist.

The descriptor “Volcanic Debris” seems to have been specifically chosen to greatly diminish the rare occurrence of the creation of a large new black sand beach. “Debris” is equated to rubbish, and so is something to be removed and thrown away. Black sand beaches are rare, but in Puna, during the thirty-five years of the Pu‘u‘ō‘ō and Kupaianaha eruptions, we‘ve seen beaches created, while others were buried by lava flows. From the EA: **“...Fresh black sand that was created as molten lava was chilled and shattered by the surf was transported by wave currents to Pohoiki Bay.”[p1-1].** This is the only sentence I read that most accurately explains the process of creation of black sand when pāhoehoe lava flows into the ocean. The massive roiling clouds of steam and volcanic gases at the shore also contained copious amounts of shattered and exploded sand particles. Compare with: **“Basalt-based sand is created as mechanical processes erode volcanic headlands. The coastline in the project area is mostly rocky sea cliffs that face southeast. Black sand beaches along the coastline have formed from natural erosion and have been buried by subsequent lava flows.” [p. 2-5].** Creation of sands by erosion does happen, and is how the beaches at Waipi‘o, Waimanu and Pololū valleys, as well as the beach along Bayfront in Hilo formed. But that is NOT how the current beach at Pohoiki formed. The ahupua‘a adjacent to, and NE of Pohoiki is Keoneloa, perhaps meaning “the long sand”, along a bay named Niehu.

Because Pohoiki is an an area of high geologic hazard, I am bewildered because the EA contains only one reference to a geologic map produced by USGS, and no information regarding the eruptive history of the region. How is it possible to come to a well-reasoned determination without considering that information?

“1-9

“... Traditional accounts suggest that Puna was one of Hawai‘i’s wealthiest agricultural regions; however, volcanic eruptions in relatively recent times have destroyed much of Puna’s best land.”

Though accounts may suggest the above characterization, realistically it seems that other regions not impacted by frequent lava flows would be much more fruitful, such as the field systems and kaluulu of the Kona districts, and the lo‘i kalo of windward valleys.

“1-14

The English missionary, William Ellis, documented his travel in Hawai‘i in 1823; his detailed journal mentions several specific ahupua‘a and villages of Puna but Pohoiki was not mentioned. **T. Stell Newman traveled in Hawai‘i in 1823, reviewed Ellis’s journal, and constructed a map of agricultural lands on different parts of the island.”**

T. Stell Newman wrote in the 1970s, and certainly did not travel in Hawai‘i in 1823.

“1-15
... Out-migration may have been exacerbated by destructive earthquakes in **in the spring of 1868 that caused a 75-mile stretch of the Puna-Ka‘ū coastline to subside and the**

destruction of numerous coastal homes and villages by a tsunami. The population of Puna was 2,200 people by 1860, and 800 people by 1890.”

“1-16
An earthquake in 1975 caused the coastline at Pohoiki to subside by over a foot. The extent of agricultural development surrounding the Pohoiki Bay area is visible in a 1977 aerial photograph. In 1979, the USACE constructed the 90-foot long breakwater structure at Pohoiki Bay.”

There have been other instances of regional coastal subsidence, as documented in the late 1800‘s and in 1924, as well as the two cited above, and the names Kapoho and Pohoiki document that.

“1-18
1.6. Project Schedule and Cost An initial estimate for the proposed project was calculated in 2022 to be $40 million. DOBOR is requesting State funds to supplement anticipated federal funds from FEMA. No County funds are associated with the proposed project.”

“funds from FEMA” and “County funds” should be clearly defined as taxpayer dollars. Folks seem to forget that detail, and don‘t understand that FEMA also pays for billions of dollars of damage from hurricane, tornado, flood, fire, etc., on the continent. Too, it‘s been said that FEMA funds are reimbused to State or County governments after they pay for fixes.

“2-5
The project area was formed from basaltic lava flows from the Kīlauea Volcano, which is one of the most active volcanoes on Earth. Basalt-based sand is created as mechanical processes erode volcanic headlands. The coastline in the project area is mostly rocky sea cliffs that face southeast. Black sand beaches along the coastline have formed from natural erosion and have been buried by subsequent lava flows.

...Constant wave action against structurally weak and friable (easily crumbled) lava flows produces sand and cobbles which are transported along the coast, especially during large wave events.”

Black sands in Puna are formed as pāhoehoe entering the ocean explodes and shatters.

2-18
As shown by the wave modeling, prevailing trade wind waves approach the shoreline from the east, thus moving debris from east to west in Pohoiki Bay. Similarly, south swells approaching from the southwest will move debris to the east. **Both wave types can be expected to quickly fill in discontinuities (such as a dredged cut) in the loose and mobile beach face and align it parallel to the wave crests.**

If discontinuities will be quickly filled, why spend millions of dollars to dredge?

“2-21
Local fishermen who have launched from Pohoiki Bay and fished in the waters off of Pohoiki for generations have stopped fishing altogether, are incurring higher expenses as a result of launching from Hilo, or continue to adjust profit goals to adjust for rising expenses (Spencer and Hammatt, 2023). Recreational opportunities in the Puna District have been decreasing as a result of lava flows. **The demand for outdoor recreational resources in the Puna District as expressed by the public is very high**. At this time, the overall community sentiment appears to support the return of the Pohoiki Boat Ramp facility to productive use due to the challenges associated with developing a boat launch facility in Puna that replaces the built facility at Pohoiki Bay.”

Again, please quantify “local fishermen”, as well as “generations”. If the first ramp was established in the 1960s, that‘s a lot different than if the first ramp had been established in 1900. In the “old days” resourceful, ingenious Puna fisherfolk along cliffed shores built log ladder-like structures. Those were lashed to cliff tops, and extended into the ocean forming a ramp, allowing canoes to ride a swell in and coast up the ramp. If the public expresses a “very high” demand for recreational opportunities, why destroy and erase a big, new, black sand beach?

“2.7. Natural Hazards
... The area of Puna that contains the project site has a high volcanic hazard designation as assessed by the United States Geological Survey. **The high hazard risk assigned to Puna is due to the presence of Mauna Loa, which is an active volcano.** The project site is located within Zone 2, which represents areas that are adjacent and downslope of the more hazardous zone (Zone 1). The Zone 1 designation includes the summit and rift zones of Mauna Loa and Kīlauea. Fifteen to twenty percent of Zone 2 has been covered by lava since 1800, and 25 to 75 percent has been covered within the past 750 years.”

A map would be a useful illustration. And, please note that the “high hazard risk assigned to Puna” is because of Kīlauea, NOT Maunaloa!!!

“2-29
...
The shoreline in the project area is characterized by a moderate to high coastal hazard due to wave and tsunami exposure. The beach and nearshore areas at Pohoiki Bay including the boat ramp facility would be impacted by 3.2 feet of sea level rise, according to the Hawai‘i Sea Level Rise Viewer (Hawai‘i Climate Change Mitigation and Adaptation Commission, 2021).”

Might that “3.2 feet of sea level rise” impact the boat ramp? When?

“2-31
... Seven parties responded to CSH out of 28 individuals or groups who were contacted:”

It‘s a shame that Cultural Surveys Hawai‘i (CSH) apparently only emailed parties to be consulted. Perhaps information also sent by US Mail, or phone calls, would‘ve yielded greater participation.

“2-33
2.9. Visual Resources As a result of the 2018 eruption, the waters of Pohoiki Bay have been replaced with a wide expanse of black sand beach. **Only a few areas of nearshore water remain at this time.”**

The entirety of the Pacific Ocean, both nearshore and offshore waters, lies adjacent to the beach.

“Impacts and Mitigation Measures

The proposed project does not add new urban structures to the landscape. **Dredging** that removes the accumulated volcanic material from Pohoiki Bay **is expected to improve the visual landscape for people who value the aesthetics of marine waters.** The wide expanse of black sand beach will be reduced as a result of the project.”

Again, the Island of Hawai‘i is surrounded by “the aesthetics of marine waters”. The beach will be removed during the project.

“2-34
newly formed accretion land is expected to be consistent with the existing landscape which includes old and recent lava flows. **No mitigation is warranted or proposed because the effects of the project on visual resources are expected to be less than significant.”**

Sigh...if the new beach is seen as part of “visual resources” as is removed, it seems to me that the effects on visual resources will be catastrophically significant.

“p 3-1
3.2. Hawai‘i Coastal Zone Management Program Any significant development within the SMA requires permit approval from the appropriate County. For the County of Hawai‘i, the SMA permit process is administered by the Department of Planning. The project area is within the SMA. Per Rule 9. SMA for Hawai‘i County, which applies to all shoreline development, “Development” does not include the following uses, activities or operations:

(R) Plan, design, construct, operate and maintain any lands or facilities under the jurisdiction of the Division of Boating and Ocean Recreation of the State Department of Land and Natural Resources.”

How absurd. “Development” doesn‘t include work on the DoBOR ramp which‘ll involve destruction of a scenic beach? Where else in Hawai‘i nei would such work at DoBOR sites that involved the destruction of a beach be tolerated?

"3-3
3. Scenic and Open Space Resources Objectives. Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources. Policies. Identify valued scenic resources in the coastal zone management area; Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline; Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and Encourage those developments that are not coastal dependent to locate in inland areas. The project involves dredging and is not expected to diminish coastal scenic view areas or open space resources.

"4. Coastal Ecosystems
Objectives. Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.
Policies. Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources; Improve the technical basis for natural resource management;
Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;
Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and
Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

"3-4
9. BeachProtection
Objectives. Protect beaches for public use and recreation.

So by dredging a channel through a new beach, there will no effects on any coastal ecosystems, or scenic coastal views, and that work will not alter a natural landform?

6-3
6. DETERMINATION The proposed project is not likely to have a significant impact on the physical or human environment based on the analysis presented in this document. DOBOR anticipates that the appropriate determination is a Finding of No Significant Impact (FONSI). The supporting rationale for this finding as set forth in HAR §11-200.1-13 is discussed below. (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;

The Pohoiki Boat Ramp facility is existing infrastructure that was necessarily developed along the coastline due to its purpose. The proposed project involves dredging and does not add new infrastructure at Pohoiki Bay. (12) Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies; or The proposed project involves dredging Pohoiki Bay, which is unlikely to have a substantial adverse effect on scenic vistas and view planes."

I simply do not comprehend how the writers can be so singularly focussed on the boat ramp and not see or understand the impacts any work will have on the new, big, black sand beach, scenic vistas, view planes, marine biota, anchialine hot pools, as well as numerous other resources. Hot anchialine pools have been common along coastal Puna ma kai, and have been referred to as "Waiwelawela" in texts and on historic maps.

Mahalo for the opportunity to comment.

4.5 Previous Consultation Work Recorded by CSH

4.5.1 Mr. John Hale

This interview has been copied in its entirety from a study completed by CSH in July 1998 (Devereux et al. 1998:20–25):

> Mr. [John] Hale was born in Pohoiki in 1919 and is the oldest living resident of the area. For the vast majority of his life (except for a short stay on Oahu) he has lived in the house currently located adjacent to the Pohoiki boat landing at Isaac Hale Park. As a boy Mr. Hale went to school in Opihikau [*sic*] and recalled his family fishing the abundant coastal waters of the area as well as farming taro and other subsistence crops. A life long resident of Pohoiki Mr. Hale witnessed the rise and fall of carious agricultural industries in the area, witnessed the departure of many Hawaiian families from the area, and saw the construction and evolution of both Pohoiki (Isaac Hale) and Ahalanui Parks. His testimony [...] was an invaluable tool to understanding not only the observable physical characteristics but cultural traditions of the region.
>
> Mr. Hale describes the cultural environment of the Pohoiki area when he was a young boy in regards to the subsistence level taro cultivation and fishing practices. He states that:
>
> *Upland, five miles from here. Good soil. Every Hawaiian family get at least five acre.*
>
> *Oh yeah, you gotta plant taro. Walk five miles up the road. We get five acre taro. Plant taro, you no sit down.*
>
> *And I don't miss one day school until I was seventh grade. I don't miss one day. When I go school that's the only time we rest. You stay home you gotta work. No sit down. Only time I rest was when I go school.*

When I was young, the last time. When the old folks passed away, that's the last time I was planting taro.

I never plant coffee. Only taro. The old man Rycroft plant coffee. Used to grow wild in Puna. You no need buy coffee. You go harvest. Then papaya come in ... The old man knock over the coffee tree. Then nothing left ...

In regards to fishing at Pohoiki:

Canoe, yeah. Before where I live, we catch in canoes. They go way, way out, chase the fish. They go, then they rest.

The fish ... You eat what you eat, the fish all over the place. Until in the '50s, rubbish. Only me was out there.

No, no, no more boat ramp. Only little ... 1975 they put that breakwater over there. Yeah, you carry the canoe go in. But most guys like the ramp, like us. We was old already, eh, ... to carry the boat ...

..... Because the people that live here they preserve, I think, no. They take for eat. They no sell. Today commercial, that's why. You know, the fish that lay the egg, they no touch that fish. They know what month, no. They no touch. Today, what? No more that kind law. They take lobster anytime. When the lobster get season, they no touch. That's why the eggs, plenty, eh. Today they take everything, that's why nothing left. They take all the main one.

He also comments on what was propagated around his family's home to supplement taro cultivation and fishing activities:

... Any kind. Orange tree, lemon tree. We no plant taro. All up (mauka). We go fishing. No more car days. And we eat good fish. Plenty to eat. Because everybody no sit down. Cannot do nothing .

... on the road where I live. I raise pig too. Before no steal. After 1950 new people start moving here. Different kind [?]. They take.

.... Yeah, yeah, cows ... Every family get cows. No need feed the cows. Plenty grass, eh. They roam everybody yard. You know where my brother stay? That's where they drink the water.

Mr. Hale also describes an exodus of people leaving the Pohoiki area in the 1920's, and provides an explanation as to why these people left and where they moved to:

1925 ... 1926 .... I born 1919 so when I was six years old, the houses not there, you know. Only the steps. People went ... I don't know where. They move Honolulu. I think no more job this island. The younger generation moved, no come back.

Our family the last ones stay here. Everybody move out. You see old house here

and there, nobody inside.

No houses when I was young. Only get, only Oneloa get house. My grandmother house. She wen ... that house. Now somebody living, Campbell family. Oneloa. Right over here. One big house. Big old house. My grandmother's place. Then when that house get ... Rycroft house. My grandmother used to stay there. That's only house we get. Nice house, you know. The old house, you know. Rycroft house. But only thing, nobody upkeep. Everybody go Honolulu. Only me, I don't care.

The land was nice like this when I was young. The people just moved out.

When asked why the people moved Mr. Hale replied:

The old folks they plant taro, fishing. Then Honolulu was building up so the young generation they want to go there, then – it's hard life in the country, eh - they move over there. The people start moving, a hundred years ago before Pearl Harbor, start moving.

Honolulu, yeah. And on top that they get Hawaiian Homes over there. You see, they go, big opening Hawaiian Homes too. Plenty Nanakuli, all that. Most of them family from over here. Most Hawaiian Homes, all Puna. That's why I know they immigrate from here, they went there quick. Honolulu Hawaiians, they live there, they get house, they get land, eh. The ones that around here they go up there. They go in homestead. I think that's why the ... wen move out, you know.

Yeah, nobody ... They come, they go work, the young generation, you know. Pearl Harbor.

The whole place was nice. But only me, one, I cannot keep the place. I go Honolulu holoholo but I no come back long time. Nobody watch.

He describes how the eruption at Kapoho sparked the slow repopulation of the Puna region in the 1960's:

You come back you no need work. Plenty food. That's why the guys come back with me. They no like go back.

1960s. The volcano wen come, eh? Everybody see the TV. That's why they start moving here. They see the coast line. All the ... open.

1960 eruption. Everybody see ... the TV ... The '70s. Full ... But they smart. They come here, hit the pakalolo. Then retire ...

Mr. Hale also provided specific information pertaining to land usage at both the Ahalanui and Pohoiki Parks project areas within the last several decades. He briefly describes what once existed in the large cleared lot located just *mauka* of the Kapoho-Kaimu Highway which makes up the majority of the current Pohoiki project area.

Referring to the past status of the area Mr. Hale states:

..... Trees, big kind tree. Kamani trees, you know, big trees. Before all fruit trees. The Hawaiians, they replant. Ulu trees. That's a different culture. I come from the other culture. So this culture I no like. I stay in my own corner now. I look, my eyes sore. Lucky I wen plant this. Otherwise I get no place to look. Today guys only take and they cut trees, the good trees, you know.

When asked what happened to the big trees he remarks:

Papaya farm

... They bulldoze

all.

Mr. Hale continued to address this section of land by stating:

Rycroft. He owned all that land. Rycroft the first owner, he buy from the government, you know.

I don't know if they wen plant coffee but they wen plant ... big place coffee way up, they own land way up til up ... seven, six mile up, I think, square, you know. Big place. So you wen plant that coffee, you make that kind mill today.

Nice. I used to make fire. The whole stuff warm inside there, the oven, big oven, big like this house. So I don't know what they wen put in here. Coffee. You can put one whole cow inside. Nice.

In the 1950's Mr. Gilbert Hay acquired the current Ahalanui Park project area.

Then the haole guy, my friend Hay bought this land, 40 acre. He the manager for the sugar, over here. Forty acre, I think. That's my friend, Gilbert Hay, he's the manager of Kea'au Sugar, Ola'a Sugar [?]. He bought this land in the '50s. [SOMEONE ASKS: "'60s?"] No. Because the haole guy stay here.

It was during Mr. Hay's tenure as land owner that the grove of coconut trees was planted.

No, yeah, that tree only over here. That, I plant that tree over there. That haole, Hay, you know Hay the old man. He was cutting some tree over here. He lose big money. The other guy charge him, I don't know how much, one hole. I tell Hay, you can make hundred dollar one plant. Three hundred trees. The kind tree you only put 'em on the ground. So the other guy make Hay dig hole, you know, on the pahoehoe rock. Cost money dig one hole like this. So us we make couple days. Pau planting. The truck. Bring one truck. Throw the coconut down. They grow itself.

Yeah, yeah, we help him plant. He's a good man, that's why, you know. He came here when he was seventeen from Scotland. When we work for him, he was in the eighties, old man.

The old man wen plant the tree. Old man Hay. Because when he was here, the other old folks wen move out already. Our generation, nobody wen follow up because only us left. Most went Honolulu.

The grove was planted with the Hawaiian concept of giving back to the land that will take care of future generations.

He plant that trees because he lived in the old Hawaiian style: you plant trees so the next guys can eat the coconut tree, eat the fruit. You got to replant when you take something. You go the mountain, before the mountain, Puna. Nice. When we go hunting you always bring banana. You got to replant. Bum-bye the new generation come away, they take everything. No replant. They cut trees. No more papaya. Knock everything down. They no more the old culture. You got to replant. That's a ... different life, eh.

Yeah he knew ... customs. I talk Hawaiian with him ... Shipman, same thing, talk Hawaiian. He go with the Hawaiians, my grandfather guys. That's his neighbor and then come here talk story. Otherwise you no see tree. You get the other custom, eh? And then you sell all these trees. And that days when we wen plant these trees, they want to buy tree, one tree cost three hundred bucks ... He no sell his trees. He live for the land, eh.

Rockefeller like hotel, Mauna Kea. He's the only guy no sell his trees. He (Mr.Hay) no like sell his trees. In the '70s, Rockefeller, no? He can make his fortune. No ... he leave those trees for the life of the land, eh. He live here so long Hawai'i. You go look, plenty houses no more coconut trees. They sold 'em. And they starve today. They get hard luck ...

In terms of Mr. Hale's Hawaiian beliefs as they relate to the grove and the products of the earth in general he states:

Oh, yeah. My friend, his friend, the old man. The one you talk Hawaiian with. Thats my grandfather's ... the Hawaiian old man. Thats the one who wen pray. Manoa. I was here. If you understand Hawaiian you no ... the tree. They came for the land, that tree, for the aina. You better watch out, that kind ... you know.

The old man Hay, that tree he plant for the next generation, that's why he plant that tree. Give something back, no ... That was the idea. Before he die, he leave the place nice. People use, eat the fruit. The old man, he die, look how nice the land ... Like me I no like hear because me I get trouble. I hear the old man pray, you guys no trouble. Like us, we hear, you know, you not supposed to destroy. But if you no hear, no trouble. That's why when that big money wen come, Rockefeller, eh, he

can make his fortune. One tree, three hundred dollars cash, quick. You know, the Mauna Kea hotel.

Oh, that live, Hawaiian style, that. The trees die, you pay with your life. Like you guys can do that. Like me I no can. I hear that guy's prayer. You no hear, you no care, eh ... That tree, you get nice because he growing. You kill that tree you goin' pay the penalty. That's why they no kill trees, old guys.

Puna custom that. Every fruit tree you kill, you gotta watch. You goin' pay with your life for that tree die. That's why old Hawaiians no kill tree ... You cut that damn tree, that mango tree. You guys lucky you guys no hear that kine prayer. So when they pray ... oh, the hair come up.

Toward the end of the interview Mr. Hale shares two short narratives addressing this issue.

But the mana, he don't know, see. They wen go fishing, they wen cut one ... He said no cut that branch. The old lady wen dig that tree and take home. She don't know, see, but the plant wen grow, but when the plant start to come sick and the old lady was sickly, see, then come more weak, they take 'em Honolulu. What kind sick, they cannot find out. They bring home, the lady weak. When they come see me my grandfather was alive. You know quick ... his mother wen take something, he don't know. He go ask the old mother first. Say yeah he cut one tree, one plant. What kind plant? One hibiscus, red one. Quick, he tell 'em, bring back the plant quick. The plant ma-ke your mother goin' die ... He bring back ... But what the old man do. The old man wen go there, where the tree was dying, he go take care the tree. The old man he get mana, he make nice. When the tree come little bit good, the ... You not supposed to take. You smart, you cut the branch. But the old lady don't know, she pull the tree. The tree goin' die, that's why ... Hawaiian kind plant. You like something you take the branch ... ! tell everybody, go Hawaiian house, nobody stay, nice plant, you take that plant, no take that tree, you cut the branch, you go plant ... Anything you take, no take all. You see tree, no cut the tree, you kill the tree, that's why you get trouble ...

And one more trouble about the tree. One Japanese family, Kurtistown now, about 30 years ago I think was. Nice tree. That tree ... but wen make one house, nice house, right next to that tree. Bumbye the old folks grumble like hell. You know that tree ruin the house. Crooked the house. The root, eh. One mistake they wen do. The tree was before the house, no. They wen kill the tree, they wen dig. They was goin' take the tree out. They goin' dig that tree and put 'em away someplace, you know. They wen dig that tree, right, was goin' move 'em. You know what happened? The cable wen cut, that tree fall on the house and kill the owner of the house. Hard luck. How the cable wen broke? They was goin' move that tree near the house. They

figure, bumbye, windy, the branch fall on the new house. Mistake. See what happen, eh? Why you build your house next to that tree?

Just like you, why no build away, no, then you gotta move that tree away. Then they make it hard luck on that part. Any kind make that kind ... no greedy. Just like coconut tree. Why kill the tree? Just for park car? No make sense, eh? [Devereux et al. 1998:20–25]

Section 5 Cultural Practices and Cultural Resources Identified During Consultation as Associated with the Project Area/ Greater Ahupua‘a

Timothy R. Pauketat succinctly describes the importance of traditions, especially in regard to the active manifestation of one's culture or aspects thereof. According to Pauketat,

> People have always had traditions, practiced traditions, resisted traditions, or created traditions […] Power, plurality, and human agency are all a part of how traditions come about. Traditions do not simply exist without people and their struggles involved every step of the way. [Pauketat 2001:1]

It is understood that traditional practices are developed within the group, in this case, within the Hawaiian culture. These traditions are meant to mark or represent aspects of Hawaiian culture that have been practiced since ancient times. As with most human constructs, traditions are evolving and prone to change, resulting from multiple influences including modernization as well as other cultures. It is well known that within Hawai‘i, a "broader 'local' multicultural perspective exists" (Kawelu 2015:3). While this "local" multicultural mix is deservedly celebrated, it must be noted that it often comes into contact with "traditional Hawaiian culture." This contact among cultures and traditions has undoubtedly resulted in numerous cultural entanglements. These cultural entanglements have prompted questions regarding the legitimacy of newly evolved traditional practices. The influences of "local" culture are well noted throughout this section and understood to represent survival or "the active sense of presence, the continuance of native stories, not a mere reaction, or a survivable name. Native survivance stories are renunciations of dominance, tragedy and victimry" (Vizenor 1999:vii). Acknowledgement of these "local" influences helps to inform nuanced understandings of entanglement and of a "living [Hawaiian] contemporary culture" (Kawelu 2015:3). This section strives to articulate traditional Hawaiian cultural practices practiced within the *ahupua‘a* in ancient times, and the aspects of these traditional practices that continue to be practiced today; however, this section also challenges "tropes of authenticity" (Cipolla 2013) and acknowledges the multicultural influences and entanglements that may "change" or "create" a tradition.

This section integrates information from Sections 3–4 in examining cultural resources and practices identified within or in proximity of the project area in the broader context of the encompassing Pohoiki landscape.

5.1 Fishing

Regarding fishing at Pohoiki, Ku‘ulei Kealoha-Cooper shared that the community is tired of waiting and are concerned for their fishermen, and their livelihood. Mrs. Kealoha stated, "[…] That is our cultural practice, going out on the boat, getting the fish, and feeding our families from those waters."

Mililani Trask shared the following:

> Pohoiki is a renowned fishing area on the eastern most point of Hawaii Island. From time immemorial it has been used by Hawaiian fishermen from Pohoiki & elsewhere on our island, as a launching and mooring site for inshore & offshore fishing. In addition, it is one of the most significant sites for Hawaiian Pacific voyagers. Pohoiki is part of a complex which also includes Kumukahi, a higher mountain across the bay, where the lower fire was lit & tended by fishing families throughout the night in order to guide boats home. Sailors returning from sea would follow the lower fire and upon reaching the shoreline, when Pohoiki was insight, steer left to reach the shore.

She also included the following Hawaiian uses of Pohoiki:

> Fishing for numerous species & gathering stones & food (opelu) from the seashore.
>
> Spear fishing as well as line & net fishing were undertaken.
>
> Mooring canoe & fishing boats.

In regards to fishing at Pohoiki, Mr. John Hale stated:

> *Canoe, yeah. Before where I live, we catch in canoes. They go way, way out, chase the fish. They go, then they rest.*
>
> *The fish ... You eat what you eat, the fish all over the place. Until in the '50s, rubbish. Only me was out there.*
>
> *No, no, no more boat ramp. Only little ... 1975 they put that breakwater over there. Yeah, you carry the canoe go in. But most guys like the ramp, like us. We was old already, eh, ... to carry the boat ...*
>
> *..... Because the people that live here they preserve, I think, no. They take for eat. They no sell. Today commercial, that's why. You know, the fish that lay the egg, they no touch that fish. They know what month, no. They no touch. Today, what? No more that kind law. They take lobster anytime. When the lobster get season, they no touch. That's why the eggs, plenty, eh. Today they take everything, that's why nothing left. They take all the main one.*

5.2 Burial Practices

In terms of burials or cultural sites, Mrs. Kealoha wants them to be preserved in place if any are discovered. However, Ms. Kealoha-Cooper discussed that cultural sites or burials that are not already designated with a SIHP number are located outside the project area, more up *mauka* and not by the oceanside.

5.3 Subsistence Farming

T. Stell Newman (1971) reviewed the journal of William Ellis for his 1823 tour of Hawai‘i Island to reconstruct the environmental characteristics of aboriginal agricultural lands on different parts of the island. Based on Ellis' early observations, there were two main types of dryland farming in Hawai‘i, either in field systems or in scattered fields. As seen on Newman's map, one of these field systems stretched from Kaimū almost to Kapoho on the southeastern coast of Puna, and thus encompassed the Pohoiki Bay area.

Handy and Handy (1972) note the importance of breadfruit as a staple in Puna: “Except in Puna, Hawaii, breadfruit was wholly secondary to taro and sweet potato as a staple. We are told that in Puna in a good year, breadfruit may be eaten for eight months of the year, beginning with May” (Handy and Handy 1972:152).

Mr. John Hale shared what was propagated around his family’s home to supplement taro cultivation and fishing activities:

> *... Any kind. Orange tree, lemon tree. We no plant taro. All up (mauka). We go fishing. No more car days. And we eat good fish. Plenty to eat. Because everybody no sit down. Cannot do nothing .*
>
> *... on the road where I live. I raise pig too. Before no steal. After 1950 new people start moving here. Different kind [?]. They take.*
>
> *.... Yeah, yeah, cows ... Every family get cows. No need feed the cows. Plenty grass, eh. They roam everybody yard. You know where my brother stay? That’s where they drink the water.*

5.4 Historic Trails

Most of the early visitors to Puna followed an ancient coastal foot trail, which in the late nineteenth century was made into a horse trail called the “Old Government Road” (Lass 1997:15). To improve these paths for horses, the variously spaced paving stones that marked the foot trail were removed, and curb stones to mark the edges of the trail and guide the horses were added. It is uncertain exactly when the foot trail was altered into an “improved road.” Alfred Hudson thought it was constructed right before the Wilkes Expedition of 1840-1841, since Wilkes (1845) states, “In some places they have taken great pains to secure a good road or walking path; thus, there is a part of the road from Nanavalie [Nānāwale] to Hilo which is built of pieces of lava. […]” However, Lass does not believe this was a horse trail, since Wilkes also states, “[T]he road is exceedingly fatiguing to the stranger, as the lumps are so arranged that he is obliged to take a long and a short step alternatively, but this the natives do not seem to mind, and they pass over the road with great facility […]” (Wilkes 1845:191). This suggests the trail was made of variously spaced paving stones. During a tour of Puna in 1848 by the missionaries Henry Lyman and Titus Coan, no mention is made of an improved road. Lass (1997:17) believes the present form of the Old Government Road was constructed around the early 1870s.

Section 6 Summary and Recommendations

CSH undertook this CIA at the request of The Limtiaco Consulting Group on behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation. The research broadly covered the *ahupua‘a* of Keahialaka, Pohoiki, and Oneloa.

6.1 Results of Background Research

Background research for this project yielded the following information (presented in approximate chronological order):

1. The project area is located in the Puna District on the eastern, windward side of Hawai‘i Island. The project area is located within the *ahupua‘a* of Keahialaka, Pohoiki, and Oneloa, which are among approximately 50 *ahupua‘a* in Puna (Maly 1998:9).
2. In the tradition of Hawaiian naming practices, the winds of and surrounding Keahialaka, Pohoiki, and Oneloa are Ulumano, ‘Awa, Pu‘ulena, Moani‘ala, Kuamoa‘e, Moa‘e, Apaiahaa, Kāpae, and ‘Unuloa (Nakuina 1902:53; Nakuina 1992:46-47; Alvarado 2005) and the rains specific to these *ahupua‘a* are called Alanilehua (also Wailehua), ‘Awa‘awa, Līhau, Lokuhala, Moanianilehua (also Moanilehua), Noenoe (also Noe), and Polohīnano (also Polopuahīnano) (Akana and Gonzalez 2015:2–3, 17, 19, 153, 166, 176, 212, 237).
3. Traditional accounts provide an understanding of an early time when the district of Puna was famous for its associations with the rising sun and the god Kāne, as well as its long stretch of sand, fertile plains, *hala* trees, and *‘awa* (e.g., Beckwith 1970; Handy and Handy 1972; Pukui 1983).
4. Many *‘ōlelo no‘eau* and *ka‘ao* describe Pele’s devouring of land by causing lava to cover either large areas of the region or more limited sections of it (Maly 1998:15–16; Pukui 1983:11, 191, 210; Thrum 1907:39–42).
5. Two *heiau* were identified in Puna: O‘olo at Pohoiki and Mahina‘akaka at Keahialaka (Thrum 1907:39; 1908:39)
6. The fishing ground of Kupakea in Puna is mentioned in the *mo‘olelo* of ‘Ai‘ai, son of Ku‘ula (Thrum 1907:249).
7. There were two main types of dryland farming in Hawai‘i, either in field systems or in scattered fields. One of these field systems stretched from Kaimū almost to Kapoho on the southeastern coast of Puna, and thus encompassed the Pohoiki Bay area (Newman 1971).
8. In the Māhele the *ahupua‘a* of Keahialaka, Pohoiki, and Oneloa were awarded to the *ali‘i* William Charles Lunalilo, who would later become King of Hawai‘i; Oneloa was also awarded to the *wahine* Laumaka (Barrère 1994). Keahialaka was retained by Lunalilo, but Pohoiki and Onela were returned as commutation and retained by the government.
9. One of the earliest endeavors in Puna was the harvesting of *pulu*, the soft yellow wool from the base of the tree fern used for stuffing mattresses and pillows. Shipments were first sent to California in 1847; the industry peaked in 1860 and had declined significantly by the mid-1880s (Thrum 1911:10). The *pulu* trade generally

had a negative effect on the Native Hawaiians it employed (Shipman 1860).

10. In 1877 a man named Robert Rycroft began leasing land in Pohoiki and purchased a store and several outbuildings on a parcel adjacent to Pohoiki Bay (Maly 1998:48). At first Rycroft went into the *‘awa* shipping business. He constructed a wharf during the mid-1880s, which he agreed to allow for public use (Int. Dept. Book 30:206 in Maly 1998:52). Rycroft’s *‘awa* business was successful and so he increased his land holdings and created a small cattle ranch (*Honolulu Advertiser* 3 February 1909:5 in Maly 1998:71).
11. Rycroft subsequently turned his efforts to coffee. By 1894 Rycroft was growing coffee in upland Pohoiki, and he constructed a new mill for processing at the bay (Rycroft 1894:99). The wharf was used to ship out the milled coffee. The fledgling coffee industry of Puna could not compete with similar growers in the Kona region, and coffee operations in Puna declined after 1905 and disappeared completely by 1927 (University of Hawai‘i 1927 in Cordy 1977:4).
12. In May 1899 Olaa Sugar Company leased 3,812 acres of land in ‘Ōla‘a (Pāhoa up to Mountain View) from W.H. Shipman for a term of 40 years (Maly 1999:59). Subsequent development and expansion of the plantation led to extensive land clearing and alteration for planting fields and construction of a mill, village, and labor camps in the ‘Ōla‘a area (Hurst 1994:15). The First Puna Sugar Company was also established around this time (Dorrance and Morgan 2000:107).
13. In 1975 an earthquake caused the coastline at Pohoiki to subside by over a foot (Hawaiian Volcano Observatory 1995). In 1979 the USACE constructed a 90-ft-long protective breakwater at the Pohoiki Boat Ramp (U.S. Army Corps of Engineers 2023), which exacerbated coastal erosion along some of the properties fronting the bay.
14. Agriculture continues to be a main economic driver for the area, though many farms were inundated or otherwise impacted by the 2018 eruption. Puna’s fishing community has been severely impacted by the loss of the boat ramp. Isaac Hale Beach Park, once a bustling hub for fishermen, surfers, and other local community users is now primarily frequented by tourists curious to see the dramatically changed landscape.

6.2 Impacts and Recommendations

The results of community consultation, underscored by background research conducted for this CIA, inform the following mitigation options promoting and preserving cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups:

1. A number of concerns expressed by the community during consultation do not relate specifically to ongoing cultural practices within the project area, but nonetheless should be considered during project planning and development. These concerns include:
    a. Security and regulation of visitors to the area: Leila Kealoha and Ku‘ulei Kealoha-Cooper are deeply concerned with people who visit the hot ponds and beach and often leave trash behind. Also, beach-goers have started swimming in the nude at Pohoiki which Ku‘ulei shares is illegal under State law. They’d like to monitor and reduce impacts by both residents and visitors.
2. Mr. Kuamo‘o was asked that his lot be used as an access way to and from the project area, to access, move sand, etc. In exchange for this access, Mr. Kuamo‘o asked to have a retaining wall built at the front of his property to protect his property from further erosion. This request has not yet been considered.
3. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. Should any potential historic properties be identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended.
4. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

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APPENDIX B

Geotechnical Engineering Exploration Report
by Geolabs, Inc.

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GEOTECHNICAL ENGINEERING EXPLORATION

POHOIKI BOAT RAMP MAINTENANCE DREDGING

PUNA DISTRICT, ISLAND OF HAWAII

W.O. 8271-00 JULY 7, 2022

Prepared for

THE LIMTIACO CONSULTING GROUP

GEOLABS, INC.
Geotechnical Engineering and Drilling Services

DRAFT GEE REPORT FOR YOUR REVIEW

GEOTECHNICAL ENGINEERING EXPLORATION
POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII
W.O. 8271-00 JULY 7, 2022

Prepared for

THE LIMTIACO CONSULTING GROUP

GERALD Y. SEKI
LICENSED PROFESSIONAL ENGINEER
No. 5635-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

DRAFT

SIGNATURE

4-30-24
EXPIRATION DATE
OF THE LICENSE

GEOLABS, INC.
Geotechnical Engineering and Drilling Services
94-429 Koaki Street, Suite 200, Waipahu, HI 96797

Hawaii • California

GEOLABS, INC.
Geotechnical Engineering and Drilling Services

July 7, 2022
W.O. 8271-00

Mr. Kyle Kaneshiro
The Limtiaco Consulting Group
1622 Kanakanui Street
Honolulu, HI 96817

Dear **Mr. Kaneshiro:**

Geolabs, Inc. is pleased to submit our report entitled "Geotechnical Engineering Exploration, Pohoiki Boat Ramp Maintenance Dredging, Puna District, Island of Hawaii," prepared for the design of the project.

Our work was performed in general accordance with the scope of services outlined in our revised fee proposal dated May 14, 2021.

Please note that the soil and rock samples recovered during our field exploration (remaining after testing) will be stored for a period of two months from the date of this report. The samples will be discarded after that date unless arrangements are made for a longer sample storage period. Please contact our office for alternative sample storage requirements, if appropriate.

Detailed discussion and specific design recommendations are contained in the body of this report. If there is any point that is not clear, please contact our office.

Very truly yours,

GEOLABS, INC.

DRAFT

Gerald Y. Seki, P.E.
Vice President

GS:sh

94-429 Koaki Street, Suite 200, Waipahu, Hawaii 96797
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Hawaii • California

DRAFT GEE REPORT FOR YOUR REVIEW

GEOTECHNICAL ENGINEERING EXPLORATION
POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII
W.O. 8271-00 JULY 7, 2022

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DRAFT GEE REPORT FOR YOUR REVIEW

GEOTECHNICAL ENGINEERING EXPLORATION
POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII
W.O. 8271-00 JULY 7, 2022

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Our field exploration generally encountered a beach deposit surface layer, about 18 feet thick, underlain by shallow marine deposit, clinker, and basalt rock formation extending to the maximum depth explored of 27 feet below the existing ground surface. The beach deposit consisted of loose to very dense sandy gravel with some cobbles. The shallow marine deposit was composed of medium dense silty sand. The clinker deposit consisted of very dense sandy gravel. The basalt rock formation was hard. We encountered groundwater in the boring at about 8.5 feet below the existing ground surface.

Recent activity along the Kilauea Volcano's east rift zone created lava flows just above the Pohoiki Boat Ramp area. These lava flows started in May of 2018 and entered the ocean just north of Pohoiki Bay from July to August of 2018. Subsequent to the recent lava flows, a large amount of sand, gravel, and cobbles was transported down the coast and closing off the existing Pohoiki Bay at the Isaac Hale Park. The sand, gravel, and cobbles were generated from the erosion of the new friable lava north of the bay from the ocean waves. We understand that the beach deposit along the shoreline is more than 20 feet in height and more than 200 feet wide.

Several ridges were observed on the surface of the beach deposit due to heavy wave events that occurred. We anticipate that numerous cobbles and some boulders may be encountered in the beach deposit below these ridges where the old shoreline existed previously.

Therefore, we anticipate that the dredged materials may consist of sand, gravel, and some cobbles. In addition, we anticipate that occasional boulders may be encountered.

Based on our slope stability analysis, we recommend that a dredged slope of 4H:1V or flatter may be used for the cut slopes below the water and up to about +2 feet Mean Sea Level (MSL). From +2 feet MSL, a dredged slope of 3H:1V or flatter may be used. Our analysis does not take fully into account the slope under wave loading. Therefore, some sloughing of the dredged slope may occur.

Due to the limited budget for the project, the slopes were not designed for seismic loading. If seismic loading conditions were considered, the finished slopes would need to be flattened significantly and the amount of dredging required would also increase significantly.

The new lava material from the recent flows is generally friable and protrusions in the coastline may provide material for deposition down current. The erosion and deposition may be the greatest during heavy wave events. Therefore, future deposition of beach material within the dredged area may occur subsequent to the maintenance dredging.

We understand that the dredged materials from the project will be stockpiled in an open lava field area adjacent to the project site. It is desired to determine if the dredged material can be used as construction fill material.

Based on the laboratory test results, the beach deposit material qualifies for use as Aggregate Subbase, Structural Backfill Material A, Structural Material B, Trench Backfill Material B, and Granular Material for Embankment in accordance with the 2005 State of Hawaii Department of Transportation Standard Specifications. In addition, the beach deposit qualifies for use as Select Borrow for Subbase and Borrow in accordance with the County of Hawaii Standard Specifications for Public Works Construction, dated September 1986.

It should be noted that some cobbles were observed within the beach deposit. In addition, we anticipate some boulders may be encountered in the beach deposit. Therefore, some screening of these larger size materials will be required.

The text of this report should be referred to for detailed discussions and specific geotechnical recommendations.

END OF SUMMARY OF FINDINGS AND RECOMMENDATIONS

DRAFT GEE REPORT FOR YOUR REVIEW

SECTION 1. GENERAL

This report presents the results of our geotechnical engineering exploration performed for the *Pohoiki Boat Ramp Maintenance Dredging* project in the Puna District on the Island of Hawaii. The project location and general vicinity are shown on the Project Location Map, Plate 1.

This report summarizes the findings and geotechnical recommendations resulting from our field exploration, laboratory testing, and engineering analyses for the project. The findings and recommendations presented herein are subject to the limitations noted at the end of this report.

1.1 Project Considerations

The project site is located along the southeast coast of the Puna District on the Island of Hawaii. We understand that subsequent to the recent lava flows immediately adjacent to Pohoiki Bay, a large deposit of sand, gravel, and cobbles was transported down the coast and closing off the existing Puna Boat Ramp at the Isaac Hale Park. The sand, gravel, and cobbles were generated from the erosion of the new friable lava from the ocean waves. The sand, gravel, and cobbles deposit along the shoreline is more than 20 feet in height and more than 200 feet wide.

We understand that it is desired to provide access from the ocean to the existing boat ramp. In addition, we understand that removal of the deposited materials down to Elevation -6 feet Mean Sea Level (MSL) is being considered. Due to the limited budget on this project, we understand that only the grading option for the maintenance dredging is feasible. Typically, the exposed cut channel slopes are protected from erosion by wave action by an armoring layer. Therefore, some amount of erosion should be expected from the wave action.

1.2 Purpose and Scope

The purpose of our exploration was to obtain information on the subsurface conditions to develop an idealized soil/rock data set to formulate geotechnical engineering recommendations for the maintenance dredging project. The work was performed in general accordance with our revised fee proposal dated May 14, 2021 with the following

exception. Due to accessibility for our truck-mounted drill rig at the project site, drilling of a boring was performed instead of the Dynamic Cone Penetration and nuclear gage testing to obtain better subsurface information. The scope of work for this exploration included the following tasks and work efforts:

1. Boring stakeout and utility clearance by our engineer.
2. Mobilization and demobilization of a truck-mounted drill rig on the Island of Hawaii, a water truck, and two operators from Honolulu to the project site and back.
3. Drilling and sampling of one borehole extending to a depth of about 27 feet below the existing ground surface. In addition, a bulk sample was obtained for testing.
4. Coordination of the field exploration and logging of the boring by our field engineer/geologist.
5. Laboratory testing of selected samples obtained during the field exploration as an aid in classifying the materials and evaluating their engineering properties.
6. Analysis of the field and laboratory data to formulate geotechnical recommendations for the design of the maintenance dredging cut slopes and potential uses of the dredge materials.
7. Preparation of this report summarizing our work on the project and presenting the findings and geotechnical recommendations.
8. Coordination of our overall work on the project by our senior engineer.
9. Quality assurance of our work and client/design team consultation by our principal engineer.
10. Miscellaneous work efforts, such as drafting, word processing, and clerical support.

Detailed descriptions of our field exploration methodology and the Logs of Borings are presented in Appendix A. Results of the laboratory tests performed on selected soil samples are presented in Appendix B. Photograph of the core samples are presented in Appendix C.

END OF GENERAL

SECTION 2. SITE CHARACTERIZATION

2.1 Regional Geology

The Island of Hawaii is the largest in the Hawaiian Archipelago and covers an area of approximately 4,030 square miles. The island was formed by the activity of the following five shield volcanoes: Kohala (long extinct), Mauna Kea (activity during recent geologic time), Hualalai (last erupted in 1801 – 1803), and Mauna Loa and Kilauea (both still active).

The project site is situated on the eastern flank of the Kilauea Volcano, which has been built up by basaltic lava flows. These flows are of the Pleistocene Epoch (Ice Age) and of the Recent Age, and belong to the Puna Volcanic Series.

Recent activity from Kilauea Volcano's east rift zone created lava flows just north of the Pohoiki area. These lava flows started in May 2018.

2.2 Existing Site Conditions

The project site is located along the southeast coast of the Puna District on the Island of Hawaii. The project site is covered by dark gray to black sands, gravels and cobbles. The abundance of cobbles was observed along the shoreline.

Remanence of the recent lava flow is located east of the project site. An existing lifeguard tower was noted just south of the boat ramp. Natural ocean thermal ponds were noted in several areas at the project site.

Several ridges were noted on the surface of the beach deposit. We believe that these ridges were formed during heavy wave events and the deposition of the beach deposits.

The project site is fairly level and slopes down near the existing boat ramp structure and at the coastline. The existing ground surface elevations at the fairly level area range from about +10 to +15 feet MSL.

2.3 Subsurface Conditions

We explored the subsurface conditions at the project site by drilling and sampling one boring, designated as Boring No. 1, extending to a depth about 27 feet below the existing ground surface. In addition, one bulk sample of the near-surface soils, designated as Bulk-1, was obtained to evaluate the characteristics of the near-surface soils. The approximate boring and bulk sample locations are shown on the Site Plan, Plate 2.

The boring generally encountered a beach deposit surface layer about 18 feet thick, underlain by a shallow marine deposit extending to about 20.5 feet deep. Below the shallow marine deposit, a clinker deposit about 4 feet thick was encountered, underlain by a basalt rock formation extending to the maximum depth explored of 27 feet below the existing ground surface.

The beach deposit layer consisted of loose to very dense sandy gravel with some cobbles. The shallow marine deposit was composed of medium dense silty sand. The clinker deposit consisted of very dense sandy gravel. The basalt rock formation was hard.

We encountered groundwater in the drilled boring at about 8.5 feet below the existing ground surface at the time of our field exploration. However, it should be noted that the groundwater levels are subject to change due to tidal fluctuations, rainfall, time of year, seasonal precipitation, surface water runoff, and other factors.

END OF SITE CHARACTERIZATION

DRAFT GEE REPORT FOR YOUR REVIEW

SECTION 3. DISCUSSION AND RECOMMENDATIONS

Based on our field exploration, the project site is generally underlain by a beach deposit about 18 feet thick, followed by a shallow marine deposit, clinker, and basalt rock formation extending to the maximum depth explored of 27 feet below the existing ground surface.

The anticipated dredged materials, dredged slope recommendations, and potential uses for the dredged materials are presented in the following sections.

3.1 Anticipated Dredged Materials

As indicated previously, recent activity along the Kilauea Volcano's east rift zone created lava flows just above the Pohoiki Boat Ramp area. These lava flows started in May of 2018 and entered the ocean just north of Pohoiki Bay from July to August of 2018.

Subsequent to the recent lava flows, a large amount of sand, gravel, and cobbles was transported down the coast and closing off the existing Pohoiki Bay at the Isaac Hale Park. The sand, gravel, and cobbles were generated from the erosion of the new friable lava north of the bay from the ocean waves. We understand that the beach deposit along the shoreline is more than 20 feet in height and more than 200 feet wide.

Based on the boring drilled at the project site, the site is generally underlain by a beach deposit surface layer consisting of loose to very dense sandy gravel with some cobbles extending about 18 feet below the existing ground surface. The beach deposit was underlain by a shallow marine deposit, clinker, and basalt rock formation extending to the maximum depth explored of 27 feet below the existing ground surface.

Several ridges were observed on the surface of the beach deposit due to heavy wave events that occurred. We anticipate that numerous cobbles and some boulders may be encountered in the beach deposit below these ridges where the old shoreline existed previously.

Therefore, we anticipate that the dredged materials may consist of sand, gravel, and some cobbles. In addition, we anticipate that occasional boulders may be encountered.

3.2 Dredged Slopes

Based on our literature search, recommended finished slopes under wave loading could not be found. In the report by Lee, Torresan, and McArthur entitled "Stability of Submerged Slopes on the Flanks of the Hawaiian Island, a Simplified Approach" for the U.S. Department of the Interior, U.S. Geological Survey, some guidelines are provided for volcaniclastic sands similar to the beach deposits encountered at the project site. For static conditions, submerged slope inclinations between 1H:1V and 2H:1V were recommended.

In our slope stability analysis, a differential hydraulic head of 2 feet was used for the static condition. To try and simulate some of the effects of wave loading, a differential head of 5 feet was used in our analysis.

Based on our slope stability analysis, we recommend that a dredged slope of 4H:1V or flatter may be used for the cut slopes below the water and up to about +2 feet MSL. From +2 feet MSL, a dredged slope of 3H:1V or flatter may be used. As indicated above, our analysis does not take fully into account the slope under wave loading. Therefore, some sloughing of the dredged slope may occur.

Due to the limited budget for the project, the slopes were not designed for seismic loading. If seismic loading conditions were considered, the finished slopes would need to be flattened significantly and the amount of dredging required would also increase significantly.

The new lava material from the recent flows is generally friable and protrusions in the coastline may provide material for deposition down current. The erosion and deposition may be the greatest during heavy wave events. Therefore, future deposition of beach material within the dredged area may occur subsequent to the maintenance dredging.

3.3 Potential Uses for Dredged Materials

We understand that the dredged materials from the project will be stockpiled in an open lava field area adjacent to the project site. It is desired to determine if the dredged material can be used as construction fill material.

DRAFT GEE REPORT FOR YOUR REVIEW

SECTION 3. DISCUSSION AND RECOMMENDATIONS

Laboratory testing consisting of gradation, sand equivalent, plasticity index, and California Bearing Ratio (CBR) tests was performed on a bulk sample of the beach deposit material recovered at the project site. The laboratory test results are provided in Appendix B.

Based on the laboratory test results, the beach deposit material qualifies for use as Aggregate Subbase, Structural Backfill Material A, Structural Material B, Trench Backfill Material B, and Granular Material for Embankment in accordance with the 2005 State of Hawaii Department of Transportation Standard Specifications. In addition, the beach deposit qualifies for use as Select Borrow for Subbase and Borrow in accordance with the County of Hawaii Standard Specifications for Public Works Construction, dated September 1986. A summary of the material requirements for the different agencies and the project sample results is provided on the Potential Uses of the Dredged Materials, Plates 3.1 and 3.2.

It should be noted that some cobbles were observed within the beach deposit. In addition, we anticipate some boulders may be encountered in the beach deposit. Therefore, some screening of these larger size materials will be required.

3.4 Design Review

Preliminary and final drawings and specifications for the project should be forwarded to Geolabs for review and written comments prior to bid solicitation for construction. This review is necessary to evaluate the conformance of the plans and specifications with the intent of the earthwork recommendations provided herein. If this review is not made, Geolabs cannot be responsible for misinterpretation of our recommendations.

3.5 Post-Design Services/Services During Construction

Geolabs should be retained to provide geotechnical engineering services during construction. The critical items of construction monitoring consist of the observation of the excavated dredge material and the temporary slope conditions.

A Geolabs representative also should monitor other aspects of earthwork construction to observe compliance with the design concepts, specifications, or

recommendations and to expedite suggestions for design changes that may be required in the event that subsurface conditions differ from those anticipated at the time this report was prepared. Geolabs should be accorded the opportunity to provide geotechnical engineering services during construction to confirm our assumptions in providing the recommendations presented herein.

If the actual exposed subsurface conditions encountered during construction differ from those assumed or considered herein, Geolabs should be contacted to review and/or revise the geotechnical recommendations presented herein.

END OF DISCUSSION AND RECOMMENDATIONS

DRAFT GEE REPORT FOR YOUR REVIEW

SECTION 4. LIMITATIONS

The analyses and recommendations submitted herein are based in part upon information obtained from the field boring and bulk sample. Variations of the subsurface conditions between and beyond the field boring and bulk sample may occur, and the nature and extent of these variations may not become evident until construction is underway. If variations then appear evident, it will be necessary to re-evaluate the recommendations presented herein.

The field boring and bulk sample locations indicated herein are approximate, having been estimated by taping from visible features shown on the Topographic Plan received from The Limtiaco Consulting Group on May 31, 2022. Elevations of the boring was estimated from contours shown on the same plan. The field boring location and elevation should be considered accurate only to the degree implied by the methods used.

The stratification breaks shown on the graphic representations of the boring depict the approximate boundaries between soil types and, as such, may denote a gradual transition. Water level data from the boring were measured at the times shown on the graphic representations and/or presented in the text of this report. These data have been reviewed and interpretations made in the formulation of this report. It should be noted that the groundwater levels are subject to change due to tidal fluctuation, rainfall, seasonal precipitation, surface water runoff, and other factors.

Due to the limited budget on this project, we understand that only the grading option for the maintenance dredging is feasible. Typically, the exposed cut channel slopes are protected from erosion by wave action by an armoring layer. Therefore, some amount of erosion should be expected from the wave action.

This report has been prepared for the exclusive use of The Limtiaco Consulting Group and their project consultants for specific application to the *Pohoiki Boat Ramp Maintenance Dredging* project in accordance with generally accepted geotechnical engineering principles and practices. No warranty is expressed or implied.

SECTION 4. LIMITATIONS

This report has been prepared solely for the purpose of assisting the design engineers in the design of the proposed project. Therefore, this report may not contain sufficient data, or the proper information, to serve as a basis for detailed construction cost estimates.

The owner/client should be aware that unanticipated soil conditions are commonly encountered. Unforeseen subsurface conditions, such as perched groundwater, soft deposits, hard layers or cavities, may occur in localized areas and may require additional probing or corrections in the field (which may result in construction delays) to attain a properly constructed project. Therefore, a sufficient contingency fund is recommended to accommodate these possible extra costs.

This geotechnical engineering exploration conducted at the project site was not intended to investigate the potential presence of hazardous materials existing at the project site. It should be noted that the equipment, techniques, and personnel used to conduct a geo-environmental exploration differ substantially from those applied in geotechnical engineering.

END OF LIMITATIONS

DRAFT GEE REPORT FOR YOUR REVIEW

CLOSURE

The following plates and appendices are attached and complete this report:

Project Location Map ..... Plate 1
Site Plan ..... Plate 2
Field Exploration ..... Appendix A
Laboratory Tests ..... Appendix B
Photograph of Core Samples ..... Appendix C

-ΩΩΩΩΩΩΩΩΩ-

Respectfully submitted,

GEOLABS, INC.

DRAFT

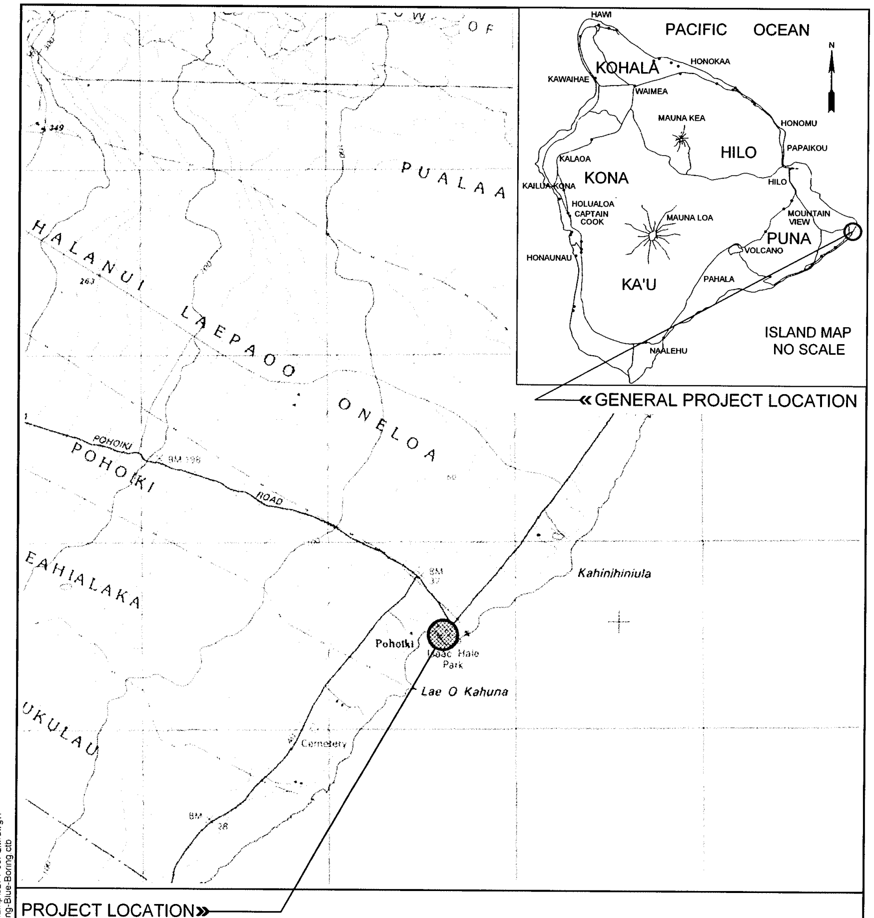
By _____
Gerald Y. Seki, P.E.
Vice President

GS:sh

h:\8200Series\8271-00.gs1

PLATES

DRAFT GEE REPORT FOR YOUR REVIEW



PROJECT LOCATION MAP

POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII

2000 1000 0 2000 FT.
GRAPHIC SCALE

N

REFERENCE: MAP CREATED WITH TOPO!® ©2010 NATIONAL GEOGRAPHIC; ©2007 TELE ATLAS, REL. 1/2007.

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DATE	DRAWN BY	PLATE
MAY 2022	HYC	
SCALE	W.O.	1
1" = 2,000'	8271-00	

CAD User: HENRY File Last Updated: June 17, 2022 5:45:53pm Plot Date: June 17, 2022 - 5:47:21pm
File: A:\Drafting\Drafting\Working\8271-00_Pohoiki_Boat_Ramp\8271-00PLM.dwg\1
Plotter: DWG To PDF-GEO.pc3 Plotstyle: GEO-No-Dithering-Blue-Boring.ctb

LEGEND:

APPROXIMATE BORING LOCATION

APPROXIMATE BULK SAMPLE LOCATION

REFERENCE: TOPOGRAPHIC PLAN RECEIVED FROM THE LIMTIACO CONSULTING GROUP ON MAY 31, 2022.

0 40 80 160 240 FT.

GRAPHIC SCALE

N

SITE PLAN

POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII

GEOLABS, INC.
Geotechnical Engineering

DATE	DRAWN BY	PLATE
JUNE 2022	HYC	2
SCALE	W.O.	
1" = 80'	8271-00	

POTENTIAL USES OF THE DREDGED MATERIALS
POHOIKI BOAT RAMP MAINTENANCE DREDGING
W.O. 8271-00

PRODUCT	TEST	HDOT REQUIREMENTS	CITY & COUNTY REQUIREMENTS	PROJECT SAMPLE RESULTS	QUALITY/DOES NOT QUALIFY
Aggregate Base Course	**Gradation**				DOES NOT QUALIFY
	2 Inch	100	100	100	
	1-1/2 Inch	90 - 100	90 - 100	98	
	3/4 inch	50 - 90	50 - 90	92	
	No. 4	25 - 50	25 - 50	49	
	No. 200	3 - 9	3 - 9	0	
Aggregate Subbase	**Gradation**				QUALIFY
	2-1/2 Inch	100	100	100	
	No. 4	20 - 60		49	
	No. 200	0 - 15	<15	0	
	Sand Equivalent	>=25	NA	100	
	Plasticity Index	<=15	NA	Non-Plastic	
Structural Backfill Material A	**Gradation**				QUALIFY
	3 Inch	100	NA	100	
	No. 4	20-75	NA	49	
	No. 200	0 - 15	NA	0	
Structural Backfill Material B	**Gradation**				QUALIFY
	3 Inch	100	NA	100	
	No. 4	20 - 100	NA	49	
Trench Backfill Material A	**Gradation**				DOES NOT QUALIFY
	3 Inch	100		100	
	1 Inch	100	NA	96	
	No. 4	75 - 100	NA	49	
	No. 200	0 - 15	NA	0	
	SW, SP, SM, SW-SM, SP-SM			GW	
Trench Backfill Material B	**Gradation**				QUALIFY
	3 Inch	100	NA	100	
	1 Inch		NA		
	No. 4	20 - 100	NA	49	
	No. 200		NA		

POTENTIAL USES OF THE DREDGED MATERIALS
POHOIKI BOAT RAMP MAINTENANCE DREDGING
W.O. 8271-00

PRODUCT	TEST	HDOT REQUIREMENTS	CITY & COUNTY REQUIREMENTS	PROJECT SAMPLE RESULTS	QUALITY/DOES NOT QUALIFY
Granular Material for Embankment	**Gradation**				QUALIFY
	6 Inch	100	NA	100	
	3 Inch	75 - 100	NA	100	
	No. 4	20 - 75	NA	49	
	No. 200	0 - 15	NA	0	
Borrow	**CBR**				QUALIFY
	Expansion	NA	<3	0	
	Value	NA	>=8	26	
	SAND EQUIVALENT	NA	>=10	100	

APPENDIX A

DRAFT GEE REPORT FOR YOUR REVIEW

APPENDIX A

Field Exploration

We explored the subsurface conditions at the project site by drilling and sampling one boring, designated as Boring No. 1, extending to a depth of about 27 feet below the existing ground surface. In addition, one bulk sample of the near-surface soils, designated as Bulk-1, was obtained to evaluate the pavement support characteristics of the near-surface soils. The approximate boring and bulk sample locations are shown on the Site Plan, Plate 2. The boring was drilled using a truck-mounted drill rig equipped with continuous flight augers and HQ coring.

Our geologist classified the materials encountered in the boring by visual and textural examination in the field in general accordance with ASTM D2488, Standard Practice for Description and Identification of Soils, and monitored the drilling operations on a near-continuous (full-time) basis. These classifications were further reviewed visually and by testing in the laboratory. Soils were classified in general accordance with ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), as shown on the Soil Log Legend, Plate A-0.1. Deviations made to the soil classification in accordance with ASTM D2487 are described on the Soil Classification Log Key, Plate A-0.2. Graphic representations of the materials encountered are presented on the Log of Boring, Plate A-1.

Relatively "undisturbed" soil samples were obtained in general accordance with ASTM D3550, Ring-Lined Barrel Sampling of Soils, by driving a 3-inch OD Modified California sampler with a 140-pound hammer falling 30 inches. In addition, some samples were obtained from the drilled boring in general accordance with ASTM D1586, Penetration Test and Split-Barrel Sampling of Soils, by driving a 2-inch OD standard penetration sampler using the same hammer and drop. The blow counts needed to drive the sampler the second and third 6 inches of an 18-inch drive are shown as the "Penetration Resistance" on the Log of Boring at the appropriate sample depths. The penetration resistance shown on the log of boring indicates the number of blows required for the specific sampler type used. The blow counts may need to be factored to obtain the Standard Penetration Test (SPT) blow counts.

Core samples of the rock materials encountered at the project site were obtained by using diamond core drilling techniques in general accordance with ASTM D2113, Diamond Core Drilling for Site Investigation. Core drilling is a rotary drilling method that uses a hollow bit to cut into the rock formation. The rock material left in the hollow core of the bit is mechanically recovered for examination and description. Rock cores were described in general accordance with the Rock Description System, as shown on the Rock Log Legend, Plate A-0.3. The Rock Description System is based on the publication "Suggested Methods for the Quantitative Description of Discontinuities in Rock Masses" by the International Society for Rock Mechanics (March 1977). "Suggested Methods for the Quantitative Description of Discontinuities in Rock Masses" by the International Society for Rock Mechanics (March 1977).

Appendix A
Field Exploration

Recovery (REC) is used as a subjective guide to the interpretation of the relative quality of rock masses. Recovery is defined as the actual length of material recovered from a coring attempt versus the length of the core attempt. For example, if 3.7 feet of material is recovered from a 5.0-foot core run, the recovery would be 74 percent and would be shown on the Logs of Borings as REC = 74%.

The Rock Quality Designation (RQD) is also a subjective guide to the relative quality of rock masses. RQD is defined as the percentage of the core run in rock that is sound material in excess of 4 inches in length without discontinuities, discounting drilling induced fractures or breaks. If 2.5 feet of sound material is recovered from a 5.0-foot core run in rock, the RQD would be 50 percent and would be shown on the Logs of Borings as RQD = 50%. Generally, the following is used to describe the relative quality of the rock, based on the "Practical Handbook of Physical Properties of Rocks and Minerals."

Rock Quality	RQD (%)
Very Poor	0 – 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	90 – 100

The rippability of a rock mass is a function of the relative hardness of the rock, its relative quality, brittleness, and fissile characteristics. A dense basalt with a high RQD value would be very difficult to rip and would probably require more arduous methods of excavation.

DRAFT GEE REPORT FOR YOUR REVIEW

GEOLABS, INC.
Geotechnical Engineering

Soil Log Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS	GRAVELS	CLEAN GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	LESS THAN 5% FINES	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
		MORE THAN 12% FINES	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE	SANDS	CLEAN SANDS	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	LESS THAN 5% FINES	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
		MORE THAN 12% FINES	SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT 50 OR MORE	MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LEGEND

- (2-INCH) O.D. STANDARD PENETRATION TEST
- (3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE
- SHELBY TUBE SAMPLE
- GRAB SAMPLE
- CORE SAMPLE
- WATER LEVEL OBSERVED IN BORING AT TIME OF DRILLING
- WATER LEVEL OBSERVED IN BORING AFTER DRILLING
- WATER LEVEL OBSERVED IN BORING OVERNIGHT

- LL LIQUID LIMIT (NP=NON-PLASTIC)
- PI PLASTICITY INDEX (NP=NON-PLASTIC)
- TV TORVANE SHEAR (tsf)
- UC UNCONFINED COMPRESSION OR UNIAXIAL COMPRESSIVE STRENGTH
- TXUU UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf)

Plate
A-0.1

LOG LEGEND FOR SOIL 8271-00.GPJ GEOLABS.GDT 5/23/22

GEOLABS, INC.
Geotechnical Engineering

Soil Classification Log Key
(with deviations from ASTM D2488)

GEOLABS, INC. CLASSIFICATION*

GRANULAR SOIL (- #200 <50%)	COHESIVE SOIL (- #200 ≥50%)
• **PRIMARY** constituents are composed of the largest percent of the soil mass. Primary constituents are capitalized and bold (i.e., **GRAVEL, SAND**)	• **PRIMARY** constituents are based on plasticity. Primary constituents are capitalized and bold (i.e., **CLAY, SILT**)
• **SECONDARY** constituents are composed of a percentage less than the primary constituent. If the soil mass consists of 12 percent or more fines content, a cohesive constituent is used (**SILTY** or **CLAYEY**); otherwise, a granular constituent is used (**GRAVELLY** or **SANDY**) provided that the secondary constituent consists of 20 percent or more of the soil mass. Secondary constituents are capitalized and bold (i.e., **SANDY** GRAVEL, **CLAYEY** SAND) and precede the primary constituent.	• **SECONDARY** constituents are composed of a percentage less than the primary constituent, but more than 20 percent of the soil mass. Secondary constituents are capitalized and bold (i.e., **SANDY** CLAY, **SILTY** CLAY, **CLAYEY** SILT) and precede the primary constituent.
• **accessory descriptions** compose of the following: with some: >12% with a little: 5 - 12% with traces of: <5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY GRAVEL **with a little sand**)	• **accessory descriptions** compose of the following: with some: >12% with a little: 5 - 12% with traces of: <5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY CLAY **with some sand**)

EXAMPLE: Soil Containing 60% Gravel, 25% Sand, 15% Fines. Described as: **SILTY GRAVEL** with some sand

RELATIVE DENSITY / CONSISTENCY

Granular Soils			Cohesive Soils			
N-Value (Blows/Foot)		Relative Density	N-Value (Blows/Foot)		PP Readings (tsf)	Consistency
SPT	MCS		SPT	MCS		
0 - 4	0 - 7	Very Loose	0 - 2	0 - 4		Very Soft
4 - 10	7 - 18	Loose	2 - 4	4 - 7	< 0.5	Soft
10 - 30	18 - 55	Medium Dense	4 - 8	7 - 15	0.5 - 1.0	Medium Stiff
30 - 50	55 - 91	Dense	8 - 15	15 - 27	1.0 - 2.0	Stiff
> 50	> 91	Very Dense	15 - 30	27 - 55	2.0 - 4.0	Very Stiff
			> 30	> 55	> 4.0	Hard

MOISTURE CONTENT DEFINITIONS

Dry: Absence of moisture, dry to the touch

Moist: Damp but no visible water

Wet: Visible free water

ABBREVIATIONS

WOH: Weight of Hammer

WOR: Weight of Drill Rods

SPT: Standard Penetration Test Split-Spoon Sampler

MCS: Modified California Sampler

PP: Pocket Penetrometer

GRAIN SIZE DEFINITION

Description	Sieve Number and / or Size
Boulders	> 12 inches (305-mm)
Cobbles	3 to 12 inches (75-mm to 305-mm)
Gravel	3-inch to #4 (75-mm to 4.75-mm)
Coarse Gravel	3-inch to 3/4-inch (75-mm to 19-mm)
Fine Gravel	3/4-inch to #4 (19-mm to 4.75-mm)
Sand	#4 to #200 (4.75-mm to 0.075-mm)
Coarse Sand	#4 to #10 (4.75-mm to 2-mm)
Medium Sand	#10 to #40 (2-mm to 0.425-mm)
Fine Sand	#40 to #200 (0.425-mm to 0.075-mm)

Soil descriptions are based on ASTM D2488-09a, Visual-Manual Procedure, with the above modifications by Geolabs, Inc. to the Unified Soil Classification System (USCS).

Plate
A-0.2

SOIL_CLASS_LOG_KEY 8271-00.GPJ GEOLABS.GDT 5/23/22

DRAFT GEE REPORT FOR YOUR REVIEW

GEOLABS, INC.
Geotechnical Engineering

Rock Log Legend

ROCK DESCRIPTIONS

	BASALT		**CONGLOMERATE**
	BOULDERS		**LIMESTONE**
	BRECCIA		**SANDSTONE**
	CLINKER		**SILTSTONE**
	COBBLES		**TUFF**
	CORAL		**VOID/CAVITY**

ROCK DESCRIPTION SYSTEM

ROCK FRACTURE CHARACTERISTICS

The following terms describe general fracture spacing of a rock:

Massive: Greater than 24 inches apart

Slightly Fractured: 12 to 24 inches apart

Moderately Fractured: 6 to 12 inches apart

Closely Fractured: 3 to 6 inches apart

Severely Fractured: Less than 3 inches apart

DEGREE OF WEATHERING

The following terms describe the chemical weathering of a rock:

Unweathered: Rock shows no sign of discoloration or loss of strength.

Slightly Weathered: Slight discoloration inwards from open fractures.

Moderately Weathered: Discoloration throughout and noticeably weakened though not able to break by hand.

Highly Weathered: Most minerals decomposed with some corestones present in residual soil mass. Can be broken by hand.

Extremely Weathered: Saprolite. Mineral residue completely decomposed to soil but fabric and structure preserved.

HARDNESS

The following terms describe the resistance of a rock to indentation or scratching:

Very Hard: Specimen breaks with difficulty after several "pinging" hammer blows.
Example: Dense, fine grain volcanic rock

Hard: Specimen breaks with some difficulty after several hammer blows.
Example: Vesicular, vugular, coarse-grained rock

Medium Hard: Specimen can be broked by one hammer blow. Cannot be scraped by knife. SPT may penetrate by ~25 blows per inch with bounce.
Example: Porous rock such as clinker, cinder, and coral reef

Soft: Can be indented by one hammer blow. Can be scraped or peeled by knife. SPT can penetrate by ~100 blows per foot.
Example: Weathered rock, chalk-like coral reef

Very Soft: Crumbles under hammer blow. Can be peeled and carved by knife. Can be indented by finger pressure.
Example: Saprolite

Plate
A-0.3

LOG LEGEND FOR ROCK 8271-00.GPJ GEOLABS.GDT 5/23/22

GEOLABS, INC.
Geotechnical Engineering

POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII

Log of Boring 1

Approximate Ground Surface Elevation (feet MSL): 12 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
							0			GW	Dark gray to black medium to coarse angular **SANDY GRAVEL (BASALTIC)** with some cobbles, loose to medium dense, dry to moist (beach deposit)
Direct Shear	4	109			23						
	4				39					GP	Dark gray **SANDY GRAVEL (BASALTIC)** with some cobbles, dense to very dense, moist to wet (beach deposit)
Direct Shear	5	131			97		5				
			3								
							10				
Sieve - #200 = 0.2%	5				47						
			58				15				
	7				23						
										SM	Dark gray with trace tan **SILTY SAND (BASALTIC)** with a little sand (coralline) and a little gravel (basaltic), medium dense (shallow marine deposit)
			25				20			GW	Gray with some brown **SANDY GRAVEL (BASALTIC)** with a little cobbles and traces of silt, very dense (clinker)
	18				56						
			90	24			25				Gray vugular **BASALT**, moderately to closely fractured, unweathered to slightly weathered, hard (a'a basalt)
											Boring terminated at 27 feet
							30				* Elevation estimated from Topographic Plan received from The Limtiaco Consulting Group on May 31, 2022.
							35				

Date Started:	May 19, 2022	Water Level: ▽ 9.5 ft. 05/19/2022 1435 HRS ▼ 8.5 ft. 05/19/2022 1655 HRS	Plate
Date Completed:	May 19, 2022		
Logged By:	S. Latronic	Drill Rig: MOBILE B-53.1	A - 1
Total Depth:	27 feet	Drilling Method: 4" Solid-Stem Auger & HQ Coring	
Work Order:	8271-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING LOG 8271-00.GPJ GEOLABS.GDT 6/17/22

DRAFT GEE REPORT FOR YOUR REVIEW

APPENDIX B

APPENDIX B

Laboratory Tests

Moisture Content (ASTM D2216) and Unit Weight (ASTM D2937) determinations were performed on selected samples as an aid in the classification and evaluation of soil properties. The test results are presented on the Logs of Borings at the appropriate sample depths.

One Atterberg Limits test (ASTM D4318) was performed on a selected soil sample to evaluate the liquid and plastic limits. The test results are summarized on the Log of Boring at the appropriate sample depth. Graphic presentation of the test results is provided on Plate B-1.

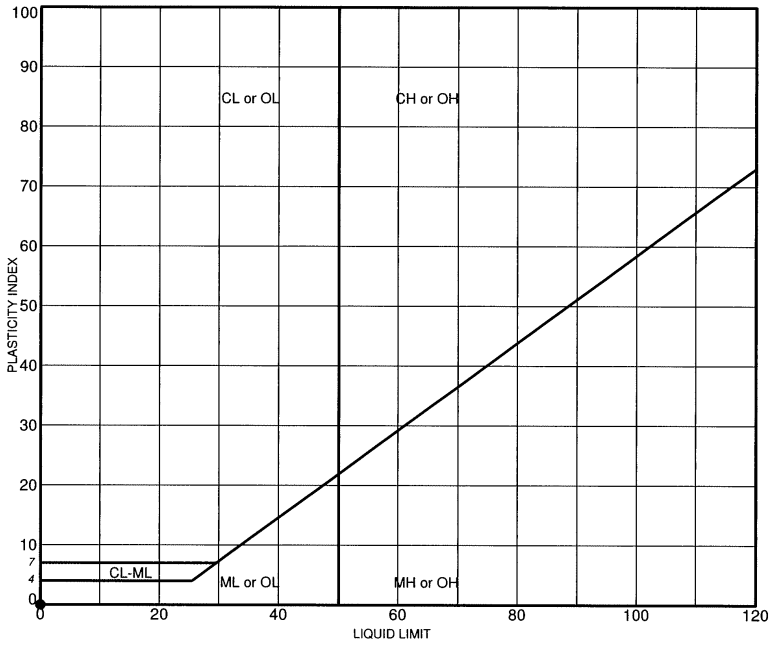
Two Sieve Analysis tests (ASTM D6913) were performed on selected samples to evaluate the gradation characteristics of the soils and to aid in soil classification. Graphic presentation of the grain size distributions is provided on Plate B-2.

Two Direct Shear tests (ASTM D3080) were performed on selected samples to evaluate the shear strength characteristics of the material tested. The test results are presented on Plates B-3 and B-4.

One laboratory California Bearing Ratio test (ASTM D1883) was performed on a bulk sample of the near-surface soils to evaluate the characteristics of the soils. The test results are presented on Plate B-5.

One Sand Equivalent test (ASTM D2419) was performed on a bulk sample of the near-surface soils to evaluate the characteristics of the soils. The test results are presented on Plate B-6.

DRAFT GEE REPORT FOR YOUR REVIEW



	Sample	Depth (ft)	LL	PL	PI	Description
●	Bulk-1	0.0-1.0	NP	NP	NP	Dark gray to black sandy gravel (NP)

NP = NON-PLASTIC

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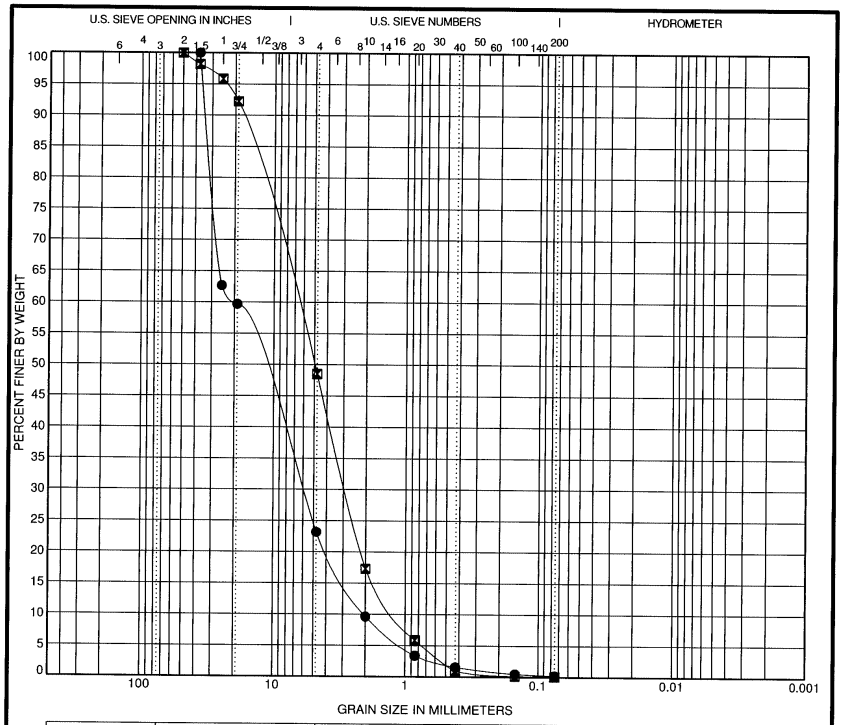
ATTERBERG LIMITS TEST RESULTS - ASTM D4318

POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII

Plate B - 1

G_ATTERBERG PI-100_LL-120_8271-00.GPJ_GEOLABS.GDT_6/17/22



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	B-1	12.0-14.0	Dark gray to black sandy gravel (GP)				0.9	9.5
⊠	Bulk-1	0.0-1.0	Dark gray to black sandy gravel (GW)	NP	NP	NP	1.0	5.9

	Sample	Depth (ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Fine
●	B-1	12.0-14.0	37.5	19.577	6.158	2.051	76.8	22.9	0.2
⊠	Bulk-1	0.0-1.0	50	6.838	2.844	1.158	51.5	48.5	0.0

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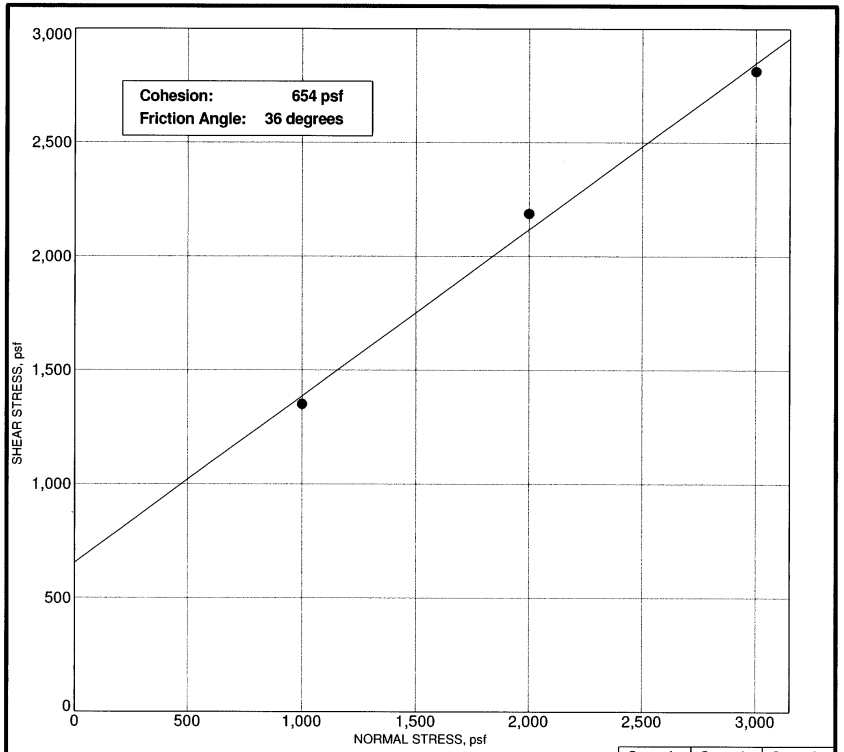
GRAIN SIZE DISTRIBUTION - ASTM D6913
POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII
Plate B - 2

G GRAIN SIZE MOD 8271-00.GPJ GEOLABS.GDT 7/7/22

DRAFT GEE REPORT FOR YOUR REVIEW



		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	7.7	13.3	8.8
	Dry Density, pcf	94.3	91.9	96.1
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	21.2	19.8	19.7
	Dry Density, pcf	91.9	93.7	96.1
	Height, inches	1.027	0.980	1.000
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0024	0.0021	0.0023
	Normal Stress, psf	**1000**	**2000**	**3000**
	Peak Shear Stress, psf	**1351**	**2187**	**2814**
	Shear Displacement, inches	0.43	0.41	0.41

Sample: B-1
Depth: 2.0 - 3.5 feet
Description: Dark gray to black sandy gravel with some cobbles

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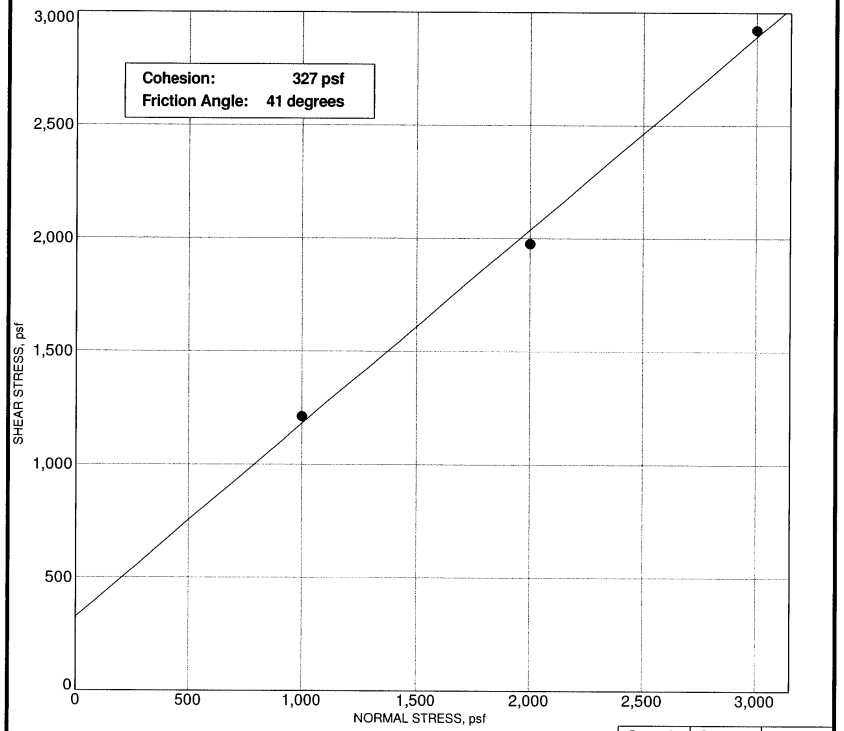
DIRECT SHEAR TEST - ASTM D3080
POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII
Plate B - 3

G DIRECT SHEAR 8271-00.GPJ GEOLABS.GDT 6/17/22



		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	9.1	9.9	12.2
	Dry Density, pcf	104.3	105.1	105.8
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	18.7	17.6	16.9
	Dry Density, pcf	101.0	105.6	106.0
	Height, inches	1.033	0.995	0.998
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0024	0.0020	0.0023
	Normal Stress, psf	**1000**	**2000**	**3000**
	Peak Shear Stress, psf	**1212**	**1976**	**2922**
	Shear Displacement, inches	0.43	0.40	0.41

Sample: B-1
Depth: 5.5 - 7.0 feet
Description: Dark gray sandy gravel with some cobbles

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DIRECT SHEAR TEST - ASTM D3080

POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII

Plate B - 4

G DIRECT SHEAR 8271-00.GPJ GEOLABS.GDT 8/17/22

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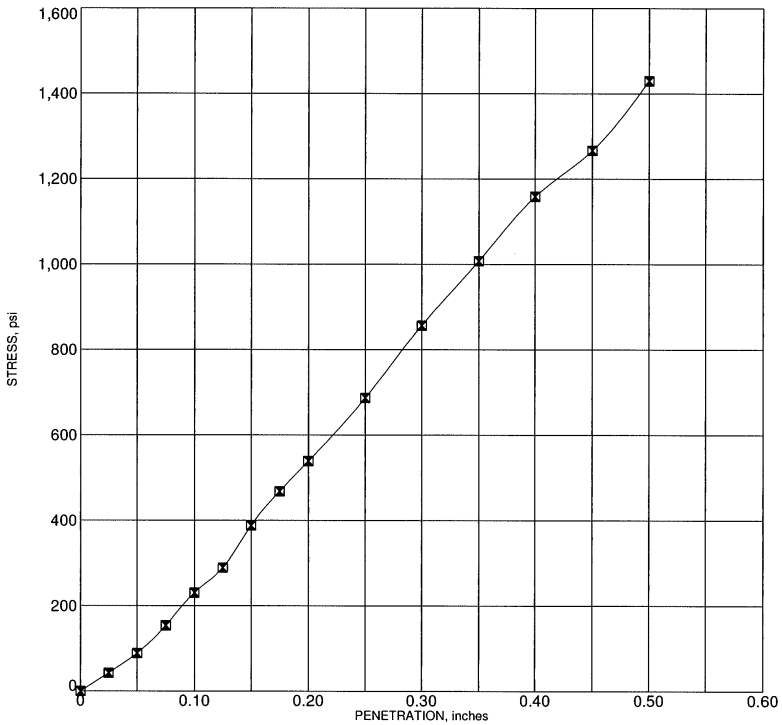

Corr. CBR @ 0.1"	26.7
Corr. CBR @ 0.2"	39.0
Swell (%)	0.00

Sample: Bulk-1
Depth: 0.0 - 1.0 feet
Description: Dark gray to black sandy gravel (NP)

Molding Dry Density (pcf)	117.3	Hammer Wt. (lbs)	10
Molding Moisture (%)	1.3	Hammer Drop (inches)	18
Days Soaked	4	No. of Blows	56
Aggregate	3/4 inch minus	No. of Layers	5

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W.O. 8271-00

CALIFORNIA BEARING RATIO - ASTM D1883

POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII

Plate B - 5

G CBR 8271-00.GPJ GEOLABS.GDT 8/17/22

SAND EQUIVALENT VALUE OF SOILS AND FINE AGGREGATE ASTM D 2419

W.O. 8271-00 PROJECT: Pohoiki Boat Ramp Maintenance Dredging

DATE TESTED: 6/3/22 BY: SA
SAMPLE: Bulk-1 Engineer: GS

SOIL DESCRIPTION: Dark gray to black sandy gravel

SEDIMENTATION TIME: 20 MINUTES

SAND EQUIVALENT = SAND READING / CLAY READING X 100

SAND READING	CLAY READING	SAND EQUIVALENT
3.6	0.0	100
3.8	0.0	100
3.9	0.0	100
AVERAGE SAND EQUIVALENT		**100**

DRAFT GEE REPORT FOR YOUR REVIEW

APPENDIX C

POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII

B-1 7.0' TO 27.0'

7.0'

27.0'

APPENDIX C

Wave Models Utilized
by Sea Engineering, Inc.

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***S**imulating **WA**ves **N**earshore* (SWAN) is a third-generation wave model developed by Delft University of Technology that computes random, short-crested wind-generated waves in coastal regions and inland waters (Booij, *et al*, 1999). The SWAN model can be applied as a steady state or non-steady state model and is fully spectral (over the total range of wave frequencies). Wave propagation is based on linear wave theory, including the effect of wave-generated currents. SWAN provides many output quantities, including two-dimensional spectra, significant wave height and mean wave period, and average wave direction and directional spreading. For this project, the SWAN model was used to transform waves from deepwater to just offshore of the of the project area. As waves move into shallow water, bathymetry has a greater influence on wave behavior. Waves interact with the bottom, dissipating more energy through depth-induced breaking and bottom friction. The SWAN model outputs wave conditions near the 45-meter depth contour offshore of Pohoiki to be used as boundary conditions for the phase resolving XBeach-NH non-hydrostatic (XBeach-NH) numerical model. The XBeach-NH model simulates the propagation of waves from the 45-meter depth contour to shore.

XBeach is an open-source numerical wave model originally developed to simulate hydrodynamic and morphological processes along sandy shorelines. The XBeach-NH module (Stelling and Zijlema, 2003) computes the depth-averaged flow due to waves and currents using the non-linear shallow water equations and includes a non-hydrostatic pressure term. The governing equations are valid from intermediate to shallow water and can simulate most of the phenomena of interest in the nearshore zone and in harbor basins, including shoaling and refraction over variable bathymetry, reflection and diffraction near structures, energy dissipation due to wave breaking and bottom friction, breaking-induced longshore/cross-shore ("rip") currents, and harbor oscillations. XBeach-NH is a phase resolving model, meaning that wave crests and troughs are modeled and propagated in time and space. The result is an accurate representation of wave heights and wave patterns across the domain.

Model Results - Two wave cases were modeled for the two predominant sources of wave energy at Pohoiki: eastly tradewind waves and south swell. The nearshore wave pattern for tradewind waves are shown in Figure 1. The figure shows that the incoming wave crests closely parallel the shape of the beach suggesting that trade wind waves are the main driver of the current beach shape. The figure also shows that as the waves round the corner of the new lava to the north, they wrap around the steep shoreline creating the potential to erode the friable lava and move more sediment into Pohoiki Bay. Figure 2 shows the wave pattern for a typical south swell. The model shows that most of the wave energy is refracted toward the shallow reef protruding from shore at the southern end of the beach but the wave crests that do reach the beach are also relatively parallel to the beach crest but may have the potential to move sediment from south to north along the beach.

The wave modeling shows that typically daily prevailing tradewind wave heights at the shoreline are about 3-4 feet, and annual event large tradewind wave breaker heights are about 8 feet.

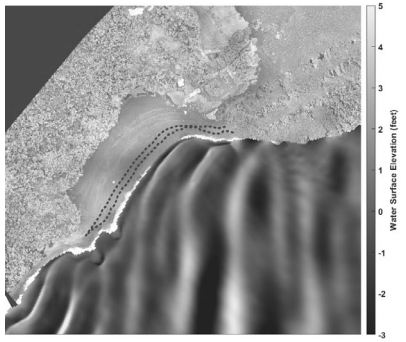

Figure 1. Wave pattern from typical easterly tradewind waves. Note dashed blue line shows the existing beach crest in March 2022

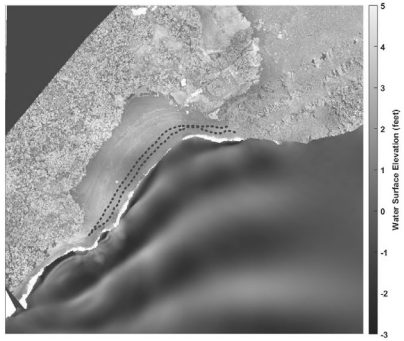

Figure 2. Wave crest patterns from prevailing south swell. Note dashed blue line shows the existing beach crest in March 2022

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APPENDIX D

Natural Resources Assessment
by AECOS, Inc.

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A natural resources assessment for the Pohoiki Boat Ramp dredging of volcanic debris and relocation, Puna District, Island of Hawai‘i

AECOS Inc.
45-939 Kamehameha Highway
Suite 104
Kāne‘ohe, Hawai‘i 96744

November 2, 2022

A natural resources assessment for the Pohoiki Boat Ramp dredging of volcanic debris and relocation, Puna District, Island of Hawai‘i

November 2, 2022 *AECOS* No. 1709

Reginald E. David, Maya LeGrande, and Stacey Kilarski
AECOS Inc.
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Kāne‘ohe, Hawai‘i 96744
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Introduction

The Kīlauea Volcano, lower East Rift Zone eruption in Puna between May and September 2018 resulted in a significant alteration of the lower Puna coastline, including the addition of land directly east of Isaac Hale (Pohoiki) Beach Park and subsequent formation of a black sand beach that has filled Pohoiki Bay and rendered useless the boat ramp and pier located there (Figure 1). The Department of Land and Natural Resources Division of Boating and Ocean Recreation (DLNR DOBOR) is proposing to dredge Pohoiki Bay to restore pre-eruption navigational access to the boat ramp. The wave deposited debris currently covers an area of approximately 11.6 ac (4.7 ha), blocks navigational access to the Pacific Ocean, and partially covers the existing U.S. Army Corps of Engineers (USACE) breakwater structure (TLCG, 2022; see cover image).

Site Description

Isaac Hale Beach Park includes a parking lot and picnic area east of the boat ramp. The new beach, located west of the parking lot, is made up of volcanic debris (sand, cinder, cobble) eroding off the face of the new lava flow to the east. Two landlocked ponds occur at the very back of the massive beach formation. The new lava land mass from the 2018 Kīlauea eruption ranges in elevation from 12 to 45 ft (3.7 to 14 m) above Mean Low Low Water (MLLW) forming a rocky sea cliff along the shore with deep water not far off the shore. The area surrounding

Pohoiki Bay on the west is mostly undeveloped and covered by dense secondary vegetation (TLCG, 2022).

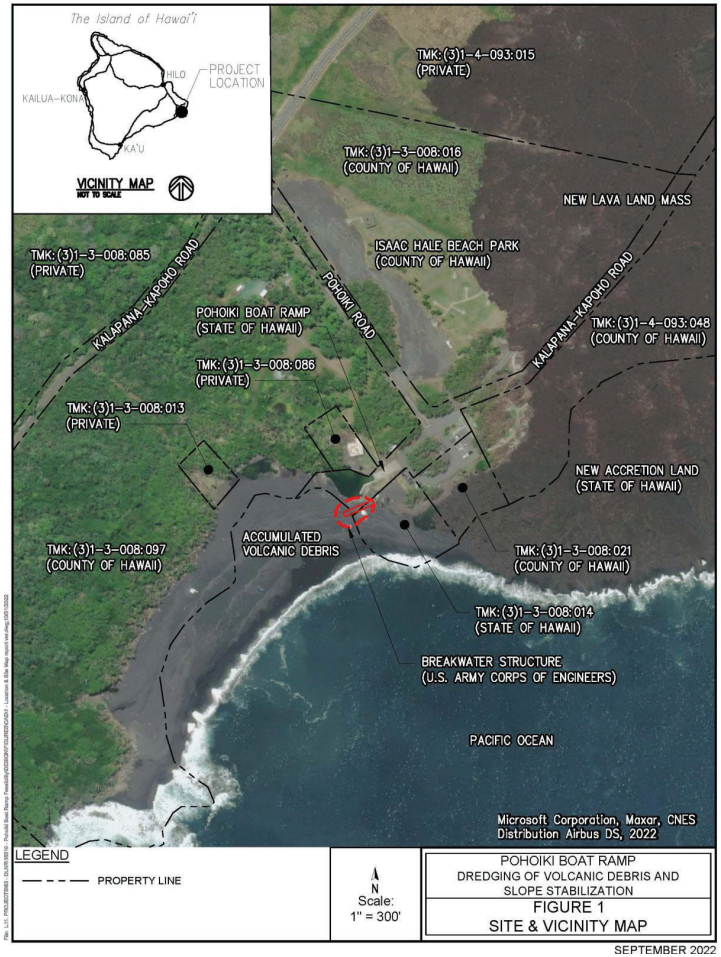

Figure 1. Site and vicinity (Limtiaco, 2022)

Methods

Botanical Survey

Maya LeGrande surveyed the project area on October 18, 2022. Plant species were identified as they were encountered during wandering transects through the project area and along boundaries. Included in the survey area were the area of beach proposed for dredging, a section of the 'a'a lava flow to the east of the beach area, and all areas of the boat ramp, parking area, and the southerly section of Issac Hale Park. Notes were made on plant associations and distribution, disturbances, topography, substrate type, exposure, and drainage. Species names follow *Manual of the Flowering Plants of Hawai'i* (Wagner, Herbst, & Sohmer, 1990; Wagner & Herbst, 1999) for native and naturalized flowering plants, *Hawai'i's Ferns and Fern Allies* (Palmer, 2003) and *Taxonomic and Nomenclatural Updates to the Fern and Lycophyte Flora of the Hawaiian Islands* (Ranker et al, 2019) for ferns, and *A Tropical Garden Flora* (Staples & Herbst, 2005) for ornamental plants. More recent name changes for naturalized plant species follow Imada (2019).

Terrestrial Vertebrates Survey

Avian Survey

A bird survey was conducted by Reginald David in the morning hours of October 18, 2022. Birds were identified by visual observations aided by Leica 8 X 42 binoculars, and by listening for vocalizations. Avian species abundance was estimated at three count-stations: one sited within the parking lot (proposed laydown area), on the lava bench east of the parking lot, and in the center of the new beach. A single, eight-minute, avian point-count was made at each count-stations. Weather conditions were ideal, with no rain, unlimited visibility, and winds between 1 and 5 kilometers per hour. The avian phylogenetic order and nomenclature used in this report follow the AOU Check-List of North and Middle American Birds 2021 (Chesser et al., 2021, 2022).

Mammalian Survey

A list was made of mammals encountered during the survey. Indicators of mammalian presence, such as tracks, scat, and other sign were noted. Mammalian phylogenetic order and nomenclature follow *Mammal Species of the World* (Wilson and Reeder, 2005).

Turtle Survey

The length of the beach was searched by Stacey Kilarski for turtle nests, tracks, or other sign of turtle usage of the new coastline. Additionally, we interviewed the night security guard and three on-site County of Hawai'i lifeguards for information on whether they had seen turtles on the beach or in the nearshore waters.

Insect Survey

We searched each of the areas for plants in the Family Solanaceae for signs of the endangered Blackburn's Sphinx Moth (*Manduca blackburni*). Larval habitat for this moth is limited to plants in the Family Solanaceae and, in Hawai'i, the most commonly found plant supporting this moth is introduced tree tobacco (*Nicotiana glauca*). We surveyed the two "ponds" for the presence of Hawaiian damselflies.

Results

Vegetation

The vegetation in the survey area is limited to landscaping plants and naturalized species in and around the parking area (Figures 2 and 4), naturally occuring vegetation around the boat ramp (Figure 3), and pioneer species on the new 'a'a lava flow (Figure 5). Overall, the vegetation is dominated by *kamani* planted around the parking area with a mix of native and non-native groundcover and mostly unvegetated 'a'a lava or cinder.

Flora

The minimal pioneer vegetation growing in the newly created cinder beach substrate included *Nephrolepis* fern species and nut grass (*Cyperus rotundus*). Other than a few coconut trees growing near the boat ramp, the cinder beach area harbors no other trees. The majority of the vegetation is located around the parking lot, trees include Kamani (*Calophyllum inophyllum*), hala (*Pandanus tectorius*), milo (*Thespesia populnea*), tropical almond (*terminalia catappa*), coconut, and papaya (*Carica papaya*). Smaller shrubs are naupaka kahakai (*Scaevola taccada*), noni (*Morinda citrifolia*), and sourbush (*Pluchea carolinensis*). A total of 53 plant species were documented in and around the project area (Table 1), five of those are considered native to the Hawaiian Islands. All of the native plants documented are common indigenous coastal species found

Figure 2. *Kamani* grove around the parking area.

Figure 3. Remnant pond beside the boat ramp.

Figure 4. Landscaped vegetation northeast of the parking area.

Figure 5. Unvegetated cinder beach and 'a'a lava field (in foreground).

Table 1. Plant species observed at the Pohoiki ramp and dredging site October 2022.

Species listed by family	*Common name*	*Status*	*Abundance*
Pteridophytes			
Ferns and fern allies			
NEPHROLEPIDACEAE			
Nephrolepis brownii (Desv.) Hovenkamp & Miyam.	---	Nat	C
Nephrolepis cordifolia (L.) C.Presl	*kupukupu*	**Ind**	O
POLYPODIACEAE			
Phymatosorus grossus (Langsd. & Fisch.) Brownlie	*laua'e*	Nat	C
PSILOTACEAE			
Psilotum nudum (L.) P.Beauv.	*moa*	**Ind**	U
Flowering Plants			
Monocots			
AMARYLLIDACEAE			
Crinum asiaticum L.	spider lily	Cult	U
ARACEAE			
Epipremnum pinnatum cult. *aureum*	pothos	Nat	R
ARECACEAE			
Cocos nucifera L.	*niu*, coconut	**Pol**	O
Pritchardia sp.	*loulu*	Cult	R
ASPARAGACEAE			
Cordyline fruticosa (L.) A. Chev.	*kī*	**Pol**	R
COMMELINACEAE			
Commelina diffusa N. L. Burm.	day flower	Nat	O
CYPERACEAE			
Cyperus brevifolius (Rottb.)Hassk.	*kili'o'opu*	Nat	U
Cyperus polystachyos Rottb.	---	**Ind**	R
PANDANACEAE			
Pandanus tectorius S. Parkinson ex Z	*hala*	**Ind**	C
POACEAE			
Axonopus compressus (Sw.) P. Beauv.	carpetgrass	Nat	U
Cenchrus echinatus L.	common sandbur	Nat	U
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat	O
Eragrostis brownei (Kunth) Nees ex Steud.	sheep grass	Nat	U

Table 1 (continued).

Species listed by family	*Common name*	*Status*	*Abundance*
POACEAE (cont.)			
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	Nat	U
Megathyrsus maximus (Jacq.) B.K. Simon & W.L. Jacobs	Guinea grass	Nat	O
Melinis minutiflora P. Beauv.	molasses grass	Nat	U
Melinis repens (Willd.) Zizka	Natal redtop	Nat	R
Paspalum conjugatum Bergius	Hilo grass	Nat	C
Eudicots			
AMARANTHACEAE			
Amaranthus spinosus L.	spiny amaranth	Nat	R
ANACARDIACEAE			
Schinus terebinthifolius Raddi	Christmas berry	Nat	R
APOCYNACEAE			
Plumeria rubra L.	plumeria	Orn	R
ARALIACEAE			
Heptapleurum actinophyllum (Endl.) Lowrey & G.M. Plunkett	octopus tree	Nat	O
ASTERACEAE			
Acanthospermum australe (Loefl.) Kuntze	spiny-bur, Paraguay bur	Nat	O
Bidens alba (L.) DC. var. *radiata* (Sch.Bip.) Ballard ex Melchert	Spanish needle, beggartick	Nat	C
Emilia sonchifolia (L.) Raf. var. *sonchifolia*	Flora's paintbrush	Nat	O
Pluchea carolinensis (Jacq.) G. Don	sourbush	Nat	R
Youngia japonica (L.) DC.	Oriental hawksbeard	Nat	R
CALOPHYLLACEAE			
Calophyllum inophyllum L.	*kamani*	**Pol**	A
CANNABACEAE			
Trema orientalis (L.) Blume	gunpowder tree	Nat	O
CARICACEAE			
Carica papaya L.	papaya	Nat	O
COMBRETACEAE			
Terminalia catappa L.	tropical almond	Nat	O
CONVOLVULACEAE			
Ipomoea trilobata L.	little bell	Nat	R
CUCURBITACEAE			
Momordica charantia L.	balsam pear	Nat	O

Table 1 (continued).

Species listed by family	*Common name*	*Status*	*Abundance*
EUPHORBIACEAE			
Euphorbia prostrata Aiton.	prostrate spurge	Nat	C
Euphorbia hirta L.	garden spurge	Nat	C
Macaranga tanarius (L.) Mull. Arg.	---	Nat	O
Phyllanthus debilis Klein ex Willd.	niuri	Nat	C
FABACEAE			
Desmodium incanum DC.	Spanish clover	Nat	U
Macroptilium lathyroides (L.) Urb.	wild bean, cow pea	Nat	U
Mimosa pudica L. var. unijuga (Duchass. & Walp.) Griseb.	sensitive plant	Nat	R
GOODENIACEAE			
Scaevola taccada (Gaetn.) Roxb.	*naupaka kahakai*	**Ind**	U
LAMIACEAE			
Mesophaerum pectinatum (L.) Kuntze	comb hyptis	Nat	U
MALVACEAE			
Melochia umbellata (Houtt.) Stapf	---	Nat	C
Thespesia populnea (L.) Sol. ex Correa	*milo*	**Ind?**	O
PASSIFLORACEAE			
Passiflora edulis Sims	passion fruit, *liliko'i*	Nat	R
PORTULACACEAE			
Portulaca oleracea L.	pigweed, purslane	Nat	R
RUBIACEAE			
Morinda citrifolia L.	*noni*	**Pol**	C
Paederia foetida L.	*maile pilau*	Nat	U
VERBENACEAE			
Lantana camara L.	lantana	Nat	U

Legend to Table 1

STATUS = distributional status for the Hawaiian Islands:
- **Ind** = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.
- Nat = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
- Orn = A cultivated plant; a species not known to be naturalized (spreading on its own) in Hawai'i.
- **Pol** = An early Polynesian introduction, introduced before 1778.

ABUNDANCE = occurrence ratings for plant species:
- R – Rare — seen in only one or perhaps two locations.
- U - Uncommon — seen at most in several locations
- O - Occasional — seen with some regularity
- C - Common — observed numerous times during the survey
- A - Abundant — found in large numbers; may be locally dominant.

throughout the main Hawaiian Islands. Four early Polynesian introduced plants were also documented during the survey.

Avian Fauna

A total of 55 individual birds of 11 species, representing nine separate families, was recorded during station counts (Table 2). One species—Pacific Golden-Plover (*Pluvialis fulva*)—is an indigenous migratory shorebird species; the remaining 10 species recorded are alien to the Hawaiian Islands.

Table 2. Avian species detected at the Pohoiki ramp and dredge site, October 2022.

Common Name	Species	Status	RA
	Order		
	CHARADRIIFORMES		
	Family		
	CHARADRIIDAE - Lapwings & Plovers		
	Charadriinae - Plovers		
Pacific Golden-Plover	*Pluvialis fulva*	IM	0.33
	COLUMBIFORMES		
	COLUMBIDAE - Pigeons & Doves		
Spotted Dove	*Streptopelia chinensis*	A	0.33
Zebra Dove	*Geopelia striata*	A	1.67
	PASSERIFORMES		
	ZOSTEROPIDAE - White-eyes		
Warbling White-eye	*Zosterops japonicus*	A	1.67
	STURNIDAE - Starlings		
Common Myna	*Acridotheres tristis*	A	4.67
	ESTRILDIDAE - Estrildid Finches		
Common Waxbill	*Estrilda astrild*	A	1.00
	PASSERIDAE - Old World Sparrows		
House Sparrow	*Passer domesticus*	A	7.33
	FRINGILLIDAE		
	Carduline Finches & Allies Carduelinae - Carduline Finches and Hawaiian Honeycreepers		
Yellow-fronted Canary	*Ceithagra mozambica*	A	0.67
	CARDINALIDAE - Cardinals & Allies		
Northern Cardinal	*Cardinalis cardinalis*	A	0.33
	THRAUPIDAE - Tanagers		
	Thraupinae - Core Tanagers		
Yellow-billed Cardinal	*Paroaria capitata*	A	1.00
Saffron Finch	*Sicalis flaveola*	A	1.00

Table 2 (continued).

Key to Table2.

Status:
IM = Indigenous migratory species
A = Naturalized, non-native species (introduced).

RA : Relative Abundance ~ species count / number of point-count stations (n=3).

Avian diversity and densities are in keeping with the location and vegetation present on the site. Two species—Warbling White-eye (*Zosterops japonicus*) and Common Myna (*Acridotheres tristis*)—accounted for 65% of all birds recorded during station counts. The most frequently recorded species was Warbling White-eye, accounting for 40% of the total number of individual birds recorded.

Mammalian Fauna

Two terrestrial mammalian species were detected during this survey. We saw three small Asian mongoose (*Herpestes javanicus*) in the *kamani* grove at the parking lot and in the paved area to the northwest of the parking lot. Four cats (*Felis catus*) were also present in the parking lot; These animals are being fed by a local resident.

Turtle Fauna

We did not record any sightings or sign of turtle usage of the new beach.

Insect Fauna

We did not record any potential host plants suitable as habitat for Blackburn's sphinx moth. Neither did we record any damselflies in or over the ponds. Though we did record the introduced scarlet skimmer (*Crocothemis servilla*), a commonly seen Asian dragonfly.

Discussion and Recommendations

Recommendations are partly based on U.S. Fish and Wildlife Service, Animal Avoidance and Minimization Measures (USFWS-PIFWO, 2922). Implementation of the recommendations (provided below as bulleted items) by the Project contractor will minimize impacts to listed species to the maximum extent practicable.

Floral Resources

Native plant habitat within the proposed project area has been highly modified by recent volcanic activity and human modifications to the landscape. The majority of the project area is unvegetated or sparsely so. Native trees include *hala* and *milo*. None of the plant species observed are listed as endangered or threatened under either the federal or State of Hawai'i endangered species statutes. (HDLNR, 1998; USFWS, nd-a).

The most abundant tree is the Polynesian introduced *kamani* found in groves around the parking lot (Fig. 2). It is recommended that these trees be retained and incorporated into the landscaping of the general area.

Avian Resources

The sole indigenous species recorded was a single Pacific Golden-Plover in the parking lot (Fig. 2). Pacific Golden-Plover is a native, indigenous migratory shorebird species which nest in the high Arctic during the late spring and summer months, returning to Hawai'i and the Tropical Pacific to spend the fall and winter months each year. The birds usually leave Hawai'i for their migration back to the Arctic in late April or the very early part of May. This plover is widely distributed across the Hawaiian Islands during the cooler months.

Seabirds

Although no seabirds were detected during the course of this survey, it is possible that the endangered Hawaiian Petrel (*Puffinus sandwichesis*), Band-rumped Storm-Petrel (*Hydrobates castro*), and the threatened Newell's Shearwater (*Puffinus newelli*) over-fly the Project area in small numbers between April and the middle of December each year. The primary cause of mortality in Hawaiian Petrels and Newell's Shearwaters in Hawai'i is thought to be predation by alien mammalian species at the nesting colonies (USFWS, 1983; Simons and Hodges, 1998; Ainley et al., 2001). Collision with man-made structures is considered the second most significant cause of mortality of these seabird species in Hawai'i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. Disoriented seabirds may collide with man-made structures and, if not killed outright, become easy targets of opportunity for feral mammals (Hadley, 1961; Telfer, 1979; Sincock, 1981; Reed et al., 1985; Telfer et al., 1987; Cooper and Day, 1998; Podolsky et al., 1998; Ainley et al., 2001; Hue et al., 2001; Day et al., 2003). No suitable nesting habitat exists within or close to the project area for any of these three seabird species.

The principal potential impact that the project poses to protected seabirds is an increased threat that birds will be downed after becoming disoriented by lights associated with construction during the nesting season. The two ways outdoor lighting can pose a threat to nocturnally flying seabirds is: 1) during construction it is deemed expedient or necessary to conduct night-time construction activities; and, 2) following build-out, security lighting is operated during the seabird nesting season.

- If night-time construction activity or equipment maintenance is proposed during the construction phases of the project, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground (Reed et al., 1985; Teller et al., 1987). Deleterious impacts to transiting seabirds can be avoided if construction occurs during daylight hours and all outdoor lighting installed is fully "dark sky compliant" (HDLNR-DOFAW, 2016). DLNR recommends avoiding construction-related night-time lighting between September 15 and December 15 (DLNR, 2016).

Mammalian Resources

The findings of the mammalian survey are consistent with the location of the property and habitats present on that property. Although no rodents were recorded, it is likely that some of the four established Muridae found on Hawai'i Island—roof rat (*Rattus rattus*), brown rat (*Rattus norvegicus*), Polynesian rat (*Rattus exulans hawaiiensis*), and European house mouse (*Mus musculus domesticus*)—use resources within the general area on a seasonal basis. These introduced rodents are deleterious to native ecosystems and native biota.

No mammalian species currently protected or proposed for protection under either the federal or State of Hawai'i endangered species programs were detected during this survey (DLNR, 2015; USFWS, nd-a).

Hawaiian hoary bat

It is probable that the Hawaiian hoary bat overflies the project area on a seasonal basis (David, 2022). The removal of trees within the project area could temporarily displace individual bats using the trees for roosting. As bats use multiple roosts within their home territories, the potential disturbance resulting from the removal of the vegetation is likely to be minimal. However, during the pupping season, females carrying their pups may be less able to vacate a roost site if the tree is felled. Further, adult female bats sometimes leave their pups in

the roost tree while they forage. Very small pups may be unable to flee a tree that is being felled.

- Potential adverse impacts from such disturbance can be avoided or minimized by not clearing woody vegetation taller than 4.6 m (15 ft) between June 1 and September 15, the period in which bats may have pups.

Turtle Resources

The distinct population segment (DPS) of green sea turtle that occurs in Hawai'i is federally-listed as a threatened species (USFWS and NOAA-NMFS, 2015a, b; USFWS, 2019) and as a threatened subspecies (*Chelonia mydas agassizi*) under state regulations (HDLNR, 2014), and the hawksbill sea turtle (*Eretmochelys imbricata*) is much less common than green sea turtle in Hawaiian waters. Hawksbill turtle is distributed across the Pacific, Indian, and Atlantic oceans. The global population has declined by more than 80% over the last 30 years and all hawksbill turtle populations were listed as endangered under the ESA in 1978, (NMFS and USFWS, 2007b).

The green sea turtle diet consists primarily of benthic macroalgae (Arthur and Balazs, 2008) that the shallow reefs of the main Hawaiian Islands provide in abundance. Red macroalgae generally make up 78% of their diet, whereas green macroalgae make up 12% (Arthur and Balazs, 2008). The single most consumed algal species is *Acanthophora spicifera*, an introduced species first recorded in Hawai'i in 1950 (Huisman et al., 2007). No algal resources occur in the nearshore waters of the Project area.

As with green turtle, hawksbill forage grounds and natal nesting areas are frequently located in different island groups, and residents of a given island group may originate from multiple natal nesting areas (NMFS & USFWS, 2007b). However, tagging studies suggest that hawksbill nesting in Hawai'i remains within the MHI (main Hawaiian Islands). Genetic samples collected and analyzed suggest that Hawai'i's hawksbill sea turtle may be genetically and geographically distinct from other populations in the Pacific (Dutton and Leroux, 2008). Parker et al. (2009) report that the tracks of nine post-nesting tagged females have all remained within the MHI, further supporting the possibility that Hawai'i's hawksbill sea turtle may be a discrete central Pacific population. Although there was no evidence of either species of sea turtle usage of the beach at the time of our survey, it should be noted that the beach (Figure 6) appears to be potential habitat for either of the two listed sea turtles.

Figure 6. Beach and shoreline showing potential turtle nesting habitat

Hawksbill nesting has been documented on four Hawaiian Islands, with the overwhelming majority of nesting females (78.4%) and nests (86.5%) recorded at four beaches along the southern coast of Hawai'i Island (Gaos et al., 2021). Females nest in a variety of habitats including black and white sand beaches, small pocket coves covered in cobbles or rugged lava, and in back beach vegetation. Hawksbill monitoring efforts were initiated on several beaches on Hawai'i Island in 1989, and flipper tagging of nesting females began in 1991. More intense monitoring efforts began on Hawai'i Island and Maui in 1993 and 1996, respectively. Approximately 85% of all confirmed hawksbills nests in the State of Hawaii have been recorded in the district of Ka'ū, on the southern coast of Hawai'i Island (Figure 7).

- No turtles were encountered in our surveys but based on the known nesting locations on Hawai'i island for hawksbill sea turtles, it is recommended that a qualified biological monitor be on site during dredging operations to ensure that dredging activities do not disturb listed sea turtle.

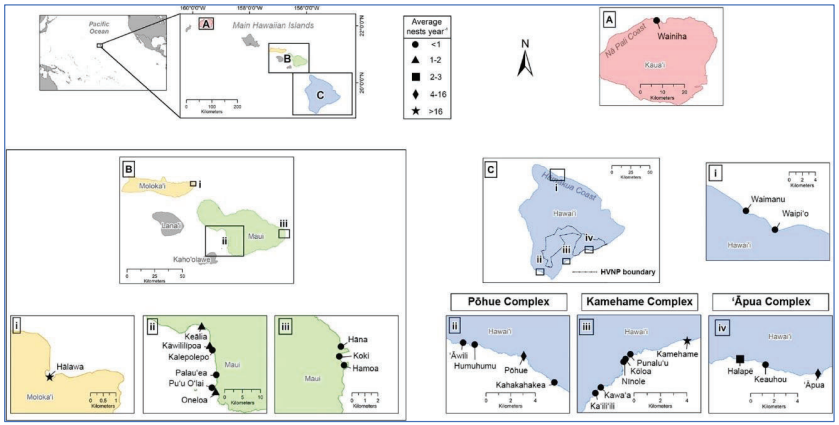

Figure 7. Confirmed hawksbill nesting beaches on the Hawaiian Islands, including panels for (A) Kaua'i, (B) Maui Nui, and (C) Hawai'i Island. Symbols correspond to the average number of nests per year based on years consistently monitored. The three primary nesting complexes on Hawai'i Island (Pōhue, Kamehame, and 'Āpua) and the boundary for Hawai'i Volcanoes National Park (HVNP) shown in (C) for reference (Gaos et al. 2021).

Insect Resources

We did not record any tree tobacco nor any other species in the Family Solanaceae that could be host plants for Blackburn's Sphinx Moth. The two landlocked ponds created behind the new beach formation presently contain water that, according to the County life guards, reaches 109 °F (43 °C). When we were on the site the deeper pond next to the boat ramp was around 105 °F (41 °C) and the shallow pond to the west was over 107 °F (42 °C). These temperatures exceed the normal range of most aquatic organisms, including damselfly nymphs.

Other Resources of Potential Concern

Critical Habitat

No federally delineated Critical Habitat for any species occurs within the Project area (USFWS, nd-b). There is no equivalent designation under State of Hawai'i endangered species statutes.

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APPENDIX E

Lava Flow Hazard Zones and Flood Hazard Assessment Report

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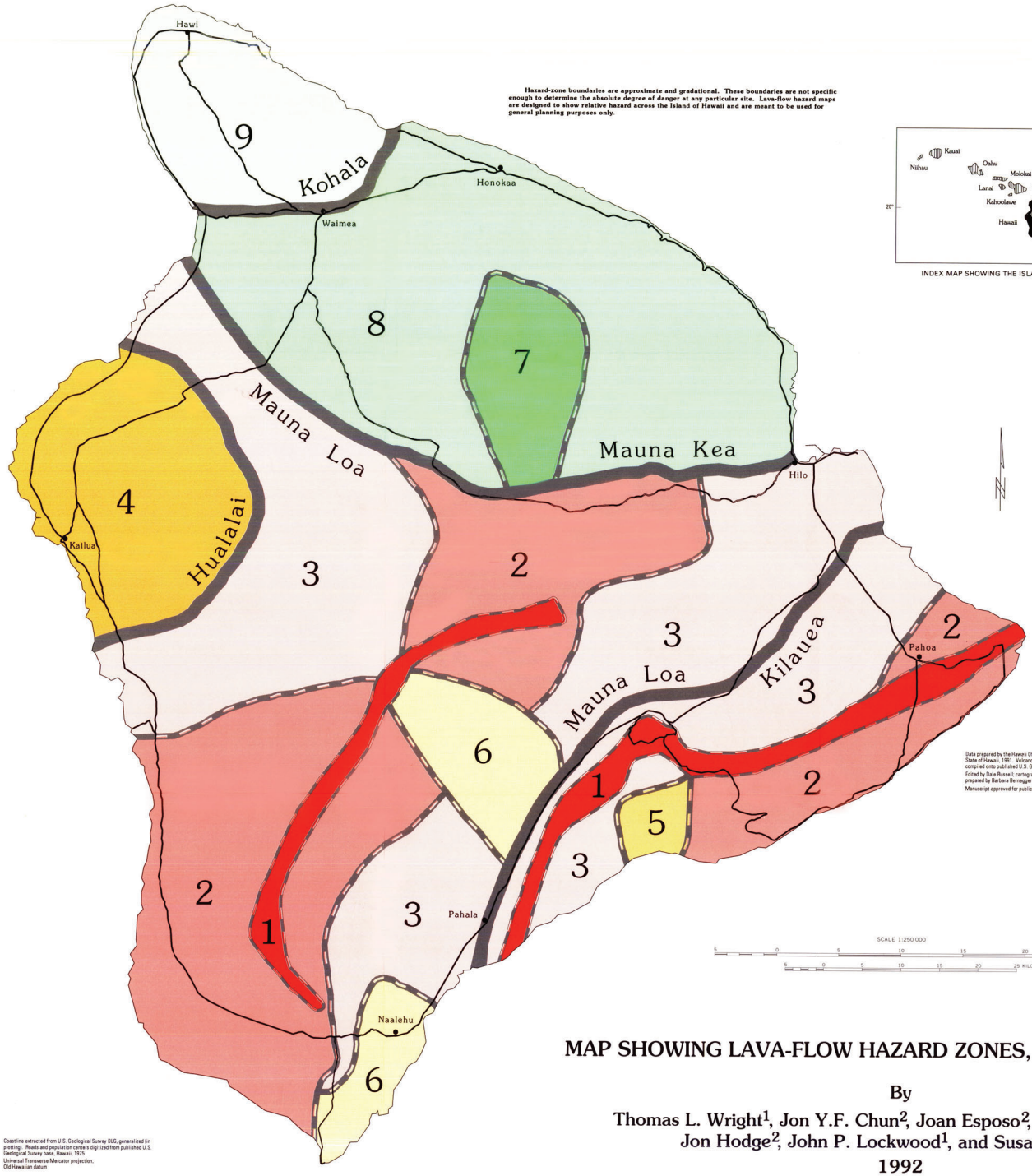
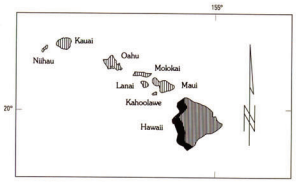
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF–2193



Hazard-zone boundaries are approximate and gradational. These boundaries are not specific enough to determine the absolute degree of danger at any particular site. Lava-flow hazard maps are designed to show relative hazard across the Island of Hawaii and are meant to be used for general planning purposes only.



INDEX MAP SHOWING THE ISLANDS OF HAWAII

Data prepared by the Hawaii Office of State Planning using the GIS of the State of Hawaii, 1991. Volcano and hazard boundaries digitized from data compiled onto published U.S. Geological Survey base, Hawaii, 1975
Edited by Dale Russell; cartography by Sandy Margriter; prepared by Barbara Bermegger
Manuscript approved for publication, March 2,1992

SCALE 1:250 000

5 0 5 10 15 20 25 MILES
5 0 5 10 15 20 25 KILOMETERS

Coastline extracted from U.S. Geological Survey DLG, generalized (in plotting). Roads and population centers digitized from published U.S. Geological Survey base, Hawaii, 1975
Universal Transverse Mercator projection, Old Hawaiian datum

MAP SHOWING LAVA-FLOW HAZARD ZONES, ISLAND OF HAWAII

By

Thomas L. Wright[1], Jon Y.F. Chun[2], Joan Esposo[2], Christina Heliker[1], Jon Hodge[2], John P. Lockwood[1], and Susan M. Vogt[2]

1992

EXPLANATION

Lava-flow hazard zones—Based on location of eruptive vents, past lava coverage, and topography

Increasing severity of hazard

- **1** — **Zone 1**—Includes summits and rift zones of Kilauea and Mauna Loa, where vents have been repeatedly active in historical time
- **2** — **Zone 2**—Areas adjacent to and downslope of zone 1. Fifteen to twenty-five percent of zone 2 has been covered by lava since 1800, and 25 to 75 percent has been covered within the past 750 years. Relative hazard within zone 2 decreases gradually as one moves away from zone 1
- **3** — **Zone 3**—Areas less hazardous than zone 2 because of greater distance from recently active vents and (or) because of topography. One to five percent of zone 3 has been covered since 1800, and 15 to 75 percent has been covered within the past 750 years
- **4** — **Zone 4**—Includes all of Hualalai, where the frequency of eruptions is lower than that for Kilauea or Mauna Loa. Lava coverage is proportionally smaller, about 5 percent since 1800, and less than 15 percent within the past 750 years
- **5** — **Zone 5**—Area on Kilauea currently protected by topography
- **6** — **Zone 6**—Two areas on Mauna Loa, both protected by topography
- **7** — **Zone 7**—Younger part of dormant volcano Mauna Kea. Twenty percent of this area was covered by lava in the past 10,000 years
- **8** — **Zone 8**—Remaining part of Mauna Kea. Only a few percent of this area has been covered by lava in the past 10,000 years
- **9** — **Zone 9**—Kohala Volcano, which last erupted over 60,000 years ago

Boundaries—Approximately located and gradational

- **Lava-flow hazard zone 1**
- **Lava-flow hazard zones 2 through 9**
- **Volcano**

DISCUSSION

This map shows lava-flow hazard zones for the five volcanoes on the Island of Hawaii. Volcano boundaries are shown as heavy, dark bands, reflecting the overlapping of lava flows from adjacent volcanoes along their common boundary. Hazard-zone boundaries are drawn as double lines because of the geologic uncertainty in their placement. Most boundaries are gradational, and the change in the degree of hazard can be found over a distance of a mile or more. The general principles used to place hazard-zone boundaries are discussed by Mullineaux and others (1987) and Heliker (1990). The differences between the boundaries presented here and in Heliker (1990) reflect new data used in the compilation of a geologic map for the Island of Hawaii (E.W. Wolfe and Jean Morris, unpub. data, 1989).

The primary source of information for volcano boundaries and generalized ages of lava flows for all five volcanoes on the Island of Hawaii is the geologic map of Hawaii (E.W. Wolfe and Jean Morris, unpub. data, 1989). More detailed information is available for the three active volcanoes. For Hualalai, see Moore and others (1987) and Moore and Clague (1991); for Mauna Loa, see Lockwood and Lipman (1987); and for Kilauea, see Holcomb (1987) and Moore and Trusdell (1991).

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[2]Hawaii Office of State Planning.

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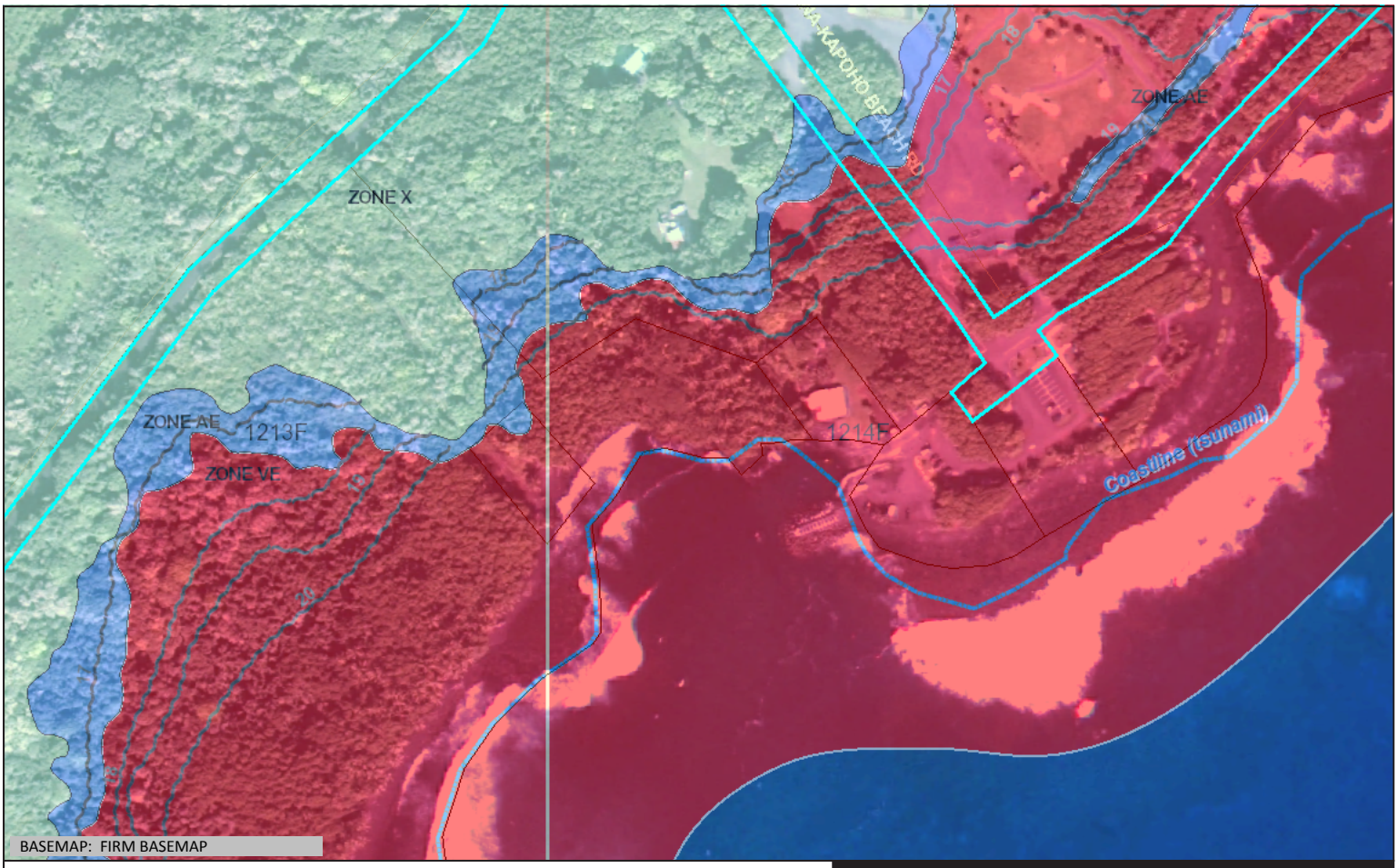

Flood Hazard Assessment Report

www.hawaiinfip.org

Property Information

COUNTY:	HAWAII
TMK NO:	(3) 1-3-008:999
WATERSHED:	KILAUEA
PARCEL ADDRESS:	13-455 POHOIKI RD PAHOA, HI 96778

Notes:

Flood Hazard Information

FIRM INDEX DATE:	SEPTEMBER 29, 2017
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL - EFFECTIVE DATE:	1551661211F - SEPTEMBER 29, 2017 1551661213F - SEPTEMBER 29, 2017 1551661214F - SEPTEMBER 29, 2017 1551661435F - SEPTEMBER 29, 2017

THIS PROPERTY IS WITHIN A TSUNAMI EVACUTION ZONE: YES
FOR MORE INFO, VISIT: http://www.scd.hawaii.gov/

THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 200 400 ft

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If this map has been identified as 'PRELIMINARY', please note that it is being provided for informational purposes and is not to be used for flood insurance rating. Contact your county floodplain manager for flood zone determinations to be used for compliance with local floodplain management regulations.

FLOOD HAZARD ASSESSMENT TOOL LAYER LEGEND
(*Note: legend does not correspond with NFHL)*

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD - The 1% annual chance flood (100-year), also know as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. SFHAs include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

	Zone A: No BFE determined.
	Zone AE: BFE determined.
	Zone AH: Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
	Zone AO: Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
	Zone V: Coastal flood zone with velocity hazard (wave action); no BFE determined.
	Zone VE: Coastal flood zone with velocity hazard (wave action); BFE determined.
	Zone AEF: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA - An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

	Zone XS (X shaded): Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
	Zone X: Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

	Zone D: Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase apply, but coverage is available in participating communities.

APPENDIX F

Archaeological Literature Review and Field Inspection Report
by Cultural Surveys Hawai‘i, Inc.

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Draft Archaeological Literature Review and Field Inspection for the Pohoiki Boat Ramp Dredging of Volcanic Debris Project, Keahialaka, Pohoiki, and Oneloa Ahupua‘a, Puna District, Hawai‘i Island TMKs: (3) 1-3-008:013 por., 014 por., 016 por., 021 por., 033, 034 por., 097 por., 999 por. (Kalapana-Kapoho Beach Road); 1-4-093:038 por., 048 por., 999 por. (Kalapana-Kapoho Beach Road)

Prepared for
The Limtiaco Consulting Group
on behalf of the
Department of Land and Natural Resources,
Division of Boating and Ocean Recreation

Prepared by
Sarah Wilkinson, B.A.,
Samantha Purdy, B.A.,
Olivier M. Bautista, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: POHOIKI 1)

January 2023

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Management Summary

Reference	Draft Archaeological Literature Review and Field Inspection for the Pohoiki Boat Ramp Dredging of Volcanic Debris Project, Keahialaka, Pohoiki, and Oneloa Ahupua‘a, Puna District, Hawai‘i Island, TMKs: (3) 1-3-008:013 por., 014 por., 016 por., 021 por., 033, 034 por., 097 por., 999 por. (Kalapana-Kapoho Beach Road); (3) 1-4-093:038 por., 048 por., 999 por. (Kalapana-Kapoho Beach Road) (Wilkinson et al. 2023)
Date	January 2023
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: POHOIKI 1
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 22-02, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-13-282.
Agencies	Federal Emergency Management Agency (FEMA); Hawai‘i State Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR); SHPD
Land Jurisdiction	State of Hawai‘i, County of Hawai‘i, Private
Project Funding	Federal (FEMA); State of Hawai‘i
Project Proponent and Contact	Finn D. McCall, P.E. Engineering Branch DLNR - Division of Boating and Ocean Recreation 4 Sand Island Access Road, Honolulu, Hawai‘i, 96819 Phone: (808) 587-3250 Email: finn.d.mccall@hawaii.gov
Planning Consultant for the Project	Claire Oshiro Environmental Planner The Limtiaco Consulting Group 1622 Kanakanui Street Honolulu, HI 96817 Office: 808-596-7790 Email: claire@tlcghawaii.com
Project Location	The project area is located at Pohoiki Bay in the district of Puna on the windward side of Hawai‘i Island, approximately 11.6 km (7.2 miles) southeast of the town of Pāhoa. The project is situated within and along the former shoreline area of Pohoiki Bay, where the existing boat access ramp was inundated with sand and volcanic debris following the 2018 eruption of Kīlauea. The project area is accessed primarily from Kalapana-Kapoho Beach Road (Route 137) and Pohoiki Road, with a secondary access route crossing TMKs: (3) 1-3-008:013 (private property) and 097 (county property). The project area is shown on a

	portion of the 1995 Kapoho U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle on Hawai‘i Island.
Project Description and Related Ground Disturbance	The State Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR) is moving forward with the restoration of the existing Pohoiki Bay boat ramp. Pohoiki Bay has filled in with black sand and cobbles as a result of the 2018 volcanic eruption. Thus, the Pohoiki boat ramp is land-locked and unusable. Currently, DOBOR's proposed action is to dredge as much material from the bay as possible to restore pre-eruption depths. Dredged volcanic debris would be distributed along the former shoreline of the bay and/or on newly formed lava land that is beyond the reach of tidal waves. The proposed project would necessitate depositing most or all of the dredged material upon the jagged area of newly formed lava land to the east of the existing boat ramp. The project area, depicted in Figure 1, comprises approximately 50.3 acres and accounts for dredging activity, access, staging, and deposit of dredge material. The overall public sentiment favors this project alternative over several other alternatives including dredging a channel that is narrow or wide, constructing protective jetties, or adoption of a "no action" option.
Project Area Acreage	For the purposes of this LRFI investigation, the 50.29-acre (20.35-hectare) project area comprises the infilled Pohoiki Bay, deposit area for dredged material, and areas for access and staging.
Document Purpose and Historic Preservation Regulatory Context	This investigation was conducted—through historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that archaeological historic properties may be affected by the project. This document is intended to facilitate the project's planning and support the project's historic preservation review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey (AIS) investigation, per HAR §13-276. This information may also be used to support the consultation with the SHPD regarding the project's necessary historic preservation review steps pursuant to HAR §13-275. Due to FEMA funding, the Restoration of Pohoiki Bay Boat Access project is considered a federal undertaking subject to National Historic Preservation Act (NHPA) Section 106 and historic preservation review under Hawai‘i Revised Statues (HRS) §6E.
Consultation	NHPA Section 106 consultation with community members, agencies, and Native Hawaiian Organizations (NHOs) is being initiated by the project proponents. A cultural impact assessment (CIA) in accordance with HRS §343 is also ongoing for the project, and involves consultation with community members, agencies, and NHOs. The

	results of this LRFI investigation will be used to inform Section 106 and CIA consultations as appropriate. Consultation was also undertaken for this LRFI investigation to obtain information about cultural and archaeological sites in the vicinity and concerns about potential impacts from the project. The consultation effort included phone and email correspondences, an online meeting, and a site visit to the project area. Consultation provided information about some of the archaeological features in and around the project area. In particular, insight was gained about a significant *ahu* (cairn) located along the proposed primary access route, and about the Old Government Road and site of the former Pohoiki courthouse and jail located within the proposed secondary access route. Concern was also expressed by some consulting parties that dredging the bay could subsequently lead to increased erosion or other coastal impacts to the lands and archaeological sites located along and south of the bay, including but not limited to Mahina‘aka‘aka Heiau and Keahialaka Ponds. Changes to the natural shoreline caused by the 2018 eruption have already impacted some of the sites in these areas. Other individuals consulted for this study expressed their belief in the importance of the project moving forward for the community.
Fieldwork Effort and Findings	Fieldwork was conducted on 21 November 2022 by CSH Project Directors Olivier Bautista, B.A., and Sarah Wilkinson, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. In general, fieldwork consisted of pedestrian coverage of the former shoreline and adjacent areas, both proposed access routes, and the interface of the 2018 lava flow with the county park. Photographs were taken and points of interest were recorded using a Garmin 60CSx handheld GPS device. Seven archaeological and/or cultural sites were identified within or in direct proximity to the project area. These include three previously documented historic properties (State Inventory of Historic Places [SIHP] #s 50-10-46-02507, historic habitation complex; -02530, Old Government Road; and -30141, landscaping complex) and four other features of interest (CSH-1, enclosure associated with the former historic Pohoiki courthouse and jail; CSH-2, coastal foot trail; CSH-3, the potential interface of historic Rycroft's Road/SIHP # -30137 with Pohoiki Road; and CSH-4, an *ahu* used for traditional healing practices located along Pohoiki Road). Other archaeological sites located along the former shoreline areas of Pohoiki Bay were visited during the field inspection with representatives of the Kuamo‘o ‘Ohana. These included a number of

	features previously recorded along the Old Government Road (SIHP # -02530) within TMK: (3) 1-3-008:097 (county parcel), and Mahina‘aka‘aka Heiau and Keahialaka Ponds (SIHP #s 50-10-46-02517 and -02518) which are located approximately 200 m southwest of the project area.
Potential for Project Effect on Historic Properties	Two sites are assessed as having the highest potential for direct impact from project activities: SIHP # -30141 and CSH-1, both located along the proposed secondary access route. SIHP # -30141 is situated along the edge of an existing unimproved driveway; depending on the size of equipment to be transported along this access route avoidance may or may not be possible. SIHP # -30141 was thoroughly documented and recommended for no further work by Clark et al. (2014). The CSH-1 enclosure contains an existing breach for the driveway along its *mauka* (inland) wall, and therefore impacts to the enclosure feature itself may be avoidable. Parking, staging, or other associated project activities within the enclosure could impact any remnants of the courthouse and/or jail structures that may still be present. The other five sites documented during the field inspection are less likely to be directly impacted by project activities, though they should be actively avoided. These sites are located either upslope of the former shoreline (i.e., SIHP # -02530, CSH-2) or adjacent to but outside active roadway surfaces (SIHP # -02507, CSH-3, CSH-4).
Recommendations	The SHPD should be consulted early for its determination of historic preservation requirements, including any necessary mitigations, for the proposed project.

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Section 1 Introduction

1.1 Project Background

At the request of The Limtiaco Consulting Group and on behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this literature review and field inspection (LRFI) report for the Pohoiki Boat Ramp Dredging of Volcanic Debris Project, Keahialaka, Pohoiki, and Oneloa Ahupua‘a, Puna District, Hawai‘i Island, TMKs: (3) 1-3-008:013 por., 014 por., 016 por., 021 por., 033, 034 por., 097 por., 999 por. (Kalapana-Kapoho Beach Road); 1-4-093:038 por., 048 por., 999 por. (Kalapana-Kapoho Beach Road). The project is located at Pohoiki Bay and the adjacent County of Hawai‘i Isaac Hale Beach Park. It is accessed primarily from Kalapana-Kapoho Beach Road (Route 137) and Pohoiki Road, with a secondary access route crossing both county and private lands. The project area is depicted on a portion of the 1995 Kapoho U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), tax map plats (Figure 2 and Figure 3), and a 2019 aerial photograph (Figure 4).

The DOBOR is moving forward with the restoration of the existing Pohoiki Bay boat ramp. Pohoiki Bay has filled in with black sand and cobbles as a result of the 2018 volcanic eruption. Thus, the Pohoiki boat ramp is land-locked and unusable. Currently, DOBOR's proposed action is to dredge as much material from the bay as possible to restore pre-eruption depths.

Dredged volcanic debris would be distributed along the former shoreline of the bay and/or on newly formed lava land that is beyond the reach of tidal waves. The proposed project would necessitate depositing most or all of the dredged material upon the jagged area of newly formed lava land to the east of the existing boat ramp. The overall public sentiment favors this project alternative over several other alternatives including dredging a channel that is narrow or wide, constructing protective jetties, or adoption of a "no action" option. For the purposes of this LRFI investigation, the 50.29-acre (20.35-hectare) project area comprises the infilled Pohoiki Bay, deposit area for dredged material, and areas for access and staging.

1.2 Document Purpose

This investigation was conducted—through historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that archaeological historic properties may be affected by the project. This document is intended to facilitate the project's planning and support the project's historic preservation review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey (AIS) investigation, per Hawai‘i Administrative Rules (HAR) §13-276.

This information may also be used to support consultation with the State Historic Preservation Division (SHPD) regarding the project's necessary historic preservation review steps pursuant to HAR §13-275.

Due to Federal Emergency Management Agency (FEMA) funding, the Restoration of Pohoiki Bay Boat Access project is considered a federal undertaking subject to National Historic Preservation Act (NHPA) Section 106 and historic preservation review under Hawai‘i Revised Statues (HRS) §6E.

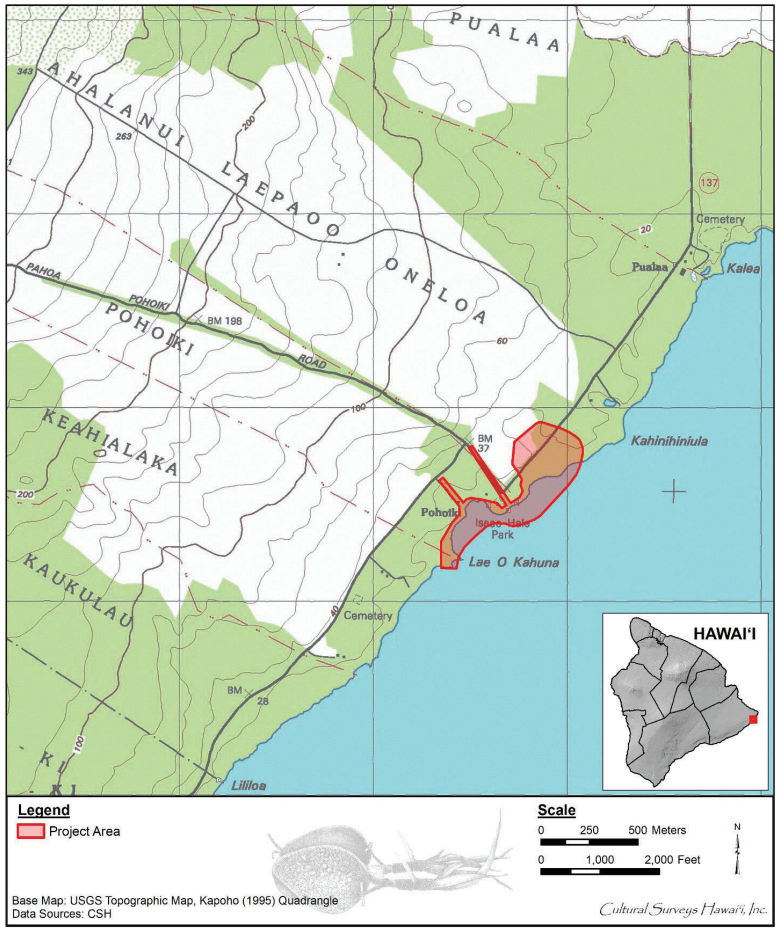

Figure 1. Portion of the 1995 Kapoho USGS 7.5-minute topographic quadrangle showing the location of the project area

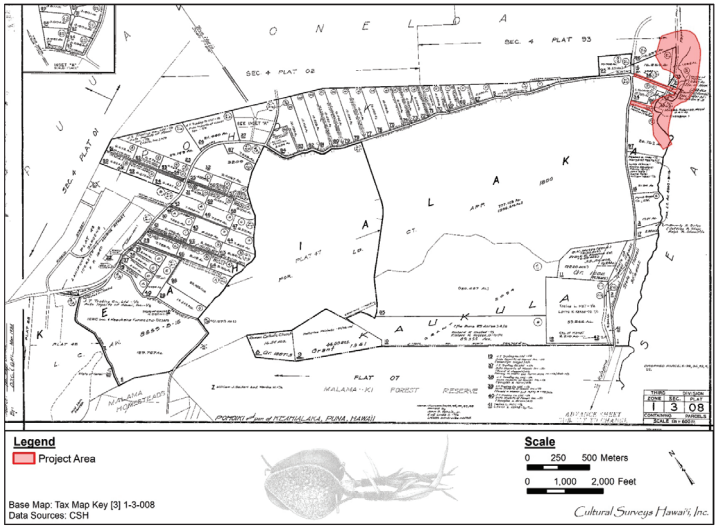

Figure 2. Tax Map Key (TMK) (3) 1-3-008 showing the project area (Hawai'i TMK 2014)

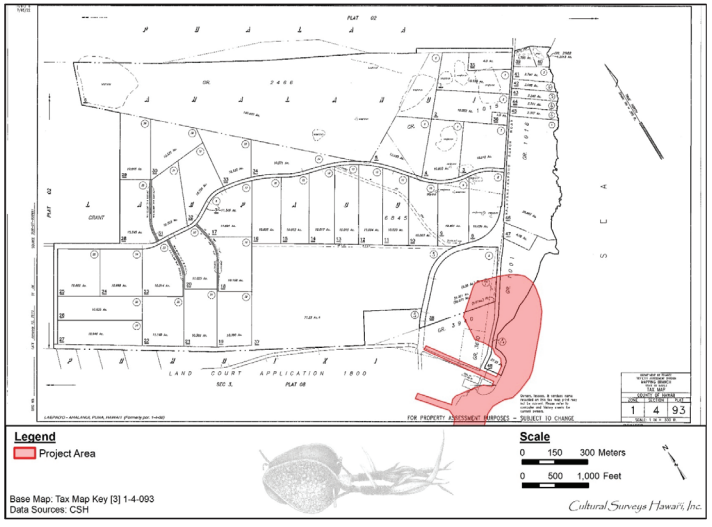

Figure 3. TMK: (3) 1-4-093 showing the project area (Hawai'i TMK 2010)

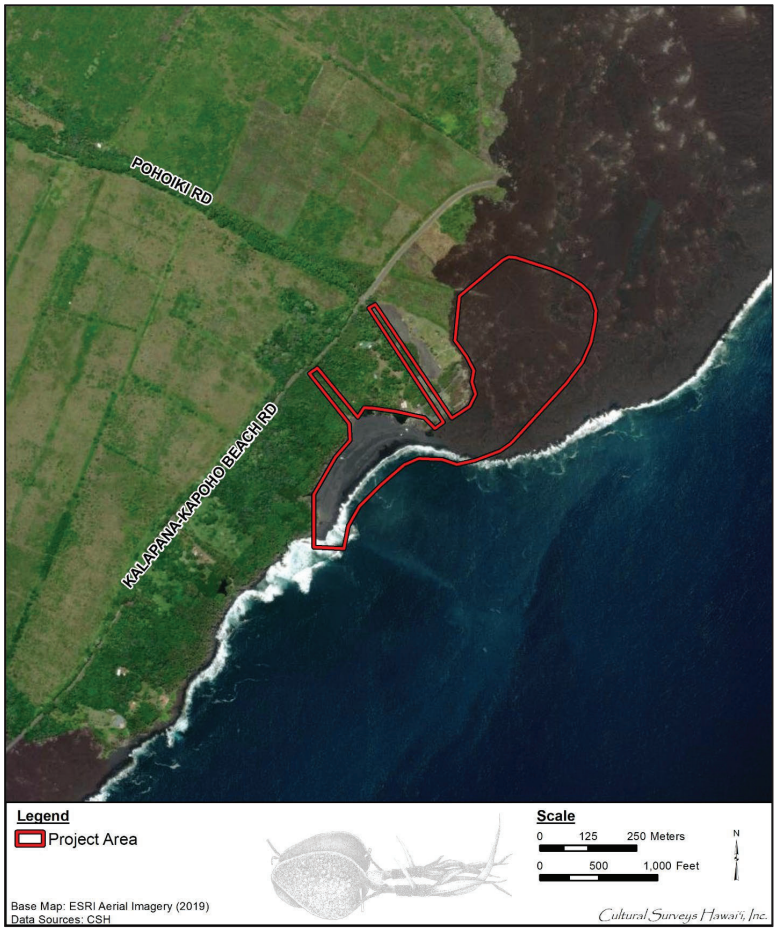

Figure 4. Aerial photograph of the project area (ESRI 2019)

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is located in the Puna District on the eastern, windward side of Hawai‘i Island. The project is located approximately 0-11 m (0-35 feet [ft]) above mean sea level (amsl), not accounting for the height of the new lava land area. The average annual rainfall in the vicinity of the project area is between 80 and 100 inches (Juvik and Juvik 1998:57). Temperatures in this area of the Puna District are usually 60–80 degrees Fahrenheit. As expected, the cooler temperatures and heavier rainfall occur in the winter months (October through April) and warmer temperatures and lighter rainfall occur during the summer months (May–September).

No perennial waterways are located near or within the project area. Abundant water flowing underground usually exits at or near the ocean via springs. These underground sources of water are known to be quite pristine, having been filtered through miles of lava rock. In the Pohoiki vicinity spring waters are often warm to hot in temperature, having been geothermically heated, and there are several small warm-water pools located near the shoreline.

The project area has been subjected to significant prior disturbance. The natural terrain within the Isaac Hale Beach Park grounds was extensively altered by development of the park. The surrounding topography slopes gently toward the coast. The main access point into Pohoiki Bay has been impacted by past development of boat ramps and dredging within the bay, as well as construction of the Army Corps of Engineers (ACOE) breakwater in 1979. The 2018 eruption resulted in the subsequent natural infilling of Pohoiki Bay with volcanic black sand and cobbles; this portion of the project area is currently an undulating, rocky black sand beach. The barren 2018 lava flow dominates the landscape northeast of the bay.

The forest surrounding the undeveloped areas around the bay is a dense canopy of native and introduced species. The park area and private property within the secondary access route have been planted with coconut, ornamentals, and fruit trees. Coconut has also been planted along the back of the new black sand beach.

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Sato et al. (1973), the project area is underlain by Malama extremely stony muck, 3 to 15% slopes (rMAD) and Opihikao extremely rocky muck, 3 to 25% slopes (rMAD) (Figure 5). Malama extremely stony muck and Opihikao extremely rocky muck are well-drained, thin, organic soils formed over lava flows. Malama soils are underlain by fragmental *ʻaʻā* lava while Opihikao soils are underlain by *pāhoehoe* lava bedrock; the two lava types are typically found beneath both soil types at depths ranging from 2 to 8 inches. The Malama soil type is generally used for woodland, pasture, and orchards, and Opihikao soils are in native forest or used for pasture (Sato et al. 1973:37, 43).

Figure 6 depicts the extent of the 2018 lava flow areas in relation to the project area. These 2018 lava flows are of the *ʻaʻā* lava type, characterized as a “rough and broken […] mass of clinkery, hard, glassy, sharp pieces piled in tumbled heaps” with generally no soil covering or vegetation” (Sato et al. 1973:34). The 2018 flow inundated areas approximately 0.5 miles south of and immediately northeast of Pohoiki Bay, and overlapped portions of Isaac Hale Beach Park. The 2018 flow did not extend over the lands surrounding Pohoiki Bay to the north, west, and south;

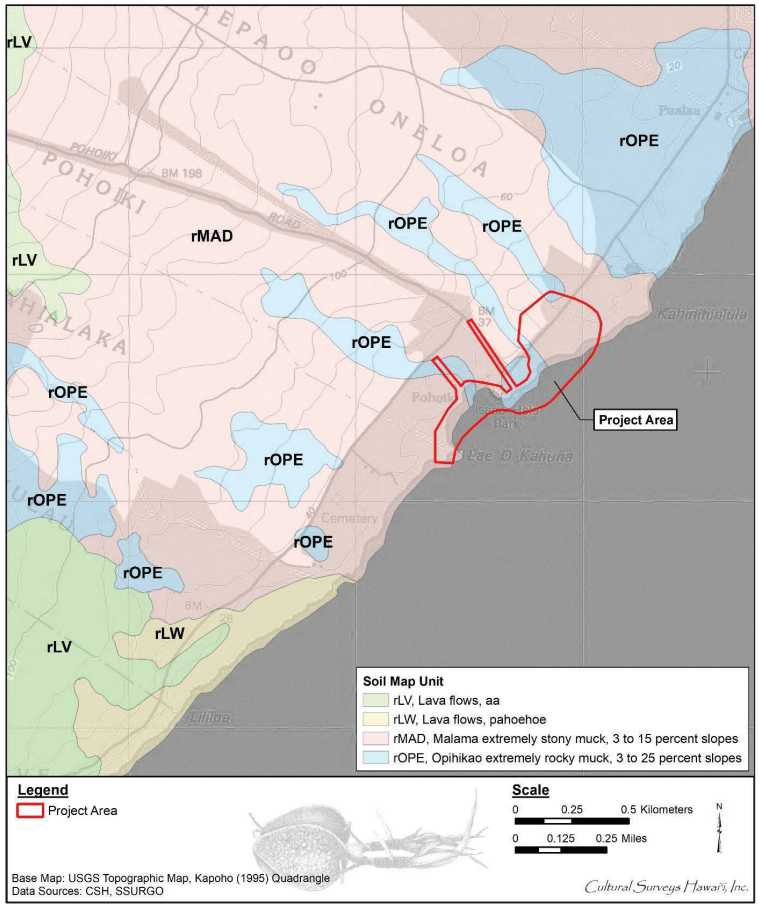

Figure 5. Overlay of *Soil Survey of the Island of Hawaii* (Sato et al. 1973), indicating soil types within and surrounding the project area (U.S. Department of Agriculture Soils Survey Geographic Database [SSURGO] 2001); note, this data does not account for the new (2018) lava land within the northeastern portion of the project area

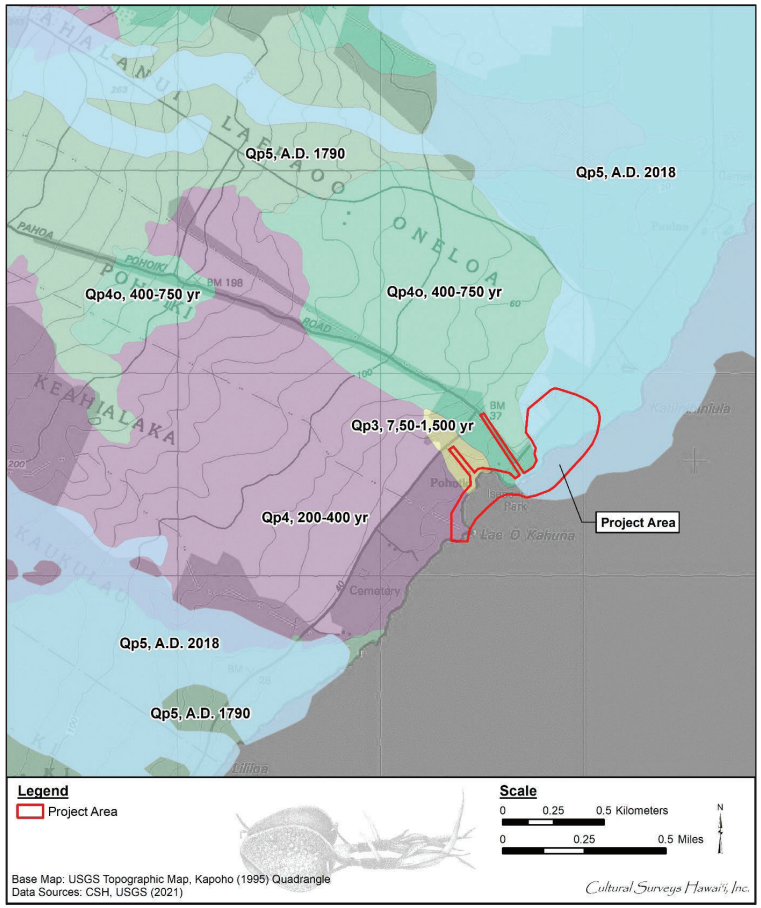

Figure 6. Portion of the 1995 Kapoho USGS 7.5-minute topographic quadrangle overlain with geological data (Sherrod et al. 2008/USGS 2021), indicating geological map units in the vicinity of the project area; note the light blue indicates areas inundated and/or created by the 2018 eruption of Kīlauea

these areas comprise Kīlauea lava flows dating from 200–1,500 years before present. Given the active volcanic nature of the area, lava tube caves are common.

1.3.2 Built Environment

The project area is at Isaac Hale Beach Park, approximately 11.6 km (7.2 miles) southeast of the town of Pāhoa in the district of Puna on Hawai‘i Island. The park includes the subject boat ramp, a breakwater, camping and picnic areas, restrooms, a boat wash area, open grassy spaces, parking lots, and Ocean Safety facilities. The Hale residence is situated just *mauka* (inland) of the boat ramp and is bounded by remnants of the old Rycroft coffee mill facility to the north and west. The areas surrounding the park not inundated by the 2018 lava flow contain scattered residences and agricultural plots.

The two proposed project access corridors are generally along existing transportation routes. The primary access along Pohoiki Road is an asphalt-paved, two-lane roadway with graded shoulders. The secondary access route follows an unimproved, two-track dirt driveway that crosses through county-owned parcel TMK: (3) 1-3-008:097 to a small oceanfront parcel (TMK: [3] 1-3-008:013) owned by the Kuamo‘o family. This small parcel was the site of the former historic-era Pohoiki courthouse and jail; it is enclosed by a dry-stacked rock wall and remnants of the former courthouse foundation are present near the *makai* (seaward) edge of the property.

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this study under archaeological fieldwork permit number 22-02, issued by the SHPD pursuant to HAR §13-13-282. Fieldwork was conducted on 21 November 2022 by CSH Project Directors Olivier Bautista, B.A., and Sarah Wilkinson, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. In general, fieldwork consisted of pedestrian coverage of the former shoreline and adjacent areas, both proposed access routes, and the interface of the 2018 lava flow with the county park. Photographs were taken and points of interest were recorded using a Garmin 60CSx handheld GPS device.

2.2 Research Methods

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i, the Hawai‘i State Archives, the Hawaiian Mission Children’s Society Library and Archives, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. Māhele records were examined from common sources (e.g., Barrère 1994, Waihona ‘Aina 2022). This research provided the environmental, cultural, historic, and archaeological background for the project area.

2.3 Consultation Methods

NHPA Section 106 consultation with community members, agencies, and Native Hawaiian Organizations (NHOs) is being initiated by the project proponents. A cultural impact assessment (CIA) in accordance with HRS §343 is also ongoing for the project, and involves consultation with community members, agencies, and NHOs. The results of this LRFI investigation will be used to inform Section 106 and CIA consultations as appropriate.

Consultation was also undertaken for this LRFI investigation to obtain information about cultural and archaeological sites in the vicinity and concerns about potential impacts from the project. The consultation effort included phone and email correspondences, an online meeting, and a site visit to the project area.

Section 3 Traditional and Historical Background

3.1 Traditional and Historical Background

This section presents a brief overview of the traditional and historical background of the project area vicinity. Several prior archaeological and cultural studies have included in-depth research and oral history interviews about the Pohoiki Bay area. In particular, the reader is referred to reports by cultural researcher Kepā Maly (1998) and Clark et al. (2014) for more in-depth information.

3.1.1 Traditional Background

Traditional accounts provide an understanding of an early time when the district of Puna was famous for its associations with the rising sun and the god Kāne, as well as its long stretch of sand, fertile plains, *hala* (*pandanus*) trees, and *‘awa* (*Piper methysticum*) (e.g., Beckwith 1971; Handy and Handy 1972; Pukui 1983). Many *‘ōlelo no‘eau* (poetical sayings) and legends also describe Pele’s devouring of land by causing lava to cover either large areas of the region or more limited sections of it. Traditions imply Puna was one of Hawai‘i’s wealthiest agricultural regions. It is only in relatively recent times that volcanic eruptions have destroyed much of Puna’s best land. The *mo‘olelo* or narrative stories of Puna also emphasize the area’s familial, genealogical, and political connections to the neighboring districts of Ka‘ū and Hilo.

The project area is located within the *ahupua‘a* (traditional land division) of Keahialaka, Pohoiki, and Oneloa, which are among approximately 50 *ahupua‘a* in Puna (Maly 1998:9). Very few legendary accounts speak specifically about the *ahupua‘a* of the project area or the other individual *ahupua‘a* of Puna. Barrère (1971:11) has speculated that the reason for the relatively small amount of traditional literature about Puna was the “remarkably successful” conversion of the natives to Christianity. This effort began when the Reverend William Ellis’ missionary party visited the district in 1823 and was continued and strengthened under Rev. Titus Coan’s management of the mission district beginning in 1835. In 1841, Wilkes noted, “Almost all the hills or craters of any note [in Puna] have some tradition connected with them; but I found that the natives were now generally unwilling to narrate these tales, calling them ‘foolishness’” (Wilkes 1845:[4]186).

In the early history of Hawai‘i there were many chiefs, each ruling one or several *ahupua‘a*, entire districts, or several districts. Emory et al. (1959) provide an explanation as to why there is also a comparative lack of traditional political history surrounding Puna:

> We find that Puna, as a political unit, played an insignificant part in shaping the course of the history of Hawai‘i island. Unlike the other districts of Hawai‘i, no great family arose upon whose support one or another of the chiefs seeking power had to depend for his success. Puna lands were desirable, and were eagerly sought, but their control did not rest upon the conquering of Puna itself, but rather upon control of the adjacent districts, Ka‘ū and Hilo. An attempt to follow in detail the course of Puna’s history is bound up with the fortunes of the ruling families on either side of her. [Emory et al. 1959:15]

Maly (1998:7–8) offers the following settlement pattern synthesized from multiple sources which applies to the project area vicinity: 1) initial settlement by the twelfth-thirteenth centuries, with subsistence based on near-residence agriculture and collection of marine resources; 2) by the fourteenth-sixteenth centuries, expansion of agriculture systems into upland areas to accommodate increased populations, accompanied by development of the *‘ohana* (extended family) value system linking coastal and upland inhabitants; 3) by the seventeenth-eighteenth centuries, increasingly formalized systems of land use and governance and expansion of settlement into more arid coastal regions. The *ahupua‘a* system provided inhabitants with all the resources needed to survive, from offshore fisheries into the upland agricultural lands and forest regions above, where timber and other plant and avian resources were obtained.

3.1.2 Early Historic Period

The first foreigners to see the Puna coast were crewmembers of Captain Cook’s third voyage to the Pacific in 1779. They were the first to note the differences in population and cultivation between the southwestern section of Puna and the more easterly area:

> The East part of Opoona [Puna] is flat, covered with Coco nut trees, and the land far back is of a Moderate height. As well as we could judge this is a very fine part of the Island, perhaps the best.
>
> On the SW extremity of Opoona the hills rise abruptly from the Sea side, leaving but a narrow border, and although the sides of the hills have a fine verdure, yet they do not seem Cultivated and when we sailed pretty near and along this end of Opoona, we did not observe that it was equally populous with the eastern parts [Beaglehole 1967:606].

In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (ABCFM), including Asa Thurston and Artemas Bishop, toured the island of Hawai‘i. After visiting Ka‘ū District, they made a side trip inland to Kīlauea Crater, then returned back to shore near the Ka‘ū/Puna border, traveling west to east. Ellis kept a detailed journal of his travels and was the second foreigner to note the differences in population and cultivation in the various areas of Puna. Several specific *ahupua‘a* and villages of Puna are named in Ellis’s account; at several of the more populous villages the company delivered sermons. In proximity to the project area, these included the villages of ‘Opihikao, Kauaea, Keahialaka, and Pū‘āla‘a (Ellis 1963:200–201). Keahialaka was noted to be the residence of the chief Kinao, who was governor of Puna at that time. Ellis (1963:201–202) described this area of Puna as “much more populous than any we had passed since leaving Kona […]” Pohoiki was not mentioned.

T. Stell Newman (1971) reviewed the journal of William Ellis for his 1823 tour of Hawai‘i Island to reconstruct the environmental characteristics of aboriginal agricultural lands on different parts of the island. Based on Ellis’ early observations, there were two main types of dryland farming in Hawai‘i, either in field systems or in scattered fields. As seen on Newman’s map (Figure 7), one of these field systems stretched from Kaimū almost to Kapoho on the southeastern coast of Puna, and thus encompassed the Pohoiki Bay area.

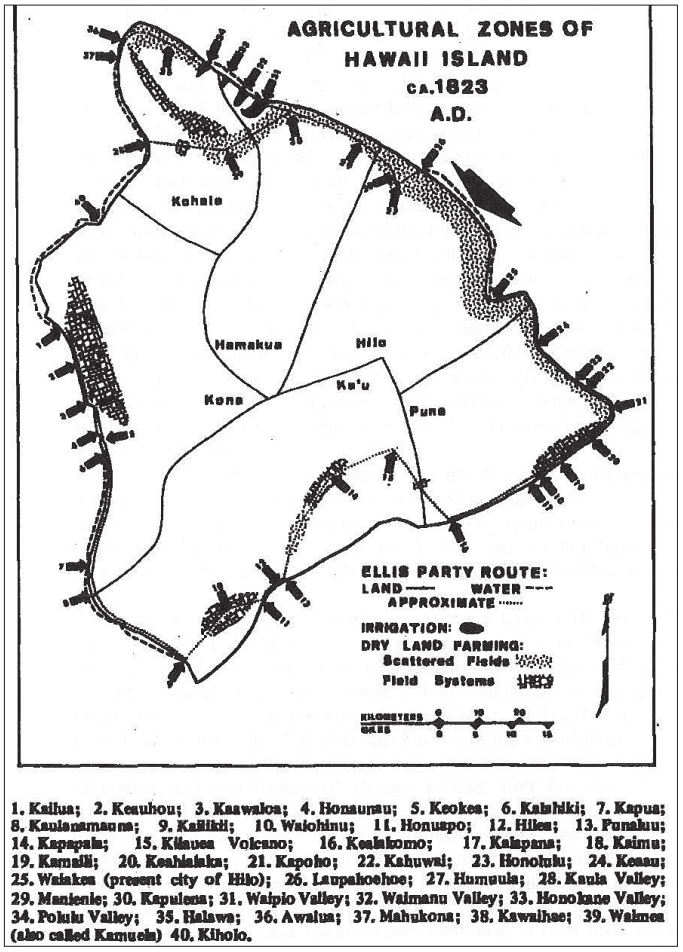

Figure 7. Newman's (1971) map of the Ellis party route, showing the vicinity of the project area (indicated generally by location 20, Keahialaka Village) within a dryland field system

Later in 1823, a mission station opened in Hilo, which was responsible for the districts of Hilo, Puna, and part of Ka'ū. The missionary Titus Coan became head of the Hilo Station in 1835. In describing the district of Puna, Coan emphasized the abundant rainfall, subterranean waters, evidence of volcanic activity, and the fields of vegetables and fruits:

> Its [Puna's] shore line, including its bends and flexures, is more than seventy miles in extent. For three miles inland from the sea it is almost a dead level, with a surface of pahoehoe or field lava, and a-a or scoriaceous lava, interspersed with more or less rich volcanic soil and tropical verdure, and sprinkled with sand-dunes and a few cone and pit-craters […] The rains are abundant, and subterranean fountains and streams are numerous, carrying the waters down to the sea level, and filling caverns, and bursting up along the shore in springs and rills, even far out under the sea […]
>
> Puna has many beautiful groves of the cocoa-palm, also breadfruit, pandanus, and ohia, and where there is soil it produces under cultivation, besides common vegetables, arrowroot, sugar-cane, coffee, cotton, oranges, citrons, limes, grapes, and other fruits. On the highlands, grow wild strawberries, cape gooseberries, and the ohelo, a delicious berry resembling our whortleberry [Coan 1882:26].

Handy and Handy (1972) note the importance of breadfruit as a staple in Puna: "Except in Puna, Hawaii, breadfruit was wholly secondary to taro and sweet potato as a staple. We are told that in Puna in a good year, breadfruit may be eaten for eight months of the year, beginning with May" (Handy and Handy 1972:152).

The first specific written mention of Pohoiki comes from a report by Chester Lyman written following a trip with Rev. Coan to Puna in 1846. Lyman describes the natural setting of the bay and the people in attendance at the church service there:

> Our stopping place for the night was Pohoiki, about 7 miles from Koae and nearly the same distance S.W. from the Eastern point of the island. The natives brought us the Ki or Ti root baked – it was very sweet & juicy. There are fine groves of cocoanut and the situation of the hamlet on an inlet of the sea is very pleasant […]
>
> Friday July 10th. At low water a small spring of warm water issues from the beach – the temperature I found to be 90º.
>
> Mr. Coan began his meeting in the church at 8. There being much preliminary business I did not go in till 9. There were several infants baptized, and I noticed a greater proportion of old people than I had observed before. About 200 people were present – mostly seated on the ground, as is usually the case except in the larger and more central churches […] [Lyman 1924:96–97]

In addition to the church, a school was also present at Pohoiki. In 1848 Kanono, the teacher at Pohoiki, reported 52 students attending classes (State Archives Series 262 in Maly 1998:34).

Most of the early visitors to Puna followed an ancient coastal foot trail, which in the late nineteenth century was made into a horse trail called the "Old Government Road" (Lass 1997:15). To improve these paths for horses, the variously spaced paving stones that marked the foot trail were removed, and curb stones to mark the edges of the trail and guide the horses were added. It

is uncertain exactly when the foot trail was altered into an “improved road.” Alfred Hudson thought it was constructed right before the Wilkes Expedition of 1840-1841, since Wilkes (1845) states, “In some places they have taken great pains to secure a good road or walking path; thus, there is a part of the road from Nanavalie [Nānāwale] to Hilo which is built of pieces of lava. […]” However, Lass does not believe this was a horse trail, since Wilkes also states, “[T]he road is exceedingly fatiguing to the stranger, as the lumps are so arranged that he is obliged to take a long and a short step alternatively, but this the natives do not seem to mind, and they pass over the road with great facility […]” (Wilkes 1845:191). This suggests the trail was made of variously spaced paving stones. During a tour of Puna in 1848 by the missionaries Henry Lyman and Titus Coan, no mention is made of an improved road. Lass (1997:17) believes the present form of the Old Government Road was constructed around the early 1870s.

3.1.3 The Māhele and the Kuleana Act

In the mid-nineteenth century, during the time of Kamehameha III, a series of legal and legislative changes were brought about in the name of land reform (see the works of Jon Chinen 1958, 1971 for a thorough and well-written explanation). Before the Māhele, all land belonged to the *akua* (gods), held in trust for them by the paramount chief, and managed by subordinate chiefs.

Following the enactment of a series of new laws from the mid-1840s to mid-1850s, Kamehameha III divided the land into four categories: Crown Lands reserved for himself and the royal house; Government Lands for the government; Konohiki Lands claimed by *ali‘i* (chiefs) and their *konohiki* (supervisors); and *kuleana*, small plots claimed by the *maka‘āinana* (commoners) (Chinen 1958:8–15). These claims are described in Land Commission Award (LCA) testimony from the claimants and witnesses. A Royal Patent (RP), which quit-claimed the government’s interest in the land, was issued on most Land Commission Awards (Chinen 1958:14). In some cases, more than one RP number was issued for an LCA, especially in cases where there were several widely separated *‘āpana* (lots), such as an award with agricultural land in one *ahupua‘a* and a house lot in another.

Ali‘i were required to pay a commutation fee to the government for their confirmed Konohiki Land titles; this payment could be in cash or in the return of land to the government or crown. Many *ali‘i* elected to return substantial portions of their awarded lands to avoid the one-third commutation cash fee. The Kuleana Act of 1850 allowed *maka‘āinana*, in principle, to own land parcels where they were currently and actively cultivating and/or residing. In 1851, certain Government Lands became available for purchase in lots of 1 to 50 acres in fee simple; this new category of land ownership became known as Royal Patent Grants or Land Grants.

In the Māhele the *ahupua‘a* of Keahialaka, Pohoiki, and Oneloa were awarded to the *ali‘i* William Charles Lunalilo, who would later become King of Hawai‘i; Oneloa was also awarded to the *wahine* (woman) Laumaka (Barrère 1994). Keahialaka was retained by Lunalilo, but Pohoiki and Onela were returned as commutation and retained by the government.

Although many Hawaiians did not submit or follow through on claims for their lands, the distribution of LCAs can provide insight into patterns of residence and agriculture. Many of these patterns probably had existed for centuries past. Examining the patterns of *kuleana* LCA parcels in the vicinity of the project area provides insight into the likely intensity and nature of Hawaiian activity in the area. However, very few *kuleana* were awarded in all of Puna. None were claimed in Keahialaka or Oneloa (Clark et al. 2014:29; Maly 1998:38). Two *kuleana* were claimed in

Pohoiki but not awarded: LCA 2557 claimed by Nalima, and LCA 8748 claimed by J.B. Kane. These claims consisted of adjacent house lots at the coast; testimony relating to Kane’s claim indicates Nalima’s lot was enclosed by a fence and Kane’s by a stone wall (Clark et al. 2014:30).

3.1.4 Mid- to Late 1800s

The mid-1800s were marked by a decline in population throughout Hawai‘i. Soon after Contact, people began to move to port cities or other trading areas. Since Puna had no good harbor, it lost a large portion of its population to out-migration. The missionary Rev. Titus Coan estimated the population of Puna was 4,371 in the year 1841, which stayed constant until at least 1846, when Chester Lyman visited the area. However, in a second journey to the area in 1871, Lyman (1924:103) noted a rapid depopulation: “There are but few people in this region […] miserably poor and for some time past have been almost in a state of famine.” Decreasing population was also the result of the introduction of many foreign diseases, to which the Native Hawaiians had no natural immunity. Four epidemics occurred in 1848 and 1849, killing at least 1,000 people in the Hilo and Puna Districts (Coan 1882:260; Crozier and Barrère 1971:7; Lyman 1906:168–169). Furthermore, destructive earthquakes in the spring of 1868 caused a 75-mile stretch of the Puna-Ka‘ū coastline to subside and a tsunami destroyed numerous coastal homes and villages (Coan 1882:314–316), which likely exacerbated out-migration.

By 1860, the population of Puna was only 2,200 people, and by 1890, it had decreased to only 800 people (Schmitt 1968:71). Titus Coan wrote in 1882, “Our people are now greatly diminished by death, and by being drawn away to the numerous plantations of the islands, upon ranches, in various industries with foreigners, and by hundreds into Honolulu, and on board vessels […]” (Coan 1882:121). Also visiting in the 1880s, Captain Dutton noted, “The native [Puna] population is somewhat scanty and has undergone a great decrease within the present century, as in all other parts of the island” (Dutton 1884:147).

A number of early commercial ventures took place in Puna—and the Pohoiki vicinity—during this time period. One of the earliest endeavors in Puna was the harvesting of *pulu*, the soft yellow wool from the base of the tree fern used for stuffing mattresses and pillows. Shipments were first sent to California in 1847; the industry peaked in 1860 and had declined significantly by the mid-1880s (Thrum 1911:10). The *pulu* trade generally had a negative effect on the native Hawaiians it employed (Shipman 1860).

In 1877 a man named Robert Rycroft began leasing land in Pohoiki and purchased a store and several outbuildings on a parcel adjacent to Pohoiki Bay (Maly 1998:48). At first Rycroft went into the *‘awa* shipping business. He constructed a wharf during the mid-1880s, which he agreed to allow for public use (Int. Dept. Book 30:206 in Maly 1998:52). Rycroft’s *‘awa* business was successful and so he increased his land holdings and created a small cattle ranch (*Honolulu Advertiser* 3 February 1909:5 in Maly 1998:71). According to Whitney (1895:66), a sawmill had also been established at Pohoiki “[…] and a quantity of lumber is exported to Honolulu.”

In 1878 J.S. Emerson surveyed Pohoiki with Rycroft and made the following remarks:

> The only landing between Hilo & Keauhou [Ka‘ū] is in the little bay makai of this land. The whole country here is fearfully rough on shoe leather. Scarce any soil. Cocoanuts, potatoes, breadfruit & awa do well. The best awa in the country.

> The timber would be valuable if it were accessible […] [Hawai‘i State Archives in Maly 1998:61]

Rycroft subsequently turned his efforts to coffee. By 1894 Rycroft was growing coffee on about 35 acres at approximately 450–500 ft amsl in upland Pohoiki, and he constructed a new mill for processing at the bay (Rycroft 1894:99). The wharf was used to ship out the milled coffee. An 1895 map (Figure 8) depicts both the “Old Mill” and “Rycroft’s New Mill” in relation to roadways and the wharf. Also shown are several enclosures and structures around the bay including a courthouse and jail in the vicinity of the secondary access route, and the church and boat shed along the southern side of the bay. Eventually Rycroft had three hundred acres under coffee cultivation (*Honolulu Advertiser* 3 February 1909:5 in Maly 1998:71).

Government lands in Ola‘a were also developed into homesteads intended for coffee cultivation, but the project was a failure (McEldowney 1979:40). Rycroft similarly found little success. The fledgling coffee industry of Puna could not compete with similar growers in the Kona region, and coffee operations in Puna declined after 1905 and disappeared completely by 1927 (University of Hawai‘i 1927 in Cordy 1977:4). Coffee trees continued to grow in scattered clumps in the Pohoiki area, but local informants who lived in the area in the mid-twentieth century said the beans were not harvested (Kennedy et al. 1991:20).

During this time travel in Puna was conducted over a few well-established roads and smaller lateral trails. The “Puna Road” or Old Government Road ran from Hilo along the Puna coast to Kahaualea where it then turned upslope and back up to the summit of Kīlauea. This road in the Pohoiki Bay vicinity is shown crossing through portions of the project area on the 1895 map (see Figure 8); the *mauka-makai* road depicted on the map accessed Rycroft’s upland coffee plantation and was the precursor to the current Pohoiki Road.

The establishment of homesteads and improved access in Puna toward the end of the nineteenth century also provided economic opportunity for small-scale farmers. Soon, however, economic activity in Puna would become focused around a new “king crop,” sugar. While much of this activity was concentrated to the north, it would also impact portions of the Pohoiki area, as Rycroft sold his interests there to the newly formed Puna Sugar Company before moving to Honolulu (*Honolulu Advertiser* 3 February 1909:5 in Maly 1998:71).

3.1.5 Early 1900s

Around the turn of the century there was no longer a church building (or school) present at Pohoiki; by 1907 a summer house had been erected in its former vicinity by J.P. Kuiaoholani, in addition to Rycroft’s wharf and boat house and a warehouse (Hawai‘i State Archives in Maly 1998:73). A 1906 map (Figure 9) shows the nearest schools at Malama to the south and Kapoho to the north, though a village is still noted at Keahialaka. The extent of the new homestead settlement tracts in Oneloa, Laepāo‘o, and Ahalanui to the north is also visible.

The major change in Puna during this period was the establishment of sugar plantations. In May 1899 Olaa Sugar Company leased 3,812 acres of land in ‘Ōla‘a (Pāhoa up to Mountain View) from W.H. Shipman for a term of 40 years (Maly 1999:59). Subsequent development and expansion of the plantation led to extensive land clearing and alteration for planting fields and construction of a mill, village, and labor camps in the ‘Ōla‘a area (Hurst 1994:15). The First Puna Sugar Company

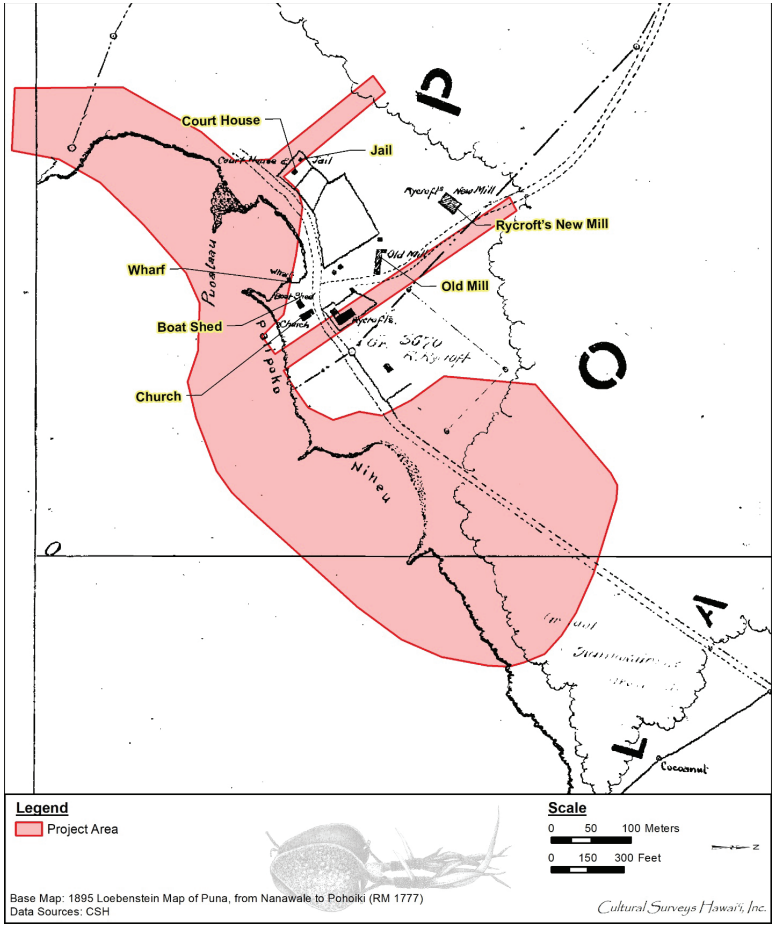

Figure 8. Portion of the 1895 Lobenstein map of Puna, from Nanawale to Pohoiki, showing the project area in relation to features such as the courthouse and jail, old and new mills, wharf, boat shed, and church

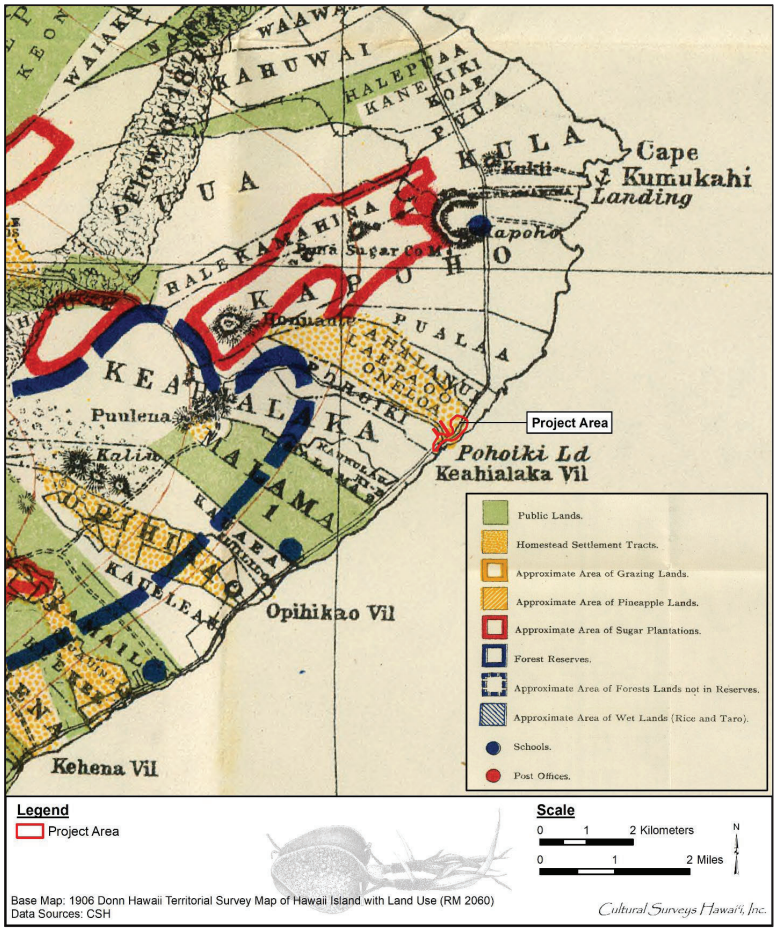

Figure 9. Portion of the 1906 Donn Hawaii Territory Survey map of Hawaii Island showing land use in the vicinity of the project area

was also established around this time:

> The same people who incorporated Olaa Sugar Company also founded the first Puna Sugar Company in 1900. By 1905 its harvests were being ground at the Olaa mill. To all intents and purposes, Puna Sugar Company operated as a division of Olaa Sugar Company. The merger was made official in 1936, when the latter company purchased the assets of the former at auction. However, the 1955 lava flow removed any possibility of harvesting cane again on the former Puna Sugar Company lands. [Dorrance and Morgan 2000:107]

The 1906 map (see Figure 9) indicates several areas planted in sugarcane by the Puna Sugar Company in upland Keahialaka and Kapoho above Pohoiki and Oneloa.

In December 1899 a 40-ft-wide right-of-way from Kea‘au to Hilo was granted to the Hilo Railway Company by Shipman for development of a railroad to service the plantations (Hurst 1994:15). In 1900, a 17-mile coastal extension was constructed to the sugarcane fields near Kapoho. Spurs were built inland to additional fields in Pāhoa and Kama‘ili. The rail transportation occurred primarily from the ‘Ōla‘a, Pāhoa, and Kapoho fields and was used to haul sugar to the mill in ‘Ōla‘a.

In 1914, the Hilo Railway Company went into receivership and was reorganized as the Hawai‘i Consolidated Railway. A portion of the railroad is visible upslope of the project area in the 1930 USGS topographic map (Figure 10). Portable tracks were used in the cane fields until 1945; Figure 11 shows the extent of the railway at that time. Prior to using the portable tracks, loaded carts were pulled by mule to the main line. On 1 April 1946 a tsunami inundated the railway on the Hāmākua Coast and in Hilo, forcing the Hawai‘i Consolidated Railway Company out of business (Condé and Best 1973:99, 211, 388). However, portions of the Puna Division continued to be operated by the Olaa Sugar Company until 1948, when trucks took over the transportation of the sugarcane (Treiber 2005:59).

3.1.6 Mid- to Late 1900s

The former Pohoiki school lot became the site of the first Pohoiki Park around 1940; by this time the wharf facilities at the old landing had been abandoned (Cordy 1977:4). In 1941 the lot containing the former courthouse and jail was deeded to Moses Kuamo‘o (Clark et al. 2014:65). A 1939 map (Figure 12) shows the location of the enclosed courthouse and jail, as well as the school lot across the bay. A driveway is shown leading *mauka* from the courthouse to the “Pohoiki-Opihikao Gov’t. Main Road,” and a “Government Trail” is shown passing the *makai* end of the lot. This trail extended around the bay where it accessed dwellings and connected to the “Old Beach Road.” Annie Kuakai, niece of Moses Kuamo‘o, was interviewed for the Clark et al. (2014) study and recalled the following information about the Kuamo‘o property and the old courthouse:

> Mrs. Kuakai, who grew up in Malama and spent much of her childhood at the Pohoiki property, recalled that her Dad, a policeman, and her uncle, a merchant marine, had purchased the property together for the sum of $200. There were three buildings on the property at that time, but the wood from one was used to build a kitchen and bedroom in the former courthouse structure, which had been open on the inside. There used to be a canoe landing in front of the Kuamo‘o property, and fishing was the only activity practiced in the water at that time, no one swan [sic]

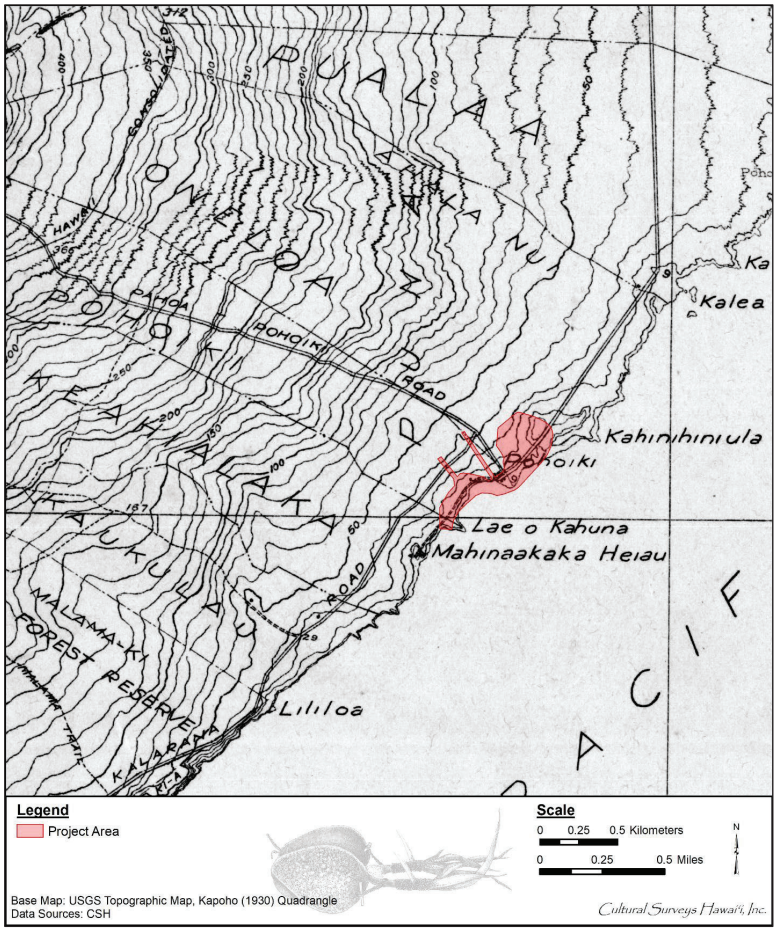

Figure 10. Portion of the 1930 Kapoho USGS topographic quadrangle showing the project area in relation to the Hawaii Consolidated Railway located upslope

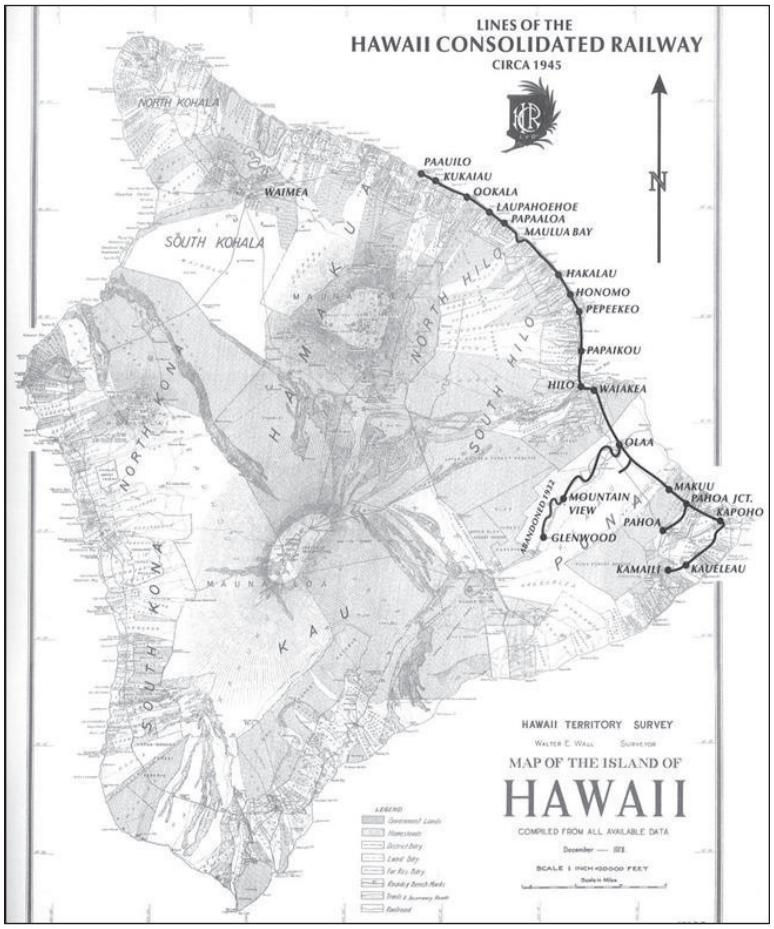

Figure 11. 1928 Territory Survey map of Hawai'i Island by Walter E. Wall, overlain with the route of the Hawai'i Consolidated Railway ca. 1945 (figure from Treiber 2005)

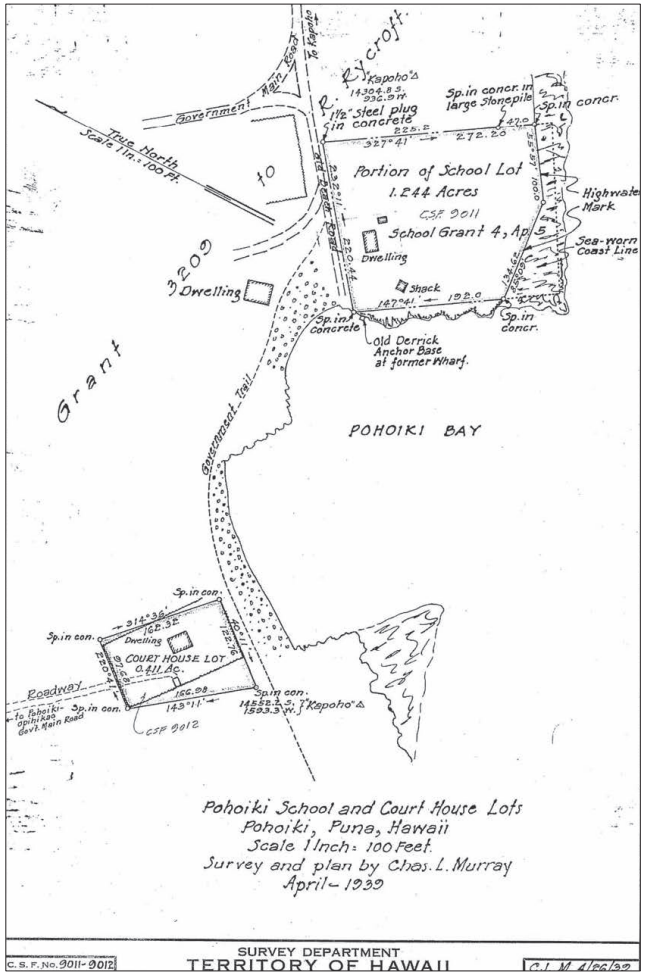

Figure 12. 1939 Murray map of Pohoiki School and Courthouse Lots

there. As a child she recalled going to the shore early in the morning and helping her father fish from the canoe before going to school. The canoes would be hauled up onto the land when not in use. The Old Government Road used to pass in front (*makai*) of the Kuamo‘o property, and she used to travel along it to Malamakī, where a trail went *mauka* to her family's land in Malama. The Old Government Road in front of the property (along with a portion of the Kuamo‘o parcel) was submerged as a result of coastal subsidence caused by the 1975 Kalapana earthquake. Mrs. Kuakai is concerned about losing more land to the ocean, and she expressed her desire to build a sea wall in front of the parcel to stop the coastal erosion.

Nearby the Kuamo‘o property, Mrs. Kuakai recalled that there were formerly two additional ponds in the vicinity of the Pohoiki Warm Spring; one has been filled in with beach cobbles, and another is now covered over and used as a well by the Smiths. While she recalled that several families lived on the *makai* lands nearby the study *ahupua‘a* when she was a child, she did not recall any agricultural activities occurring there during her time (she thought that some taro and bananas had previously been grown near her family's property in Pohoiki), and said that all the families had gardens in the more *mauka* regions of the *ahupua‘a*. The old Pohoiki Courthouse building accidently burned down in ca. 1958-1959. Following the destruction of the original building a new structure was erected on the property that also burned down, followed by a third structure that was destroyed by fire in ca. 2000. The family did not rebuild after the third fire. [Clark et al. 2014:78–79]

The site of the old Rycroft coffee mill was maintained by John Hale until the 1950s and then fell into disrepair (Devereaux et al. 1998:50). In 1963 the U.S. Army Corps of Engineers (USACE) constructed a boat ramp at the site of the former wharf. The 1963 USGS topographic map (Figure 13) illustrates limited development in the vicinity of the project area during this time period. "Isaac Hale Park" is shown, reflecting the renaming of Pohoiki Park in honor of Korean War casualty Private Isaac Kepookani Hale of Kapoho. A series of roadways are also visible in upper Keahialaka, Pohoiki, Oneloa, and Laepāo‘o, related to agricultural development.

In 1975 an earthquake caused the coastline at Pohoiki to subside by over a foot (Hawaiian Volcano Observatory 1995). A 1977 aerial photograph (Figure 14) shows the extent of agricultural development surrounding the Pohoiki Bay area. In 1979 the USACE constructed a 90-ft-long protective breakwater at the Pohoiki Boat Ramp (U.S. Army Corps of Engineers 2023), which exacerbated coastal erosion along some of the properties fronting the bay.

3.1.7 Contemporary Land Use

Isaac Hale Beach Park was expanded and improved in the modern era to include additional facilities on lands *mauka* of Kaimu-Kapoho Road (also known as Kalapana-Kapoho Road) that were formerly under papaya cultivation. Agriculture continues to be a main economic driver for the area, though many farms were inundated or otherwise impacted by the 2018 eruption. Puna's fishing community has been severely impacted by the loss of the boat ramp. Isaac Hale Beach Park, once a bustling hub for fishermen, surfers, and other local community users is now primarily frequented by tourists curious to see the dramatically changed landscape.

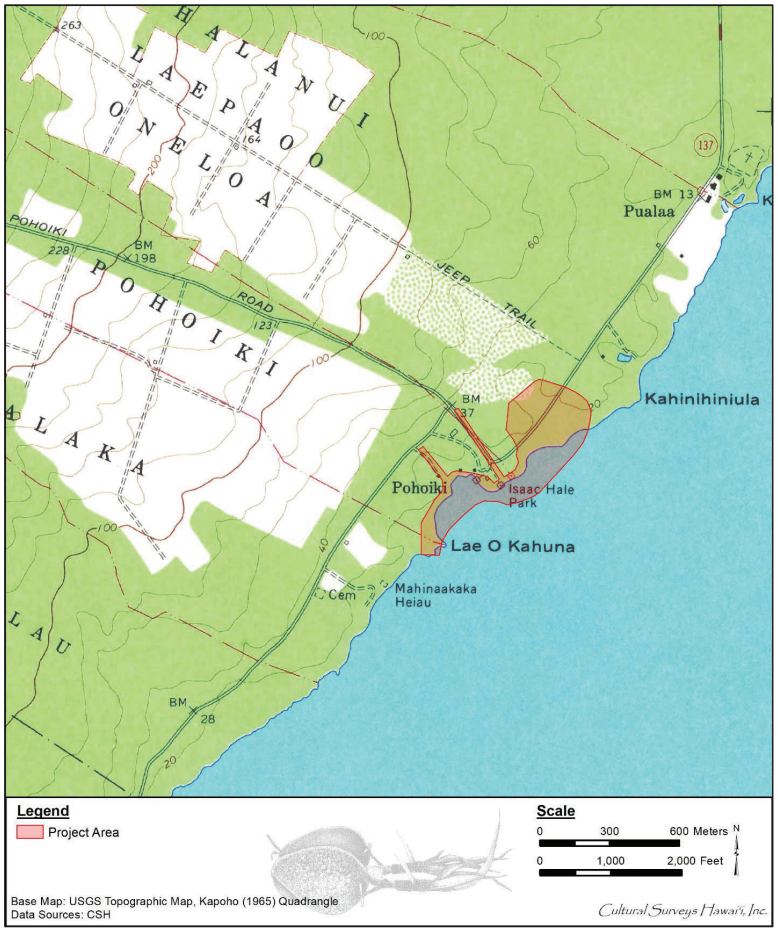

Figure 13. Portion of the 1965 Kapoho USGS topographic quadrangle showing "Isaac Hale Park" and some roadway development upslope of the project area

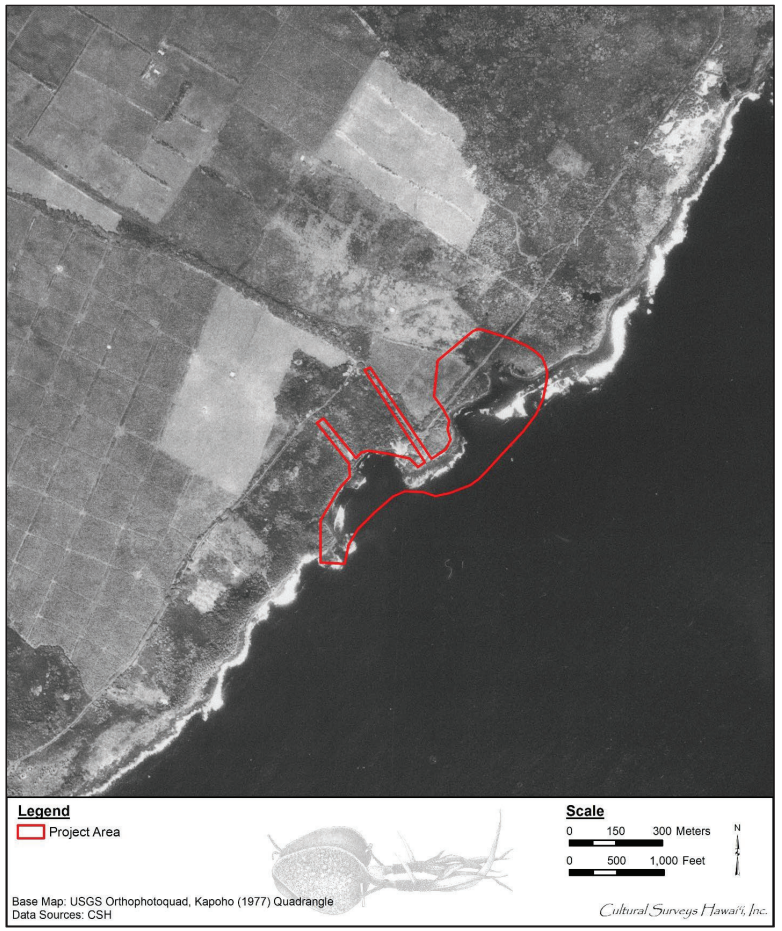

Figure 14. Portion of the 1977 USGS orthophotoquad aerial photo (Kapoho quadrangle), showing the project area in relation to agricultural developments

3.2 Previous Archaeological Research

Research indicates 11 prior archaeological studies have been conducted in the vicinity of Pohoiki Bay. These studies are summarized in Table 1. The earliest studies were island or district-wide surveys of *heiau* (pre-Christian places of worship) and the coast (Hudson 1932; Stokes 1919; Thrum 1907); subsequent studies were conducted within more clearly delineated boundaries and are illustrated in relation to the project area in Figure 15. Of these more recent studies, five overlap with or are surrounded by the current project area limits: Bevaqua and Dye (1972), Cordy (1977), Devereux et al. (1998), Clark and Rechtman (2005), and Clark et al. (2014). These five studies are discussed in greater detail below. Historic properties previously documented in the vicinity of the project area are shown in Figure 16.

3.2.1 Bevaqua and Dye 1972

In 1972 the Bishop Museum conducted an archaeological reconnaissance for the proposed Kapoho-Kalapana (Kaimu-Kapoho) Highway (Bevacqua and Dye 1972; see Figure 15). Forty-eight sites were documented along a 15-mile stretch between Kapoho and Kalapana and assigned SIHP numbers. Of these, seven sites were located in the vicinity of Pohoiki Bay (see Figure 16): SIHP # 50-10-46-02507, a complex of habitation enclosures and surrounding agricultural features; -02508, a square-shaped enclosure; -02509, an irregularly shaped enclosure used as an animal pen; -02510, a natural warm spring pool; -02511, the old Rycroft coffee mill; -02515, a complex comprising an enclosure, stone-lined well, wall, and platform; and -02530, the “King’s Highway” or “King’s Trail” (also known as the Old Government Road). Bevaqua and Dye (1972:20) describe SIHP # -02530 as “a curbed trail for two horses that was probably built in the late 1860s by prison labor.” Three more sites were documented just *mauka* of Route 137 in Pohoiki (SIHP #s -02512 through -02514, two enclosures and a platform, respectively), and Mahina‘aka‘aka Heiau (SIHP # -02517) and the Keahialaka Ponds (SIHP # -02518) were documented to the south of Pohoiki Bay in Keahialaka (see Figure 16). Note the name for Mahina‘aka‘aka is given as Mahina‘akaka in some other sources; consultation with *heiau* architect Keone Kalawe indicates the correct spelling is Mahina‘aka‘aka.

3.2.2 Cordy 1977

In 1977, an archaeological inventory survey was conducted for the Pohoiki Bay Navigation Improvement project by the U.S. Army Corps of Engineers, focused around the existing boat ramp area (Cordy 1977; see Figure 15). Two metal poles were documented in the water near the boat ramp, interpreted as remnants of the landing dating to the Rycroft era when coffee was shipped from the bay (mid-1890s; Cordy 1977:6). No SIHP designation was assigned for the poles. Oral testimonies collected from Pohoiki resident John Hale and Wayne Naiga also indicated the park had been the site of an historic fishing village that included two houses (Cordy 1977:2).

3.2.3 Devereux et al. 1998

In 1998 CSH completed an AIS at Ahalanui Park and Pohoiki (Isaac Hale) Park (Devereux et al. 1998). While the Ahalanui Park study area was well north of the current project area, the Pohoiki Park study area overlaps the limits of the current project area(see Figure 15). One historic property was documented within the Ahalanui Park study area (SIHP # 50-10-46-21352, a well), and a coconut grove was noted but not designated as an archaeological site. One historic property

Table 1. Previous archaeological studies in the vicinity of the project area

Reference	Type of Study	Location	Results (SIHP # 50-10-46-*****)
Thrum 1908	Survey of *heiau*	Island-wide	Documented two *heiau* in general vicinity of current project area: O‘olo in Pohoiki, described as destroyed; and Mahina‘aka‘aka in Keahialaka
Stokes 1919 (see Stokes and Dye 1991)	Survey of *heiau*	Island-wide	Documented one *heiau* in general vicinity of current project area: Mahina‘aka‘aka in Keahialaka
Hudson 1932	Archaeological survey	Coastal East Hawai‘i	Documented two historic properties in general vicinity of current project area: SIHP #s -00145, a possible house site located approx. 1.2 km northeast of Pohoiki; and -00147, described as possible habitation platforms “a few hundred yards” south of Pohoiki; Hudson (1932:366) also noted “Around the boat landing at Pohoiki and for some distance up and down the coast are evidence of former extensive occupancy. The lines of old walls can be followed although the stones have been removed and there are traces of former platforms and paving on the beach.”
Bevacqua and Dye 1972	Archaeological reconnaissance	Kapoho-Kalapana (Kaimu-Kapoho) Hwy	Documented seven historic properties in general vicinity of current project area: SIHP #s -02507 (habitation complex); -02508 (enclosure); -02509 (enclosure); -02510 (warm spring), -02511 (old Rycroft coffee mill), -02515 (complex), -02516, -2530, King’s Rd/Old Government Rd; of these, only a portion of SIHP # -02530 indicated within/overlapping current project area
Cordy 1977	Archaeological inventory survey	Pohoiki Bay	Documented two metal poles located in water near existing Pohoiki boat ramp; no SIHP # assigned

Reference	Type of Study	Location	Results (SIHP # 50-10-46-*****)
Kennedy et al. 1991 and Dunn et al. 1994	Archaeological inventory survey	Ahalanui, Oneloa, and Laepaoʻo Ahupuaʻa, TMKs: (3) 1-4-002:013, 014, 024, 069, and 070	Documented 48 sites comprising 26 complexes and 22 single feature sites (SIHP #s -11565, -11574, -11899, -11926, -12007, -12124 through -12141, -12143 through -12147, -12153, -12154, -12156 through -12162, -12185, -12188, -12572, -12668, -12699, -12704, -12724, -12726, -12774, and -16178); site types included alignment, cave, C-shape, enclosure, hearth, indeterminate agriculture, modified outcrop, mound, platform, terrace, trail and wall; functional categories identified include agricultural, habitation, ancillary habitation, temporary habitation, boundary wall, burial, animal husbandry, and transportation; sites represented remnants of Pūʻālaʻa Village; all sites inundated by 2018 lava flow
Hunt 1996	Archaeological inventory survey	4.54-acre parcel in Keahialaka Ahupuaʻa, TMK: (3) 1-3-008:003	No historic properties documented; lack of archaeological features attributed to extensive past land alteration
Devereux et al. 1998	Archaeological inventory survey	Ahalanui Park at TMKs: (3) 1-4-002:005, 006, and 061; and Pohoiki (Isaac Hale) Park at TMKs: (3) 1-3-008:016 and 013, and 1-4-002:008	Documented two historic properties: previously identified SIHP # -02507 (historic habitation complex) in Pohoiki; and newly identified SIHP # -21352 (historic well) in Ahalanui; SIHP # -21352 inundated by 2018 lava flow
Clark and Rechtman 2005	Archaeological inventory survey	Kapoho-Kalapana Rd (Route 137) near Pohoiki Bay, Oneloa Ahupuaʻa, TMKs: (3) 1-4-002:009, 013 and 1-3-008:016	Within study area documented five features of previously identified SIHP # -12157 (agricultural and habitation complexes); also documented locations of two previously identified sites located outside but near study area, including SIHP #s -12153 (burial platform), and -12156 (lava blister with burials); all sites inundated by 2018 lava flow

Reference	Type of Study	Location	Results (SIHP # 50-10-46-*****)
Clark et al. 2014	Archaeological inventory survey	35.5-acre parcel at Pohoiki Bay; Pohoiki and Keahialaka Ahupuaʻa, TMK: (3) 1-3-08:034	Documented five previously identified historic properties (SIHP #s -02510, -02511, -02515, -02516, and -02530) and 22 newly identified archaeological sites assigned as SIHP #s -30129 through -30150; sites associated primarily with agriculture and historic-era activity; two sites indicated to overlap current project area, including a portion of SIHP # -02530 (Old Government Rd) and -30141 (historic/modern landscaping complex); one additional site (SIHP # -30137, Rycroft’s Rd alignment) may interface th current project area along Pohoiki Rd

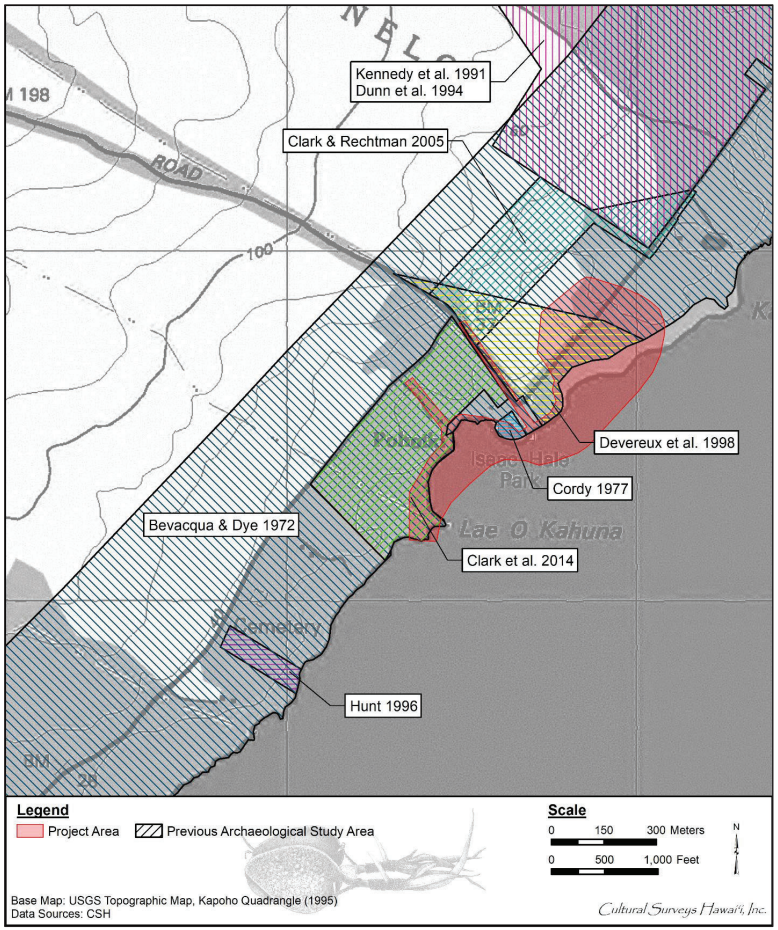

Figure 15. Portion of the 1995 Kapoho USGS 7.5-minute topographic quadrangle showing the location of previous archaeological studies in the vicinity of the project area

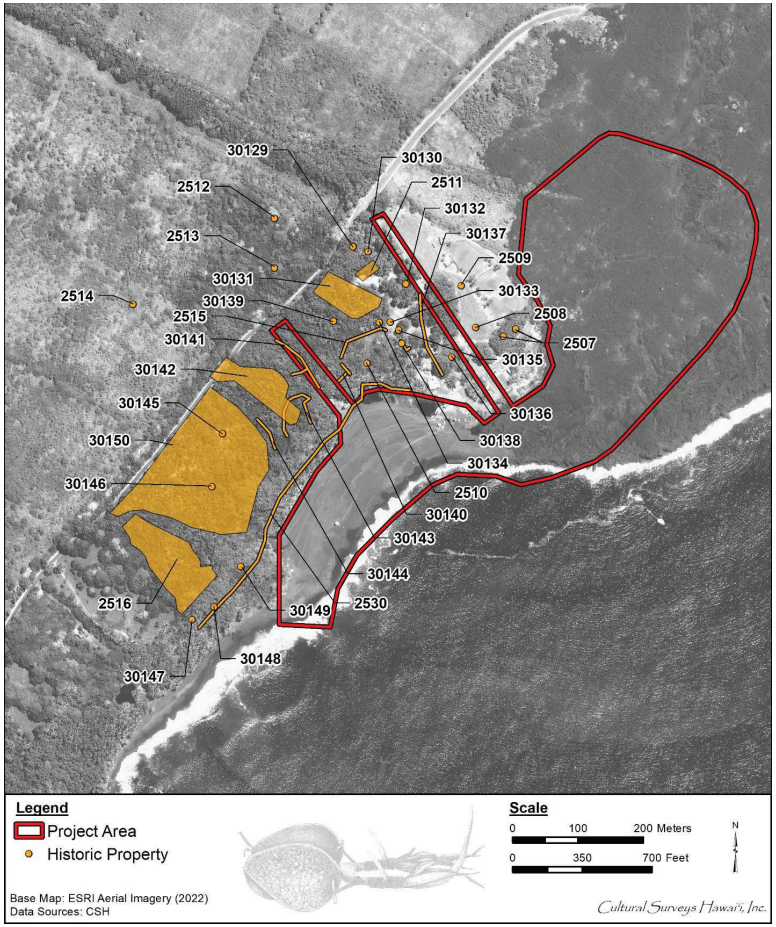

Figure 16. Aerial imagery (ESRI 2019) showing the location of previously documented historic properties in the vicinity of the project area

was also identified within the Pohoiki Park study area (SIHP # -02507, habitation complex previously documented by Bevaqua and Dye 1972; see Figure 16). Devereux et al. (1998:29–30) described SIHP # -02507 as a complex of two habitation-related enclosures situated on the *mauka* side of Kaimu-Kapoho Road near the junction with Pohoiki Road, likely constructed in association with the mid-1900s Land Grant 1001 awarded to Kamakuakane. Both SIHP #s -02507 and -21352 were recommended for preservation; SIHP # -21352 was later inundated by the 2018 lava flow.

SIHP #s -02508 and -02509, previously documented by Bevaqua and Dye (1972) in the Pohoiki Park vicinity, were not confirmed during the AIS. Devereux et al. (1998:26) note the general area of these sites—currently part of the boat parking area—had been bulldozed for a papaya field in the past.

3.2.4 Clark and Rechtman 2005

In 2005 Rechtman Consulting undertook an AIS for the Pohoiki Road Realignment project, overlapping a portion of the proposed access route along Pohoiki Road (Clark and Rechtman 2005; see Figure 15). The majority of the study area was found to have been mechanically altered in the past for papaya cultivation. Five features of SIHP # 50-10-46-12157 (agricultural and habitation complex) previously identified by Dunn et al. (1994) were confirmed and documented within the triangular, northeastern portion of the study area, which had not been impacted by papaya cultivation. The specific locations of these features are not included in the report and therefore they do not appear on Figure 16. Two additional sites previously identified by Dunn et al. (1994) located outside but near the study area were also investigated, including SIHP #s -12153 (burial platform), and -12156 (lava blister with burials). The study concluded the project would have no direct impact on any known archaeological sites (Clark and Rechtman 2005:13). All three sites were inundated by the 2018 lava flow.

3.2.5 Clark et al. 2014

In 2014 ASM Affiliates undertook an AIS of a 35.5-acre parcel located at Pohoiki Bay, overlapping portions of the current project area along the former shoreline and proposed secondary access route (Clark et al. 2014; see Figure 15). The AIS was completed in association with the subdivision of parcel TMK: (3) 1-3-008:034 to facilitate the county's purchase of a 26.782-acre portion under the Public Access, Open Spaces, and Natural Resource Preservation Commission (PONC) program (current parcel TMK: [3] 1-3-008:097). The other 8.785 acres would remain under the ownership of landowners Merrill and Ida Smith.

The AIS documented 27 historic properties comprising over 70 individual features. Of the 17 documented sites, five were previously recorded by Bevaqua and Dye (1972), including SIHP #s 50-10-46-02510 (Pohoiki Warm Spring), -02511 (historic mill complex), -02515 (a pre-Contact to early historic habitation complex), -02516 (agricultural complex), and -02530 (a portion of the old coastal Government Road). The 22 newly recorded sites were assigned as SIHP #s 50-10-46-30129 through -30150 and included several enclosures and alignments, two concrete cisterns, two concrete foundations, four core-filled wall segments, a stone-lined pit, free-standing concrete oven and smokestack, the former Rycroft's Road alignment, stepping-stone trail segment, anchialine pond, and habitation and agricultural complexes. While the majority of the sites were found to be associated with historic-era land use, some evidence of pre-Contact habitation and agriculture was also observed. Figure 16 indicates two of documented sites overlap with the current project area, both in the vicinity of the proposed secondary access route. These include a portion of the Old

Government Road (SIHP # -02530) and the majority of SIHP # -30141, a complex comprising two alignments and an enclosure associated with historic/modern landscaping. Additionally, the former Rycroft's Road alignment (SIHP # -30137) may interface with the project area where it terminates along the current Pohoiki Road corridor (see Figure 16).

Fourteen of the 27 documented historic properties were situated in the portion of the study area to be purchased by the county. Clark et al. (2014:242) recommended preservation for all 14 of these sites, and also data recovery at one site (SIHP # -02516, agricultural complex) to obtain additional information about its functional nature and temporal development. In the portion of the study area to be retained by the Smith family, two sites (SIHP #s -02515 and -30131) were recommended for preservation and the remaining 11 sites were recommended for no further work.

3.3 Background Summary and Predictive Model

Background research indicates the vicinity of Pohoiki Bay has been used for generations as a fishing village with one of the best natural boat landings along the Puna coast. A small community was present at Pohoiki into the twentieth century. Around 1940 a park was established at Pohoiki. In 1941 the old courthouse property was deeded to Moses Kuamo‘o, and during this time John Hale was actively maintaining the site of the old Rycroft coffee mill. Remnants of the old mill and archaeological features associated with other traditional and historic land uses surround Pohoiki Bay. In 1963 the USACE constructed a boat ramp at the site of the former wharf at Pohoiki, and during the 1970s a major earthquake and construction of the breakwater impacted the shoreline areas. Isaac Hale Beach Park was subsequently expanded to include lands *mauka* of Kaimu-Kapoho Road (also known as Kalapana-Kapoho Road) that were formerly under papaya cultivation.

Several previous archaeological studies (Bevacqua and Dye 1972, Cordy 1977, Devereux et al. 1998, Clark et al. 2014) have documented a considerable number of archaeological sites around the bay. These sites are generally associated with agricultural activity, historic habitation and transportation, and the activities of the Rycroft mill. Three previously documented sites are indicated by these prior studies to exist within or immediately adjacent to the project area:

- SIHP #s 50-10-46-02530 (King's Road/Old Government Road) and -30141 (historic/modern landscaping complex) are indicted within or overlapping the proposed secondary access route, which crosses the county parcel and the Kuamo‘o property located at TMKs: (3) 1-3-008:097 and 013, respectively;
- The route of the historic Rycroft's Road (SIHP # 50-10-46-30137) is indicated to interface with the current Pohoiki Road, which serves as the project's primary access route; Rycroft's Road was the predecessor to the current Pohoiki Road, once connecting Pohoiki Bay to the uplands;
- Clark et al. (2014) described an enclosure wall upon the Kuamo‘o property (within the proposed secondary access route) as the site of the old Pohoiki courthouse and jail; this site was not fully documented at that time as it fell outside that study area.

Given the overlapping prior study coverage within the "on-shore" portions of the project area, additional previously unrecorded features are not expected. In the unlikely event a newly identified feature is encountered, it would likely be similar in nature to known sites in the area.

Archaeological features are not expected within the infilled bay and new lava land portions of the project area. The existing breakwater will not be impacted by the project, and no other submarine archaeological features are known to be present within the bay.

Section 4 Consultation

As noted in Section 2.3, NHPA Section 106 consultation with community members, agencies, and Native Hawaiian Organizations (NHOs) is being initiated by the project proponents. A cultural impact assessment (CIA) in accordance with HRS §343 is also ongoing for the project, and involves consultation with community members, agencies, and NHOs. The results of this LRFI investigation will be used to inform the Section 106 and CIA consultations as appropriate.

The Limtiaco Group has been working to establish and maintain communication with key community members for the Restoration of Pohoiki Boat Ramp project since 2020. CSH involvement in the consultation process began with attendance at a kick-off meeting on 22 March 2022 at Pohoiki Bay. Attendees at this meeting included members of the project team, agency representatives, and many of the community members who have been actively involved in the project planning consultations to date. At this meeting CSH was able to meet these community members and listen to their *mana‘o* (thoughts, opinions, beliefs) about the history of the area, impacts caused by loss of the boat ramp, and concerns about the proposed project. These *mana‘o* will be thoroughly documented and presented in the project CIA.

Consultation undertaken specifically for this LRFI investigation included phone and email correspondence, online meetings, and a site visit to the project area. This effort has focused on obtaining information about archaeological and cultural sites located in and around the project area from representatives of key Pohoiki-area *‘ohana* (families). Through this process information has been shared with CSH about some of the known sites in the vicinity of the project area, as well as concerns about possible impacts of the proposed project. This information has been integrated into the results discussed in Section 5.

Information shared with CSH during one-on-one consultations by email or phone is presented in Section 4.1. Comments provided during an online consultation meeting on 3 November 2022 are provided in Section 4.2. The results of the site visit, which was conducted in association with the field inspection on 21 November 2022, are given in Section 4.3.

4.1 Individual Consultations

4.1.1 Leila Kealoha

Leila Kealoha is a key community and family representative for the Pohoiki area. She also serves as Executive Director for Pōhaku Pelemaka, a non-profit organization that aims to protect and preserve cultural and natural resources along the Puna Coast through culture- and community-based programs. CSH reached out to Leila in October 2022 via email to begin coordinating a site visit. Leila replied requesting to meet online prior to the site visit and asked that Ana Kon-Kapukini be included. Ana is *‘ohana* from the Pohoiki area with land next to the project area, and she also helps to oversee the county PONC parcel at TMK: (3) 1-3-008:097 crossed by the proposed secondary access route. Both Leila and Ana attended the 3 November 2022 online meeting (see Section 4.2). Subsequently a site visit was coordinated via email among Leila, Ana, Lena Carver of the Kuamo‘o ‘Ohana, and CSH.

While Leila was unable to attend the site visit, she later provided CSH with additional information via email. In particular, CSH asked Leila if she had knowledge about the CSH-4 *ahu*

feature located during the field inspection along Pohoiki Road. Leila provided the following statements in two emails on 11 January 2023:

> The site that is within the parking lot area of the park is a Kahea ahu that was used by Tutu Joe Manoa and Kahuna Lā‘au lapa‘au. The exact dates I am not sure, but I was told that my great-grandparents took my grandfather to Tutu Joe Manoa because he broke his back when he was a kid. They took him to the ahu and he helped to heal his back.
>
> My grandfather was born in 1928 so I would say the ahu is at least that old, I would assume older for sure. This site is significant.

In follow-up conversation Leila noted she showed the *ahu* to the County Parks & Recreation Director and Planner and asked them to have it documented with the SHPD. She also shared that the *ahu* should be fine during the project as it is outside the active roadway and protected by the vegetation growing around it. Leila expressed her belief in the importance of the project moving forward for the benefit of her *‘ohana*, including her children, and the community.

4.1.2 Lena Carver

Lena Carver was identified to CSH as the representative for the Kuamo‘o ‘Ohana, which owns the parcel at TMK: (3) 1-3-008:013, crossed by the proposed secondary access route. CSH on 2 November 2022 consulted with Lena via telephone to discuss the project and historic properties known to exist within the secondary access route. During the call Lena expressed a major concern of the family is with nudist and partying behavior at the new warm ponds along the back of beach, and people accessing their property illegally. She spoke of how the Kuamo’o property was once owned by the government and had a jail on it. It was sold to her family around the 1940s. She was interested in knowing when the site visit would happen so that someone from the family could attend.

The next day (3 November 2022) Lena attended the online meeting with other consulting parties (see Section 4.2). Following the meeting she helped to coordinate the date and time of the site visit via email. Lena, her husband Wade Carver, and other members of the Kuamo‘o ‘Ohana attended the 21 November 2022 site visit, during which the family members provided additional information and comments (see Section 4.3).

In email correspondence on 14 January 2023, Lena expressed that she would prefer a new ramp be constructed on the new lava land near the bay. If dredging is pursued, she would prefer that her grandparent’s property not be used for access:

> They will be tearing it up with all that equipment and trucks going in and out. If they still want to pursue tearing out the sand, they should build their own driveway to the beach on the Kalapana side of our property. Give some distance between the properties. This way they can control their own gate/entry and it was stated during one of our meetings, in the future, they wanted to build a parking lot on that side.

Lena also noted in her email that the state needs to take responsibility for the new hot ponds in front of her property:

> No matter what the State decide, we would like the hot ponds in front our property covered. The State needs to take ownership of the hot ponds, especially water sample testing if they plan on leaving the old Hot Pond. Lots of foul play and cults come out.

In general Lena is concerned about unintended consequences of the project. She believes that if the bay in dredged the properties along the bay will be impacted by water coming in. She notes that if the state decides to make a channel for boats instead of dredging the entire bay, a retaining wall will be needed to control the ocean from taking away the sand and rocks.

4.1.3 Keone Kalawe

Keone Kalawe is also a representative for the Kuamo‘o ‘Ohana for cultural and other issues in the area. CSH consulted with Keone during the 21 November 2022 site visit (see Section 4.3) and also during follow-up email correspondence on 11 January 2023. Keone notes his *kūpuna*, Leialoha Kuamo‘o, grew up in Malama Ahupua‘a, which is near to Pohoiki and Keahialaka. He shared he has already been working with FEMA for the Kīlauea Eruption Recovery and is recognized by FEMA as a lineal descendant. Keone is also an experienced *heiau* architect who, as part of the Kuamo‘o ‘Ohana, helps to care for *heiau* such as Mahina‘aka‘aka near the project area. Upon request he confirmed the spelling for the name of this *heiau*, which is used throughout this report.

4.2 Online Meeting – 3 November 2022

The 3 November 2022 online meeting was attended by Leila, Ana, Lena, Ku‘ulei Kealoha Cooper (another key community representative), John Katahira of The Limtiaco Group, and Sarah Wilkinson of CSH. Sarah presented the group with research about previously documented historic properties in and around the project area, including two previously documented sites understood to be present in the proposed secondary access corridor, and asked for any information or feedback.

During the meeting Ana expressed concern over plans to dredge entire bay, stating she would prefer to dredge only what is needed. She is particularly concerned about impacts of extensive dredging on fishing, noting this practice has already been impacted by the 2018 lava flow. Ana mentioned the fishing village at Ka Lae o Kahuna, the point at the southern end of Pohoiki Bay in Keahialaka, and that a Lunalilo Estate map shows the fishing *koa* extending 300 yards out to sea in this area. She noted her involvement in developing a management plan for the county’s PONC parcel (at TMK: [3] 1-3-008:097) and asked to be included in scheduling of the site visit.

Ku‘ulei stated the importance of the project moving forward for the community. She noted the county and state have obligations to retore the boat ramp, and the amount of sand to be dredged will depend on available funding. Ku‘ulei was only aware of archaeological sites located further upslope, as she has been involved in the Pohoiki Road restoration project located *mauka.* She mentioned the county is also working on a project to restore Isaac Hale Beach Park. Currently each restoration project has its own studies and consultations; Ku‘ulei asked how efforts could be shared amongst these projects.

The outcome of the meeting was to move forward with scheduling the site visit for further consultation. Immediately following the meeting Sarah emailed the attendees a link to a digital copy of the Clark et al. (2014) report, pointing out some information specifically regarding the two sites documented in the proposed secondary access route.

4.3 Site Visit – 21 November 2022

One of the primary goals for the LRFI consultation was to undertake a site visit with knowledgeable individuals to view the project area and obtain information about any archaeological features present. Following the 3 November 2022 online meeting, the site visit was scheduled for 21 November 2022 in coordination with Leila Kealoha, Ana Kon-Kapukini, and Lena Carver. Due to unforeseen circumstances Leila and Ana were unable to attend the site visit. The site visit was attended by Lena and her husband Wade Carver and several other members of the Kuamo‘o ‘Ohana including Larry Kuamo‘o, Kimo Kahaloa, Keanaina Pearl, Eileen Rodrigues, and Keone Kalawe.

Following introductions, Keone shared his belief the sand should be left alone and a new boat ramp facility developed between the first two points of the new lava land adjacent to the bay.

In Wade’s recollection, a road was once present at the *makai* edge of the Kuamo‘o property accessing the Hale house, but this road was not part of the old Government Road. Wade and other Kuamo‘o family members walked portions of the old Government Road (SIHP # -02530) southwest of the project area with CSH staff. The portion of the old road nearest the Kuamo‘o property has become extremely overgrown and difficult to follow. Further south in Keahialaka the road becomes more open and defined, with segments of rock walls running along either side. Other features of interest were pointed out to CSH including numerous mounds and brackish and thermal ponds previously documented by Clark et al. (2014); and the Hale property, Mahina‘aka‘aka Heiau (SIHP # -02517), and Keahialaka Ponds (SIHP # -02518) in Keahialaka. The family shared how the pond areas and the *heiau* have been impacted over time by changes to the coastline following the 2018 eruption. Some of the ponds along the old road have dried up. Keahialaka Ponds and Mahina‘aka‘aka Heiau have been impacted by storm surge and erosion. Deep concern was expressed about the potential for increased impacts should the entire bay be dredged. Keone, an experienced *heiau* architect, is particularly concerned about Mahina‘aka‘aka Heiau, which he notes is the last *luakini heiau* remaining in Puna. According to Keone, for generations the Kuamo‘o ‘Ohana has been in charge of *luakini heiau*, and he strongly feels this *heiau* should continue to be protected. Keone is also concerned that heavy trucks coming in and out of the secondary access route could impact a lava tube containing sensitive archaeological features located beneath Route 137.

Upon returning to the Kuamo‘o property CSH staff asked Wade about the former courthouse and jail once located there. Wade noted the old courthouse was situated where a concrete slab is still visible in the northeastern portion of the parcel. He explained the concrete slab was actually associated with a lanai that was a later addition to the courthouse structure. A trail once led from the courthouse to a *lua* (outhouse) located in the northern corner of the stone enclosure. The jail was in the western corner of the enclosure, and consisted of a small, single room cell. The courthouse eventually burned down in a fire. Wade mentioned the property was recently surveyed, and the western property corner lies exactly at the exterior western corner of the stone enclosure; a survey stake with pink flagging tape was observed at this location by CSH staff. The parcel widens out just a bit going *makai*. A young *kamani* tree out on new beach marks the eastern corner of the property, and the southern corner is just beyond a cluster of palm trees.

Section 5 Results of Fieldwork

The field inspection was conducted on 21 November 2022 by CSH Project Directors Olivier Bautista, B.A., and Sarah Wilkinson, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. In general, fieldwork consisted of pedestrian coverage of the former shoreline and adjacent areas, both proposed access routes, and the interface of the 2018 lava flow with the county park. Photographs were taken and points of interest were recorded using a Garmin 60CSx handheld GPS device.

The field inspection effort confirmed the majority of the project area consists of the infilled Pohoiki Bay and new lava land to the east and northeast of Isaac Hale Beach Park (Figure 17 through Figure 19). The proposed access corridors are along existing travel ways (Figure 20 and Figure 21), with the exception of the *makai* portion of the proposed secondary access which crosses an open, grassy area within the privately owned Kuamo‘o parcel (Figure 22).

Seven archaeological and/or cultural sites were identified within or in proximity to the project area. These include three previously documented historic properties (SIHP #s -02507, -02530, and -30141) and four other features or areas of interest (CSH-1 through CSH-4). The locations of these sites are shown in relation to the project area in Figure 23. Observations made at each site during the field inspection are as follows:

- SIHP # -02507 (historic habitation complex) is located in a forested area at the margin of the 2018 lava flow area within Isaac Hale Beach Park (see Figure 23, Figure 24, and Figure 25). It is likely related to historic activity associated with Land Grant 1001 to Kamakaimoku and was recommended for preservation by Devereux et al. (1998). The site is located outside the project area, but near where dredge spoils may be deposited onto the new lava land area. The site should be avoided during this proposed activity.
- SIHP # -02530 is the coastal Old Government Road, indicated by Clark et al. (2014) to pass through the proposed secondary access route in the Kuamo‘o property (see Figure 23). As noted in the background discussion above (see Section 3.1.6), the portion of this road that once passed in front of the old Pohoiki courthouse has been lost to subsidence/erosion. Clark et al. (2014) indicate SIHP # -02530 continues northeast around the bay from the Kuamo‘o parcel as a coastal foot trail, but did not document it all the way around to the boat ramp; see discussion of CSH-2 below. Other portions of the old road located southwest away from the project area are still present but in variable condition; these sections were walked with members of the Kuamo‘o family who shared points of interest along the way. There is concern these areas along the Old Government Road could be impacted by inundation if the bay is dredged.
- SIHP # -30141 (landscaping complex) was confirmed during the field inspection within the proposed secondary access route, which follows the driveway extending through the county parcel into the Kuamo‘o parcel (see Figure 23). The site was observed in poor to fair condition (Figure 26 and Figure 27). The long wall located parallel to the driveway has a rather jumbled appearance.

Figure 17. Photo overlooking the project area from the southern end of infilled Pohoiki Bay; view to northeast

Figure 18. Photo overlooking the project area from the *makai* edge of the Kuamo‘o parcel; note black sand ridges within the central portion of former Pohoiki Bay; view to southeast

Figure 19. Photo looking toward the new lava land proposed for depositing of dredge materials, taken from the current terminus of the Beach Road; view to northeast

Figure 20. Photo looking *mauka* along Pohoiki Road, proposed primary access route; view to northwest

Figure 21. Photo looking *makai* down the driveway proposed as a secondary access route, near the intersection with Route 137; view to southeast

Figure 22. Photo overlooking the Kuamo‘o parcel and CSH-1 enclosure; the driveway visible at the center is part of the proposed secondary access route; view to northwest

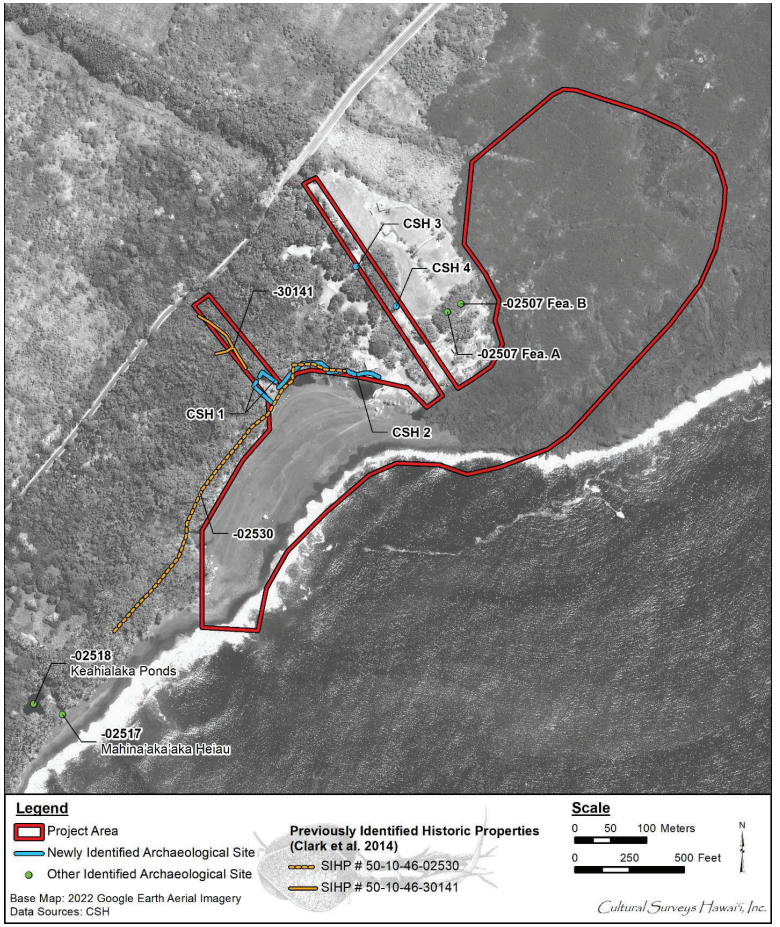

Figure 23. Aerial photo (Google Earth 2022) showing archaeological sites identified during the field inspection

Figure 24. Photo overlooking the forested area containing SIHP # -02507 located near the terminus of the former Kalapana-Kapoho Road at the new 2018 lava land; view to northeast

Figure 25. Photo showing a rock wall within a portion of the SIHP # -02507 Feature B enclosure; view to northeast

Figure 26. Photo showing a portion of the SIHP # -30141 Feature A rock alignment along the existing driveway within the proposed secondary access route; view to southeast

Figure 27. Photo showing the intersection of SIHP # -30141 Features A and B along the existing driveway within the proposed secondary access route; view to southwest

- CSH-1 is a three-sided rock wall enclosure located on the Kuamo‘o property within or overlapping the proposed secondary access route (see Figure 23). The enclosure measures approximately 25 m long on its northern side, 35 m long on its southern side, and 20 m wide along its western (*mauka*) side (Figure 28 and Figure 29). A breach is present at the midpoint of the western enclosure wall where the driveway through the county parcel above accesses the Kuamo‘o property. CSH-1 is the site of the old Pohoiki courthouse and jail. Wade Carver showed CSH staff some features of the site and shared its history. A foundation for a later lanai addition to the courthouse is present within the northeastern corner of the enclosed area (Figure 30). Mr. Carver indicated a trail used to lead from the courthouse to a *lua* located in the northern interior corner of the enclosure. The old jail was a single-room structure located in the western interior corner of the enclosure. A dirt roadway is present adjacent to the exterior northern corner of the enclosure, leading from the county driveway northeast toward the old Rycroft mill site (Figure 31). The Kuamo‘o family shared concerns about the potential for coastal inundation and further erosion of the property if the bay is dredged.
- CSH-2 is the section of the current coastal trail located between the vicinity of the boat ramp and the Kuamo‘o property. A portion of the trail was recorded by Clark et al. (2014) as part of SIHP # -02530 (see Figure 23). Near the boat ramp the trail is a worn dirt track (Figure 32). As it proceeds under the trees around the bay, it has an *‘ili‘ili* pebble surface with intermittent rock lining (Figure 33); Clark et al. (2014:140) noted these modifications are modern. Portions of this trail are located along or very near to the project area boundary.
- CSH-3 is the location along Pohoiki Road that may represent the interface of the historic Rycroft’s Road alignment (SIHP # -30137) with the current Pohoiki Road (see Figure 23 and Figure 34).
- CSH-4 is an *ahu* located under an area of trees along Pohoiki Road near the boat parking area (see Figure 23 and Figure 35). The feature consists of a small, neatly constructed stone platform with an upright waterworn stone at the center of the platform surface. According to Leila Kealoha, this feature is a *Kahea ahu* used for traditional healing practices. Leila indicates the *ahu* was constructed during the 1920s or earlier and is a significant cultural feature.

Other archaeological sites located along the former shoreline areas of Pohoiki Bay were visited during the field inspection with representatives of the Kuamo‘o ‘Ohana. These included a number of features previously recorded along the Old Government Road (SIHP # -02530) within TMK: (3) 1-3-008:097 (county parcel), and Mahina‘aka‘aka Heiau and Keahialaka Ponds (SIHP #s 50-10-46-02517 and -02518) which are located approximately 200 m southwest of the project area (see Figure 23, Figure 36, and Figure 37).

Figure 28. Photo showing the northern corner of the CSH-1 enclosure; view to east

Figure 29. Photo showing stacked construction at the interior western corner of the CSH-1 enclosure; view to west

Figure 30. Photo showing a concrete slab used for a lanai addition at the former courthouse structure within the CSH-1 enclosure; view to northeast

Figure 31. Photo showing a road extending northeast from behind the CSH-1 enclosure; view to northeast

Figure 32. Photo showing the portion of the CSH-2 coastal trail near the boat ramp; view to southeast

Figure 33. Photo showing the portion of the CSH-2 coastal trail located in the forest between the boat ramp and the Kuamo‘o parcel; view to southeast

Figure 34. Photo showing the location along Pohoiki Road (CSH-3) that may mark the interface with the old Rycroft's Road (SIHP # -30137); note remnants of the old mill visible in the background; view to southwest

Figure 35. Photo of the CSH-4 *ahu* located along Pohoiki Road; view to west

Figure 36. Photo overlooking Mahina‘aka‘aka Heiau (SIHP # -02517) located southwest of the project area; view to north

Figure 37. Photo overlooking Keahialaka Ponds (SIHP # -02518) located southwest of the project area; view to northwest

Section 6 Summary and Recommendations

6.1 Summary

At the request of The Limtiaco Group and on behalf of the State DOBOR, CSH has undertaken this LRFI for the Pohoiki Boat Ramp Dredging of Volcanic Debris Project, Keahialaka, Pohoiki, and Oneloa Ahupua‘a, Puna District, Hawai‘i Island, TMKs: (3) 1-3-008:013 por., 014 por., 016 por., 021 por., 033, 034 por., 097 por., 999 por. (Kalapana-Kapoho Beach Road); (3) 1-4-093:038 por., 048 por., 999 por. (Kalapana-Kapoho Beach Road).

Two CSH archaeologists completed fieldwork on 21 November 2022. Fieldwork consisted of a pedestrian survey and GPS data collection and included on-site consultation with members of the Kuamo‘o ‘Ohana, which owns the private parcel crossed by the proposed secondary access route. Seven archaeological and/or cultural sites were identified within or in direct proximity to the project area. These include three previously documented historic properties (SIHP #s -02507, historic habitation complex; -02530, Old Government Road; and -30141, landscaping complex) and four other features of interest (CSH-1, enclosure associated with the former historic Pohoiki courthouse and jail; CSH-2, coastal foot trail; CSH-3, the potential interface of historic Rycroft’s Road/SIHP # -30137 with Pohoiki Road; and CSH-4, an *ahu* used for traditional healing practices located along Pohoiki Road).

Other archaeological sites located along the former shoreline areas of Pohoiki Bay were visited during the field inspection by representatives of the Kuamo‘o ‘Ohana. These included a number of features previously recorded along the Old Government Road (SIHP # -02530) within TMK: (3) 1-3-008:097 (county parcel), and Mahina‘aka‘aka Heiau and Keahialaka Ponds (SIHP #s -02517 and -02518) which are located approximately 200 m southwest of the project area.

Two sites are assessed as having the highest potential for direct impact from project activities: SIHP # -30141 and CSH-1, both located along the proposed secondary access route. SIHP # -30141 is situated along the edge of an existing unimproved driveway; depending on the size of equipment to be transported along this access route, avoidance may or may not be possible. SIHP # -30141 was thoroughly documented and recommended for no further work by Clark et al. (2014). The CSH-1 enclosure contains an existing breach for the driveway along its *mauka* wall, and therefore impacts to the enclosure feature itself may be avoidable. Parking, staging, or other associated project activities within the enclosure could impact any remnants of the courthouse and/or jail structures that may still be present.

The other five sites documented during the field inspection are less likely to be directly impacted by project activities, though they should be actively avoided. These sites are located either upslope of the former shoreline (i.e., SIHP # -02530, CSH-2) or adjacent to but outside active roadway surfaces (SIHP # -02507, CSH-3, CSH-4).

Concern was also expressed by consulting parties that dredging the bay could subsequently lead to increased erosion or other coastal impacts to the lands and sites located along and south of the bay, including but not limited to Mahina‘aka‘aka Heiau and Keahialaka Ponds. Changes to the natural shoreline caused by the 2018 eruption have already caused impacts to some of the sites in these areas. Other individuals consulted for this study expressed the importance of the project moving forward for the community.

6.2 Recommendations

The SHPD should be consulted early for its determination of historic preservation requirements, including any necessary mitigations, for the proposed project.

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APPENDIX G

Pre-Design Report
by The Limtiaco Consulting Group

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THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

Mr. Finn McCall
State of Hawaii
Department of Land and Natural Resources
Division of Boating and Ocean Recreation
4 Sand Island Access Road
Honolulu, Hawaii 96819

September 30, 2022

Project: **Pohoiki Boat Ramp Dredging of Volcanic Debris and Slope Stabilization**
Final Pre-Design Report
Pahoa, Hawaii

Dear Mr. McCall,

The Limtiaco Consulting Group (TLCG) has prepared this pre-design letter report for Pohoiki Boat Ramp Dredging of Volcanic Debris and Slope Stabilization project for the Department of Land and Natural Resources, Division of Boating and Ocean Recreation.

The purpose of this letter report is to evaluate proposed alternatives for the removal of volcanic debris from the Pohoiki Boat Ramp. This letter report includes a general description of the existing condition of the boat ramp, possible design alternatives, opinions of probable construction costs, and potential permitting and environmental clearance requirements.

Please contact me at (808) 687- 8740 if you have any questions or comments. Thank you.

Very Truly Yours,

The Limtiaco Consulting Group, Inc.

Trevor Vagay
Associate Principal

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PREAMBLE

This preamble is intended to help the reader understand the unique and complicated circumstances that resulted in an untraditional approach to project development.

The existing Pohoiki Boat Ramp is currently landlocked by volcanic debris (sand, rock, and cobble) produced during the 2018 eruption of Kilauea Volcano. The intact but now-inoperable boat ramp at Pohoiki makes the region inaccessible for ocean safety and severely impacts the local economy (commercial fishing and ocean/volcano tours) and the overall food sustainability and cultural practices of the Puna community. Realizing the severity of impacts to the community, stakeholders (including the Department of Land and Natural Resources – Division of Boating and Ocean Recreation (DLNR-DOBOR)) and County/State agencies and elected officials immediately sprung to action by organizing relief and assistance efforts. The community has been adamant about the need to re-open the Pohoiki Boat Ramp.

The Limtiaco Consulting Group (TLCG) was contracted by DLNR-DOBOR in July 2020 to work directly with the community. Community members most impacted by the inoperable boat ramp provided input through public meetings and countless one-on-one discussions.

In February 2022 TLCG was contracted by DLNR-DOBOR to develop a Pre-Design Letter Report that identifies and evaluates alternatives to re-open the boat ramp. After the draft report was completed, the project was paused to solicit additional input from the community and elected officials given the constraints of challenging construction conditions, limited construction budget, permitting requirements, and need to act quickly. TLCG presented the draft report findings in a public meeting held on August 18, 2022 to determine how to best move forward.

Ultimately, a new alternative was identified and is included in this Final Pre-Design Letter Report but there are still critical unknowns surrounding this alternative including but not limited to (1) the State's ability to secure additional money for construction, (2) funding assistance from the Federal Emergency Management Agency, (3) United States Army Corps of Engineers approval for coverage under its Nationwide Permit, and (4) how long the re-opened boat ramp will remain operational considering all the volcanic material currently on-land and in-water that could be washed back into the bay. These very important considerations will continue to be unconfirmed for months after the completion of this report. This is a very unconventional approach to project delivery but it is unavoidable considering the urgency to re-open the boat ramp and all the moving targets and approvals that can only be determined later in the project process.

Pre-Design Letter Report Format

It was important for TLCG to document an accurate project development timeline so the new alternative will be introduced in the report as it occurred; as a result of the August 18, 2022 public meeting. The alternative will be described in its own section following the letter report titled Addendum 1, and will be evaluated against the alternatives that were evaluated before the August 18, 2022 public meeting.

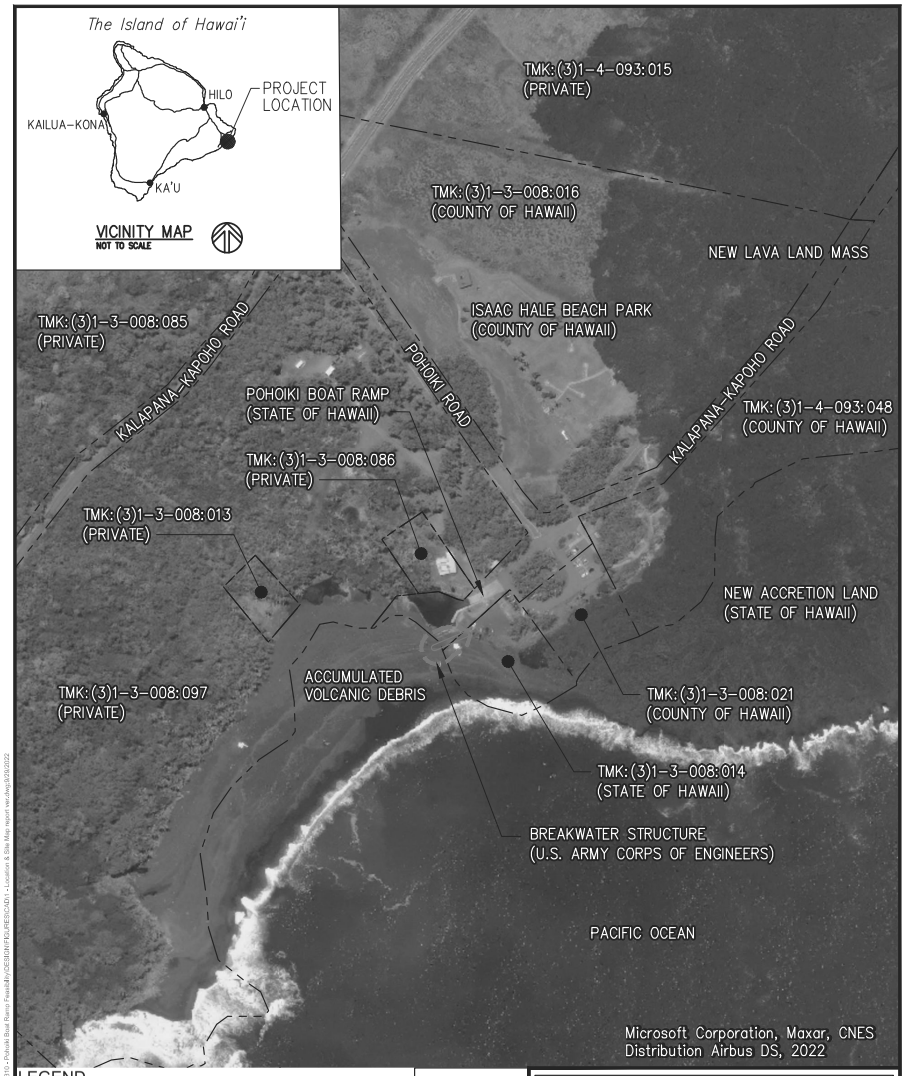
1 INTRODUCTION

1.1 Purpose

The purpose of this report is to assess and offer recommendations to the State of Hawaii, Department of Land and Natural Resources (DLNR) Division of Boating and Ocean Recreation (DOBOR) for restoration of ocean access to the Pohoiki Boat Ramp facility at the southern end of Pohoiki Road.

1.2 Location

The Pohoiki Boat Ramp is located on the Puna District coast of the Island of Hawaii (South of Hilo, North of Kau) and is now landlocked by volcanic debris that accumulated within Pohoiki Bay during the 2018 eruption of Kilauea Volcano. The debris currently covers an area of approximately 11.6 acres, blocks navigational access to the Pacific Ocean, and partially covers the existing U.S. Army Corps of Engineers (USACE) breakwater structure. The shoreline is almost entirely rocky sea cliffs, with deep water close to shore and relatively high nearshore ground elevations. Other than what used to be Pohoiki Bay, there are no shallow water embayments or significant headlands to provide natural wave protection. The coast is directly exposed to the persistent prevailing tradewind generated seas, and summer season south swell. Tropical storms and hurricanes passing south of the island generate large waves that can batter the coast. To the east of the boat ramp facility exists a new lava land mass and a large area of accretion land with elevations ranging from 12 feet to 45 feet above Mean Low Low Water (MLLW). The surrounding area to the west of Pohoiki Bay is mostly undeveloped and comprised of dense vegetation (see **Figure 1**).



1.3 Background

Pohoiki Boat Ramp was an important part of the community and local economy, granting the local Iawai'a community (local commercial fishing for income and fishing for food subsistence) and tourism businesses safe passage into Pohoiki Bay and the Pacific Ocean (see **Figure 2**).

In 2018, the Kilauea Volcano Lower East Rift Zone began erupting, causing lava to cover areas of the southeast coast of the Lower Puna district and creating a new lava land mass (consisting of a new lava layer on existing land) and accretion land (consisting of entirely new land created by the lava flow) that extends into the ocean. The constant wave activity at the accretion land and ocean interface produced sand, rock, and cobbles. Loose materials were transported down coast by prevailing wave direction and ocean currents, eventually filling in Pohoiki Bay and land locking Pohoiki Boat Ramp (see **Figure 3**).

The loss of ocean access from Pohoiki Boat Ramp greatly impacted the local Iawai'a community. Additionally, rescue teams from the U.S. Coast Guard and the Hawaii County Fire Department who used Pohoiki Boat Ramp to provide emergency rescue services were no longer able to access the ocean. No new boat launch areas have been developed along the Puna coastline to replace the facilities at Pohoiki Bay and currently, the nearest operable boat ramp is Wailoa Sampan Basin in Hilo, approximately 40 miles away.

Federal disaster assistance was made available to the State of Hawaii and DOBOR is currently working with the Federal Emergency Management Agency (FEMA) and Hawaii Emergency Management Agency (HIEMA) on reestablishing ocean access to the boat ramp facility.

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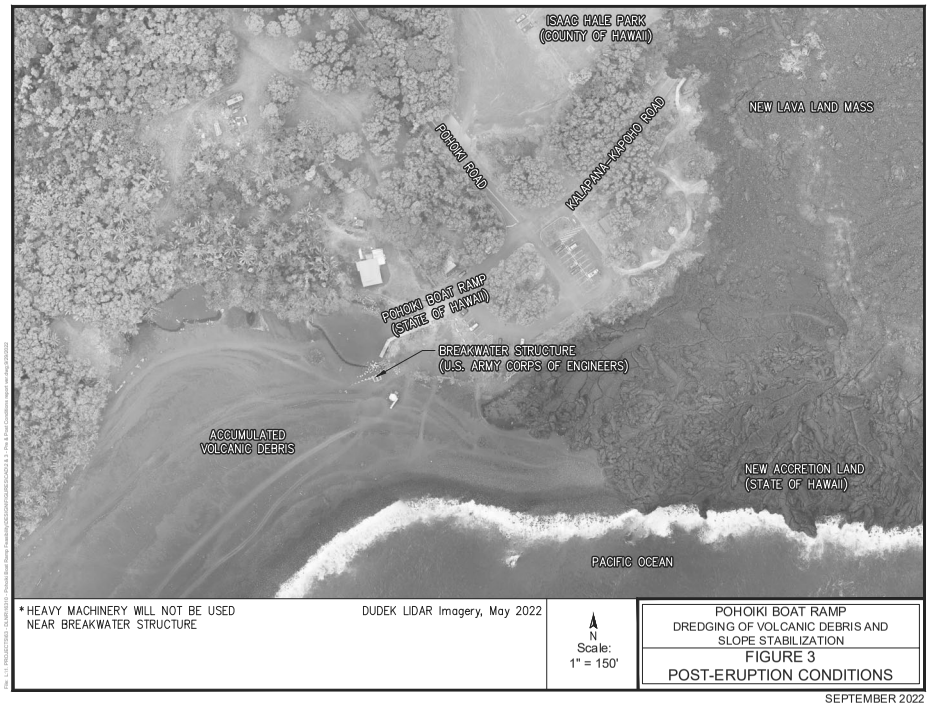


The following four photos were taken during a site visit conducted in March 2022 to investigate more current conditions of Pohoiki Bay. **Photo 1** and **Photo 2** show the condition of the shoreline and boat ramp and illustrates the large amounts of debris that filled in Pohoiki Bay. **Photo 3** takes a look at the new accretion land to the east, adjacent to Pohoiki Bay. **Photo 4** shows the debris found on the surface of the shore in relation to a Hawaii driver's license, highlighting the varying size of material present in the bay.

Photo 1 – Pohoiki Bay Shoreline, March 2022

Photo 2 – Landlocked Pohoiki Boat Ramp, March 2022

Photo 3 – New Accretion Land to the East, March 2022

Photo 4 –Surface Debris with Hawaii Driver's License for Comparison, March 2022

1.4 Soil Conditions

Exploration of the existing soil material within Pohoiki bay was done via boring test in May 2022 (see **Figure 4**). The boring extended to a depth of about 27 feet and generally encountered a beach deposit surface layer about 18 feet thick, underlain by a shallow marine deposit extending to about 20.5 feet deep. Below the shallow marine deposit, a clinker deposit about 4 feet thick was encountered underlain by basalt rock extending to the maximum depth explored. The beach deposit layer consisted of loose to very dense sandy gravel with some cobbles. The Shallow marine deposit was composed of medium dense sand and the clinker deposit consisted of very dense sandy gravel (see **Figure 5**). The basalt rock formation was hard. Groundwater was encountered in the boring at about 8.5 feet below the existing ground surface. However, it should be noted that the groundwater levels are subject to change due to tidal fluctuations, rainfall, time of year, seasonal precipitation, surface water runoff, and other factors.

Several ridges were observed during the boring test on the surface of the beach deposit due to heavy wave events that occurred. It is anticipated that numerous cobbles and some boulders may be encountered in the beach deposit below these ridges where the old shoreline existed previously. Therefore, it could be anticipated that the dredged materials may consist of sand, gravel, some cobbles, and occasional boulders. Some screening of the larger sized materials will be required.

Based on laboratory test results, the beach deposit material qualifies for use as Aggregate Subbase, Structural Backfill Material A, Structural Material B, Trench Backfill Material B, and Granular Material for Embankment in accordance with the 2005 State of Hawaii Department of Transportation Standard Specifications. In addition, the beach deposit qualifies for use as Select Borrow for Subbase and Borrow in accordance with the County of Hawaii Standard Specifications for Public Works Construction, dated September 1986.

LEGEND

APPROXIMATE BORING LOCATION

APPROXIMATE BULK SAMPLE LOCATION

DUDEK LIDAR Imagery, May 2022

N

Scale: 1" = 150'

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS AND SLOPE STABILIZATION

FIGURE 4

BORING & BULK SAMPLING LOCATION

SEPTEMBER 2022

GEOLABS, INC.

Geotechnical Engineering

POHOIKI BOAT RAMP MAINTENANCE DREDGING
PUNA DISTRICT, ISLAND OF HAWAII

Log of Boring 1

Approximate Ground Surface Elevation (feet MSL): 12 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
Direct Shear	4	109			23					GW	Dark gray to black medium to coarse angular **SANDY GRAVEL (BASALTIC)** with some cobbles, loose to medium dense, dry to moist (beach deposit)
	4				39					GP	Dark gray **SANDY GRAVEL (BASALTIC)** with some cobbles, dense to very dense, moist to wet (beach deposit)
Direct Shear	5	131			37		5				
			3								
							10				
Sieve - #200 = 0.2%	5				47						
			58				15				
	7				23					SM	Dark gray with trace tan **SILTY SAND (BASALTIC)** with a little sand (coralline) and a little gravel (basaltic), medium dense (shallow marine deposit)
			25				20			GW	Gray with some brown **SANDY GRAVEL (BASALTIC)** with a little cobbles and traces of silt, very cense (clinker)
	18				56						
			90	24			25				Gray vugular **BASALT**, moderately to closely fractured, unweathered to slightly weathered, hard (a'a basalt)
							30				Boring terminated at 27 feet
							35				* Elevation estimated from Topographic Plan received from The Limtiaco Consulting Group on May 31, 2022.

Date Started:	May 19, 2022	Water Level: ▽ 9.5 ft. 05/19/2022 1435 HRS	Plate
Date Completed:	May 19, 2022	▼ 8.5 ft. 05/19/2022 1655 HRS	
Logged By:	S. Latronic	Drill Rig: MOBILE B-53.1	A - 1
Total Depth:	27 feet	Drilling Method: 4" Solid-Stem Auger & HQ Coring	
Work Order:	8271-00	Driving Energy: 140 lb. wt., 30 in. drop	

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS AND SLOPE STABILIZATION

FIGURE 5

SOIL PROFILE

SEPTEMBER 2022

1.5 Assumptions and Elevation Datum

Elevations presented in this report are based on Mean Low Low Water (MLLW) as its datum unless noted otherwise. Historically, MLLW has been used for navigational purposes and is typically used to represent elevations for projects within the maritime area. A conversion factor of +1.14 feet was applied to the elevations in the existing Light Detection and Ranging (LiDAR) data to translate Mean Sea Level (MSL) to MLLW.

The alternatives investigated to restore ocean access to the boat ramp considered community input, historical information, and oceanographic conditions. Channel bottom conditions were based on pre-eruption ocean floor elevations. Only new volcanic material is proposed to be excavated from the site; no pre-eruption material is intended to be excavated as a part of the channel dredging process. The alignment and channel widths were based on the community's input on the type of fishing vessels, wave and ocean current conditions, and historical harbor use in addition to engineering assessment of the oceanographic conditions. The volume of dredging was limited to construction budget restraints and permit compliance.

The existing breakwater structure (owned by the U.S. Army Corps of Engineers) located near the boat ramp will remain in place. Per federal requirements, construction equipment will not be used on any part of the breakwater structure.

1.6 Coastal Analysis

Surrounded by the Pacific Ocean, the Hawaiian Islands are subject to wave approach from all directions. The wave climate in Hawaii is typically characterized by five general wave types. These include northeast tradewind waves, southeast tradewind swell, southern swell, North Pacific swell, and Kona wind waves. Tropical storms and hurricanes also generate waves that can approach the islands from virtually any direction. Any and all of these wave conditions may occur at the same time. Pohoiki is located on the southeast coast of the island of Hawaii, and is directly exposed to tradewind waves, southeast tradewind waves, and south swell, and sheltered from north swell waves by the island itself. Prevailing wave types and approach directions are illustrated in **Photo 5**.

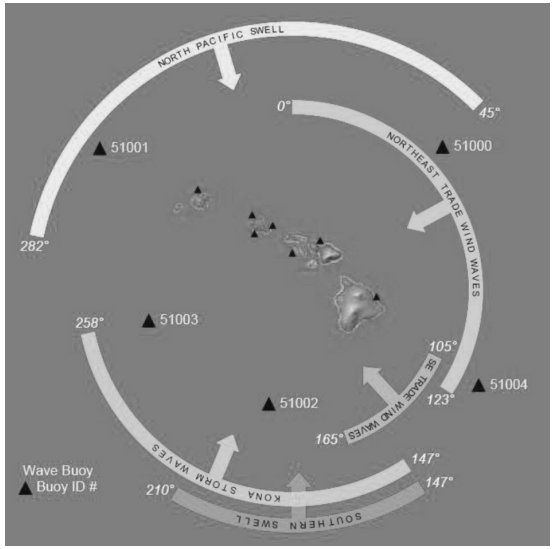


Photo 5 – Prevailing Deepwater Wave Types and Approach Directions

Tradewind waves occur throughout the year and are the most persistent in April through September when they usually dominate the local wave climate. They result from the strong and steady tradewinds blowing from the northeast quadrant over long fetches of open ocean. Tradewind deepwater waves are typically between 3 to 8 feet in height with periods of 5 to 10 seconds, depending upon the strength of the tradewinds and how far the fetch extends east of the Hawaiian Islands. The direction and approach, like the tradewinds themselves, varies between north-northeast and east-northeast and is centered on the northeast direction.

Waves can also be generated by the southeastern tradewinds that blow south of the equator and can occur any time during the year. Southeast tradewind swell has small wave heights on the order of 1 foot and typical periods less than 12 seconds. These waves are not typically used for design criteria, but may be important for sediment movement along the shoreline due to their frequency of occurrence.

Southern swell is generated by storms in the southern hemisphere and is most prevalent during the months of April through September. Traveling distances of up to 5,000 miles, these waves arrive with relatively low deepwater wave heights of 1 to 4 feet and long periods of 14 to 20 seconds. Depending on the positions and tracks of the southern hemisphere storms, southern swell approaches from the southeast through southwest directions.

Tropical storms and hurricanes often track from east to west and south of the islands, sending large storm waves to east and south shores.

For more site specific offshore wave statistics, waves approaching from the east are calculated from the Coastal Data Information Program (CDIP) Buoy 188 located approximately 9 miles northeast of Hilo shown in **Photo 6**. CDIP Buoy 188 provides representative wave data for easterly waves offshore of Pohoiki. The buoy data covers a 10-year period from 2012 to 2022. Return period easterly deepwater wave heights, calculated using the Weibull distribution, are listed in **Table 1**. A plot of the Weibull distribution and recorded events are shown in **Photo 7**. The 10 largest recorded easterly waves events are listed in **Table 2**. These waves are primarily forced by the tradewinds, though passing hurricanes contribute to some of the events. To show the prevalence of energetic wave climate impacting Pohoiki, **Photo 8** shows the average number of days per month deepwater wave heights of easterly wind waves exceed 6, 8, 10, and 12 feet at CDIP Buoy 188.

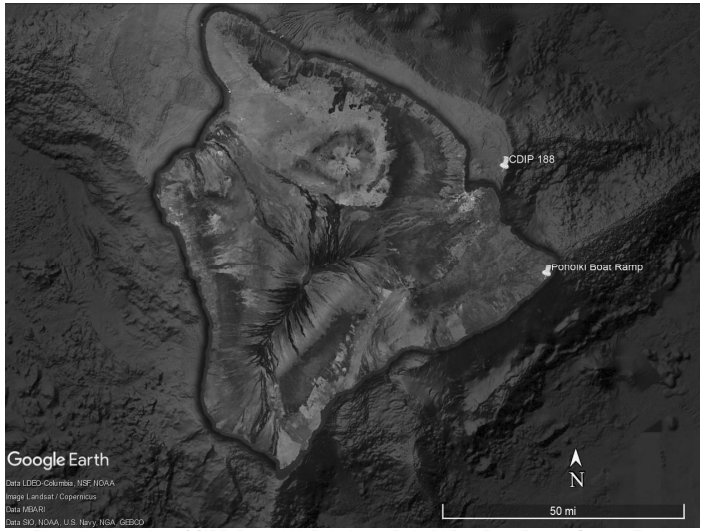


Photo 6 – Location of CIPD Buoy 188 Relative to Pohoiki Bay Boat Ramp, Google Earth

Table 1 – Return Period Deepwater Wave Heights for Easterly Waves Based on CIPD Buoy 188 Off Hilo

Return Period (years)	Wave Height (ft)
1	13.2
5	16.1
10	17.4
25	19.0
50	20.3

Table 2 – 10 Largest Easterly waves measured by CIPD Buoy 188 off Hilo

Date (yyyy-mm-dd)	Hs (ft)	Tp (s)	Dp (deg)
2016-08-31	17.0	10.5	79
2016-07-23	15.9	9.9	86
2018-08-24	15.0	9.1	103
2020-01-09	15.0	11.1	78
2018-02-27	14.5	10.5	96
2013-02-19	14.5	9.9	84
2013-01-06	14.4	10.5	74
2019-04-13	13.6	11.1	71
2020-03-03	13.4	11.1	71
2021-01-26	13.3	9.9	77

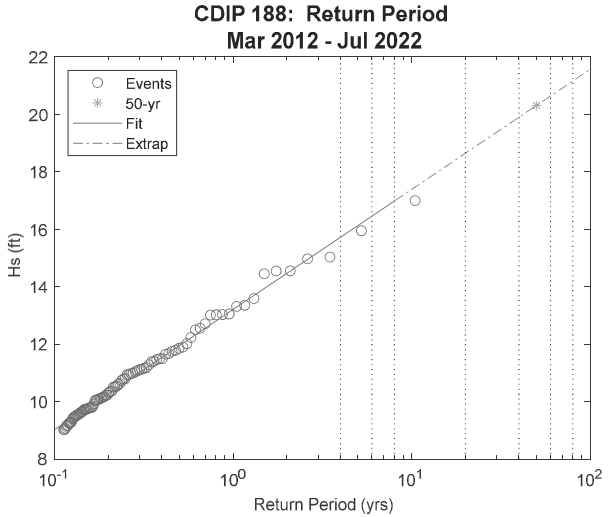


Photo 7 – Weibull Distribution of Return Period Wave Heights

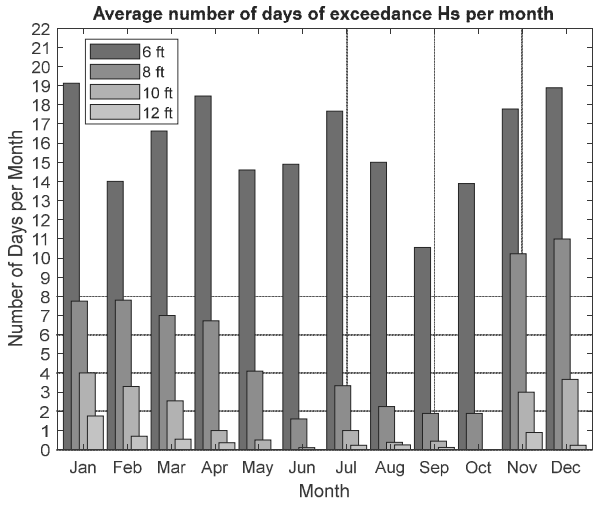


Photo 8 – The Average Number of Deepwater Wave Height Exceedance Days Per Month

The coast is directly exposed to the prevailing tradewind seas, south and southeast swell waves, and waves generated by passing storms. Wave heights in shallow water are a function of water depth. Based on depth-limited wave height criteria provided in the Coastal Engineering Manual (2006), the design extreme wave height at the shoreline is estimated as follows:

Water depth at the beach toe	-	10 feet
Stillwater level rise (high tide, wave setup, sea level rise)	-	5 feet
Total water depth (ds)	-	15 feet
Bottom slope	-	1V:33H
Wave period	-	12 seconds
Breaker height versus water depth (Hb/ds)	-	1.0
Breaker height (Hb)	-	15 feet

A drone survey was conducted in April 2022 to document the current topographic features of Pohoiki Boat Ramp and the surrounding area. Historical LiDAR and bathymetric information were used to determine the pre-eruption ocean floor elevations within Pohoiki Bay. The nearshore bathymetry was generated by merging the USACE 2013 LiDAR dataset covering topography and bathymetry and the drone topographic LiDAR survey conducted in May 2022. For deeper waters than those covered by the 2013 LiDAR dataset, bathymetry was obtained from the Hawaii Mapping research group. The nearshore bathymetry with elevation from -10 to -100 feet MLLW from the 2013 LiDAR data set is shown below in **Photo 9**.

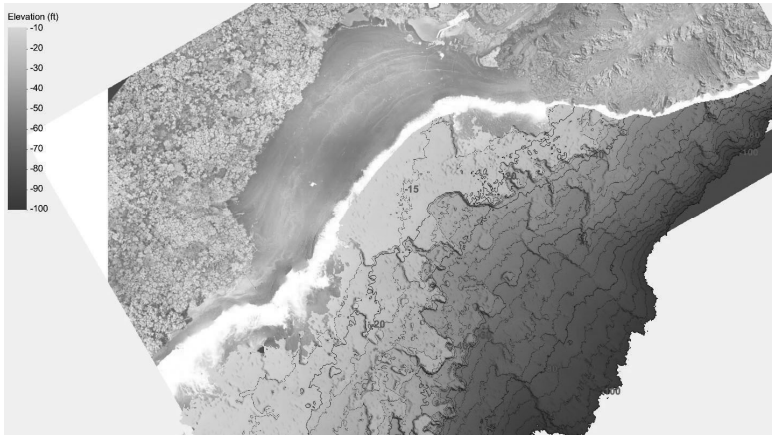


Photo 9 – Nearshore Bathymetry Relative to Mean Low Low Water (MLLW), 2013 LiDAR Dataset

Currently, the beach at Pohoiki exhibits a series of crest ridges marking the progression of the shoreline seaward as sediment infilled the bay and high waves pushed sand and cobbles higher up the beach face. An example of this is shown in **Photo 10** in a Google Earth image from May 2019. The crest ridge lines are highlighted with a dashed white line. These crest ridge lines represent the natural, equilibrium shape of the beach for different volumes of sediment within the bay. The crest lines are relatively parallel suggesting a constant forcing of the beach shape by the incident waves.

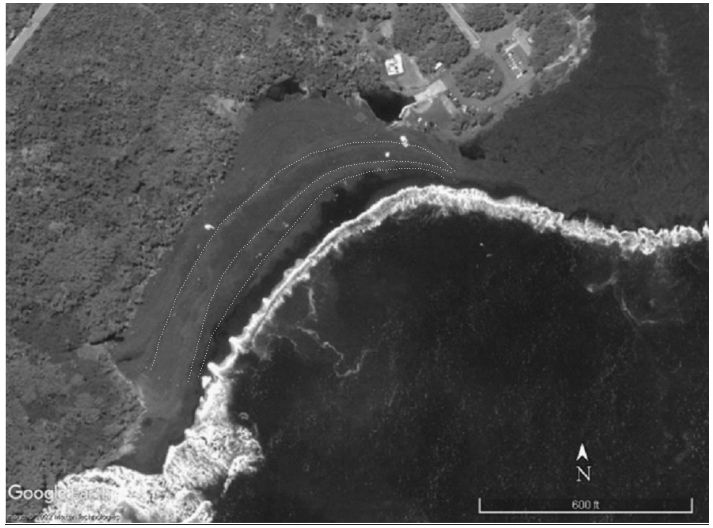


Photo 10 – Crest Lines on Beach and Constant Lines Matching Tradewind Wave Crest, Google Earth Image May 2019

A stable beach shape will match the incoming wave crests. In general, if sand is added to the beach or removed from the beach, for example by dredging a channel, the prevailing waves will work to redistribute the sand to achieve the arcuate shape shown by the beach ridges in **Photo 10**.

A Global Positioning System (GPS) was used to measure the location of the beach crest on site visits conducted on May 1, 2019 and March 22, 2022. The beach crest was not well defined so the upper and lower bounds were recorded. A map of the measured beach crests is shown in **Photo 11**. The solid green lines show the beach crest bounds from May 2019 while the dashed red lines show the beach crest bounds from March 2022. These results show that the shape of the beach is stable and that from 2019 to 2022, the beach grew in width. Geotechnical investigations for the project corroborate that the ridges on the surface of the volcanic debris formed during large wave events while the sand deposition was occurring.

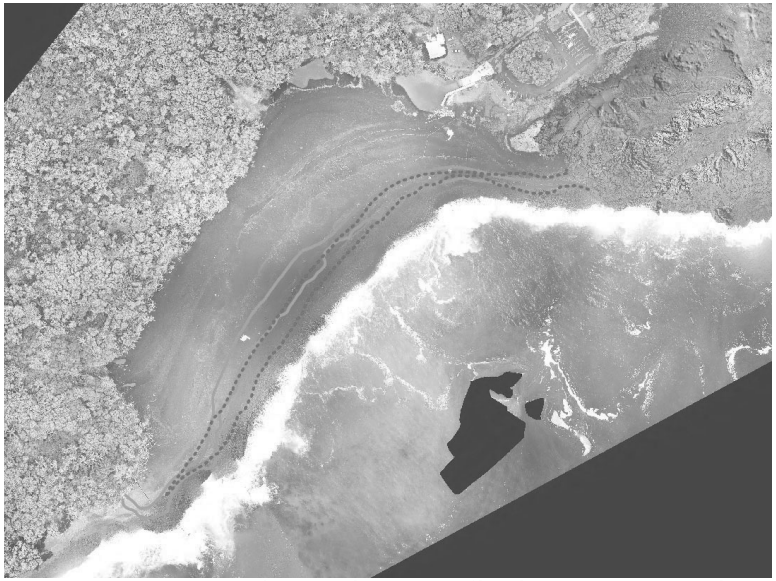


Photo 11 – Measured Locations of the Beach Crest at Pohoiki (Solid Green Lines – 2019 Beach Crest; Dashed Red Lines – 2022 Beach Crest

Two wave cases were modeled for the two predominant sources of wave energy at Pohoiki: eastly tradewind waves and south swell. The nearshore wave pattern for tradewind waves is shown in **Photo 12**. The photo shows that the incoming wave crests closely parallel the shape of the beach suggesting that tradewind waves are the main driver of the current beach shape. The photo also shows that as the waves round the corner of the new accretion land to the north, they wrap around the steep shoreline creating the potential to erode the friable lava and move more sediment into Pohoiki Bay. **Photo 13** shows the wave pattern for a typical south swell. The model shows that most of the wave energy is refracted toward the shallow reef protruding from shore at the southern end of the beach, but the wave crests that do reach the beach are also relatively parallel to the beach crest and may have the potential to move sediment from south to north along the beach.

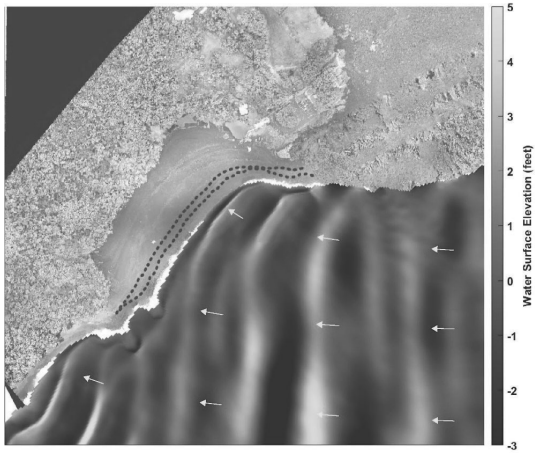


Photo 12 – Wave Pattern from Typical Easterly Tradewind Waves.
Note: Dashed Blue Line Show the Existing Beach Crest in March 2022
and Yellow Arrows Indicate Wave Direction

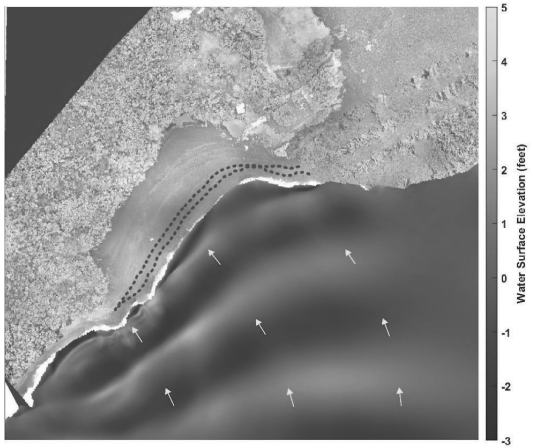


Photo 13 – Wave Crest Patterns from Prevailing South Swell.
Note: Dashed Blue Line Show the Existing Beach Crest in March 2022
and Yellow Arrows Indicate Wave Direction

Unconsolidated (sand and cobbles) and mobile shorelines tend to align themselves with the incident wave crests, and are most stable when oriented parallel to the nearshore wave crests. The May 2019 Google Earth photograph, previously shown in **Photo 10**, illustrates wave crest alignment at the shore and a series of progressive beach crest ridges in approximate alignment with the wave crests. It is estimated that an unstabilized sand and cobble shoreline will continue to align itself with the approaching waves. As shown by the wave modeling, prevailing tradewind waves approach the shoreline from the east, thus moving debris from east to west in Pohoiki Bay. Similarly, south swells approaching from the southwest will move debris to the east. Both wave types can be expected to quickly fill in discontinuities (such as a dredged cut) in the loose and mobile beach face and align it parallel to the wave crests.

2 ALTERNATIVES

This section considers several alternative solutions to restore ocean access to the Pohoiki Boat Ramp facility.

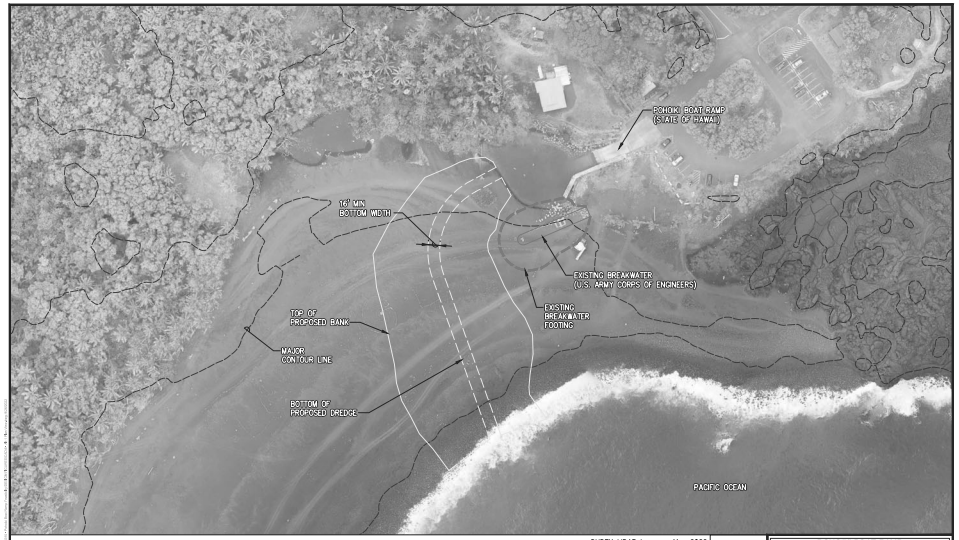
2.1 Alternative 1 – Narrow Channel

Alternative 1 proposes to excavate and dredge a narrow channel through a portion of the volcanic debris to reestablish ocean access from Pohoiki Boat Ramp (see **Figure 6**). The proposed channel would be approximately 415 linear feet from the existing boat ramp to the ocean and have a bottom width of 16 feet with channel sides sloped at 4H:1V (4 feet horizontal for every 1 foot vertical) to match the existing sand elevation (see **Figure 7**). Bottom of channel will match the existing ocean floor, varying in elevation from approximately -5 feet MLLW at the boat ramp to approximately -11 feet MLLW at the mouth of the channel.

The debris would be removed through on-land excavation and dragline dredging before being transported via trucks to nearby stockpiling locations. Heavy equipment utilized for the project will avoid traveling near the existing breakwater structure. Instead, settled sand and cobbles on the breakwater may be manually removed with the use of hand tools to ensure that it is not damaged. Slope stabilization systems that aim to preserve channel integrity and ocean access is discussed further in section 3.

This layout will create approximately 22,300 cubic yards of excavated material which will be distributed across approximately 5.5 acres to level areas of the surrounding debris, neighboring properties, and the lava land mass and accretion land to the east. Backfill on the lava land mass and accretion land will be in 1 to 2 foot thick layers and will maintain a consistent top elevation with slopes to match surrounding elevations (see **Figure 8**). A 50 foot buffer will be maintained along the ocean side of the backfill area to ensure excavated material will not erode into the ocean. Temporary paths constructed from the backfill will also be implemented to facilitate access to the flattened areas. These paths will range from 100 to 340 feet in length and have a slope no greater than 10 percent.

This alternative is estimated to have a probable construction cost of $4.1 million. The opinion of probable cost is presented in Appendix A. Please note the probable construction cost estimate will be refined during the design phase of the recommended alternative.

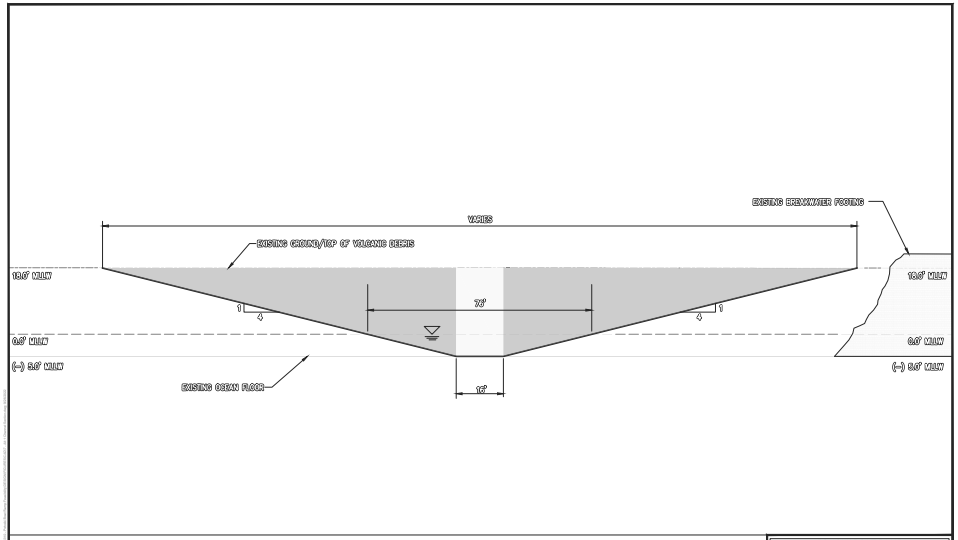


DUDEK LIDAR Imagery, May 2022

N
Scale:
1" = 80'

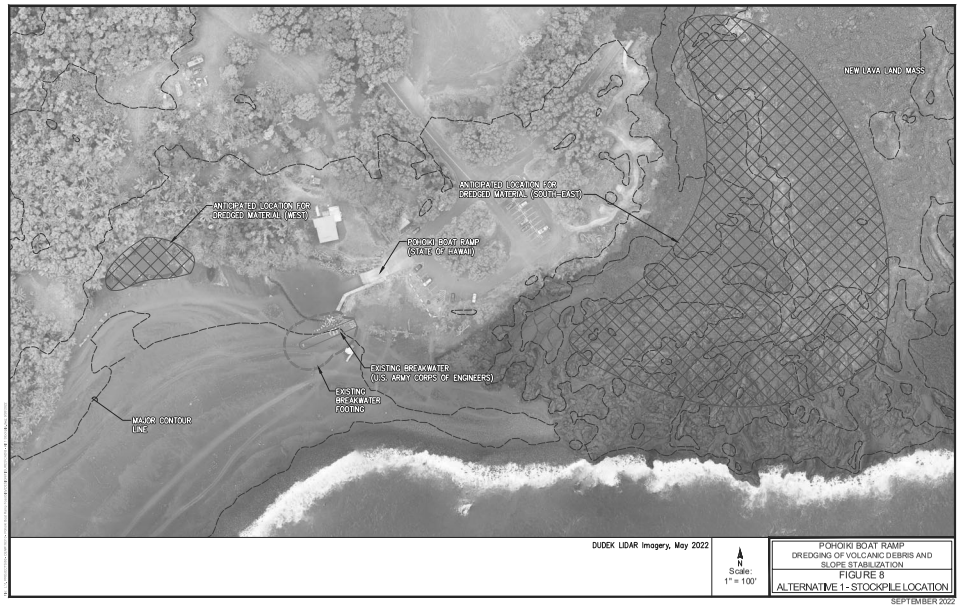
POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS AND
SLOPE STABILIZATION
FIGURE 6
ALTERNATIVE 1 - PLAN VIEW

SEPTEMBER 2022



POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS AND
SLOPE STABILIZATION
FIGURE 7
ALTERNATIVE 1 - TYPICAL SECTION

SEPTEMBER 2022



2.2 Alternative 2 – Wide Channel

Alternative 2 explores excavating and dredging a channel of approximately 325 feet long through a portion of the existing volcanic debris (see **Figure 9**). The navigable channel will have an initial bottom width of 15 feet near the boat ramp and open to approximately 160 feet at the mouth to allow for easier navigation into the channel from the ocean. The west bank of the channel will have a 4H:1V slope while the east bank will start with a 2H:1V slope as it curves around the breakwater structure where after it will transition into a 4H:1V slope (see **Figure 10** and **Figure 11**). Bottom of channel will match the existing ocean floor varying in elevation from approximately -5 feet MLLW at the boat ramp to approximately -11 feet MLLW at the mouth of the channel.

The debris would be removed through on-land excavation and dragline dredging before being transported via trucks to nearby stockpiling locations. Heavy equipment utilized for the project will avoid traveling near the existing breakwater structure. Instead, settled sand and cobbles on the breakwater may be manually removed with the use of hand tools to ensure that it is not damaged. Slope stabilization systems that aim to preserve channel integrity and ocean access is discussed further in section 3.

This layout will result in approximately 31,000 cubic yards of excavated material which will be distributed across approximately 11 acres to level areas of the surrounding debris, neighboring properties, and the lava land mass and accretion land to the east. Backfill on the lava land mass and accretion land will be in 1 to 2 foot thick layers and will maintain a consistent top elevation with slopes to match surrounding elevations (see **Figure 12**). A 50 foot buffer will be maintained along the ocean side of the backfill area to ensure no excavated material will be transported into the ocean. Temporary paths constructed from the backfill will also be implemented to facilitate access to the flattened areas. These paths will range from 100 to 340 feet in length and have a slope no greater than 10 percent.

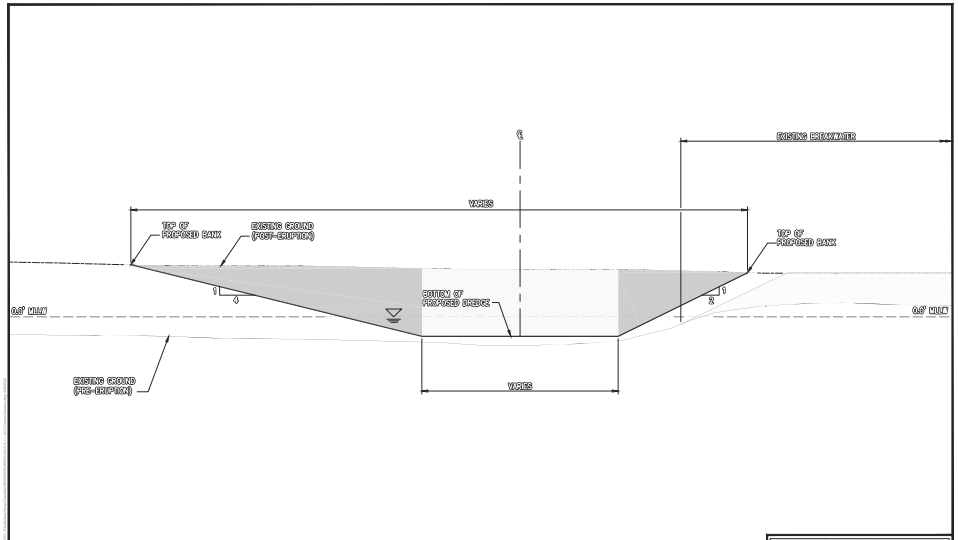
This alternative is estimated to have a probable construction cost of approximately $5.4 million. The opinion of probable cost is presented in Appendix A. Please note the probable construction cost estimate will be refined during the design phase of the recommended alternative.

DUDEK LIDAR Imagery, May 2022

N
Scale:
1" = 80'

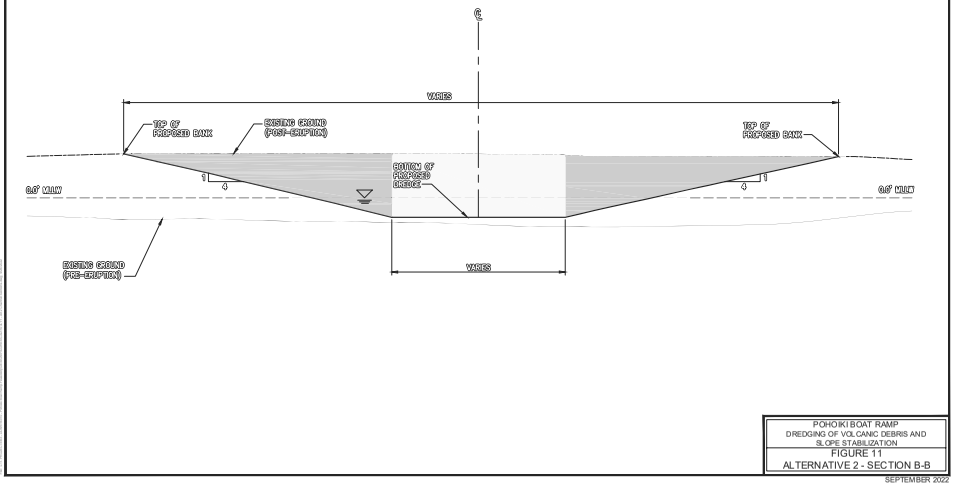
POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS AND
SLOPE STABILIZATION
FIGURE 9
ALTERNATIVE 2 - PLAN VIEW

SEPTEMBER 2022



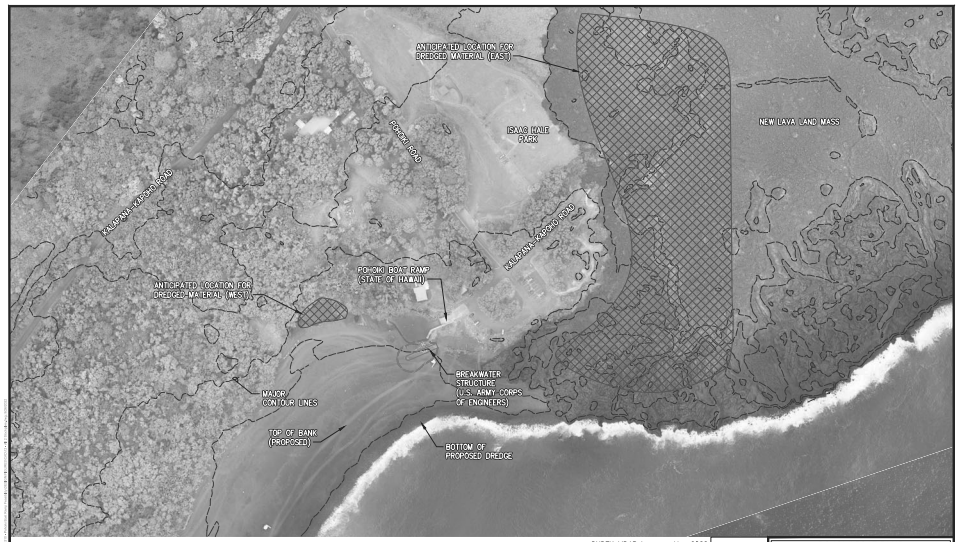
POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS AND
SLOPE STABILIZATION
FIGURE 10
ALTERNATIVE 2 - SECTION A-A

SEPTEMBER 2022



POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS AND SLOPE STABILIZATION
FIGURE 11
ALTERNATIVE 2 - SECTION B-B

SEPTEMBER 2022



DUDEK LIDAR Imagery, May 2022

N
Scale: 1" = 180'

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS AND SLOPE STABILIZATION
FIGURE 12
ALTERNATIVE 2 - STOCKPILE LOCATIONS

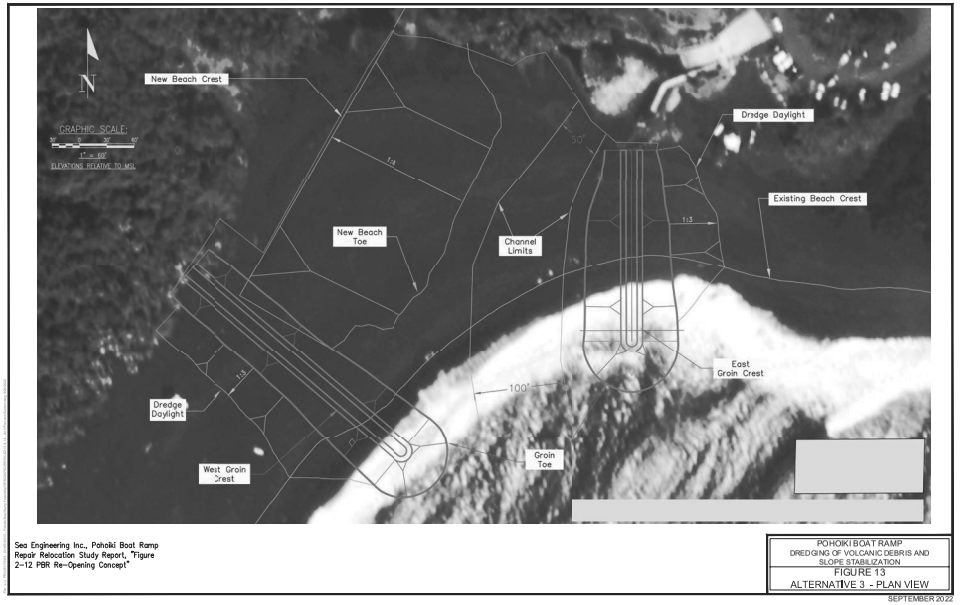
SEPTEMBER 2022

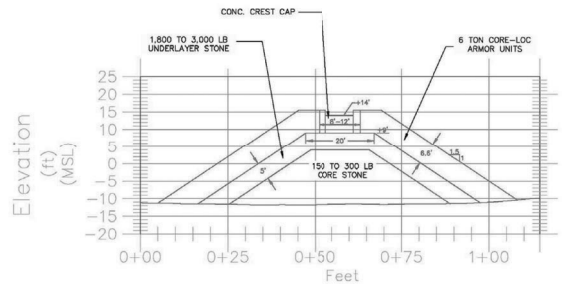
2.3 Alternative 3 – Channel and Jetties

Alternative 3 consists of dredging and disposing of approximately 105,000 cubic yards of backfill to construct east and west jetties in addition to a channel. Excavation of debris between the jetties will provide access to the ramp on the former shoreline. The channel limits will have a depth of 6 feet and a width of 50 feet at the ramp, opening up to 100 feet at the seaward end. Debris would remain along the shoreline landward of the channel, with an 8H:1V beach face (see **Figure 13**). The east and west jetties will be 210 feet and 310 feet in length respectively and reinforced with Core-Loc armor and stone before being topped with a concrete crest cap (see **Figure 14**).

Excavated material will be distributed across approximately 20 acres to level areas of the new beach, neighboring properties, and the lava land mass and accretion land to the east. Backfill on the lava land mass and accretion land will be in 1 to 2 foot thick layers and will maintain a consistent top elevation with slopes to match surrounding elevations. A 50 foot buffer will be maintained along the ocean side of the lava rock backfill area to ensure no excavated material will be transported into the ocean. Temporary access paths will be constructed from excavated material to facilitate access to the backfill areas. These paths will range from 100 to 340 feet in length and have a slope no greater than 10 percent.

This alternative is estimated to have a probable construction cost of roughly $45.6 million. A breakdown of the approximate cost is presented in Appendix A. Please note the probable construction cost estimate will be refined during the design phase of the recommended alternative.





Sea Engineering Inc., Pohoiki Boat Ramp
Repair Relocation Study Report, "Figure 2-11
Typical Jetty Section"

POHOIKI BOAT RAMP
DREDGING OF VOLCANIC DEBRIS AND
SLOPE STABILIZATION
FIGURE 14
ALTERNATIVE 3 - TYPICAL JETTY SECTION

SEPTEMBER 2022

2.4 Alternatives Comparison

Table 3 – Alternatives Comparison

Alternative	Advantages	Disadvantages
1 – Narrow Channel	a. Lowest construction cost b. Shortest construction schedule c. Smallest dredged volume	a. Wave energy a threat to channel failure b. May be filled with new material in the shortest period of time c. Narrowest channel width d. Narrowest channel opening
2 – Wide Channel	a. Next lowest construction cost b. Next shortest construction schedule c. Widest channel width d. Widest channel opening	a. Wave energy a threat to channel failure b. May be filled with new material c. Medium dredged volume
3 – Channel and Jetties	a. Best alternative for keeping the boat ramp open for the longest period of time	a. Highest project cost (by far) b. Longest project schedule; will require additional permitting c. Largest dredged volume d. Most construction impacts

3 SIGNIFICANT FINDINGS

3.1 No Alternative Recommended

At this time, no alternative can be recommended with the available construction budget. Further coastal and geotechnical analysis revealed that the previously listed alternatives are not feasible due to environmental conditions or cost related obstacles.

3.2 Alternative 1 & Alternative 2

Both Alternatives 1 and 2 are deemed infeasible due to channel bank stabilization issues. Concerns were raised about the longevity of a newly dredged channel against the coastal conditions of Pohoiki Bay without slope stabilization. Possible solutions to fortify the channel slopes were explored but were discarded due to either technical or budget limitations. Additionally, the difficulty in modeling and predicting the extent of volcanic debris production and transport leaves the future of a dredged channel ambiguous.

Marine mattresses, rock-filled containers constructed of high-strength geogrid as shown in **Photo 14**, was an option considered as a possible bank stabilization technique. The USACE has published a Technical Note discussing how the product can be used on coastal projects (Uses for Marine Mattresses in Coastal Engineering, ERDC/CHL CHETN-III-72, February 2006). Through the guidelines provided in the technical note, it was determined that for this project's application, the marine mattresses would greatly exceed the typical maximum mattress length and weight becoming problematic to hoist and place without exceeding the geogrid strength. And given the significant prevailing wave action, maintaining mattress toe stability would be difficult. Furthermore, through discussions with the Triton Marine Mattress manufacturer, it was indicated that their product was not suitable for the project's intended use due to the high wave energy, material abrasion concerns, and anchoring issues.

In summary, given the relatively extreme wave conditions at the site, which greatly exceed recommended design conditions for the use of marine mattresses, and the thickness, length, and weight required for stability, marine mattresses are not considered feasible for use at or near the shoreline (beach/water interface).

Photo 14 – Marine Mattress Shore Protection, ERDC/CHL CHETN-III-72

Items such as concrete armor units may withstand the design wave height, however, like the marine mattress, placement of the units should extend to abut into a hard, non-erodable surface; otherwise, flanking erosion could quickly result failure of the structure. For this reason, units are typically used on self-standing structures, such as jetties (used in Alternative 3), and carry a significant construction cost. Placement only along the channel slopes and channel mouth also would not prevent sand infill, channel shoaling, and beach formation across the mouth of the channel, rendering the channel unusable.

The production and transport of more volcanic debris is difficult to model and predict. Consequently, the worst-case scenario must be taken into account, which is the continuous production and transport of new volcanic debris downstream. This leaves the idea of new volcanic debris filling up a newly dredged channel a possibility. The accretion land to the east is generally friable and is a protrusion in the coastline. The erosion and deposition of the accretion land may be the greatest during heavy wave events. Therefore, future deposition of volcanic debris within the dredged area may occur subsequent to the maintenance dredging.

3.3 Alternative 3 – Channel and Jetties

Alternative 3, although would be efficient in stabilizing the existing debris, had to be disregarded due to the high construction costs well above the approximate project construction budget. In general, and where possible, locating harbor facilities behind sandy shorelines is avoided due to the difficulty of preventing sand infill and shoaling of the entrance channel. Where harbors are located landward of a sandy shoreline, jetties (shore perpendicular structures) engineered for the site wave and coastal conditions are used to stabilize the channel sides and prevent sand infill.

Jetties come in different sizes, lengths, and construction materials depending on the site conditions. The bigger the design wave conditions, the bigger and more robust the jetties must be, particularly the jetty heads at the beach-water interface where direct wave attack occurs. As discussed previously, the project site is an open coastal area, exposed to significant prevailing wave energy as well as passing severe storms and hurricanes. Typically, prevailing tradewind wave heights at the shoreline are about 3 to 4 feet, and annual tradewind wave breaker heights are about 8 feet. The design storm breaking wave height for jetty structure design is estimated to be 15 feet, which is a relatively large design wave height. Construction of appropriately designed jetties would be an effective means of stabilizing and maintaining a newly dredged channel through the wide sand beach into the ramp. However, as outlined in the 2019 DLNR Division of Boating and Ocean Recreation Pohoiki Boat Ramp Repair Concept Screening Study, jetties would be long and large due to the wide beach and high design wave heights, and consequently, very expensive.

The construction of the two jetties vastly changes the scope of the project, and consequently may disqualify the project from falling under the U.S. Army Corps of Engineers Nationwide Permit (USACE NWP). An individual permit will need to be applied for, potentially increasing the overall project cost and schedule.

3.4 Opinion of Probable Construction Cost

The opinion of probable cost for all alternatives presented in this report are presented in Appendix A.

4 PERMITS AND APPROVALS

4.1 Environmental Review

A Draft Environmental Assessment (DEA) will be required in accordance with State Chapter 343 HRS guidelines. Possibly, a joint NEPA/HEPA document will be required for Federal (Department of the Army) permit processing. The environmental document will include historical/archaeological investigations, a Cultural Impact Assessment, terrestrial biological and botanical surveys, marine environment investigations, and a water quality assessment. Following coordination of the draft document for public and agency review, a Final EA will be prepared.

4.2 Permit Requirements

U.S. Army Corps of Engineers' (USACE) Regulatory Program Permit – The U.S. Army Corps. of Engineers will decide what Nationwide Permits (NWPs) apply to the project, such as NWP 35 (Maintenance Dredging of Existing Basins), NWP 13 (Bank Stabilization) or NWP 3 (Maintenance). Section 10 of the Rivers and Harbors Act of 1899, and Section 404 of the Clean Water Act permits be required from the U.S. Army Corps of Engineers. These permits require consultation/concurrence with the DLNR-SHPD (HPA Section 106), NOAA-NMFS (Essential Fish Habitat) and USF&WS (Endangered Species Act). The USACE Regulatory Program Permit also requires obtaining a Section 401 WQC from the State Department of Health and a CZM Consistency Review by the State of Planning.

Section 401 Water Quality Certification – A Clean Water Act Section 401 WQC permit from the State Department of Health would be needed if the project or activities are not covered by the

Blanket Section 401 WQC or cannot comply with the conditions of the Blanket Section 401 WQC.
NPDES Permit – A National Pollutant Discharge Elimination System (NPDES) permit from the State Department of Health is required when a construction work site exceeds 1 acre.

Coastal Zone Management (CZM) Consistency Review – A CZM review by the State Office of Planning, CZM Program, is required prior to issuance of a USACE Regulatory Program Permit.

Conservation District Use Permit (CDUP) – State Department of Land and Natural Resources, Office of Conservation and Coastal Land. DOBOR has indicated that a CDUP issued by the [cite agency as noted above] is not required.

State Historic Preservation Review – HRS Chapter 6E-8 (HAR 13-275) requires projects review by DNLR-SHPD for historic impacts, and mitigation if necessary.

County Special Management Area (SMA) and Shoreline Setback Variance (SSV) – Per Rule 9. Special Management Area for Hawaii County, Lands or Facilities under the jurisdiction of DOBOR are not considered as development. Unencumbered lands may be transferred to DOBOR's jurisdiction.

5 REFERENCES

Geolabs, Inc., Geotechnical Engineering Exploration, Pohoiki Boat Ramp Maintenance Dredging, Puna District, Island of Hawaii, W.O. 8271-100. July 2022.

Sea Engineering, Inc., General Coastal Design Considerations. July 2022.

Sea Engineering, Inc., Pohoiki Boat Ramp Repair/Improvement and Relocation Concept Screening Study, Puna District, Island of Hawaii. June 2019.

Uses for Marine Mattresses in Coastal Engineering, ERDC/CHL CHETN-III-72, February 2006.

APPENDIX A
OPINION OF PROBABLE COST

Alternative 1 - Narrow Channel					
ITEM NO.	ESTIMATED QUANTITY	DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	L.S.	Mobilization/Demobilization, including setup and restoration of staging and work areas	LS	$ LS	$ 188,800.00
2	L.S.	Temporary Erosion Control Measures, including installation, maintenance, removal of temporary BMPs and construction access	LS	$ LS	$ 549,000.00
3	22,292	Local Stockpile Area Management, including placement, erosion control measures, and construction access (Assume no major voids that stop work)	CY	$ 19.00	$ 423,548.00
4	4,612	Dredging, Land Disposal	CY	$ 119.00	$ 548,828.00
5	17,680	Excavation, Local Disposal	CY	$ 92.00	$ 1,626,560.00
				SUBTOTAL	$ 3,336,736.00
				CONTIGENCY (20%)	$ 667,347.20
				TOTAL	$ 4,004,083.20
				SAY	**$ 4,100,000.00**

Alternative 2 - Wide Channel

ITEM NO.	ESTIMATED QUANTITY	DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	L.S.	Mobilization/Demobilization, including setup and restoration of staging and work areas	LS	$ LS	$ 252,600.00
2	L.S.	Temporary Erosion Control Measures, including installation, maintenance, removal of temporary BMPs and construction access	LS	$ LS	$ 549,000.00
3	30,557	Local Stockpile Area Management, including placement, erosion control measures, and construction access (Assume no major voids that stop work)	CY	$ 19.00	$ 580,587.91
4	9,970	Dredging, Land Disposal	CY	$ 119.00	$ 1,186,433.86
5	20,587	Excavation, Local Disposal	CY	$ 92.00	$ 1,894,024.81
				SUBTOTAL	$ 4,462,646.59
				CONTIGENCY (20%)	$ 892,529.32
				TOTAL	$ 5,355,175.90
				SAY	**$ 5,400,000.00**

Alternative 3 - Channel and Jetties

ITEM NO.	ESTIMATED QUANTITY	DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	L.S.	Site Preperation	LS	$ LS	$ 3,846,000.00
2	L.S.	Environmental Controls	LS	$ LS	$ 1,250,000.00
3		Core-Loc Armor Units			
	20	Formwork	EA	$ 25,000.00	$ 500,000.00
	3,800	Concrete	CY	$ 375.00	$ 1,425,000.00
	1,130	Casting	EA	$ 5,100.00	$ 5,763,000.00
	1,130	Transport	EA	$ 100.00	$ 113,000.00
4		East Jetty			
	3,740	Core Stone	TON	$ 55.00	$ 205,700.00
	3,340	Underlayer Stone	TON	$ 85.00	$ 283,900.00
	450	Concrete	CY	$ 375.00	$ 168,750.00
	210	Placement	FT	$ 35,860.00	$ 7,530,600.00
5		West Jetty			
	2,830	Core Stone	TON	$ 55.00	$ 155,650.00
	3,660	Underlayer Stone	TON	$ 85.00	$ 311,100.00
	650	Concrete	CY	$ 375.00	$ 243,750.00
	310	Placement	FT	$ 26,700.00	$ 8,277,000.00
6	105,000	Dredge and Dispose	CY	$ 75.00	$ 7,875,000.00
				SUBTOTAL	$ 37,948,450.00
				CONTIGENCY (20%)	$ 7,589,690.00
				TOTAL	$ 45,538,140.00
				SAY	**$ 45,600,000.00**

*Alternative 3 cost estimate obtained from 2019 Pohoiki Boat Ramp Repair/Improvement and Relocation Study by Sea Engineering, Inc.

PRE-DESIGN LETTER REPORT

ADDENDUM 1

Pohoiki Boat Ramp
Dredging of Volcanic Debris and Slope Stabilization Addendum 1

Purpose

A draft of the Pre-Design Report was submitted to the Department of Land and Natural Resources (DLNR) Division of Boating and Ocean Recreation (DOBOR) on July 22, 2022 for review and comment. None of the evaluated alternatives could be confidently recommended considering the dynamic and energetic wave characteristics of the area. Two possible alternatives that would dredge a channel through the debris to restore ocean access would require slope stabilization due to the high risk of slope failure; loose material that collapses into the channel would once again restrict ocean access. The third alternative stabilizes the debris through the construction of jetties, which would have considerable environmental impacts, be costly, and involve a lengthy project schedule. Due to the obvious need and local significance of the Pohoiki Boat Ramp, the initial determination of “no recommended alternative” was subject to further evaluation. Project design and development was paused to allow for a discussion of the alternatives and findings, and to obtain feedback from the local Iawai‘a, residents of the area, and other stakeholders. This addendum incorporates public input gathered from the community meeting held on August 18, 2022 at the Pāhoa Community Center including the community’s concerns and a new proposed alternative to re-open Pohoiki Boat Ramp.

Community Meeting

Over 120 participants consisting of Iawai‘a, local residents, and state officials attended the community meeting, which provided the opportunity to ask questions and provide comments. The community remains adamant about the urgent need to re-open the Pohoiki Boat Ramp. The main concerns from the public are the project duration, the proposed alternatives, other alternative ideas, the required permitting, and future sediment production and accumulation. The idea of dredging the entire bay was mentioned by those at the community meeting and is examined further in this addendum as Alternative 4. The main sentiment expressed during the meeting was that the boat ramp needs to reopen as soon as possible to allow fishermen to return to their livelihoods.

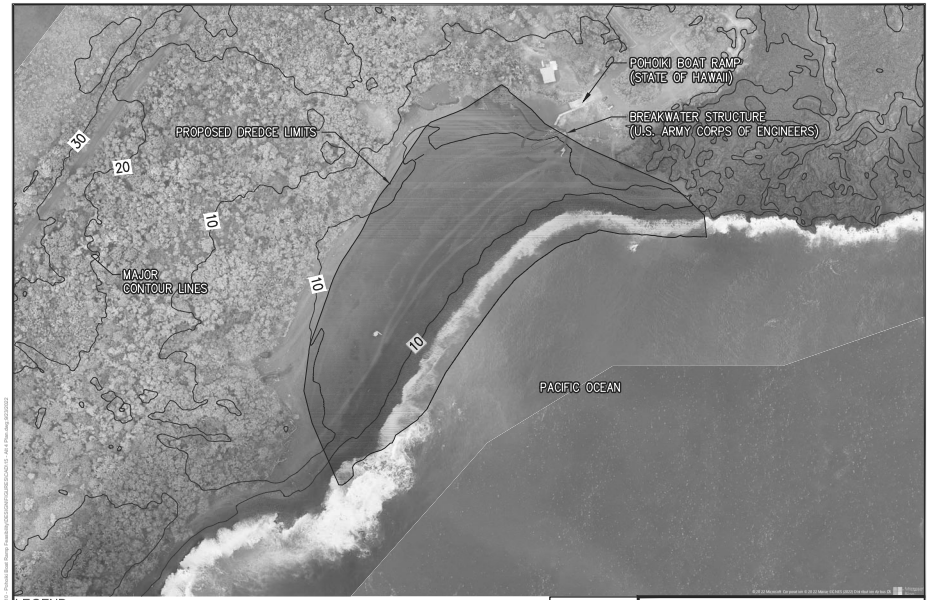
Alternative 4 – Dredge Entire Bay

Alternative 4 proposes to dredge the vast majority of the volcanic debris accumulated within Pohoiki Bay to reinstate ocean access from Pohoiki Boat Ramp. This would remove approximately 250,000 cubic yards of debris over an area of 11 acres (see **Figure 1A**). While the intent of this alternative is to dredge to the pre-eruption ocean floor within the bay, residual material may remain. Redistribution of this residual debris toward the west/south-west area of the boat ramp may occur as natural wave action reinforces a beach shape that matches the incoming wave crest lines. Bottom elevations in the bay will be similar to pre-eruption conditions and will range from approximately -3 feet MLLW inland to -14 feet MLLW towards the Pacific Ocean. The existing debris would be removed through on-land excavation and dragline dredging before being transported via trucks to nearby stockpiling locations (see **Figure 2A**). Heavy equipment utilized for the project will avoid traveling and working on or near the existing breakwater structure. Settled sand and cobbles on the breakwater may be manually removed with the use of hand tools to ensure that the breakwater structure is not damaged.

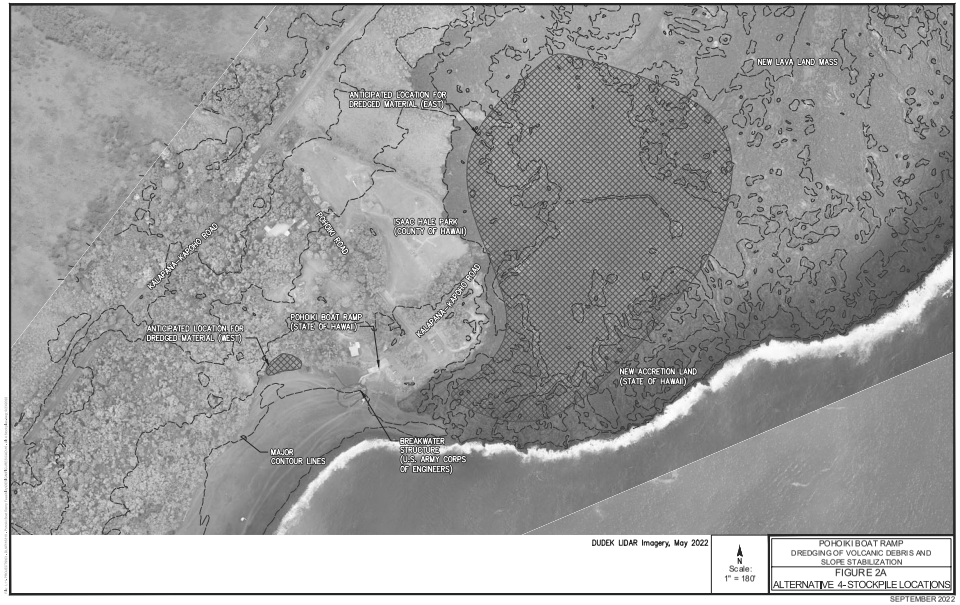
The excavation and dredging of the material will start inland from the mauka side of Pohoiki Bay and uniformly progress towards its makai side. The United States Army Corps of Engineers (USACE) currently has jurisdiction over the bay's shoreline. As construction approaches the limits of this shoreline jurisdiction, coordination with the USACE will be conducted before dredging the shoreline and completing the dredging of Pohoiki Bay.

Excavated material will be distributed across approximately 29 acres to level areas of the surrounding debris, neighboring properties, and the nearby lava land mass (consisting of a new lava layer on existing land) and the accretion land (consisting of entirely new land created by the lava flow) to the east of the boat ramp. Backfill on the lava land mass and accretion land will be in 1 to 2 foot thick layers and will maintain a consistent top elevation with slopes to match surrounding elevations. A 50 foot buffer will be maintained along the makai side of the backfill area to ensure excavated material will not erode into the ocean. Temporary paths constructed from the backfill will facilitate access to the flattened areas. These paths will range from 200 to 250 feet in length and have a slope no greater than 10 percent.

Alternative 4 is estimated to have a probable construction cost of $39.5 million. The opinion of probable cost is presented in Appendix AA. Please note the probable construction cost estimate will be refined during the design phase of the recommended alternative.



SEPTEMBER 2022



Permitting

A major influence on the project schedule is obtaining the necessary permits at the federal, state, and county levels as well as coordinating with any other regulatory agencies to do work within the bay. The completion of permit processes takes time and work cannot start prior to the required approvals. The permits required for Alternatives 1, 2, and 3 are also applicable for Alternative 4. These permits include but are not limited to a U.S. Army Corps of Engineers' (USACE) Regulatory Program Permit, Section 401 Water Quality Certification, National Pollutant Discharge Elimination System (NPDES) Permit, Coastal Zone Management (CZM) Consistency Review, Conservation District Use Permit (CDUP), State Historic Preservation Review, and County Special Management Area (SMA) and Shoreline Setback Variance (SSV). A Nationwide Permit (NWP) or Individual Permit are required USACE Regulatory Program Permits for working in navigable waters of the United States. Coverage under a one of the existing NWP's would be determined by USACE based on project activity and anticipated impacts. Due to the requirements and qualifications of the NWP, coordination with the USACE will be required and phasing of construction activities may be necessary to expedite the process of obtaining the permit. If the project is unable to satisfy applicable terms and conditions of the NWP, then an Individual Permit must be applied for and obtained, which lengthens the project schedule.

Sediment Production and Accumulation

A large concern within the community is the rate of sediment accumulation in the bay once it is dredged and how often maintenance dredging will be necessary. The accretion land that formed during the 2018 eruption is subject to erosion from the strong wind and wave energy at Pohoiki. Based on input received by community members who frequent the Pohoiki Bay area – both land and sea – it appears the rate of erosion may have waned and is possibly negligible. Reported observations suggest that the erosion and transport of material to Pohoiki Bay have ceased or slowed significantly. These anecdotal reports rely on qualitative observations and should not be mistaken as technical data. It is logical to assume that erosion will continue over time and will continue to produce sand and cobble in varying sizes; however, this information can be obtained only through long-term erosion monitoring. Nonetheless, these observations provide useful insight and are valuable. Furthermore, while it is reasonable to assume the erosion material will be transported by typical trade wind swells, it is impossible to determine if the material would eventually make its way back into the bay as it did when the 2018 eruption occurred.

Numerical wave modeling conducted for this study indicates that the prevailing trade wind waves propagate to the west along the new accretion shoreline and bend to the north into the bay, transporting sediment and shaping the arcuate northeast-southwest trending beach. Beach ridges visible in aerial photographs show this progression of the beach as it widened seaward.

For a proposed dredging project that clears the bay of sediment, understanding if sand and cobble will continue to be generated by wave erosion of the new accretion shoreline and the rate sediment might fill in the bay and boat ramp would be beneficial. However, frequent and detailed surveys of the beach topography, the accretion shoreline topography, and the nearshore bathymetry would be needed to help understand the current sedimentation processes. Current information that may contribute to a better grasp on this sedimentation issue includes:

- Observations have indicated that growth or widening of the beach has slowed significantly. During the lava flow, over 400 feet of beach filled in the bay in less than a year. Between May 2019 and March 2022, the beach appeared to widen only about 40 feet. Some community members are reporting that the beach is no longer widening and that sediment accumulation is negligible.

- It is uncertain whether the recent slower accumulation rate is due to slowing erosion of the new accretion shoreline or whether the infilled bay has reached equilibrium and sediment is bypassing to the south or settling in deeper water. The beach at present extends nearly to the offshore edge of the rocky outcrops that previously served as the southwest boundary of the bay, possibly allowing sand to move further south, and depths seaward of the present beach location are greater, requiring proportionally more sediment to infill.

- It is unknown if erosion of the accretion shoreline is still occurring, generating new sand and cobble sediment. The geotechnical report prepared for this project (Geolabs, Inc.) indicates that the new accretion land from the recent flow is generally friable (erodible) and may provide material for deposition down current. Beach users and lifeguards have reported observing recent undermining and erosion of the accretion shoreline. It is also possible that the current erosion rate and sediment creation rate is insignificant.

- Even if the production rate of sediment from the new accretion land remains constant, the accumulation rates at Pohoiki may change once the bay is dredged. Recent reports of slow accumulation rates may not be applicable to a dredged out bay offering more sheltered and shallow waters for sediment to settle.

Given such unpredictability and no structures to regulate the production of sediment in the bay, it would be most advantageous to dredge out the maximum volume of debris possible. The benefit of Alternative 4 is to extend the time that the access between Pohoiki Boat Ramp and the ocean remains navigable. As stated before, the material was reported to erode off the accretion land face and potentially displaced by wave action. A coastal analysis of this area suggests that debris in the bay will eventually congregate and configure into a stable shoreline parallel to the shore's wave crests. By removing as much material as possible, there is a higher chance that this congregation of material produces a shoreline that will not block and restrict navigable access. Should sediment production on the shoreline or in the bay continue and grow, maintenance dredging will be necessary to preserve a connection to the ocean.

Revised Recommended Alternative

Based on feedback provided during the community meeting, Alternative 4 (dredging of the entire Pohoiki Bay to restore pre-eruption navigational access), is the recommended alternative. Although Alternative 4 involves a longer construction schedule than Alternatives 1 and 2, it has a higher potential for extending the period of navigable access. Alternative 4 does not require slope stabilization since this alternative does not create a channel through loose material which is the similar characteristic of Alternatives 1 and 2. In other words, channel failure that would result in the ceasing of ocean access, will not be a threat with Alternative 4. Additionally, Alternative 4 removes significantly more debris than all the other alternatives. Upon completion of Alternative 4, less material would remain within Pohoiki Bay, which reduces the likelihood of material being redistributed to again impede access to the ocean from Pohoiki Boat Ramp. Alternative 4, however, does not propose any new built structures, such as the jetties in

Alternative 3, to protect against new eroded material that may settle in the bay. Consequently, future maintenance dredging of this new debris is likely to be needed. Even though Alternatives 3 and 4 have similar construction costs, Alternative 4 will not require the additional permitting of Alternative 3 which helps expedite the project schedule and the reopening of Pohoiki Boat Ramp.

Alternative 4 will restore the bay to a similar shape and depth of the pre-eruption conditions, such that the wave environment, including wave height and runup would also be similar to the pre-eruption conditions. The protruding accretion shoreline, however, may provide some additional protection to the interior of the bay compared to the previously occurring conditions. In addition, sand below a depth of -14 feet MLLW will not be dredged which may help dissipate wave energy. For all of these reasons, the proposed dredging alternative is not expected to result in increased flooding or wave energy at the shoreline compared to pre-eruption conditions. The disadvantage to Alternative 4 is the high construction cost.

If there are insufficient funds to fully dredge Pohoiki Bay, then Alternative 4 shall be modified to dredge the most area that funds will allow. This will restore navigable access to Pohoiki Bay and maximize the time that Pohoiki Boat Ramp stays open. The anticipated impact and dredged volume are expected to fall between that of Alternatives 2 and 4.

It is also recommended that a short, grouted rock wall (reusing onsite stones and rocks) or fence be constructed to better delineate a clear walking path to the shoreline and beach area to the west of the boat ramp. Consultation with the state and county agencies is expected to be required to ensure compliance with applicable rules pertaining to shoreline areas. An easement may be necessary to facilitate construction of improvements intended to improve pedestrian access. This recommendation applies to all alternatives.

Due to various uncertainties, it is difficult to predict or quantify what the actual sediment accumulation rate and subsequent maintenance dredging intervals might be needed once the bay and ramp are dredged. To establish starting values, the following are recommended:

- An initial maintenance dredging interval of 5 years. This is based on the assumption that the potential future sediment accumulation rate is 5 percent of the dredged quantity. This equates to approximately 5,500 cubic yards of new sediment accumulating in Pohoiki Bay per year.

- Annual bathymetry surveys be conducted of the bay to monitor elevation changes of the bay floor along with visual inspections of the bay occurring regularly between surveys.

- Adjustments to the maintenance dredge interval should be made as necessary to reflect a better understanding of the actual sediment accumulation rate within the bay under post-construction conditions.

Revised Alternatives Comparison

Table 1A – Revised Alternatives Comparison

Alternative	Advantages	Disadvantages
1 – Narrow Channel	a. Lowest construction cost b. Shortest construction schedule c. Smallest dredged volume	a. Wave energy a threat to channel failure b. May be filled with new material in the shortest period of time c. Narrowest channel width d. Narrowest channel opening
2 – Wide Channel	a. Next lowest construction cost b. Next shortest construction schedule c. Widest channel width d. Widest channel opening	a. Wave energy a threat to channel failure b. May be filled with new material c. Medium dredged volume
3 – Channel and Jetties	a. Best alternative for keeping the boat ramp open for the longest period of time	a. Highest project cost b. Longest project schedule; will require additional permitting c. Large dredged volume d. Most construction impacts
4 – Dredge Entire Bay	a. Does not require slope stabilization b. Next best alternative for keeping the boat ramp open c. Most closely restores the bay back to pre-eruption conditions	a. High construction cost b. Long construction schedule c. May be filled with new material d. Largest dredged volume

APPENDIX AA

OPINION OF PROBABLE COST

Alternative 4 - Dredge Entire Bay					
ITEM NO.	ESTIMATED QUANTITY	DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	L.S.	Mobilization/Demobilization, including setup and restoration of staging and work areas	LS	$ LS	$ 1,862,800.00
2	L.S.	Temporary Erosion Control Measures, including installation, maintenance, removal of temporary BMPs and construction access	LS	$ LS	$ 645,000.00
3	246,840	Local Stockpile Area Management, including placement and construcion access (Assume no major voids that stop work)	CY	$ 19.00	$ 4,689,960.00
4	109,415	Dredging, Land Disposal, including hauling	CY	$ 119.00	$ 13,020,385.00
5	137,425	Excavation, Local Disposal, including hauling	CY	$ 92.00	$ 12,643,100.00
6	166	Grouted Stone Wall	LF	$ 300.00	$ 49,800.00
				SUBTOTAL	$ 32,911,045.00
				CONTIGENCY (20%)	$ 6,582,209.00
				TOTAL	$ 39,493,254.00
				SAY	**$ 39,500,000.00**

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APPENDIX H

Consultation and Comments

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From: Seto, Joanna L
To: Claire Oshiro; McCall, Finn D
Cc: DOH.WWB
Subject: Re: Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris, Puna, Island of Hawaii
Date: Tuesday, January 10, 2023 4:26:27 PM
Attachments: image003.png
20230110_Letter-final.pdf

Aloha Claire and Finn,

In most cases, the Environmental Management Division branches will no longer provide individual comments to agencies or project owners to expedite the land use review and process.

Agencies, project owners, and their agents should apply Department of Health "Standard Comments" regarding land use to their standard project comments in their submittal. Standard comments can be found on the Land Use Planning Review section of the Department of Health website: https://health.hawaii.gov/epo/landuse/. Contact information for each Branch/Office is available on that website.

Note: Agencies and project owners are responsible for adhering to all applicable standard comments and obtaining proper and necessary permits before the commencement of any work.

General summary comments have been included for your convenience. However, these comments are not all-inclusive and do not substitute for review of and compliance with all applicable standard comments for the various DOH individual programs.

Clean Air Branch

1. All project activities shall comply with the Hawaii Administrative Rules (HAR), Chapters 11-59 and 11-60.1.
2. Control of Fugitive Dust: You must reasonably control the generation of all airborne, visible fugitive dust and comply with the fugitive dust provisions of HAR §11-60.1-33. Note that activities that occur near existing residences, businesses, public areas, and major thoroughfares exacerbate potential dust concerns. It is recommended that a dust control management plan be developed which identifies and mitigates all activities that may generate airborne and visible fugitive dust and that buffer zones be established wherever possible.
3. Standard comments for the Clean Air Branch are at: https://health.hawaii.gov/epo/landuse/

Clean Water Branch

1. All project activities shall comply with the HAR, Chapters 11-53, 11-54, and 11-55.
   The following Clean Water Branch website contains information for agencies and/or project owners who are seeking comments regarding environmental compliance for their projects with HAR, Chapters 11-53, 11-54, and 11-55: https://health.hawaii.gov/cwb/clean-water-branch-home-page/cwb-standard-comments/.

Hazard Evaluation & Emergency Response Office

1. A Phase I Environmental Site Assessment (ESA) and Phase II Site Investigation should be conducted for projects wherever current or former activities on site may have resulted in releases of hazardous substances, including oil or chemicals. Areas of concern include current and former industrial areas, harbors, airports, and formerly and currently zoned agricultural lands used for growing sugar, pineapple or other agricultural products.
2. Standard comments for the Hazard Evaluation & Emergency Response Office are at: https://health.hawaii.gov/epo/landuse/.

Indoor and Radiological Health Branch

1. Project activities shall comply with HAR Chapters 11-39, 11-45, 11-46, 11-501, 11-502, 11-503, 11-504.
2. Construction/Demolition Involving Asbestos: If the proposed project includes renovation/demolition activities that may involve asbestos, the applicant should contact the Asbestos and Lead Section of the Branch at https://health.hawaii.gov/irhb/asbestos/.

Safe Drinking Water Branch

1. Agencies and/or project owners are responsible for ensuring environmental compliance for their projects in the areas of: 1) Public Water Systems; 2) Underground Injection Control; and 3) Groundwater and Source Water Protection in accordance with HAR Chapters 11-19, 11-20, 11-21, 11-23, 11-23A, and 11-25. They may be responsible for fulfilling additional requirements related the Safe Drinking Water program: https://health.hawaii.gov/sdwb/.
2. Standard comments for the Safe Drinking Water Branch can be found at: https://health.hawaii.gov/epo/landuse/.

Solid & Hazardous Waste Branch

1. Hazardous Waste Program - The state regulations for hazardous waste and used oil are in HAR Chapters 11-260.1 to 11-279.1. These rules apply to the identification, handling, transportation, storage, and disposal of regulated hazardous waste and used oil.
2. Solid Waste Programs - The laws and regulations are contained in HRS Chapters 339D, 342G, 342H and 342I, and HAR Chapters 11-58.1, and 11-282. Generators and handlers of solid waste shall ensure proper recycling or disposal at DOH-permitted solid waste management facilities. If possible, waste prevention, reuse and recycling are preferred options over disposal. The Office of Solid Waste Management also oversees the electronic device recycling and recovery law, the glass advanced disposal fee program, and the deposit beverage container program.
3. Underground Storage Tank Program – The state regulations for underground storage tanks are in HAR Chapter 11-280.1. These rules apply to the design, operation, closure, and release response requirements for underground storage tank systems, including unknown underground tanks identified during construction.
4. Standard comments for the Solid & Hazardous Waste Branch can be found at: https://health.hawaii.gov/epo/landuse/.

Wastewater Branch

For comments, please email the Wastewater Branch at doh.wwb@doh.hawaii.gov.

Sanitation / Local DOH Comments:

1. Noise may be generated during demolition and/or construction. The applicable maximum permissible sound levels, as stated in Title 11, HAR, Chapter 11-46, "Community Noise Control," shall not be exceeded unless a noise permit is obtained from the Department of Health.

2. According to HAR §11-26-35, No person, firm, or corporation shall demolish or clear any structure, place, or vacant lot without first ascertaining the presence or absence of rodents that may endanger public health by dispersal from such premises. Should any such inspection reveal the presence of rodents, the rodents shall be eradicated before demolishing or clearing the structure, site, or vacant lot. A demolition or land clearing permit is required prior to demolition or clearing.

Other

1. CDC - Healthy Places - Healthy Community Design Checklist Toolkit recommends that state and county planning departments, developers, planners, engineers, and other interested parties apply these principles when planning or reviewing new developments or redevelopment projects.

Mahalo!
Joanna

DOH Environmental Management Division Chief
808-586-4305 (direct work)
808-292-8408 (cell)

From: Claire Oshiro
Sent: Tuesday, January 10, 2023 4:15 PM
Subject: [EXTERNAL] Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris, Puna, Island of Hawaii

Aloha:

The attached letter contains information about a proposed project that reestablishes pre-eruption navigational access to the Pacific Ocean and returns the now-inoperable Pohoiki Boat Ramp facility in Puna on the Island of Hawaii to productive use. The project is proposed by the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DLNR - DOBOR), which owns and maintains the Pohoiki Boat Ramp facility.

Please do not hesitate to share the letter with other individuals or parties. We would greatly appreciate written comments by January 31, 2023. If you intend to provide comments but require more time, please do not hesitate to contact me at 808-596-7790/claire@tlcghawaii.com.

Please send comments to:

Finn McCall, Project Manager
DLNR - DOBOR
4 Sand Island Access Road
Honolulu, HI 96819
finn.d.mccall@hawaii.gov

And please provide a copy to:
Claire Oshiro, Environmental Planner
The Limtiaco Consulting Group
1622 Kanakanui Street
Honolulu, HI 96817
claire@tlcghawaii.com

Thank you.

Claire Oshiro
Direct: (808) 687-8750
Office: (808) 596-7790

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

April 10, 2023

SENT VIA EMAIL ONLY: <joanna.seto@doh.hawaii.gov>
Ms. Joanna Seto, P.E., Chief
Department of Health - Environmental Management Division

Subject: Response to Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Island of Hawai'i

Dear Chief Seto, P.E.:

Thank you for the email correspondence on January 10, 2023. The general summary comments you provided are appreciated and we acknowledge that the Environmental Management Division branches have standard comments available to agencies or project owners to expedite the land use review and process. We will refer to the standard comments and regulatory guidance in the Administrative Rules of the Department of Health as the project proceeds.

Thank you for your participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Claire Oshiro
Environmental Planner

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

Mitchell D. Roth
Mayor

Lee E. Lord
Managing Director

County of Hawai'i
HAWAI'I FIRE DEPARTMENT
25 Aupuni Street • Suite 2501 • Hilo, Hawai'i 96720
(808) 932-2900 • Fax (808) 932-2928

Kazuo S. K. L. Todd
Fire Chief

Eric H. Moller
Deputy Fire Chief

January 11, 2023

Finn McCall, Project Manager
DLNR - DOBOR
4 Sand Island Access Road
Honolulu, HI 96819

Dear Mr. McCall:

SUBJECT: Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Island of Hawai'i

We are in receipt of your letter dated January 10, 2023 in regards to a Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area.

The Hawai'i Fire Department has no comments.

If you should have any questions, please feel free to contact my office at (808) 932-2911.

Mahalo,

KAZUO S. K. L. TODD
Fire Chief

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

April 10, 2023

SENT VIA EMAIL ONLY: <fire@hawaiicounty.gov>
Fire Chief Kazuo S. K. L. Todd
County of Hawai'i Fire Department

Subject: Response to Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Island of Hawai'i

Dear Fire Chief Todd:

Thank you for your letter dated January 10, 2023. We acknowledge that the County of Hawai'i Fire Department has no comments.

Thank you for your participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Claire Oshiro
Environmental Planner

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

Mitchell D. Roth
Mayor

Andrew S. Burian
Acting Police Chief

County of Hawai`i
POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawai`i 96720-3998
(808) 935-3311 • Fax (808) 961-8865

January 13, 2023

Mr. Finn McCall, Project Manager
DLNR – DOBOR
4 Sand Island Access Road
Honolulu, HI 96819
finn.d.mccall@hawaii.gov

Dear Mr. McCall:

SUBJECT: PRE-ASSESSMENT CONSULTATION FOR AN ENVIRONMENTAL ASSESSMENT FOR THE POHOIKI BOAT RAMP DREDGING OF VOLCANIC DEBRIS IN THE POHOIKI BAY AREA, PUNA DISTRICT, ISLAND OF HAWAII

This is in response to an email dated January 10, 2023, requesting input on a pre-assessment consultation for an environmental assessment for the Pohoiki Boat Ramp on the Island of Hawaii.

Staff, upon reviewing the provided documents, does not anticipate any significant impact to traffic and/or public safety concerns.

Thank you for allowing us the opportunity to comment.

If you have any questions, please contact Captain Scott Amaral, Puna Patrol, at 965-2716 or via email at scott.amaral@hawaiicounty.gov.

Sincerely,

KENNETH A. K. QUIOCHO
ASSISTANT POLICE CHIEF
AREA I OPERATIONS

SA:lli/23HQ0047

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

April 10, 2023

SENT VIA EMAIL ONLY: <copsysop@hawaiicounty.gov>
Assistant Police Chief Kenneth A. K. Quiocho
County of Hawai'i Police Department

Subject: Response to Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Island of Hawai'i

Dear Assistant Chief Quiocho:

Thank you for your letter dated January 13, 2023. We acknowledge that the County of Hawai'i Police Department does not anticipate any significant impact to traffic and/or public safety concerns.

Thank you for your participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Claire Oshiro
Environmental Planner

c: Captain Scott Amaral, Puna Patrol (scott.amaral@hawaiicounty.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAI'I
345 KEKŪANAŌ'A STREET, SUITE 20 • HILO, HAWAI'I 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

January 25, 2023

Mr. Finn McCall
State of Hawai'i, DLNR
DOBOR
4 Sand Island Access Road
Honolulu, HI 96819

Dear Mr. McCall:

Subject: **Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp, Dredging of Volcanic Debris in the Pohoiki Bay Area Puna District, Island of Hawai'i**

We have reviewed your Pre-Environmental Assessment consultation letter for the subject project and have no comments to offer.

Should there be any questions, please contact Mr. Ryan Quitoriano of our Water Resources and Planning Branch at (808) 961-8070, extension 256.

Sincerely yours,

Keith K. Okamoto, P.E.
Manager-Chief Engineer

RQ:dfg

copy – Ms. Claire Oshiro, The Limtiaco Consulting Group

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

April 10, 2023

SENT VIA EMAIL ONLY: <dws@hawaiidws.org>
Manager-Chief Engineer Keith K. Okamoto, P.E.
County of Hawai'i
Department of Water Supply

Subject: Response to Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Island of Hawai'i

Dear Manager-Chief Engineer Okamoto, P.E.,

Thank you for your letter dated January 25, 2023. We acknowledge that the County of Hawai'i Department of Water Supply provded no comments.

Thank you for your participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Claire Oshiro
Environmental Planner

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

STATE OF HAWAI'I
OFFICE OF PLANNING
& SUSTAINABLE DEVELOPMENT

JOSH GREEN, M.D.
GOVERNOR

SCOTT J. GLENN
DIRECTOR

235 South Beretania Street, 6th Floor, Honolulu, Hawai'i 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawai'i 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: https://planning.hawaii.gov/

Coastal Zone Management Program

Environmental Review Program

Land Use Commission

Land Use Division

Special Plans Branch

State Transit-Oriented Development

Statewide Geographic Information System

Statewide Sustainability Branch

DTS 202301111627NA

January 30, 2023

To: Dawn N. S. Chang, Chairperson
Department of Land and Natural Resources (DLNR)

From: Scott J. Glenn, Director
Office of Planning and Sustainable Development

Attention: Finn McCall, Project Manager
DLNR – Division of Boating and Ocean Recreation (DOBOR)

Subject: Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Island of Hawai'i

Thank you for the opportunity to provide comments on the proposed Pohoiki Boat Ramp restoration project. The review material was received by our office via memo dated January 10, 2023.

It is our understanding that the proposed project reestablishes pre-eruption navigational access to the Pacific Ocean and returns the Pohoiki Boat Ramp facility to operational use. Because of the volcanic activity and lava flows that impacted the Puna community in 2018, much of the area is inaccessible and the boat harbor inoperable. Re-establishing access to the Puna coastline is a priority.

The proposed action will involve dredging the accumulated volcanic debris in Pohoiki Bay to restore the bay to a shape and depth that resembles pre-eruption conditions to the extent possible. The Draft Environmental Assessment (Draft EA) will evaluate dredging alternatives. Many may require slope stabilization to protect a re-opened channel from the seasonal ocean swells.

The Office of Planning and Sustainable Development (OPSD) has the following comments to offer:

1. Coastal Zone Management Act (CZMA), Federal Consistency
   We note that the proposed action involves actions involving submerged lands. The dredging of volcanic debris and restoration of the boat ramp may be subject to federal permits such as a Department of the Army Nationwide Permit. Please consult with the appropriate federal authorities, such as the U.S. Army Corps of Engineers, on applicable federal approvals and authorization. If it is deemed that federal permits are needed, then this project may be subject to CZMA federal consistency.

   OPSD is the lead state agency with the authority to conduct CZMA federal consistency reviews. We recommend that DLNR-DOBOR consult with our office on the applicability of CZMA federal consistency if federal permits are required.

2. Hawai'i Coastal Zone Management (CZM) Program
   The CZM area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" under Hawai'i Revised Statutes (HRS) § 205A-1.

   Pursuant to HRS § 205A-4, in implementing the objectives of the CZM program, agencies shall consider ecological, cultural, historic, esthetic, recreational, scenic, open space values, coastal hazards, and economic development. As the proposed action is being proposed by DLNR-DOBOR, the Draft EA should include a discussion on the project's consistency with the policies of the Hawai'i CZM Program, HRS § 205A-2, as amended.

   Furthermore, the objectives and supporting policies of the Hawai'i CZM Program serve as the foundation of the enforceable policies of the State of Hawai'i, as listed in HRS § 205A-2. Disclosure of impacts on CZM objectives and supporting policies, as it relates to HRS Chapter 343 requirements, will aid the State in determining impacts to the resources of the coastal zone, and mitigation measures on lands involved for this proposed action.

3. Special Management Area (SMA) Use Permit / Shoreline Setback Variance (SSV)
   Pursuant to HRS § 171-6, as amended, SMA use permits are not required for planning, design, construction, operation, and maintenance of any lands or facilities under the jurisdiction of the DLNR-DOBAR. However, we recommend that your agency consult with the County of Hawai'i Planning Department as to whether there are shoreline setback requirements that are applicable for this proposed project. OPSD recommends that the Draft EA provide a certified shoreline for the Pohoiki boat ramp facility project site.

4. Climate Change Adaptation/Sea Level Rise (SLR)
   Based on the included maps from the review material the boat harbor and its support facilities may be vulnerable to SLR related natural hazards. Natural hazards associated with SLR that may impact Pohoiki Boat Harbor include storm surge, coastal erosion, intense wave action, high winds, and potentially hurricanes. These coastal areas threats may negatively affect the long-term viability of this facility. To assess the potential environmental impacts

and vulnerability of this facility, we suggest the Draft EA refer to the findings of the Hawai'i Sea Level Rise Vulnerability and Adaptation Report 2017, accepted by the Hawai'i Climate Change Mitigation and Adaptation Commission.

The Report, and Hawai'i Sea Level Rise Viewer at https://www.pacioos.hawaii.edu /shoreline/slr-hawaii/ identifies a 3.2-foot SLR exposure area across the main Hawaiian Islands, as a starting evaluation point. The Draft EA should provide a map of 3.2-foot SLR exposure area in relation to the project area, and consider site-specific mitigation measures, including setbacks from the shoreline or relocation options further inland, increasing the height of the support facilities to accommodate higher water levels, or various climate change adaptation strategies to respond to impacts of 3.2-foot SLR or greater.

If you have any questions, please contact Joshua Hekekia on Environmental Assessment concerns as they relate to this OPSD response letter at (808) 587-2845; Debra Mendes on CZMA federal consistency issues at (808) 587-2840; or Shichao Li at (808) 587-2841 on SMA Use/Shoreline Setback matters.

c: Claire Oshiro

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

April 10, 2023

SENT VIA EMAIL ONLY: <dbedt.director@hawaii.gov>
Director Scott J. Glenn
State of Hawaii Office of Planning and Sustainable Development

Subject: Response to Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Island of Hawai'i (Ref. DTS 202301111627NA)

Dear Director Glenn,

Thank you for your letter dated January 30, 2023 (Ref. DTS 202301111627NA). We acknowledge that your office is the lead state agency for Coastal Zone Management Act (CZMA) federal consistency reviews. The EA will include a discussion of the project's consistency with Hawai'i's CZM Program (Hawaii Revised Statutes §205A-1). Thank you for the information that Special Management Area use permits are not required for planning, design, construction, operation, and maintenance of any lands or facilities under the jurisdiction of DLNR-DOBOR pursuant to HRS §171-6, as amended. We appreciate the recommendations pertaining to shoreline setback variance requirements, certified shoreline, and climate change adaption/sea level rise.

Thank you for your participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Claire Oshiro
Environmental Planner

c: Joshua Hekekia, Coastal Zone Management Program (joshua.k.hekekia@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: lenacarver@comcast.net
To: Claire Oshiro; finn.d.mccall@hawaii.gov
Subject: Re: Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris, Puna, Island of Hawaii
Date: Tuesday, January 31, 2023 8:56:36 PM
Attachments: image003.png

Aloha Finn and Claire,

We, the Kuamo'o Ohana, who's property is next to the proposal project are concerned on the dredging of the whole Pohoiki Bay. There were 3 proposals shared at the meetings with your groups and the county. None of those proposals were to dredge the whole bay. The larger the dredging, was stated, the cost would mean more money. Now, we have money to dredge the whole bay instead of only the area where the boats were going to launch and return. Will there be money allocated for the maintenance of this dredge?
Our main concern is the dredging of the whole bay and impact on our property and those who own properties near the bay. We do not want our properties to be under water, so please make a wise decision. Possibly starting at the ramp area might give a better perspective of what might happen once everything is removed.
We would like a copy of the EA after completion, and to be copied on any intended projects concerning Pohoiki Bay.
By using the dredged sediment to build up Bay wetlands and owner's properties, will make them better able to protect shorelines from sea level rise. Also covering all unsanitary existing hot ponds (old and new) would remove the existing nudity and open sexual gatherings.

Mahalo,
Lena Carver and Kuamo'o Ohana

On 01/10/2023 4:48 PM Claire Oshiro <claire@tlcghawaii.com> wrote:

> Aloha:
>
> The attached letter contains information about a proposed project that reestablishes pre-eruption navigational access to the Pacific Ocean and returns the now-inoperable Pohoiki Boat Ramp facility in Puna on the Island of Hawaii to productive use. The project is proposed by the Department of Land and Natural

Resources, Division of Boating and Ocean Recreation (DLNR - DOBOR), which owns and maintains the Pohoiki Boat Ramp facility.

Please do not hesitate to share the letter with other individuals or parties. We would greatly appreciate written comments by January 31, 2023. If you intend to provide comments but require more time, please do not hesitate to contact me at 808-596-7790/claire@tlcghawaii.com.

Please send comments to:

Finn McCall, Project Manager

DLNR - DOBOR

4 Sand Island Access Road

Honolulu, HI 96819

finn.d.mccall@hawaii.gov

And please provide a copy to:

Claire Oshiro, Environmental Planner

The Limtiaco Consulting Group

1622 Kanakanui Street

Honolulu, HI 96817

claire@tlcghawaii.com

Thank you.

Claire Oshiro

Direct: (808) 687-8750

Office: (808) 596-7790

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

April 10, 2023

SENT VIA EMAIL ONLY: <lenacarver@comcast.net>
Ms. Lena Carver and the Kuamoʻo Ohana

Subject: Response to Pre-Assessment Consultation for an Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Island of Hawaiʻi

Dear Ms. Carver and the Kuamoʻo Ohana,

Thank you for your email correspondence on January 31, 2023. We acknowledge the stated concerns about dredging more area of Pohoiki Bay, project costs (including maintenance), and possible impacts to properties near the bay including your ohana's parcel. We acknowledge your request for a copy of the EA, which will be available as an electronic file. The comments in your correspondence appear to indicate support for placing dredged material along the shoreline (including on privately-owned properties) and to fill the hot ponds at the back of the newly formed beach.

Thank you for your participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Claire Oshiro
Environmental Planner

JOSH GREEN, M.D.
GOVERNOR | KE KIAʻĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIAʻĀINA

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

LAURA H.E. KAAKUA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

EDWARD R. UNDERWOOD
ADMINISTRATOR
BOATING AND OCEAN RECREATION

STATE OF HAWAIʻI | KA MOKUʻĀINA ʻO HAWAIʻI
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA ʻOIHANA KUMUWAIWAI ʻĀINA
DIVISION OF BOATING AND OCEAN RECREATION

4 SAND ISLAND ACCESS ROAD
HONOLULU, HAWAII 96819

Virtual Public Meeting

Draft Environmental Assessment for Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris

Project Proponent: Department of Land and Natural Resources
Division of Boating and Ocean Recreation

Wednesday, May 10, 2023
5:00 to 7:00 p.m.
Zoom Meeting Link: **https://bit.ly/3AY7R93**
Call In Number:
1-669-444-9171
Meeting ID: 868 4295 3471
Passcode: 755470

A Draft Environmental Assessment was published on April 23, 2023 and is available for public review and comment until May 23, 2023. The public libraries in Pahoa, Mountain View, Keaau, and Hilo have a hard copy of the report along with the Hawaii State library in Honolulu, Oahu. Interested parties are welcome to provide comments on the proposed project. The purpose of this meeting is to allow any interested parties an opportunity to provide written or oral comments on the Draft EA and proposed project.

Please use this link for online access to the Draft Environmental Assessment:

https://files.hawaii.gov/dbedt/erp/Doc_Library/2023-04-23-HA-DEA-Pohoiki-Boat- Ramp-Dredging-of-Volcanic-Debris.pdf

You are welcome to share this flyer about the virtual public meeting on May 10, 2023 that will be facilitated by The Limtiaco Consulting Group.

Point of Contact
Trevor Vagay: (808) 596-7790 or trevor@tlcghawaii.com

Pohoiki Boat Ramp Dredging of Volcanic Debris Draft Environmental Assessment

Virtual Public Meeting

State of Hawai'i

Department of Land and Natural Resources

Division of Boating and Ocean Recreation (DOBOR)

May 10, 2023 from 5:00 – 7:00 PM

VIRTUAL MEETING

- Meeting is being recorded
- Audience on mute
- Virtual meeting supports Draft Environmental Assessment (EA)
- Two methods of communication:
  - Type comments in chat (anytime during meeting)
  - 2 minutes per participant (after the presentation)
- Equal participation will be encouraged
- Comments and responses will be included in Final EA

PROJECT HISTORY

- The Limtiaco Consulting Group (TLCG) is DOBOR's consultant
- Design and coordination by TLCG since 2020
  - 11 meetings and discussions (in person and virtual) including Revitalize Puna workshops held at Pāhoa Gym
  - Public input gathered from community meeting held on August 18, 2022 at the Pāhoa Community Center (discussed design report and proposed alternatives)

CONSULTANTS

- Cultural Surveys Hawaii, Inc.
  - Cultural Impact Assessment
  - Archaeological Literature Review and Field Inspection
- AECOS, Inc. (natural resources)
- Geolabs, Inc. (geotechnical engineering)
- Sea Engineering, Inc. (wave modelling)

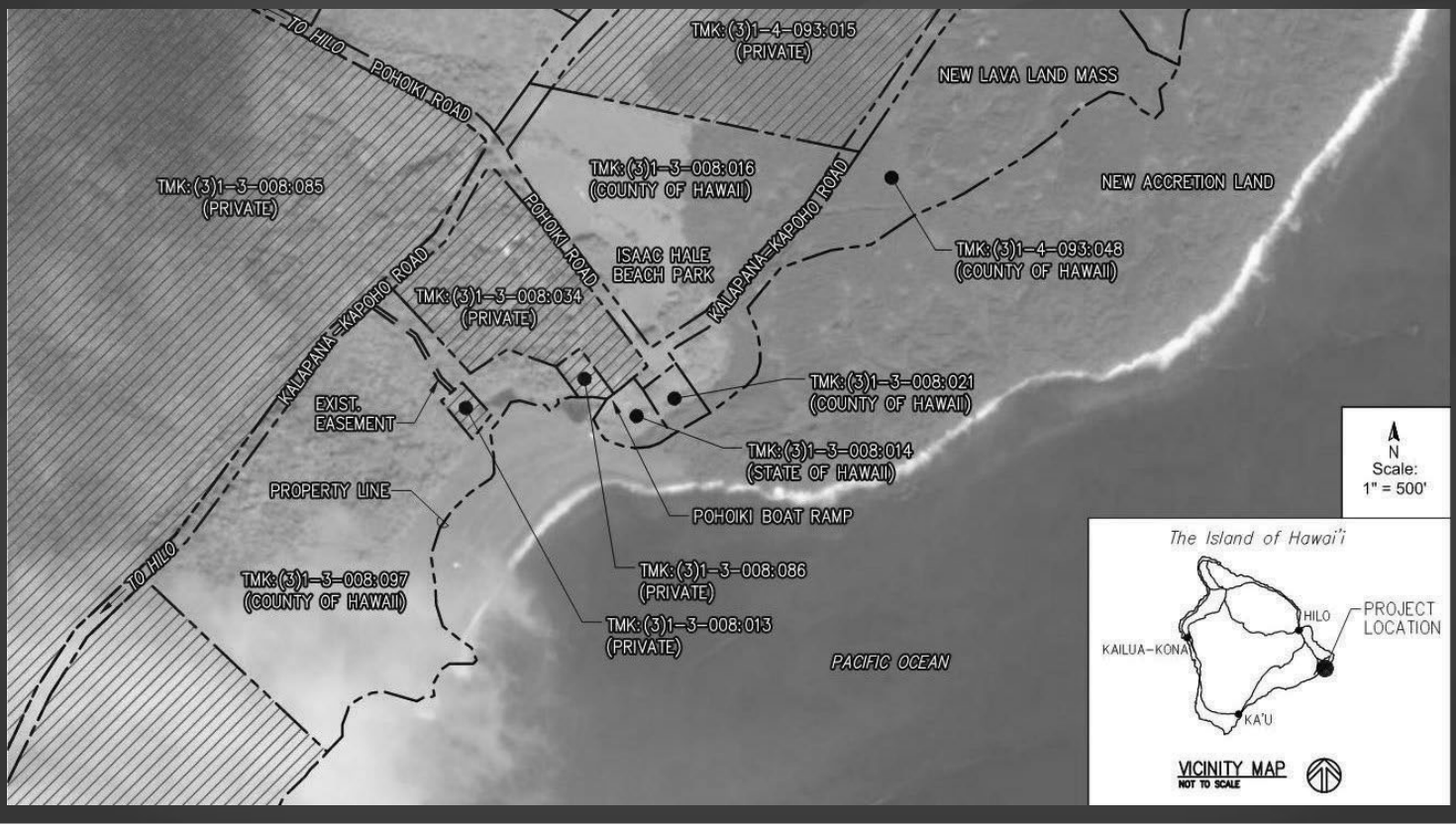
PRESENTATION OF DISCUSSION TOPICS

- Overview of Existing Conditions
- Need and Objectives
- Considered Alternatives
- Environmental Conditions
- Next Steps
- EA Questions/Comments

2018 ERUPTION CREATED TWO TYPES OF LAND

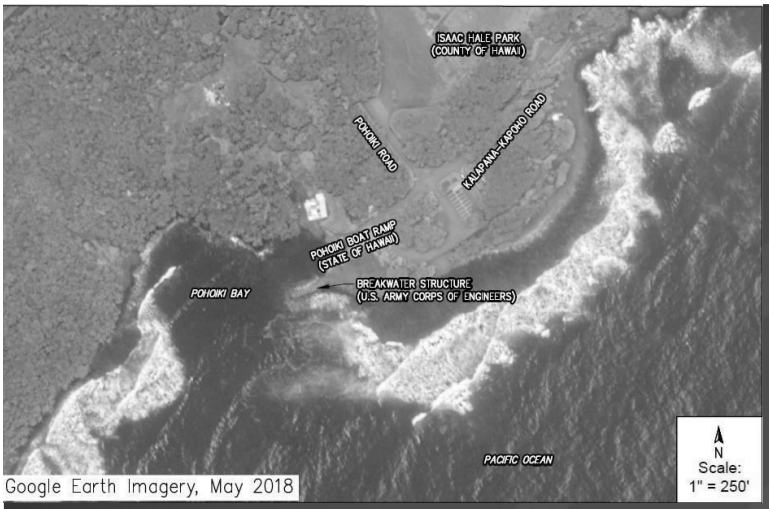
- New land mass consisting of new lava layer on existing land
- Accretion land consisting of entirely new land that extends into the Pacific Ocean

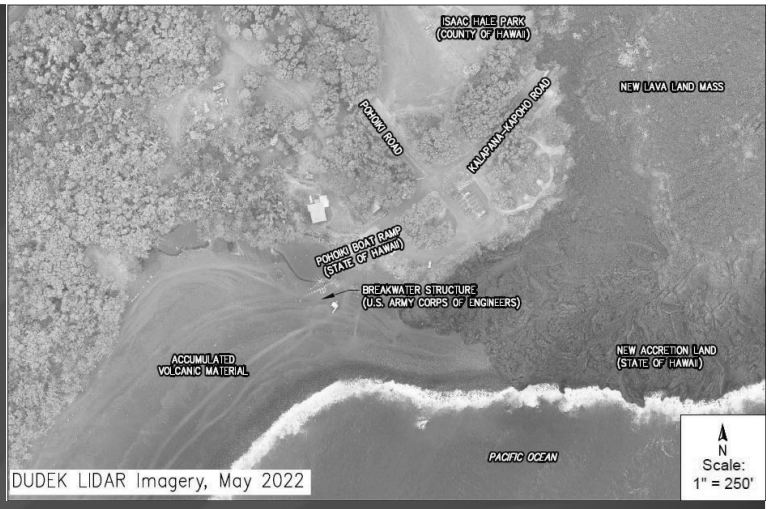
PROJECT LOCATION



POHOIKI BOAT RAMP FACILITY

- Constructed in 1963 by the U.S. Army Corps of Engineers (USACE) at site of former wharf
- 90-ft-long breakwater structure that protects the boat ramp was completed by the USACE in 1979
- Maintenance dredging in 1999 (completed in 2001)
- DOBOR replaced the entire boat ramp facility in 2008
- Boat ramp facility is owned and maintained by DOBOR





Pohoiki Bay (Pre- and Post-Eruption)

Status of DOBOR's Pohoiki Boat Ramp facility: currently closed and landlocked

Status of USACE's breakwater structure: intact, partially covered by volcanic material


Photo 1 – Landlocked Pohoiki Boat Ramp. March 2022


Photo 2 – New Accretion Land to the East, March 2022

Lava entered the ocean approx. 0.9 miles northeast from Pohoiki Bay at 'Ahalanui Beach Park on July, 12, 2018 and advanced to approx. 230 feet southeast of the boat ramp facility by August 6, 2018. On August 13, 2018, the boat ramp was blocked by a sandbar of accumulated volcanic material.

Photo 3 – Pohoiki Bay Shoreline. March 2022

Photo 4 – Surface Debris with Hawaii Driver's License for Comparison, March 2022

Pohoiki Bay was approximately 1,000 feet wide at the mouth and extended inland approximately 450 feet. The nearshore marine environment was drastically altered by the accumulation of volcanic material that has reduced Pohoiki Bay to a few areas of trapped water.

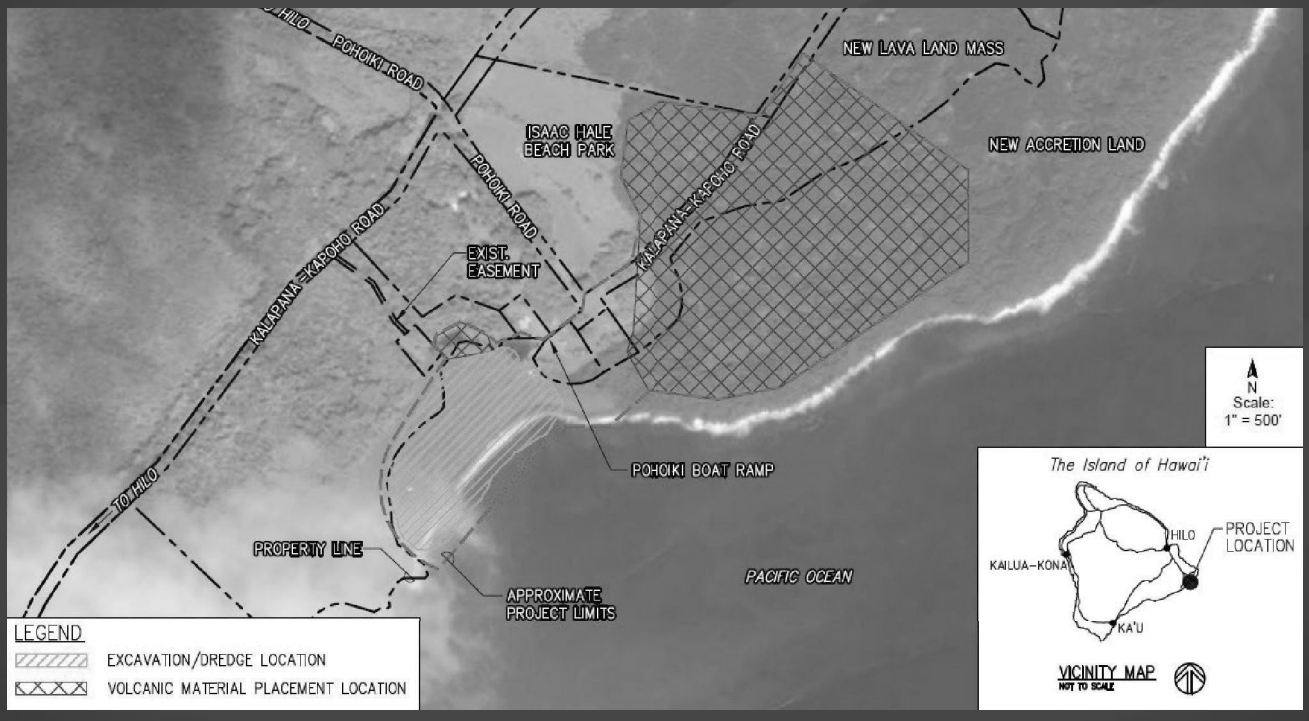
CURTAILED ACTIVITIES AT POHOIKI BAY

- Food sustainability and cultural practices
- Ocean rescue services
- Commercial fishing
- Ocean/volcano tours
- Recreational opportunities in the water

OBJECTIVES OF DOBOR'S PROJECT

- Restore navigational access through excavation and dredging (approx. 175,000 cy of material)
- Support the resumption of previously available services, activities, practices and opportunities
- Return Pohoiki Bay to its pre-eruption shape and depth (to the extent possible with available funding)
- Strategically place excavated and dredged material on new lava, accretion land and backshore area

MATERIAL REMOVAL / NEARBY PLACEMENT



DISCUSSION OF ALTERNATIVES

- Alternative Locations Beyond Pohoiki Bay
- Channel Restoration (requires stabilization)
  - Narrow Channel (Alternative 1)
  - Wide Channel (Alternative 2)
  - Channels and Jetties (Alternative 3)
- No Action
- Restore Pre-Eruption Shape and Depth of Pohoiki Bay (the Preferred Alternative)

PROJECT HISTORY

- The Limtiaco Consulting Group (TLCG) is DOBOR's consultant
- Design and coordination by TLCG since 2020
  - 11 meetings and discussions (in person and virtual) including Revitalize Puna workshops held at Pāhoa Gym
  - Public input gathered from community meeting held on August 18, 2022 at the Pāhoa Community Center (discussed design report and proposed alternatives)

ENVIRONMENTAL CONDITIONS

- Documented history of prior disturbance and alteration (e.g., wharf constructed during mid-1880s, USACE constructed boat ramp in 1963 and 90-ft-long breakwater structure in 1979, boat ramp facility replacement by DOBOR in 2008)
- Intentionally modified terrain and vegetation; no critical habitat; unlikely to displace listed species
- Pohoiki Warm Springs are mauka of vegetation line

INPUT FROM CONSULTED PARTICIPANTS

- The main continuous cultural practice within the project area is subsistence fishing
- Undesirable activities occurring in project area: nude swimming, littering, trespassing
- Nearby landowners support material placement that eliminates nuisance aspects of ponds, and for improved security and regulation of visitors

ADDITIONAL CONSIDERATIONS

- Nearshore marine environment was drastically altered by 2018 eruption
- Water circulation is disrupted with no connection to the ocean
- Department of Health information about Vibrosis is available from https://health.hawaii.gov/docd/disease_listing/vibriosis/

DRAFT EA AVAILABILITY

- Publication in *The Environmental Notice* on **April 23, 2023**; there are two ways to access the Draft EA
  - Online library (view or download file)
    https://files.hawaii.gov/dbedt/erp/Doc_Library/2023-04-23-HA-DEA-Pohoiki-Boat-Ramp-Dredging-of-Volcanic-Debris.pdf
  - Public Libraries
    Pāhoa, Mountain View, Keaʻau, Hilo, and the Hawaiʻi State Library (in Honolulu, Oʻahu)
- Draft EA comment deadline is **May 23, 2023**

Next Steps

April 23, 2023	Draft EA published
May 23, 2023	Draft EA comment deadline
July 2023	Final EA published

Overall Project Next Steps

	Draft Design
April 23, 2023	Draft EA published
May 23, 2023	Draft EA comment deadline
	Design
July 2023	Final EA published
	Bid*
	Completed Construction*

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

Testimony or Draft EA Comments

General Rules:

- **TYPE** in Chat Box
- **RAISE HAND** if you want to ask a question or provide testimony
- Please be **respectful** and **to the point** when unmuted
- 2 minutes

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Thank you and stay safe!

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

Send Draft EA comments to:

State of Hawai'i, DLNR - DOBOR
4 Sand Island Access Road, Honolulu, HI 96819
Finn McCall, (808) 587-3250, finn.d.mccall@hawaii.gov

Please provide a copy to:

The Limtiaco Consulting Group
1622 Kanakanui Street, Honolulu, HI 96817
Trevor Vagay, (808) 596-7790, trevor@tlcghawaii.com

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

EDWARD R. UNDERWOOD
ADMINISTRATOR
BOATING AND OCEAN RECREATION

STATE OF HAWAIʻI | KA MOKUʻĀINA ʻO HAWAIʻI
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF BOATING AND OCEAN RECREATION

4 SAND ISLAND ACCESS ROAD
HONOLULU, HAWAII 96819

A virtual public meeting that was facilitated by The Limtiaco Consulting Group was held on May 10, 2023 from 5:00 to 7:00 p.m. for the Draft Environmental Assessment (EA) for Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris. The presentation and recorded meeting are available from the following links:

https://dlnr.hawaii.gov/dobor/files/2023/05/Pohoiki-DEA-Public-Meeting-Presentation-20230510.pdf; and
https://dlnr.hawaii.gov/dobor/pohoiki-draft-ea-meeting-held-on-5-10-2023/.

The comments and concerns provided to the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR) are summarized and generally grouped by topic or issue. DOBOR's responses to the stated comments or concerns will be published in the Final EA.

Comment or Concern	DOBOR's Response
Comment or concern mentions project objectives	
Fisherfolk need to have ocean access restored. The community relies on fisherfolk to feed their families. This is our icebox. The project will help with erosion along the coastline. The project as proposed should be completed.	Support for the proposed project (which restores Pohoiki Bay to a shape and depth that resembles pre-eruption conditions to the extent possible) is acknowledged. The amount of funding available for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained.
The loss of a landing spot near Pohoiki is a safety issue during bad weather conditions. A major concern is for the fisherfolk. The costs borne by fisher families are $800 for fuel for the launch from Hilo, bait, etc. Local fisherfolk jeopardize their lives to provide fish for the community. Pohoiki is one of the top three areas for fish.	The comments about ocean safety, fish production, and information about fishing expenses are acknowledged. As a result of DOBOR's project, fisherfolk would be able to provide fresh fish for the local community to purchase and consume, earn income, and feed their families with their catch.

Comment or Concern	DOBOR's Response
Comment or concern mentions project objectives (continued)	
The project addresses food subsistence issues and concerns pertaining to pond usage. There are numerous trespassers on private land. Respectful recreational enjoyment is not occurring. Families used a barter system to exchange farmed food resources such as papaya for fish. Being able to feed families takes precedent over recreation.	The comments about food subsistence and expressed sentiment pertaining to observed recreational activities at Pohoiki Bay are acknowledged. Dredged material may be used to eliminate identified hazards or nuisances such as ponds in the backshore area.
Fishing is hard work and an enjoyable lifestyle. Thank you to everyone who is supporting the project to help fisher families.	The comments expressing gratitude are acknowledged.
Comment or concern mentions existing ponds in the backshore area	
Do not place dredged volcanic material along the backshore area (i.e., retain the ponds). Ahalanui was filled with bacteria and was warm whereas the world-class ponds/springs at Pohoiki are very hot. The water is pristine and not filled with bacteria. There are no other hot springs along the coast. Hundreds of people utilize the ponds, which are popular natural resources that even elderly people can access.	The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. DOBOR has considered the suggestion about retaining ponds (which are utilized for recreational purposes such as swimming and soaking) but does not support the viewpoint that the ponds are a safe area for recreational activities. Section 2.3. Water Quality in the Final EA will include considerations pertaining to additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. Adjacent landowners have suggested that the backshore areas could be flattened for cultural practices.
The jacks caused of a lot of erosion. Please protect the homesteaders' lands. 100 people visit the ponds each day? How is that healing or clean? Naked people doing their business have trespassed on private land. The ponds should be filled.	DOBOR understands the comment as referring to the breakwater structure that protects the boat ramp. Erosion may have been accelerated as a result of the structure. Dredged material that is placed in the backshore area may ameliorate the impacts of erosion. The comments that describe observed activities are acknowledged.

Comment or Concern	DOBOR's Response
Comment or concern mentions existing ponds in the backshore area (continued)	
Old ponds along the coastline were utilized for fishing and raising shrimp (ʻōpae ʻula). We have been fishing families for generations in comparison to people who talk about using the ponds for healing.	The comments that provide cultural background about pond usage are acknowledged.
Councilmember Kierkiewicz says the ponds being destroyed is not part of the project. She supports retaining the ponds and dredging to re-open the boat ramp.	The Final EA will state that DOBOR's proposed project does not involve alterations to or activities near the Pohoiki Warm Springs, which are located mauka (or upland) of the beach and vegetation line at Pohoiki Bay. Dredged material would be placed in the backshore area, which would eliminate ponds that are makai (or seaward) of the vegetation line.
Comment or concern mentions additional project alternatives	
The ocean water area at Pohoiki is 2,292 feet deep and debris refilling the boat ramp area would be impossible. Divers went into the water; the drop off is still there; the coral is gone (decimated). There is nothing to see.	Proposed dredging to pre-eruption depths 6 to 12 feet would occur within Pohoiki Bay, which has the following conditions: • 5-6 feet deep within the bay • 6-12 feet deep near entrance of bay DOBOR understands this comment as a suggestion to relocate the boat ramp to an area with a steep drop off. This implies that boats would enter the ocean where there is very limited or no protection from wave action, which is not favorable and a safety hazard.
Has this kind of project (removing so much beach) been done before? A better solution is to install a ramp on top of the beach from the end of the parking lot instead of removing the volcanic material. Why wasn't this solution considered?	A ramp placed on the beach would require an anchoring system or stabilized sub grade whereas the material that has accumulated at Pohoiki Bay is loose and erodible such that normal daily waves would undermine the ramp panels. This suggestion also implies boats would enter the ocean where there is very limited or no protection from wave action, which is not favorable and a safety hazard.
He supports dredging all of the material. If a wide channel is the resulting alternative, is it going to work?	There are varying opinions about whether the wide channel will work and how long a wide channel will remain open because the effects of wave action are difficult to predict with certainty. The alternatives reflect the possibility that available funding will affect the extent of the dredging effort.

Comment or Concern	DOBOR's Response
Comment or concern mentions funding	
How are the funds allocated? Does Federal funding affect timing?	DOBOR is hoping for FEMA support (funding), which would reimburse project costs up to 75 percent. The reimbursable basis for FEMA funding means repayment may take up to a year. For project initiation, the State of Hawaii would need to fund 100 percent of the costs upfront. Lawmakers have been trying to get this funding but there is nothing official about the project funding at this time. The timeline will be determined by the State since project funding will be from the state initially.
Any other kinds of funding available?	There may be other entities that will fund coastal projects but this hasn't been explored since disaster recovery projects are funded by FEMA.
July 2023 was the date but now it appears you were wasting time. Where did all the funds go?	This comment was not easily understood since the earliest availability for construction funding was indicated as July 2023. The funding allotment for design and planning was spent on research, public outreach, pre-design, the EA, etc.
Other general comments or concerns beyond purview of the EA	
Egregious behavior, rubbish, and candlewax left on rocks needs to stop. Referring to the area as Queen's bath is inappropriate. The local community has been working diligently with government officials.	The comments that describe observations of activities at Pohoiki Bay are acknowledged.
There is a style of fishing unique to Pohoiki, which is one of the roughest places and one of the most productive (with regards to fishing). Tourism supports the local economy. As a business owner, he has mostly Native Hawaiian employees conduct lava tours. Kaʻakepa is too rough to use as alternative location for a boat ramp.	The comments that provide background information about fishing at Pohoiki and commercial activities are acknowledged. The information pertaining to Kaʻakepa (which is discussed in Section 4.1. Alternate Locations Along the Puna Coastline of the EA) is acknowledged.

Comment or Concern	DOBOR's Response
Other general comments or concerns beyond purview of the EA (continued)	
Pohoiki is a healing place and a gift from Pele.	This comment is acknowledged as community sentiment.
Is there an in-depth study of inventory along the south side of Pohoiki Bay? If there is no survey that can be shared, the property owner on the south side would like one done pre/during/after the dredging occurs. The 2018 eruption created a natural impact. There is concern about intentional disturbance. A willingness to meet with Cultural Surveys Hawaii, Inc. was indicated.	DOBOR understands the comments as concern about shoreline erosion and will consider the request for a study or survey although it is unclear what kind of shoreline inventory is desired.
Would rain return sand to the ocean?	Rain will probably have little effect on sand movement; wave action is the primary force responsible for sand movement at Pohoiki Bay. The highwater mark has remained the same since 2019. It has been reported to DOBOR that the debris mound is taking on a different shape.

From: j t <moonrainsun@yahoo.com>
Sent: Wednesday, April 26, 2023 12:12 PM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>
Cc: Limtiaco Consulting <trevor@tlcghawaii.com>
Subject: [EXTERNAL] Pohoiki boat ramp

Aloha Mr. Mccall,

Pohoiki bay should never had been developed for commercial purposes. This bay should be given back to the public for recreational activities only. The boat ramp should be relocated next door on the unusable land created by 2018 lava where a developer had planned to create a marina. Utilizing this area would make more sense & have a more positive impact for all. With all the funding involved plus maintenance funds for unforeseen future complications, would constructing a similar design to Honokohau have a much better outcome? Protests for Mauna Kea was focused on desecration yet if inconvenience by nature, we take it upon ourselves to desecrate for convenience. The volume of sediment has been accumulating in this area for a reason & in the future those reasons will be seen by those lucky enough the be here. Relocate the boat ramp!

Mahalo!
Jeff

From: j t <moonrainsun@yahoo.com>
Sent: Wednesday, May 17, 2023 12:43 PM
To: Claire Oshiro
Subject: Re: Video and slides from 5/10/23 - Pohoiki Boat Ramp Dredging of Volcanic Debris

Thanks for the link Claire. I still think the boat ramp should be relocated onto an area inundated by lava. The dropoff is already deep, It would take a very long time to fill a dredged channel that steps down. Keeping Issac Hale beach a recreational only area would be best for future generations.

Aloha,
Jeff

On Wednesday, May 17, 2023 at 12:05:19 PM HST, Claire Oshiro <claire@tlcghawaii.com> wrote:

Good afternoon:

The meeting video and presentation slides from 5/10/2023 have been uploaded to the DLNR - DOBOR website.

You may access the information at the link below:

https://dlnr.hawaii.gov/dobor/pohoiki-draft-ea-meeting-held-on-5-10-2023/

Thank you.

Claire Oshiro

Direct: (808) 687-8750

Office: (808) 596-7790

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <moonrainsun@yahoo.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Jeff T.:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the emails sent on April 26 and May 17, 2023. We acknowledge your view that Pohoiki Bay should not have been used for commercial purposes, and understand your remaining comments as opposition to the proposed project. The relocation of the boat ramp to another area is preferred. An area inundated by lava with a steep drop off is suggested, along with developing a more robust facility like the one at Honokōhau. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

The boat ramp at Pohoiki was developed at the site of the former wharf. Robert Rycroft constructed the wharf at Pohoiki Bay during the mid-1880s to support his commercial activities and he allowed public use of the wharf. Alternative locations are discussed in the EA in Section 4.1. Alternate Locations Along the Puna Coastline and warrant no further consideration. From DOBOR's perspective, an alternative with boats entering the ocean where there is very limited or no protection from wave action is not more favorable than the use of built infrastructure (i.e., the existing boat ramp which is protected by the breakwater structure).

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: Leslie Colter <lea_punasolutions@yahoo.com>
Sent: Thursday, April 27, 2023 10:28 AM
To: finn.d.mccall@hawaii.gov; Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Isaac Hale Beach Park/Pohoiki PUBLIC COMMENT

To whom it may concern:

Dear Trevor, Dear Finn,

At the last Revitalize Puna meeting, the decision was made to re-build the boat ramp at Isaac Hale Beach Park/Pohoiki, and then rashly, to dredge the entire beach, making it "as much like it was, as possible".
A Draft Environmental Assessment has been proposed, examining a plan to restore Pohoiki Bay "to a shape and depth that resembles pre-eruption conditions to the extent possible" before the eruption of 2018.
Over 4000 people have signed petitions for the re-building of the Boat Ramp, but there are not 4000 fishermen in the area.
Although citizens here are happy to purchase and consume the daily catch, there is much more to the picture than fishermen, surfers, or what the Draft Environmental Assessment presents.

NO voice has been raised to represent the impact on the only natural Hot Springs on Hawai'i Island, or on the thousands of people,
local residents, taxpayers and tourists from all over the world, who visit these Hot Springs regularly! They are listed in all of the new travel guides. Since the East Rift eruption in 2018, when the beloved Ahalanui Park and warm pool were completely covered, the pristine waters in the Hot Springs at Pohoiki have heated up quite a bit (the temperature used to be in the upper 90s and now it usually sits around 106°).
Dragonflies, numerous species of birds, and even a pair of Nene geese have been sighted here in this fragile ecosystem.

Let it be known:
The Draft Environmental Assessment is completely invalid as a document:

1 It does not even mention the Hot Springs nor their imminent destruction, as if this world-class natural wonder in Hawai'i is NOTHING, not a part of the environment being discussed. In fact it was suggested at the Revitalize Puna discussion to fill in the Hot Springs with the dredged debris, and the Draft Environmental Assessment proposes that "the volcanic material would be placed in areas of new lava or new beach that are away from the ocean", which is where the Hot Springs and ponds are located. A word search of the Draft Environmental Assessment finds 'hot springs' only mentioned in passing. It calls the excellent natural feature a NUISANCE that attracts people. Apparently these thousands of people are of lesser value than a handful of fishermen. It does not discuss the thousands of local people & tourists who regularly visit BECAUSE of the Hot Springs. Despite loss of ocean entry in 2018 for between 25-30 fishing boats, and for surfers, Pohoiki remains a public beach park destination for many.

Some of the displaced fisherman launch in Hilo now, and claim that the wear and tear and gas costs to drive, and then motor back to their old fishing grounds, is too much for them.
Understood. The local government should subsidize these fishermen!
But millions and millions of dollars, and countless years of environmental destruction to dredge Pohoiki bay is not warranted to support them. This money could be better spent in our low-income rural area.

The Draft Environmental Statement claims to want to rebuild a place for children to swim, but:

2 A place for children to safely swim already exists and hundreds of families enjoy the deep warm pond which has formed at the end of the old boat ramp daily. Life Guards are on duty 9am - 5pm.

Along the beach geothermal water bubbles out of the former shoreline and, mixing with the tidal waters, fills numerous large and small natural pools with hot and warm healing waters, all with easy access for bathers of any age and ability. This is a place where residents of the community come to find peace and soak.

Another hidden impact completely ignored by the Draft Environmental Assessment:

3 Pohoiki Road was blocked by Lava in 2018 and construction has not even started yet, so the routes to be taken by the huge trucks and heavy machines belonging to the dredging companies, as well as the trucks pulling fishing boats have only 2 lanes; winding, steep and narrow Kamaili Road with its speed humps, or the already deeply potholed Kalapana-Kapoho Road, Highway 130.

Both of these roads are woefully inadequate, roughly maintained and run through rural residential neighborhoods.
There is NO direct route to Pohoiki.

If County was clever they'd open up the restrooms, fill the water tanks, and charge for Camping at the old grassy park just inside the gate there! They already hire 24/7 Security to patrol the grounds.
Hundreds of people visit the Hot Springs and stroll the beach daily!

If the boat ramp must be re-opened we just want the multi-million dollar plan to have the Most Minimal Impact, the smallest cost, dredged volume, and ALSO to preserve Hawaii's ONLY NATURALLY OCCURRING GEOTHERMAL HOT SPRING which many of us visit to enjoy the benefits of Pele's healing waters.
If Pohoiki is really the only location being considered, please choose either the narrow or wide channel alternative to avoid destroying the Hot Springs completely. Any alternative on this list except the (by far) most expensive "may be filled with new material". Meaning the dredging would be ongoing, forever.
There is "expressed opposition" from community members against disturbing what has naturally occurred here.
We will mount a petition if necessary.
No Action IS the preferred alternative.

Please have a real Environmental Impact Study done.
The proposed Draft Environmental Assessment is nothing short of a one-sided lie.
Stop the desecration before it begins!
Thank you in advance for your attention.

Quite Sincerely,
Le`a Leslie Colter
Licensed Marriage and Family Therapist #71
Home Owner for over 25 years in Kalapana
Lea_punasolutions@yahoo.com
808.938.9374

From: Leslie Colter <lea_punasolutions@yahoo.com>
Sent: Monday, May 22, 2023 2:12 PM
To: finn.d.mccall@hawaii.gov; Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Re: Isaac Hale Beach Park/Pohoiki PUBLIC COMMENT: ADDENDUM

-The pristine and very hot spring at Pohoiki is indicated in yellow. There seems to be no reason to dredge and randomly fill this area.
I would be happy to meet any county, state or health department officials at the site to measure the bacteria levels here.
-In addition, with all due respect to the Aunty who owns the land adjacent to the new hot springs, there is no farming going on there.
It is a lovely vacant lot without any house,
and there are no cesspools in the area.
I don't often see people on that land nor nudists in the ponds, and topless is legal.
-And after hearing the fisherman's wife,
I want to reiterate the suggestion that state and county fishery subsidize Pohoiki fishermen $1000. Per commercial trip out of Hilo, based on quantity of catch, until this boat ramp issue is resolved. Many trips can be made for 40 million dollars+.

Sincerely
Le`a Leslie Colter MA, LMFT
Licensed Marriage & Family Therapist
Lea_PunaSolutions@yahoo.com
808.938.9374

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <lea_punasolutions@yahoo.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Leslie Colter:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the emails sent on April 27 and May 22, 2023. We understand your comments as mostly criticism of the Draft Environmental Assessment (EA) but also opposition to the proposed project. No action is preferred. The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final EA.

DOBOR's proposed project does not involve alterations to or activities near the Pohoiki Warm Springs, which are located mauka (or upland) of the beach and vegetation line at Pohoiki Bay. The Final EA will state that dredged material would be placed in the backshore area, which would eliminate ponds that are makai (or seaward) of the vegetation line. DOBOR does not support the viewpoint that the ponds are a safe area for recreational activities such as swimming. Section 2.3. Water Quality in the Final EA will include additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. The following citations and links will be included in the Final EA:

Fecal bacteria found at a number of Hawaii beaches
By Paul Drewes / KITV4 / Jun. 20, 2023
https://www.kitv.com/news/local/fecal-bacteria-found-at-a-number-of-hawaii-beaches/article_cd3bac04-0ff1-11ee-9314-d3dd9fc8dd64.html

Thrill seekers jumping into polluted Ala Wai Canal waters spark major health concerns
By Jolanie Martinez / Hawaii News Now / Jun. 21, 2023
https://www.hawaiinewsnow.com/2023/06/22/thrill-seekers-jumping-into-ala-wai-canal-spark-major-health-concerns/

83,000 Hawaii homes dispose of sewage in cesspools. Rising sea levels will make them more of a mess
By Audrey McAvoy / Associated Press on KITV4 / July 6, 2023
https://www.kitv.com/news/local/83-000-hawaii-homes-dispose-of-sewage-in-cesspools-rising-sea-levels-will-make-them/article_9b95117b-7334-5251-ad33-e14225e2af20.html

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(808) 596-7790 • tlcghawaii.com

Hawaii's Cesspool Crisis Has A Long History. It's Not Over Yet.
By Jessica Terrell / Civil Beat / July 9, 2023
https://www.civilbeat.org/2023/07/hawaiis-cesspool-crisis-has-a-long-history-and-its-not-over-yet/

Hawai'i Cesspool Hazard Assessment & Prioritization Tool: Web Application. Available online from http://hawaiicespooltool.org/

Vibrosis
https://health.hawaii.gov/docd/disease_listing/vibriosis/

We appreciate your information about the state of Pohoiki Road, which was partially damaged by the lava flow. People currently travel to the project site at this time via roadways including the lower portion of Pohoiki Road, which was not damaged. Construction vehicles will traverse usable roadways to access the project site. The additional comments about measuring bacteria levels, no farming occurring on land adjacent to the hot ponds, subsidizing fishermen $1,000, and observations with regards to nudists are acknowledged.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

From: Syd Singer <sydsinger@gmail.com>
Sent: Saturday, April 29, 2023 3:14 PM
To: finn.d.mccall@hawaii.gov; Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Comment on Pohoiki EA

Aloha,

Please accept this comment on this EA. My comment is below, with a .pdf attached. If this is not the best way to submit this comment, please advise. Mahalo.

From:
Sydney Ross Singer
Medical Anthropologist
Director, Good Shepherd Foundation

April 29, 2023

Regarding: **Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki**

Pohoiki Rd. is an essential road for this project. The EA assumes the Pohoiki Rd is open. According to section 2.11, "Site access to Pohoiki Bay and Isaac Hale Beach Park is primarily from Pohoiki Road and Kalapana-Kapoho Beach Road (Route 137)."

However, Pohoiki Road is currently closed from lava inundation from the 2018 flow, and is currently unusable. This means that the only way to get to Pohoiki from Pahoa currently is along the Kalapana-Kapoho Beach Road.

Clearly, Pohoiki Road needs to be repaired and re-opened prior to any construction beginning at Pohoiki Bay. Traffic from heavy machinery and personnel should primarily travel along Pohoiki Road, which is called "Pohoiki Road" because it is the road to Pohoiki. Clearly, this road needs to be part of the project.

However, the EA does not mention the repair and re-opening of Pohoiki Rd. This road project should have been discussed in the EA as a prior condition for any activity at the Pohoiki site.

Further, if an EA or any other government permitting will be required for the repair and re-opening of Pohoiki Rd., this should be considered part of this EA, as one large project. If Pohoiki Road did not exist, then this project would not be proposed as is. A better road access is required than the Kalapana-Kapoho Beach Road. This dredging project must not come before Pohoiki Road is reopened.

Environmental and cultural impacts of this project will be different for different road routes from Pahoa to Pohoiki. If heavy machinery and personnel need to travel along the Kalapana-Kapoho Beach Rd, that will have different impacts than travel along Pohoiki Road. The EA fails to mention the status of Pohoiki Road, or offer an analysis of impacts of the dredging project with and without access to this important roadway. Therefore, the EA is deficient in this regard.

I hope these comments help make Pohoiki Bay useful to the public again, and improve the current plan by insuring proper ingress and egress from Pohoiki for the public and for the work for this project.

Sincerely,

Sydney Ross Singer
Environmental Anthropologist
Director, Good Shepherd Foundation
15-2660-Pahoa Village Rd.
Suite 203, Box 82
Pahoa, Hawaii 96778
808-640-3836

From: Syd Singer <sydsinger@gmail.com>
Sent: Saturday, May 13, 2023 5:08 AM
To: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Re: Comment on Pohoiki EA

Hi Trevor,
To support my comment about the need for Pohoiki Road to be part of this Boat Ramp EA, I would like to add this quote from HAR 200-7:
"Multiple or phased applicant or agency actions. A group of actions proposed by an agency or an applicant shall be treated as a single action when: (1) the component actions are phases or increments of a larger total undertaking; (2) an individual project is necessary precedent for a larger project; (3) an individual project represents a commitment to a larger project; or (4) the actions in question are essentially identical in a single statement will adequately address the impacts of each individual action and those of the group of actions as a whole."

I believe this supports my contention that the Boat Ramp EA needs to include the Pohoiki Road EA.

Thanks for adding this to my comments.

Sydney Ross Singer

On Thu, May 11, 2023 at 1:56 PM Trevor Vagay <Trevor@tlcghawaii.com> wrote:

> Thank you for you remail dated 4/29/2023. DOBOR acknowledges receipt of your comments, and a response will be published in the Final EA.
>
> Regards,
>
> **Trevor Vagay**
>
> ***Associate Principal***

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <sydsinger@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Sydney Ross Singer:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the emails sent on April 29 and May 13, 2023. We acknowledge the suggestion that the repair of Pohoiki Road should be part of the Environmental Assessment (EA) for the Proposed Pohoiki Boat Ramp Dredging. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final EA.

Hawai'i County will undertake necessary repairs to Pohoiki Road as a separate action. People currently travel to the project site at this time via roadways including the lower portion of Pohoiki Road, which was not damaged. Construction vehicles will traverse the usable roadways to access the project site.

DOBOR is not proposing improvements to Pohoiki Road or Kalapana-Kapoho Beach Road as part of its project. Roadway improvements that are undertaken by Hawaii County are expected to occur in a location that is away from the proposed action. The road project and the proposed action have separate funding opportunities and constraints and may occur in different timeframes. In other words, the road improvements and the proposed action do not represent one large project and do not rely on each other.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

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From: Statts, Meghan L <meghan.l.statts@hawaii.gov>
Sent: Tuesday, May 2, 2023 7:13 AM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>
Cc: Underwood, Ed R <ed.r.underwood@hawaii.gov>
Subject: Fwd: Gov referral - Pohoiki Boat Ramp

FYI

Mahalo,

Meghan Statts
Deputy Administrator

From: Aguilar, Ryan C <ryan.aguilar@hawaii.gov>
Sent: Monday, May 1, 2023 4:34:00 PM
To: Underwood, Ed R <ed.r.underwood@hawaii.gov>; Statts, Meghan L <meghan.l.statts@hawaii.gov>
Subject: Gov referral - Pohoiki Boat Ramp

Hi Ed and Meghan,

Fyi, a suggestion came in through the Governor's Referral system email re: Pohoiki ramp. Please see below.

Thanks,
Ryan

Constituent Message:
Aloha: Maybe the use of Marston mats or similar rollout systems would be a more timely and effective solution at Poho'iki Boat Ramp than the current costly proposals of battling nature and temporarily dredging/dozing entire beach areas. Also, maybe our military camp would be able to work with the state by having materials and experience to install launching ramps as part of military exercises. Magdalene Phillips https://shop.mobi-mat.com/

Ryan Aguilar
Communications Specialist
Hawai'i Department of Land and Natural Resources
dlnr.comms@hawaii.gov
808-587-0396

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <meghan.l.statts@hawaii.gov>, <dlnr.comms@hawaii.gov>
Meghan Statts, Deputy Administrator
Department of Land and Natural Resources, Division of Boating and Ocean Recreation

Ryan Aguilar, Communications Specialist
Hawai'i Department of Land and Natural Resources

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Ms. Statts and Mr. Aguilar:

We would appreciate your assistance, if possible, to provide this response to Magdalene Phillips since no email address or other contact information was included with her comments. We understand the comments as opposition to the proposed project. The use of Marston mats or similar rollout systems is preferred. Marston mats (or pierced steel planking) generally require a stabilized sub grade for anchoring whereas the material that has accumulated at Pohoiki Bay is loose and erodible from strong wave action. The following link was provided to DOBOR as an example of other available boat ramp products: https://shop.mobimat.com/.

The suggested alternatives of mats or ramps formed from various materials that are laid on or across the beach imply that boats would enter the water where strong wave action occurs. No further consideration by DOBOR is warranted since the suggested mats, ramps or pads laid on or across the beach are not more favorable than the use of permanent infrastructure (i.e., the existing boat ramp which is protected from strong wave action by the breakwater structure).

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

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(808) 596-7790 • tlcghawaii.com

From: Val Colter <val.colter@yahoo.com>
Sent: Sunday, May 7, 2023 4:25 PM
To: finn.d.mccall@hawaii.gov; Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Comments on draft EA - Pohoiki Boat Ramp Dredging of Volcanic Debris

The current environment at Pohoiki is basically ignored by this EA.

Currently existing are:

1) A wide black sand beach reasonably accessible to people with disabilities. One of the largest accessible beaches on this island.

2) The only easily accessible hot springs in Hawaii

3) A park with facilities that could easily be opened to overnight camping which would earn needed money for our county. The only reason it is not open is apparently lack of county water. However, there are already tanks in place and they could be filled with water by truck.

The "subsistence fishing" discussed in this EA is not accurate.
EA writers ignore the fact that nearly all fishing boat owners using this ramp to launch were not fishing for subsistence but were fishing to sell their catch.
What is the difference between subsistence and commercial?
I would suggest that when the catch is sold it is commercial.

Page 2-18

"Outdoor recreation activities such as swimming and surfing, which were popular activities at Pohoiki Bay, may resume as a result of the proposed project.Excavation and dredging that restores Pohoiki Bay to a similar pre-eruption shape and depth would remove newly created beach and increase the area of nearshore water."

Comments:

Swimming was illegal at Pohoiki during boat ramp days. It was also unsafe whenever a boat was using the ramp area. However, although illegal, it was a common practice.

In the current environment, created by Pele, that the people supporting this EA conclusion seek to destroy, there are several warm water swimming ponds that are currently used regularly by adults and children. These ponds have no greater bacteria levels than the warm pond at Ahalanui that was lost to the 2018 lava flow. They are used daily, and on weekends there are hundreds of people a day using these ponds.

The proposed dredging will destroy the existing ponds and there is no guarantee that the end result will be better than what currently exists.
In fact it will almost certainly be worse.

EA writers say that trash is a big problem currently being created by users of the hot springs.
I have to assume that the writers never were at Pohoiki during boat ramp days when there was a far greater amount of trash created by the users of the boat ramp than now exists.

Aloha,
Val Colter
808-769-2949
val.colter@yahoo.com

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <val.colter@yahoo.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Val Colter:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for your comments sent on May 7, 2023. We understand the comments as opposition to the proposed project. Only recreational uses at Pohoiki and camping at Isaac Hale Beach Park to generate revenue is preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

We acknowledge the following comments: (1) accumulated volcanic material allows for easy and convenient access for people with disabilities from the existing parking area at Isaac Hale Beach Park to the beach; (2) adults and children utilize the hot ponds in the backshore area; and (3) users of the boat ramp created more trash. The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members.

The boat ramp at Pohoiki was developed at the site of the former wharf. Robert Rycroft constructed the wharf at Pohoiki Bay during the mid-1880s to support his commercial activities and he allowed public use of the wharf. Camping facilities would generate revenue for Hawai'i County whereas the State of Hawai'i receives revenue from docking, launching and maintenance fees. Fisherfolk may sell what is caught and feed their families with their catch. The Puna community is expected to benefit from having its people resume activities that provide income and food for their families.

DOBOR does not support the viewpoint that the ponds are a safe area for recreational activities such as swimming. Section 2.3. Water Quality in the Final EA will include additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. The following citations and links will be included in the Final EA:

> Fecal bacteria found at a number of Hawaii beaches
> By Paul Drewes / KITV4 / Jun. 20, 2023
> https://www.kitv.com/news/local/fecal-bacteria-found-at-a-number-of-hawaii-beaches/article_cd3bac04-0ff1-11ee-9314-d3dd9fc8dd64.html
>
> Thrill seekers jumping into polluted Ala Wai Canal waters spark major health concerns
> By Jolanie Martinez / Hawaii News Now / Jun. 21, 2023
> https://www.hawaiinewsnow.com/2023/06/22/thrill-seekers-jumping-into-ala-wai-canal-spark-major-health-concerns/

83,000 Hawaii homes dispose of sewage in cesspools. Rising sea levels will make them more of a mess
By Audrey McAvoy / Associated Press on KITV4 / July 6, 2023
https://www.kitv.com/news/local/83-000-hawaii-homes-dispose-of-sewage-in-cesspools-rising-sea-levels-will-make-them/article_9b95117b-7334-5251-ad33-e14225e2af20.html

Hawaii's Cesspool Crisis Has A Long History. It's Not Over Yet.
By Jessica Terrell / Civil Beat / July 9, 2023
https://www.civilbeat.org/2023/07/hawaiis-cesspool-crisis-has-a-long-history-and-its-not-over-yet/

Hawai'i Cesspool Hazard Assessment & Prioritization Tool: Web Application. Available online from http://hawaiicespooltool.org/

Vibrosis
https://health.hawaii.gov/docd/disease_listing/vibriosis/

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

From: Rebecca Corby <rebeccacorby@gmail.com>
Sent: Monday, May 8, 2023 12:10 AM
To: finn.d.mccall@hawaii.gov; Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Pohoiki boat ramp project- FEEDBACK

Aloha,
I just read the Pohoiki boat ramp plan and I'm SHOCKED.
This plan to spend $40MIL + to dredge "aka destroy" the massive black sand beach
that nature/Pele created seems very foolish and unrealistic. There's a much faster, cheaper and safer
way to create a new boat ramp there.

A NEW boat ramp/concrete path over the beach could be installed, why wasn't this included as an option ?
--Take a look at the 2 attached pictures as examples. A NEW path could be
poured in concrete from the parking lot over the beach and into the ocean
for boats to launch and probably cost about $2MIL instead of $40MIL +

AND would:
1. leave the new beautiful black sand beach in tact for surfers, swimmers and beach goers who enjoy the new and largest sandy beach that Puna has
2. leave the old boat ramp/warm pond in tact for families and CHILDREN TO swim safely away from boats
3. leave the existing hot pond in the back for the many residents who enjoy those natural hot springs, WHY IS The plan to fill in the hot pond in
the back ?? Makes no sense, just seems like a straight disrespect/slap to everyone who enjoys the natural volcanic hot springs. I understand some residents were concerned/upset about some
people soaking in that pond nude but that can be addressed without destroying the entire beach. We lost the ahalanui warm pond and Pele gave us these warm ponds now. They are beautiful natural formations that can be preserved while also adding in a new boat ramp.
4. leaves more swimming, didn't anyone notice that the Pohoiki beach is becoming more mellow for swimming ? ? there is an area where the shore break
has SIGNIFICANTLY mellowed out since 2018 and now can be entered safely for swimming, which is so welcome as the whole Puna coastline has very few mellow beaches
to swim at (we lost Ahalanui warm pond and Kapoho tide pools) Imagine a family friendly beach where people can swim safely, its happening as the shore break continues to mellow out
5. protects the shoreline from erosion (which was also a concern of the Kuamo'o family who lives there and I AGREE, this plan to remove the entire NEW sandy beach
is FOOLISH at best and dangerous at worst and a waste of money as sand will probably fill it back in and create new issues of erosion which will cost lots of money to mitigate
6. a NEW path over the existing 20-40 ft high beach would also keep the boat ramp open for boaters more reliably by eliminate the very real probability of sand just filling in the dredged areas so each time that happens, the boaters would be blocked again and again and we would constantly have to spend Millions
to keep removing sand accumulation while they wait for access again.

Why not work WITH NATURE instead of AGAINST it ? Haven't people noticed what happens when we work against nature?
I find this plan to remove a massive beach that is around 20-40 ft deep of new sand totally foolish and ridiculous
and I understand that many people want to restore boat access and this plan would. Look at the pictures. This is much simpler and would restore boat access faster
without destroying the beautiful beach and all that comes with it. The area is massive , it can be enjoyed by all...fishermen, boaters, swimmers, surfers, sunbathers, hot spring soakers
and families.

There is no need to make it an "either /or" situation. There is plenty of room to install a new path and ramp from the parking lot for boats to launch directly off the beach
that is getting more and more mellow aka safe with the waves as all beaches do over time as the sand spreads out and makes the shore break more gradual.

There is also room to look into addressing concerns about increased traffic to the area such as charging out of state visitors a parking fee etc.

Why wasn't this plan looked into and included in the report ?

Thank you,
Rebecca Corby

From: Rebecca Corby <rebeccacorby@gmail.com>
Sent: Thursday, May 11, 2023 1:13 PM
To: Trevor Vagay
Cc: McCall, Finn D
Subject: Re: Pohoiki boat ramp project- FEEDBACK

What happened to the plan 2 years ago to build a new boat ramp just north of the old one over the lava ? this seems much more logical
Also why doesn't your plan include other successful projects where a sandy beach of similar size was completely and successfully removed?

thanks

On Thu, May 11, 2023 at 1:02 PM Trevor Vagay <Trevor@tlcghawaii.com> wrote:

Thank you for you remail dated 5/8/2023. DOBOR acknowledges receipt of your comments, and a response will be published in the Final EA.

Regards,

Trevor Vagay

Associate Principal

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <rebeccacorby@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Rebecca Corby:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 8 and May 11, 2023. We understand the comments as opposition to the proposed project. The installation of a concrete ramp or path over the beach, and only recreational activities at the project site is preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

The Final EA will include a discussion of a concrete ramp or path laid on or across the beach in Section 4.6.1. Boat Ramp Placed on Beach. A concrete ramp or path would be undermined by normal daily wave action since the material that has accumulated at Pohoiki Bay is loose and erodible. The suggested alternative also implies that boats would enter the water where strong wave action occurs. No further consideration by DOBOR is warranted since the suggested alternative is not more favorable than the use of permanent infrastructure (i.e., the existing boat ramp which is protected from strong wave action by the breakwater structure). Alternative locations are discussed in the EA in Section 4.1. Alternate Locations Along the Puna Coastline and warrant no further consideration.

We acknowledge your statements about preserving the entire beach and the ponds, and charging a parking fee for out-of-state visitors. The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. The amount of funding available for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained.

DOBOR does not support the viewpoint that the ponds are a safe area for recreational activities such as swimming. Section 2.3. Water Quality in the Final EA will include additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. The following citations and links will be included in the Final EA:

> Fecal bacteria found at a number of Hawaii beaches
> By Paul Drewes / KITV4 / Jun. 20, 2023
> https://www.kitv.com/news/local/fecal-bacteria-found-at-a-number-of-hawaii-beaches/article_cd3bac04-0ff1-11ee-9314-d3dd9fc8dd64.html

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Thrill seekers jumping into polluted Ala Wai Canal waters spark major health concerns
By Jolanie Martinez / Hawaii News Now / Jun. 21, 2023
https://www.hawaiinewsnow.com/2023/06/22/thrill-seekers-jumping-into-ala-wai-canal-spark-major-health-concerns/

83,000 Hawaii homes dispose of sewage in cesspools. Rising sea levels will make them more of a mess
By Audrey McAvoy / Associated Press on KITV4 / July 6, 2023
https://www.kitv.com/news/local/83-000-hawaii-homes-dispose-of-sewage-in-cesspools-rising-sea-levels-will-make-them/article_9b95117b-7334-5251-ad33-e14225e2af20.html

Hawaii's Cesspool Crisis Has A Long History. It's Not Over Yet.
By Jessica Terrell / Civil Beat / July 9, 2023
https://www.civilbeat.org/2023/07/hawaiis-cesspool-crisis-has-a-long-history-and-its-not-over-yet/

Hawai'i Cesspool Hazard Assessment & Prioritization Tool: Web Application. Available online from http://hawaiicespooltool.org/

Vibrosis
https://health.hawaii.gov/docd/disease_listing/vibriosis/

The Draft EA does not reference a similar project because the resulting damage from the 2018 volcanic eruption event and proposed beach removal to allow restoration of the boat ramp are very unusual circumstances. To our knowledge, there is no comparable project.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

From: Justin Havird <jchavird@gmail.com>
Sent: Tuesday, May 9, 2023 6:35 AM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>
Subject: [EXTERNAL] Input on Big Island dredging project

Hi,

I wanted to weigh in on the proposed dredging project near the Pohoiki Boat Ramp, which I read about here: https://www.khon2.com/big-island-news/officials-asking-for-public-input-on-big-island-dredging-project/

I'm a biologist at the University of Texas that has studied anchialine pools in Hawaii for the last ~15 years. These coastal ponds represent an unusual, rare ecosystem, with the majority of anchialine habitats found in Hawaii. They are home to endemic, culturally important, and sometimes endangered organisms, with opae ula (Halocaridina rubra) being the most widespread anchialine animals in Hawaii - these shrimp are only found in these habitats in Hawaii.

The 2018 Kilauea eruption created new anchialine ponds near the Pohoiki Boat Ramp, which we've been studying since 2019. To my knowledge, this is the first documented case of anchialine habitats being created naturally via volcanism and provides an opportunity we've never had before - examining how the unique assemblage of microbes, plants, and animals that make up an anchialine pond community come together when one of these habitats forms.

Our first efforts have examined microbes in the ponds, and we found microbial communities of the three ponds at Pohoiki are drastically different than communities in any other anchialine habitat we've studied. Each of the three ponds has a somewhat similar, though unique microbial community, and we've shown that these communities have been changing over time since the ponds were created. We plan to continue sampling the ponds to see if their microbial communities will one day resemble those in older, established habitats. This work was published last year and you can read more about it in the attached scientific article.

We have also collected opae ula from these ponds and have found that they are extremely tolerant to high temperatures compared to shrimp collected in other habitats. This is likely because the new ponds remain relatively hot compared to established habitats. We are examining how these populations of opae ula are able to cope with the hot temperatures, and have found their genetics may be involved. We had samples collected previously from the area and see that the new shrimp are genetically distinct from the old populations, which may be because the new shrimp have adapted to warmer temperatures. This is ongoing work, but highlights how shrimp from the new ponds might be models for climate change adaptation.

I'm writing because I'm concerned a dredging effort might disrupt or destroy these new ponds. I can't attend the public meeting tomorrow, but I want to make it clear that these are the only known "baby" anchialine habitats in the entire world. They represent a scientific value that is immeasurable. Destroying them or drastically altering their natural march to "adulthood" would represent a huge loss to the scientific community that care about these types of habitats (the annual anchialine conference was held in Kailua-Kona last year). It would also prevent future work that might have real applications for improving human health and wellbeing - for example, proteins and compounds from microbes inhabiting unusual environments have been used to treat diseases and manufacture biomedical products.

I strongly urge DLNR to take this into consideration when thinking about any projects around Pohoiki and I'd be happy to provide any other thoughts.

Cheers and Mahalo,

Justin

****
Justin C. Havird
Department of Integrative Biology
The University of Texas at Austin
he/him/his
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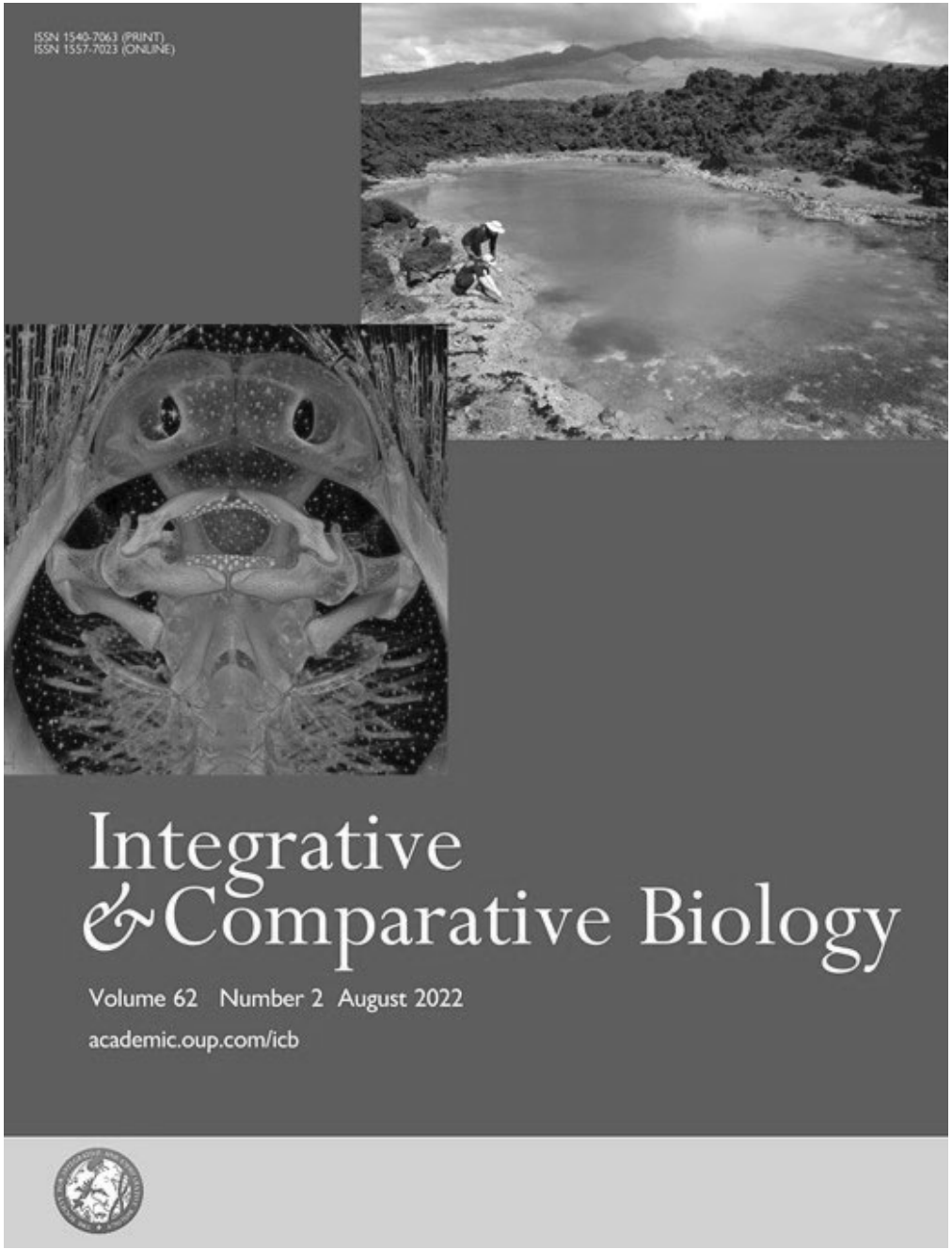

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SYMPOSIUM

Primary Microbial Succession in the Anchialine Ecosystem

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Synopsis When new land is created, initial microbial colonization lays the foundation for further ecological succession of plant and animal communities. Primary microbial succession of new aquatic habitats formed during volcanic activity has received little attention. The anchialine ecosystem, which includes coastal ponds in young lava flows, offers an opportunity to examine this process. Here, we characterized microbial communities of anchialine habitats in Hawaii that were created during volcanic eruptions in 2018. Benthic samples from three habitats were collected ~2 years after their formation and at later time points spanning ~1 year. Sequence profiling (16S and 18S) of prokaryotic and eukaryotic communities was used to test whether communities were similar to those from older, established anchialine habitats, and if community structure changed over time. Results show that microbial communities from the new habitats were unlike any from established anchialine microbial communities, having higher proportions of Planctomycetota and Chloroflexi but lower proportions of green algae. Each new habitat also harbored its own unique community relative to other habitats. While community composition in each habitat underwent statistically significant changes over time, they remained distinctive from established anchialine habitats. New habitats also had highly elevated temperatures compared to other habitats. These results suggest that idiosyncratic microbial consortia form during early succession of Hawaiian anchialine habitats. Future monitoring will reveal whether the early communities described here remain stable after temperatures decline and macro-organisms become more abundant, or if microbial communities will continue to change and eventually resemble those of established habitats. This work is a key first step in examining primary volcanic succession in aquatic habitats and suggests young anchialine habitats may warrant special conservation status.

Introduction

Ecological succession is a hallmark of biological theory (Clements 1916; Gleason 1926; Connell and Slatyer 1977; Chang and Turner 2019), but has been largely ignored in many unusual habitats. Species initially colonize sterile habitats in a process termed primary succession (Walker and Moral 2003), with microbes playing critical roles in nutrient cycling during this early phase (Ohtonen et al. 1999). Volcanic activity is one process that creates new, sterile land and the establishment and succession of plant communities in volcanic lands has been of interest for decades (Rejmanek et al. 1982; Tsuyuzaki and Delmoral 1995; Yurkewycz et al. 2014). However, primary succession in the microbial communities of new habitats created during volcanic activity has received scarce attention, with nearly all studies focused on terrestrial systems (Schipper et al. 2001; Gomez-Alvarez et al. 2007; Hopkins et al. 2007; Yoshitake et al. 2013).

Anchialine habitats are a model for examining microbial succession in aquatic volcanic environments. Habitats in the anchialine ecosystem include coastal bodies of water (ponds, pools, caves, and cracks) with no surface connections to the open ocean, but with subterranean connections to both seawater and the freshwater aquifer (Holthuis 1973; Sket 1996; Bishop and Iliffe 2012; von Rintelen et al. 2012). Such habitats are rare worldwide but are most common in the Hawaiian Islands, where ~600 of the ~1000 globally described anchialine habitats are found (Maciolek and Brock 1974; Brock 1987; Bailey-Brock and Brock 1993). Many Hawaiian anchialine habitats are found in relatively young (i.e., <1000 years) lava flows and have basalt basins, although others are common in older limestone basins or even in forested areas somewhat far inland. Both macro- and microbial communities in Hawaiian anchialine habitats show a high degree of endemism. The small red shrimp *Halocaridina rubra* is the most abundant and widespread macro-organism in the anchialine habitats of the Hawaii Islands, being endemic to both the ecosystem and the state (Holthuis 1963; Bailey-Brock and Brock 1993; Yamamoto et al. 2015). These shrimp are important grazers in anchialine habitats, feeding on diverse assemblages of algae and microbes across habitat types. Previous sequence profiling studies suggest that benthic microbial communities are largely unique to individual habitats, with even nearby ponds having distinct microbial communities (Hoffman et al. 2018b). Microbial communities in anchialine habitats of Hawaii also show negligible change throughout the year and are likely more influenced by environmental factors such as salinity than by seasonality (Hoffman et al. 2018a, 2018b). Unique to anchialine ponds on the southern coast of Maui and western coast of Hawaii is an orange cyanobacterial-bacterial crust community that forms laminated mats with distinct layers (Fig. 1A) (Wong 1975; Bailey-Brock and Brock 1993; Hoffman et al. 2020). Notably, Maui and Hawaii have never shared a coastline, and although orange crust communities are phenotypically similar on the two coasts, they have distinct microbial assemblages (Hoffman et al. 2018b; Hoffman et al. 2020). This strongly suggests that anchialine ponds on the two coasts have independently converged on phenotypically similar communities.

The number of anchialine habitats in an area is likely in constant flux over geological timescales, with habitats being created via volcanism or sea level change and destroyed through erosion or sedimentation. Although man-made anchialine habitats have been created (Bailey-Brock and Brock 1993; Brock and Bailey-Brock 1998), natural formation of anchialine habitats via volcanism has not been previously studied. From May to August 2018, lava flows from Kilauea volcano on the island of Hawaii created ~875 acres of new coastline (Fig. 1B), much of which is in proximity to Isaac Hale Park at Pohoiki Beach, a recreational area in Southeast Hawaii barely missed by the lava flows. Previously in 2004 and again in 2016, we sampled *H. rubra* from an anchialine habitat in this area (the popular "Hot Pond") (Santos 2006; Craft et al. 2008). During mid-2019 when the lava flows had subsided, we

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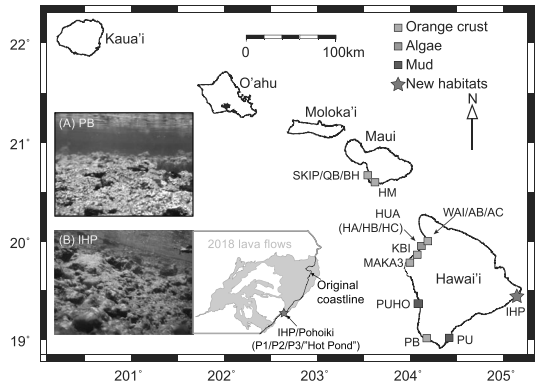

Fig. 1. Map of anchialine habitats analyzed in this study (symbols indicate benthic substrate type). (A) Photo of an anchialine habitat at Pohue Bay (PB) with an orange crust microbial community. (B) Photo of benthic substrate at a newly created anchialine habitat (Pohoiki 1) and expanded map of the region near Pohoiki showing the extent of the 2018 Kilauea lava flows and the new land created.

noticed the original habitat, now much further from the sea, was devoid of *H. rubra* and hotter than previously recorded. Moreover, several ponds were found nearby within the new coast. *Halocaridina rubra* were observed in these ponds and their water levels fluctuated with the tide, confirming their status as anchialine habitats. In November 2019, we again visited Pohoiki, and a thin microbial crust was observed in the new ponds (Fig. 1B), which was phenotypically reminiscent of the orange crust communities on South Maui and West Hawaii. Taken together, this suggests that the 2018 lava flows created several new anchialine habitats at Pohoiki that had begun at least the early stages of ecological succession.

Here, we describe initial efforts to characterize the physiochemical properties and microbial communities of three new anchialine ponds near Isaac Hale Park in the Pohoiki Beach region of Hawaii. We specifically asked how similar these new benthic microbial communities were to those in older, established anchialine habitats across the Hawaiian Islands. Of particular interest was whether any of the new ponds had a microbial community resembling those from habitats with orange crusts, possibly representing a third independent assemblage of this community phenotype. We also sampled these ponds three times during 2020–2021 to ask whether communities have remained relatively stable since their initial sampling or are undergoing change. Our findings have implications for primary succession theory, microbial ecology, and conservation of anchialine habitats in general.

Materials and methods

Physiochemical analyses

Three anchialine ponds at Pohoiki Beach near Isaac Hale Park, referred to here as Pohoiki 1–3 (P1–P3), were sampled for physiochemical and water chemistry parameters beginning on June 2, 2020 to determine if they showed values similar to previously described anchialine habitats. Water temperature, dissolved oxygen %, salinity, conductivity (SPC), and turbidity (NTU) were measured *in situ* at Pohoiki 2 and 3 using a YSI EXO1 Multiparameter Sonde with an EXO Handheld Display (YSI, Yellow Springs, OH), while Pohoiki 1 could not be measured at this date due to low water levels. However, the older "Hot Pond" where we previously sampled *H. rubra* was also measured. These measurements were repeated for Pohoiki 1–3 on November 20, 2020 and March 28, 2021, except that pH was measured instead of turbidity. At each of the three sampling dates, 0.25 L of water was collected from ∼2 cm below the surface of each pond at two sampling sites per pond and filtered (0.2 μm) for water chemistry analyses. Samples were submitted to the University of Hawaii at Hilo Analytical Laboratory to measure ammonium (NH_4^+), dissolved organic carbon (DOC), nitrate (NO_3^-) + nitrite (NO_2^-), orthophosphate (PO_4^{3-}), pH, salinity, silica (H_4SiO_4), total dissolved nitrogen (TDN), and total dissolved phosphorus (TDP).

These new ponds appeared to have elevated temperatures, so here we compare their temperatures to those measured in December 2011 from seven anchialine habitats on Maui and Hawaii. These data were previously collected using HOBO temperature loggers (Onset Computer Corporation, Bourne, MA) deployed in the water column for ∼0.5 to 3 h. Loggers were suspended from a float using monofilament line at different depths to access thermoclines. At one habitat, Queen's Bath (QB) on Maui, loggers were continuously deployed for 5 days at shallow and deep regions to assess temporal temperature trends.

Benthic microbial community sampling

On the three sampling dates above, benthic microbial communities (i.e., the epilithon) were collected at two sites from Pohoiki 1–3 using previously described methods (Hoffman et al. 2018a, 2018b, 2020). Briefly, ∼100 g of benthic epilithon (i.e., crusts and mat material) were collected from two locations in each pond using sterile spoons and spatulas. Samples were preserved in RNAlater (ThermoFisher) and frozen at −80°C until DNA extraction. DNA extractions were performed in duplicate on ∼0.3 g of material using DNeasy Powersoil Pro Kits (Qiagen), with bead-beating being used to homogenize samples.

To compare microbial communities from the recently created anchialine habitats to those of established habitats, we used publicly available data generated from benthic microbial samples that were previously characterized (Supplementary Table S1) (Hoffman et al. 2018a, 2018b, 2020). These older samples were collected and processed using the same methods described here. They included samples from four habitats with orange cyanobacterial-bacterial crust communities: Hanamanioa (HM) and Skippy's Pond (SKIP) on Maui as well as Pohue Bay (PB) and Waikoloa (at Kapalaoa Bay, AB and AC, and at the resort, WAI) on Hawaii. Three habitats at Hualalai on Hawaii with green algal mats were also included (HA, HB, and HC). One cave on Hawaii, Puhi 'Ula (PU) with basalt pebble substrate, was included, as well as a large pond on Hawaii with mud substrate at Pu'uhonua O Hōnaunau National Historical Park (PUHO). Samples from reference habitats were collected during different seasons in 2010 and 2011, except for those at Waikoloa and Hualalai, which were all sampled during January 2013, and those at PB and PU, which were only sampled once in July 2010.

DNA profiling and microbial community analyses

Sequence data were generated using a similar scheme to that described previously for the reference samples included here (Hoffman et al. 2018a, 2018b). For each sample from the new ponds at Pohoiki, two DNA extractions were sent to the Genomic Sequencing and Analysis Facility at the University of Texas where PCR was performed on 20 ng of each template DNA. Two regions were amplified for each sample: the hypervariable *Bacteria*-specific V6 region of *16S-rRNA* using primers 967–985F and 1078–1061R (Gloor et al. 2010), and the hypervariable *Eukarya*-biased V9 region of *18S-rRNA* using primers 1389F and 1510R (Amaral-Zettler et al. 2009). These were the same gene regions amplified previously for the reference anchialine habitats, allowing for direct comparisons between datasets. The 72 DNA samples (three ponds x three sampling dates x two sampling sites per pond x two DNA extractions x two rRNA markers) were sequenced on a single flow cell of an Illumina MiSeq and 250 bp paired-end reads were delivered in FASTQ format.

Note that the amplicons used here were only 111 and 121 bp (16S and 18S, respectively), meaning that a substantial amount of trimming was needed on the fastq files. However, we opted for this strategy rather than sequencing larger amplicons to more directly compare samples from the new habitats to those from the established habitats (which were sequenced with older technology). Also, note that the 16S *Bacteria* and 18S *Eukarya* primer sets recovered additional targets like chloroplast and mitochondrial sequences in the 16S dataset and *Bacteria* in the 18S dataset. We therefore analyzed these data after filtering out non-target sequences based on assigned taxonomy (i.e., creating a "filtered" dataset). We also analyzed the "unfiltered" dataset, which may more accurately reflect overall microbial diversity. Results using the "filtered" dataset are discussed and presented in the main text, while results based on the "unfiltered" dataset are provided in the Supplementary Information. Notably, results were similar regardless of the examined dataset.

Unfortunately, the 18S forward reads were of uniformly low quality in the reference habitat samples (see Hoffman et al. 2018b), so for 18S, we performed two sets of analyses: (1) only reverse reads using the new samples and reference habitat samples, and (2) both forward and reverse reads using only the new habitat samples. Therefore, the presented 18S results are based on reverse reads only when comparing the new Pohoiki habitats to reference habitats, and both forward and reverse reads when solely comparing among the new Pohoiki ponds.

For both 16S and 18S, resulting sequences were quality filtered using Quantitative Insights Into Microbial Ecology 2's (QIIME2; Bolyen et al. 2019) DADA2 plugin, which contains internal chimera checking methods and abundance filtering (Callahan et al. 2016). The default QIIME2 chimera-checking and abundance filtering settings were used (Bolyen et al. 2019). This plugin was also used to overlap forward and reverse reads. Taxonomy was then assigned to each amplified sequence variant (ASV) using the classify-consensus-blast plugin in QIIME2, with reference being set to the pre-formatted SILVA database (16S/18S, SSU) (v. 138) (Quast et al. 2013). Reference sequence and taxonomy files were processed using RESCRIPt (Robeson et al. 2021) and were exported using QIIME2 (Bolyen et al. 2019). QIIME2 formatted files produced for generating taxonomic barplots were visualized with the QIIME2view online tool (https://view.qiime2.org/) using taxonomic level 2 (roughly correlating to phyla). Beta-diversity matrices (Binary Jaccard and Bray–Curtis dissimilarities) were calculated in QIIME2 based on ASVs.

Rarefication curves (Supplementary Fig. S1) were examined to decide on the sequencing depth used to equalize the number of reads per sample. We took two approaches. First, we rarified to 20,000 reads for each sample and included replacement (—p-with-replacement option in QIIME2) to include samples with fewer than 20,000 reads in our analyses. While sampling with replacement did not affect results in a recent study examining rarefication, the authors expressed caution against using this approach blindly (Cameron et al. 2021). Therefore, we performed a second approach without replacement. Sampling depth was set so that no more than 10% of samples would be excluded from a particular analysis. This equated to a sampling depth of 2814 reads for 16S, 4206 reads for the 18S dataset based on forward and reverse reads from the new habitat samples, and 7753 reads for the 18S dataset based on reverse reads only from all samples. In the main text, we emphasize results from analyses with replacement, but the alternate strategy produced very similar results.

Resulting beta-diversity matrices based on ASVs were imported into Plymouth Routines in Multivariate Ecological Research (PRIMER-e v. 7) (Anderson et al. 2008) to produce non-metric multidimensional scaling (nMDS) ordinations. A permutational multivariate analysis of variance (PERMANOVA) was performed to examine significance between groups in PRIMER for each beta-diversity matrix (Anderson et al. 2008). We tested for several differences between samples (e.g., new habitats vs reference habitats and among time points for each new pond). A PERMDISP test was conducted in PRIMER to determine whether the multivariate dis-

Table 1. Physiochemical properties of anchialine habitats examined here.

Site	Hot pond	Pohoiki 1			Pohoiki 2			Pohoiki 3		
Latitude	19.4578	19.45783			19.45765			19.45753		
Longitude	−154.84317	−154.84311			−154.84364			−154.84178		
Sample date	Jul 2, 2020	Jul 2, 2020	Nov 20, 2020	Mar 28, 2021	Jul 2, 2020	Nov 20, 2020	Mar 28, 2021	Jul 2, 2020	Nov 20, 2020	Mar 28, 2021
In situ measurements										
Temperature (°C)	40.27	–	41.76	43.60	41.6	43.12	41.87	39.81	41.72	42.63
DO (%)	91.2	–	109.3	95.6	97.8	98.5	89.3	104.7	111.1	107.6
Salinity (ppt)	14.00	–	14.68	12.17	14.96	15.23	10.62	14.06	14.98	12.22
SPC (μS/cm)	24,329	–	24,702	20,875	25,143	25,606	18,403	23,685	25,168	20,925
pH	–	–	7.67	7.41	–	7.47	7.42	–	7.71	7.71
NTU	0.97	–	–	–	2.5	–	–	2.56	–	–
Water chemistry analyses*										
Salinity (ppt)	–	14.18	14.69	9.87	15.45	15.21	9.57	14.40	15.15	11.09
pH	–	7.55	–	–	7.64	–	–	7.93	–	–
$NO_2 + NO_3$ (μM)	–	29.115	25.575	63.40	27.93	23.94	75.26	32.37	30.37	67.52
PO_4 (μM)	–	1.705	1.615	2.00	1.65	1.38	1.76	1.85	1.94	2.07
H_4SiO_4 (μM)	–	1108.88	689.945	1352.09	1227.35	598.84	1180.90	1216.71	631.83	1327.05
NH_4 (μM)	–	0.58	0.445	2.23	ND	ND	1.64	ND	0.66	2.20
DOC (μM)	–	48.69	411.45	754.20	24.82	377.50	746.50	34.44	579.90	757.35
TDN (μM)	–	35.05	33.86	44.52	29.53	29.26	51.40	36.84	37.99	62.86
TDP (μM)	–	1.86	1.76	2.02	1.69	1.47	2.73	1.88	1.98	2.24

* Water chemistry data are averages of two samples, (see Supplementary Table S2 for data on both samples).
Abbreviations: DO, dissolved oxygen; SPC, conductivity; ND, not detected; NTU, turbidity; $NO_2 + NO_3$, nitrate + nitrite; PO_4, orthophosphate; H_4SiO_4, silica; NH_4, ammonium; DOC, dissolved organic carbon; TDN, total dissolved nitrogen; TDP, total dissolved phosphate.

persion was homogenous (Anderson 2006). For very few comparisons, the PERMDISP test returned a significant result ($P < 0.05$; although likely not significant after multiple-testing corrections), suggesting that some comparisons had a non-homogenous dispersion. We therefore suggest a cautious interpretation of statistical results presented here, although broad comparisons (e.g., those not comparing time points) are statistically robust.

Results

Newly formed anchialine habitats retain high temperatures

Physiochemical parameters quantified for the newly formed Pohoiki anchialine habitats (Table 1) were generally in the range of parameters measured previously in established Hawaiian anchialine habitats (Supplementary Fig. S2) (Hoffman et al. 2018b). However, concentrations of silica were among the highest recorded for anchialine habitats, being comparable to habitats on Hawaii with orange cyanobacterial-bacterial crust communities (Supplementary Fig. S2). DOC levels were comparable to previous habitats at the first sample date, but increased with time and became ∼4 times higher than reference habitats by the last sampling date (Supplementary Fig. S2). Salinity was intermediate between seawater and freshwater and was somewhat variable between the three sampling dates (Table 1), as expected for anchialine habitats. Water level also changed with the tide, another characteristic of anchialine habitats.

Temperatures were uniformly high in all the newly formed anchialine habitats, with measurements reaching nearly 44°C *in situ* (Table 1). Our previous measurements of anchialine habitats in 2011 suggest that anchialine habitats in Hawaii rarely exceed 30°C (Supplementary Fig. S3), which is supported by previous measurements in habitats of the Cape Kinau region of Maui (Maciolek 1986). The only temperatures that routinely approached those of the new habitats were recorded in a shallow area of Queen's Bath (Maui) during midday (Supplementary Fig. S3). However, it is unclear if the shallow logger where those high temperatures were recorded remained submerged during the low tides that occurred around midday. More generally, temperatures in anchialine habitats can vary substantially throughout the day, even in deep regions (Supplementary Fig. S3), but are relatively stable throughout the year (Maciolek 1986). Temperatures also varied with depth, although not consistently across habitats (Supplementary Fig. S3), with some sites showing higher temperatures at shallow depths and others showing the reverse pattern. This may be due to tidal influences or the specific basin architectures of individual habitats.

Newly formed anchialine habitats have a distinct microbial community

On average, 62,388 raw paired-end reads (± 9623) were generated for each of the 36 samples from the new habitats at Pohoiki using the *Bacteria*-specific 16S primer set, while 56,278 reads (± 5580) were generated using the *Eukarya*-biased 18S primer set (Supplementary Table S2). Based on nMDS ordination analysis, three distinct clusters of microbial communities were found, corresponding to established habitats with algae or mud communities, established habitats with orange crust communities, and communities from the new habitats at Pohoiki (Fig. 2, Supplementary Fig. S4–S6). These community types were significantly different from each other based on both the 16S and 18S analyses and regardless of the filtering approach, rarefaction scheme, or diversity index used ($P < 0.001$, $t > 1.93$ across the different methods, PERMANOVA, Fig. 2, Supplementary Fig. S4–S7). In general, samples also clustered together based on habitat of origin (both for new and established habitats), indicating each habitat has a distinct microbial community. These comparisons between habitats were statistically significant via PERMANOVA for comparisons where multiple samples were collected from the same habitat (i.e., all comparisons except those involving PU and PB, which had only a single sample each). Importantly, the three new habitats at Pohoiki each had a distinct microbial community when all time points within a habitat were pooled. This held for both 16S ($P < 0.001$, $t > 1.53$ for all comparisons, Fig. 2A) and 18S ($P < 0.003$, $t > 1.64$ for all comparisons, Fig. 2B, using either both reads or reverse only), and these results were again robust to different methodological choices.

The new habitats at Pohoiki tended to have more diverse bacterial communities than those of the established anchialine habitats. For the 16S analysis, the new habitats averaged 352 ASVs, while the established ponds averaged just 101 ASVs (Table S2). However, this was not found in the 18S analysis, where new habitats averaged 127 ASVs compared to 716 ASVs in the established habitats (Table S2). These general patterns held whether the new habitats were compared to established ones with or without orange crust communities.

While the established anchialine habitats we used here for comparison had 16S-communities composed largely of Cyanobacteria, Proteobacteria, Bacteriodota, and unidentified Bacteria, the new habitats at Pohoiki had noticeably different communities, with large proportions of Planctomycetota and Chloroflexi (Fig. 3A, Supplementary Fig. S7). Chloroflexi made up ∼11% of 16S communities in the Pohoiki habitats, but only 0.4% in the established habitats, and the difference was similar for Planctomycetota (∼8 vs <0.01%). Given this, the proportion of Cyanobacteria and Proteobacteria was smaller (although still high) in the Pohoiki

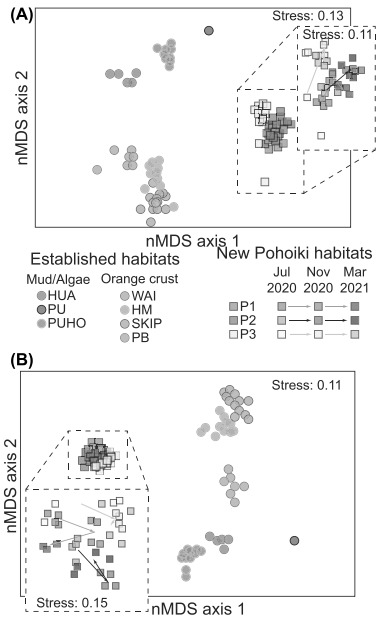

Fig. 2. Non-metric multi-dimensional scaling (nMDS) ordination of microbial community samples analyzed in this study. Ordinations shown here are based on the Binary Jaccard dissimilarity index using the filtered dataset and rarefied to 20,000 reads per sample with replacement, but those based on the Bray–Curtis index, using the unfiltered dataset, or other rarefication schemes were similar (Supplementary Fig. S4–S7). Samples were amplified using (A) the *Bacteria*-specific V6 hypervariable region of the *16S-rRNA* or (B) the *Eukarya*-specific V9 hypervariable region of the *18S-rRNA* genes. Reference samples from established anchialine habitats are shown in orange (orange crusts communities) or green (mud/algae communities), while those from the new habitats at Pohoiki are in blue (P1), gray (P2), or yellow (P3). Insets show ordinations of the new habitats, with increasing color intensity showing later time points. The general direction of change for each habitat is indicated with arrows in the insets.

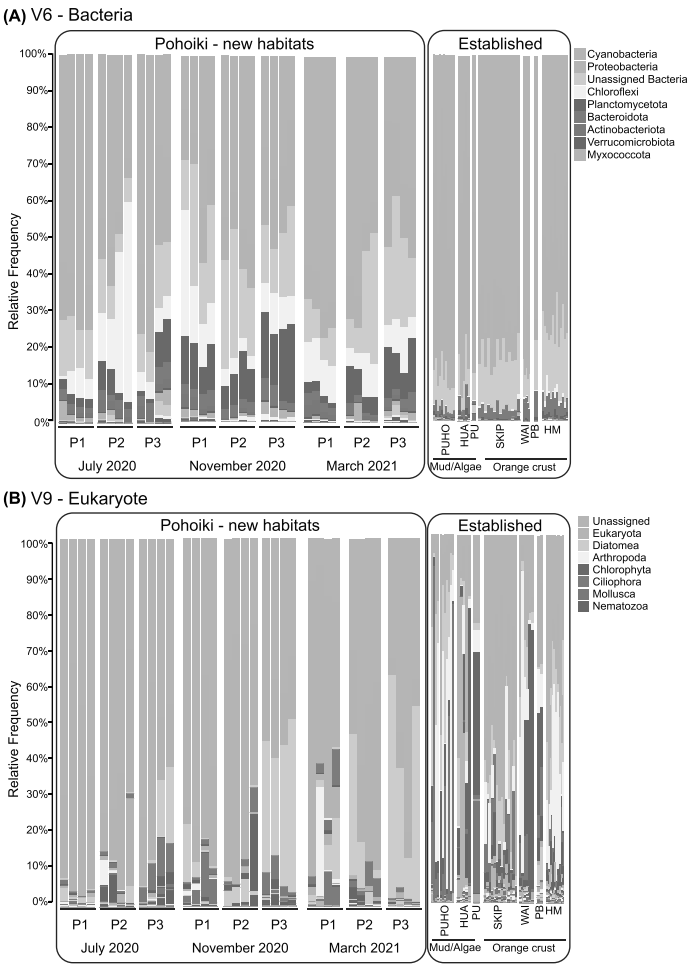

Fig. 3. Microbiome profiles of the (A) 16S, *Bacteria*-specific and (B) 18S, *Eukarya*-specific amplified communities (based on reverse reads only from the filtered dataset and rarefied to 20,000 reads per sample with replacement; see Supplementary Figs. S7 and S8 for similar plots based on other criteria). The established habitats used for reference are grouped by community type (orange crust and mud/algae), while the new habitats at Pohoiki are grouped by habitat and sampling time. The displayed taxa correspond to a "level 2" analysis in QIIME 2 (roughly phyla). Legends only display colors corresponding to the most abundant taxa (i.e., to account for ~90% of taxa across habitats) and the order of taxa in the legend (from top to bottom) correspond to their order in the bar plots.

ponds (e.g., ~10% smaller for both). More surprisingly, Chlorophyta (green algae) made up a small proportion of the 18S-communities at the Pohoiki habitats (either <0.01% or totally absent in many samples), compared to the established, reference habitats which averaged ~8% (Fig. 3B, Supplementary Fig. S7–S9). Interestingly, sequences attributable to Arthropods were also nearly absent in the new ponds, but averaged 16% in established ponds (Fig. 3B, Supplementary Fig. S7–S9).

Microbial succession over short time scales in new habitats

Community composition in the new habitats at Pohoiki did change over time, but not as expected under the hypothesis that they would become more similar to the established, reference habitats. Specifically, when samples across Pohoiki habitats were grouped by time point, there was a significant difference between each time point for 16S- and 18S-communities ($P < 0.010$, $t > 1.39$ for all comparisons, Fig. 2), except for the two later time points (November 2020 and March 2021) in the 16S-communities ($P = 0.061$, $t = 1.20$). When each new habitat was considered separately for each time point, there were significant differences for all comparisons for both 16S- and 18S-communities ($P < 0.047$, $t > 1.21$ across all comparisons, Fig. 2). For example, within a single habitat there were significant differences among all time points, and within a single time point there were significant differences among all habitats. Again, these results were generally robust to different ways of performing the analyses.

Each new habitat also changed in a similar way over time (Fig. 2), although not along a trajectory towards becoming more like any of the established habitats. Overall, the proportions of Planctomycetota and Chloroflexi in the 16S-communities slightly increased over time, while the proportions of Cyanobacteria and Proteobacteria decreased, counter to what would be expected if the new habitats were tracking in the direction of the established habitats (Fig. 3A). Similarly, Chlorophyta in the 18S-communities only increased moderately in the new habitats over time, remaining at <1% of the microbial community at all time points, and recovery of Arthropoda sequences did not increase with time in the new habitats (Supplementary Figs. S8 and S9).

Discussion

Young anchialine habitats harbor distinct microbial communities

Volcanic activity creates new habitats that can be colonized by microbes, plants, and animals. While primary ecological succession has been examined in terrestrial habitats following volcanic eruptions (del Moral and Wood 1993; Vitousek et al. 1993; Nara et al. 2003), such patterns in aquatic habitats remains understudied. Here, we examined microbial communities in anchialine ponds created ~2 years prior to sampling by employing metabarcoding and sequence profiling of 16S and 18S rRNA regions. Our main findings are two-fold. First, newly created anchialine habitats harbor a highly distinctive benthic microbial community compared to any habitats described previously. Second, while communities of new habitats show appreciable changes in their structure over short timescales, they do not yet appear to be transitioning to anything resembling communities in established habitats examined to date.

As described previously, anchialine habitats in Hawaii with the distinctive orange cyanobacterial-bacterial crust have very different microbial communities than those with mud, green algal mats, or other types of periphyton (Hoffman et al. 2018a; 2018b). Based on our nMDS analyses, the differences between microbial communities in the new Pohoiki habitats and either orange crust or mud/algae habitats is at least as extreme as the difference between orange crust and mud/algae habitats (e.g., $t > 2.68$ vs $t = 2.03$ or 2.57, PERMANOVA, Figs. 2 and 3). This strongly suggests that the new Pohoiki habitats represent novel microbial assemblages distinctive from all other anchialine habitats. Anchialine habitats also tend to harbor distinct communities endemic to individual ponds or caves, both in Hawaii (Hoffman et al. 2018a; 2018b) and elsewhere (Kajan et al. 2021). The new habitats at Pohoiki support this general pattern, as each pond harbored a statistically distinct microbial community in all our comparisons (Fig. 2). This result was somewhat surprising, as these habitats are quite close to each other (<10 m in some cases) and certainly share the same groundwater. These results suggest a high degree of endemism in microbial communities of anchialine habitats and that newly formed habitats harbor very different communities than those of established habitats.

The high proportions of Planctomycetota and Chloroflexi in the new habitats suggest ecosystem functions of the benthic communities may differ compared to those of the reference, established habitats. Chloroflexi were first known as "green non-sulfur bacteria" and are a major component of many extreme aquatic systems, including hot springs and hypersaline environments (Thiel et al. 2019). Being anoxygenic phototrophs, they likely are spatially segregated from other taxa like oxygen-producing cyanobacteria. This is reasonable given the 3D structure of many communities in established anchialine habitats, including the presence of distinct layers (Hoffman et al. 2020). Chloroflexi have

also been suggested to provide a structural component to support other microbes in activated sludge (Speirs et al. 2019). Furthermore, several Planctomycetota genera were identified as highly-abundant in new habitats, including *Gemmata* and the uncultured SM1A02 and OM190. These microbes are often associated with algae (Lage and Bondoso 2014; Rambo et al. 2020) and are metabolically diverse, forming close associations with other bacteria or eukaryotes. It is interesting to speculate that such taxa may be "nurse" species, facilitating the establishment of other species during the early stages of microbial succession in anchialine habitats.

We note that a shortcoming of our analyses is the lack of directly comparable, established reference habitats with characterized microbial communities. The habitats used here for reference are from different coasts or islands and were sampled at different times (i.e., sampled ∼10 years apart). While there are anchialine habitats closer to Pohoiki that could be examined near Hilo and within the boundaries of Hawaii Volcanoes National Park, these are difficult to access. Moreover, microscopic descriptions of the periphyton and general features of these habitats suggest they, along with their microbial communities, are different from the new habitats at Pohoiki (Chai et al. 1989). The established anchialine habitats examined here appear to have relatively stable microbial communities based on sampling during wet and dry seasons across ∼1.5 years (Hoffman et al. 2018a). This suggests that even if communities at the reference habitats have changed within the last ∼10 years, these changes are likely not extreme enough to explain the large differences between the new and established habitats. An obvious comparison at Pohoiki is the "Hot Pond," as it also was affected by the 2018 Kilauea eruption and is quite close (∼100 m) to the new habitats. Microbial communities at this pond have not been sampled for sequence profiling, although we note that the general characteristics of this pond are quite different than those of the new habitats (e.g., rubble bottom basin with leaf litter vs basalt rocks with crust/mat communities). Analyses of benthic communities in this pond in 1980 also described several abundant taxa (e.g., mollusks, ciliates, and flagellates) that were not detected in the new habitats examined here (Chan and Fujii 1980). Therefore, while our conclusions are based on available microbial community data from Hawaiian anchialine habitats to date, we note that sampling efforts have been minimal and long-term sampling of diverse habitats would be useful.

Highly elevated temperatures in the new habitats at Pohoiki may also explain their distinct microbial communities. Specifically, temperatures were routinely >40°C at each sampling time for all new habitats (Table 1). This is likely due to increased geothermal activity at Pohoiki beginning with the 2018 eruption of Kilauea, as prior temperatures from the nearby "Hot Pond" were ∼32–35°C at various sampling times from 1980 to 2016 (Santos, pers. obs.; Chan and Fujii 1980; Evans et al. 2014), but were elevated to 40°C in July 2020 (Table 1), suggesting increased geothermal activity has warmed the groundwater under Pohoiki. In contrast, prior measurements at other anchialine habitats (including many of the established, reference habitats examined here) seldom exceeded 30°C (Supplementary Fig. S3). It is therefore possible that the Pohoiki region remains "warm" from previous geothermal activity and the resulting elevated temperatures are a major driver in shaping the microbial communities of these new habitats. Temperature has previously been shown to be a driver of microbial community structure in marine habitats (Ward et al. 2017; Frade et al. 2020; Kopprio et al. 2020), including hot springs with cyanobacterial-bacterial mat communities (Lacap et al. 2007; Briggs et al. 2014).

Ecological succession in newly formed anchialine habitats

Previous work suggests benthic microbial communities in the Hawaiian anchialine ecosystem are relatively stable over ∼1–2 years and across seasons (Hoffman et al. 2018a). For example, sampling at SKIP, HM, and PUHO (i.e., reference habitats in this study) failed to detect a significant difference in 16S- and 18S-communities collected from July 2010–December 2011 based on their time of sampling (Hoffman et al. 2018a). In contrast, the new Pohoiki habitats examined here did undergo statistically significant changes over a similar time period (Fig. 2). However, while all three new habitats underwent similar changes at the community level (i.e., direction of arrows in insets of Fig. 2), each are quite similar at all time points when compared to the established, referenced habitats. In other words, geographic location and/or habitat of origin are much stronger predictor(s) of community structure than time. Below, we explore three possible hypotheses to explain this pattern.

First, "climax" anchialine microbial communities (Horn 1974) may become established relatively quickly after habitat formation. For example, microbial succession can be rapid in some habitats, progressing over the course of weeks (Kaplan and Kitts 2004), especially if nutrient concentrations are high during primary succession (Knelman et al. 2014). In contrast, our first sampling date was ∼2 years after the likely creation of the new habitats at Pohoiki, and primary microbial communities may have become established and then changed greatly before our first samples were collected. Thus, while our sampling strategy was designed

to track the early stages of microbial succession, we may have only captured later "fine-tuning" of these microbial communities given that changes did appear to be larger between the earliest time points.

Second, the continued high temperatures at the new Pohoiki habitats may have an impact on ecological succession of their microbial communities. Although anchialine habitats recurringly form over geologic timescales due to events like volcanic activity, it is not known how long such habitats remain "hot" following their formation. The establishment of stable climax communities such as the orange crust may require cooler temperatures. The habitats at Pohoiki have likely had elevated temperatures since their formation, and more recent sampling efforts (January 2022) confirm that temperatures remain high at these habitats and are possibly even still increasing (P1—42.03°C, P2—44.92°C, and P3—43.03°C). Benthic samples and environmental parameters should continue to be monitored in these habitats to determine how temperature, salinity, and other factors affect microbial community changes in these young anchialine habitats.

Third, a growing body of literature suggests that grazing by the endemic atyid shrimp *H. rubra* influences microbial communities in anchialine habitats of Hawaii. Correlative analyses across natural anchialine habitats (Dalton et al. 2013), examinations of grazed and non-grazed communities on tiles deployed in anchialine habitats (Sakihara et al. 2015), and sequence profiling of proxy communities subjected to different levels of grazing in the laboratory (Havird et al. 2022) all indicate that the presence of shrimp alters community composition of the periphyton and may increase algal abundance. Grazing by other atyid shrimps has also been shown to alter biomass and composition of aquatic benthic communities (Pringle 1996; De Souza and Moulton 2005). While *H. rubra* was observed in the new habitats at Pohoiki, they were far less abundant than in many established, reference habitats and were mostly confined to under rocks. Often *H. rubra* was not observed at all during collection of microbial samples and sequences attributable to Arthropoda like *H. rubra* were largely absent from 18S profiles of the new ponds (in contrast to the established ponds, where Malacostraca sequences were found), suggesting shrimp have not yet become fully established in these new habitats. High DOC levels at later sampling dates in the new habitats may also reflect a lack of shrimp grazing (Supplementary Fig. S2). High temperatures may be the cause of low shrimp abundances, as the critical thermal maximum (CT_{max}) of *H. rubra* in captivity is ∼37°C (Havird, pers. obs.). While genetic variation and thermal acclimation may allow shrimp populations to tolerate higher temperatures in natural habitats, it is possible that the high temperatures at Pohoiki prevent shrimp grazing and, in turn, possibly microbial succession. Detailed surveys of shrimp populations should be made in these new habitats, including diel surveys (Capps et al. 2009; Havird et al. 2013; Dudley et al. 2017), to determine how microbial communities may change when or if shrimp populations (and other anchialine macrofauna such as mollusks) become established.

Conservation implications

Anchialine habitats and organisms are threatened worldwide, particularly in Hawaii, due to invasive fish (Havird et al. 2013), habitat degradation via development and non-point source pollution (Brock et al. 1987; Bailey-Brock and Brock 1993) as well as rising sea levels due to climate change (Marrack 2016). The finding here that newly created anchialine habitats can have microbial communities that are unlike any observed in older habitats suggests that young habitats should be viewed with special conservation concern. This also reiterates the more general finding that although anchialine microbial communities may appear phenotypically similar, each habitat generally harbors a unique and distinctive microbial community (Hoffman et al. 2018b). While the new habitats at Pohoiki have not undergone noticeable degradation since their creation, we often observed people swimming in the new warm ponds. It is unclear how such activities might influence microbial communities in these habitats or their natural patterns of succession.

While some anchialine macro-organisms have been considered candidates for protection at the State and Federal level, current efforts often ignore the microbial components of the anchialine ecosystem. There is a need to protect unique microbial communities (Griffith 2012), as microbes from such communities can have both practical applications (Bender and Phillips 2004; Ishino and Ishino 2014) and influence our understanding of evolution (Rothschild and Mancinelli 2001; Walker et al. 2005). Because bacterial communities in the new anchialine habitats described here are both unique and more diverse compared to other habitats (Figs. 2 and 3), an in-depth examination of their microbial communities may identify important new species. Therefore, while the 2018 eruptions of Kilauea caused much damage, including destroying ∼700 homes, the new anchialine habitats it created may be important for future biological understanding in general.

Acknowledgments

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our way to greater understanding across scales of biological organization" for their invitation to contribute this work. We thank D. Kuamo'o, A. Penrose Jr., R. Weaver, and M. Kamioka for vital assistance in the field, B. Neilson, B. Kanenaka, R. Okano, and D. Sakoda (Division of Aquatic Resources) for support towards this project, and T. Holitzki and E. Johnson (UHH Analytical Lab) for water quality sample analyses.

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Supplementary data

Supplementary data available at *ICB* online.

Conflicts of interest statement

The authors have declared no conflicts of interest.

Data availability

Sequence data generated here for the new habitats at Pohoiiki were uploaded to NCBI's SRA database and are publicly available under BioProject PRJNA819984. Previously described sequences from reference habitats are available under BioProjects PRJNA767902 and PRJNA325159. Raw outputs from QIIME2, feature tables summarizing abundance of each taxa in each sample, and raw output of the PERMANOVA and PERMDISP tests for each dataset analyzed are available via FigShare at DOI: 10.6084/m9.figshare.19425599 (https://tinyurl.com/yckf5h92).

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THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <jchavird@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Justin C. Havird:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 9, 2023 that provide information about the ongoing study of anchialine pools in Hawai'i. The Final Environmental Assessment (EA) will include the comments from DLNR - Division of Aquatic Resources (DAR) that mention the naturally formed anchialine ponds and the detection of two native anchialine shrimp species during biological surveys conducted by DAR from 2019 to 2020. The letter from DAR (Ref. DAR #6397) states that it is not opposed to the filling of the ponds at the backshore area in part because the water temperatures increased to over 45 degrees Celsius (or 113 degrees Fahrenheit) and extirpated native anchialine shrimp species from that habitat. DAR expanded its anchialine surveys into the new lava field north of Pohoiki and recorded new habitat with native anchialine shrimp species including the endemic *Halocaridina rubra* (or 'ōpae 'ula) and the indigenous *Metabetaus lohena*.

DAR also states in its letter that the filling of anchialine ponds habitats would typically be discouraged based on its efforts to protect these unique habitats; however, the proposed action in this instance is not expected to have measurable impacts to native anchialine species or nearby anchialine or other aquatic habitats. All written comments including your email and DAR's letter will be included with the Final EA.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

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From: Adam Medeiros <amanhowzit@gmail.com>
Sent: Wednesday, May 10, 2023 8:56 AM
To: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Pohoiki

Aloha I am emailing to support the total and complete restoration of pohoiki bay using fema funds from the damage caused by 2018 eruption.

My family fished, surfed and played in that bay before the eruption. Now we can't at all. The "hot ponds" is gross and in my option is a public health hazard. It is in no way similar to alahanui or pohoiki pre eruption. Please continue with the plans to remove the entirety of the material at pohoiki bay.

Mahalo.
--
Adam Medeiros
WristWidget Director of Operations.

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <amanhowzit@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Adam Medeiros:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 10, 2023 that indicate support for the proposed project. The amount of funding available for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: Joshua Ganus <ohmwearth@gmail.com>
Sent: Wednesday, May 10, 2023 9:27 AM
To: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Please

Please do not dredge this natural rare phenomenon. Pele created this hot spring the way it is for a reason. There's many other places for a boat ramp to be made. Obviously god want this to be this way why would we have the audacity to just destroy such amazing healing beauty that actually brings in funds for local communities.

Destroying this would destroy the ALOHA OF THE AINA

Sent from my iPhone

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <ohmwearth@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Joshua Ganus:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 10, 2023. We understand your comments as opposition to the proposed project. No action is preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

DOBOR's proposed project does not involve alterations to or activities near the Pohoiki Warm Springs, which are located mauka (or upland) of the beach and vegetation line at Pohoiki Bay. The Final EA will state that dredged material would be placed in the backshore area, which would eliminate ponds that are makai (or seaward) of the vegetation line. The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. The amount of funding available for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: Robert Gerard <rgdgerard@aol.com>
Sent: Wednesday, May 10, 2023 11:36 AM
To: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Comments re: Pohoiki dredging project

Dredging project at Pohoiki boat ramp and restoration of ramp:a cost benefit analysis.

Assume 30 launches/day, everyday (likely an overestimate) That's 10,950 launches/ year Projecting a 20 year use period is 219,000 launches (assumes no new volcanic activity affects the boat ramp. This is probably not a safe bet) Cost is projected at $22M, minimum, never mind cost overruns that would occur during the 5+ year process So $22,000,000/219,000 launches= $99.50/ launch

This is a huge amount of money to spend to facilitate convenient ocean access by the relatively few people who will use the facility. It is simply not a cost-effective use of public funds. It also doesn't matter if the Federal Government picks up 75% of the tab, it's still not a good idea. Let's be responsible in how we spend our money.

Robert Gerard
Waikoloa Village
Sent from my iPhone

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <rgdgerard@aol.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Robert Gerard:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 10, 2023. We understand your comments as opposition to the proposed project based on your analysis of the cost. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment.

The amount of funding available for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained. The Puna community is expected to benefit from having its people resume activities that provide income and food for their families.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: Statts, Meghan L <meghan.l.statts@hawaii.gov>
Sent: Wednesday, May 10, 2023 12:16 PM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>
Subject: FW: [EXTERNAL] Pohoiki Boat Ramp Restoration

FYI

Mahalo,

Meghan Statts, Deputy Administrator
Division of Boating and Ocean Recreation
4 Sand Island Access Road
Honolulu, Hawaii 96819
(808) 587-1967

From: DLNR.BLNR.Testimony <blnr.testimony@hawaii.gov>
Sent: Wednesday, May 10, 2023 12:13 PM
To: Underwood, Ed R <ed.r.underwood@hawaii.gov>; Statts, Meghan L <meghan.l.statts@hawaii.gov>; Howard, Richard T <richard.t.howard@hawaii.gov>
Subject: FW: [EXTERNAL] Pohoiki Boat Ramp Restoration

FYI

Darlene Ferreira
Secretary
Board of Land and Natural Resources
Department of Land and Natural Resources
Office: 808.587.0404
Cell: 808.291.1197
Email: Darlene.S.Ferreira@Hawaii.gov

BLNR.Testimony@hawaii.gov

From: Jeffrey Northon <jeffrey.northon@gmail.com>
Sent: Wednesday, May 10, 2023 11:06 AM
To: DLNR.BLNR.Testimony <blnr.testimony@hawaii.gov>
Subject: [EXTERNAL] Pohoiki Boat Ramp Restoration

I do think a little research on similar problems of harbor will reveal the Santa Cruz California harbor. This harbor was built south of the San Lorenzo River, and receives sediment, rock and sand transported by wave action. It has become an expensive solution to maintain a dredge and operate it during winter and springtime. It often reaches a level of siltation to a point the harbor is not accessible.

https://www.santacruzharbor.org/dredging-scientific-studies-reports/

A better solution exists that will not be subject to dredging maintenance, Punaluu Boat Ramp,

Punaluu Boat Ramp
https://maps.app.goo.gl/zjM4sLMQqKrsvDSz8

Improvements to the launch ramp would be needed, such as three launch ramps, lighting and a water supply.

Shared route
From Pohoiki Black Sand Beach to Punaluu Boat Ramp via HI-11/Hawai'i Belt Rd.

1 hr 55 min (81 mi)
1 hr 55 min in current traffic

1. Head northwest on Kalapana Kapoho Beach Rd toward HI-137
2. Turn left onto HI-137
3. Slight right toward HI-137
4. Continue straight onto HI-137
5. Turn right onto Pahoa Kalapana Rd
6. Continue straight
7. Merge onto HI-130
8. At the traffic circle, take the 1st exit
9. At the traffic circle, continue straight to stay on HI-130/Keaau-Pahoa Rd
10. Turn left onto Keaau Bypass Rd
11. Turn left onto HI-11/Hawai'i Belt Rd/Volcano Rd
12. Turn left onto Punalu'u Rd
13. Turn left
14. Arrive at location: Punaluu Boat Ramp

For the best route in current traffic visit https://maps.app.goo.gl/eMnktCxXaWkznwwm6

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <jeffrey.northon@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Jeffrey Northon:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the email sent on May 10, 2023. We understand your comments as opposition to the proposed project. Site improvements that would transform the privately-owned Punalu'u Wharf into a more robust facility are preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

We acknowledge the suggestion to examine problems associated with the Santa Cruz, California harbor. Suggested site improvements (e.g., three launch ramps, lighting and a water supply) are not suitable for further consideration from DOBOR's perspective. The Punalu'u Wharf is a historic property with a shoreline ramp built in 1916 and a heiau nearby. The Final EA will include the following citation and link:

> Big Island Residents Halt Punalu'u Excavation
> By Pacific Media Group / Big Island Now / Jul. 27, 2017
> https://bigislandnow.com/2017/06/27/big-island-residents-halt-punaluu-excavation/

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAI'I
345 KEKŪANAŌ'A STREET, SUITE 20 • HILO, HAWAI'I 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

May 12, 2023

Mr. Finn McCall, P.E., Project Manager
State of Hawai'i, Department of Land and Natural Resources
4 Sand Island Access Road
Honolulu, HI 96819

Dear Mr. McCall:

Subject: Draft Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
Tax Map Key (3) 1-3-008:014 Portion and Unencumbered Land (New Lava Flow)

We have reviewed the subject Draft Environmental Assessment and have no additional comments to offer at this time.

Should there be any questions, please contact Mr. Ryan Quitoriano of our Water Resources and Planning Branch at (808) 961-8070, extension 256.

Sincerely yours,

Keith K. Okamoto, P.E.
Manager-Chief Engineer

RQ:dfg

copy – Mr. Trevor Vagay, The Limtiaco Consulting Group

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <dws@hawaiidws.org>
Keith Okamoto, P.E., Manger-Chief Engineer
County of Hawaii, Department of Water Supply

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Mr. Okamoto, P.E., Manger-Chief Engineer:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the letter dated May 12, 2023. We acknowledge that the County of Hawaii, Department of Water Supply has no additional comments to offer at this time.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: galen alpine <galenalpine@hotmail.com>
Sent: Saturday, May 13, 2023 9:52 AM
To: finn.d.mccall@hawaii.gov
Cc: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Pohoiki boat ramp public comments.

Aloha.

Please restore pohoiki bay to its original shape by dredging out and removing ALL the material deposited by the 2018 lava flow, not just a small boat channel which will inevitably fill in.
As a resource for fishermen like myself if is the most important way for us to feed our familys and make a living. Now I have to trailer my boat from Kapoho to hilo , taking time and money and Unneeded wear in vehicles and highways. Then spend 400$ in gas to get back around to these most fertile fishing grounds along the puna coast just to catch the fish out from pohoiki bay.
As a resource for recreation and ocean access it to is so valuable as many families teach their children to swim and interact with the ocean in the protected waters and hundreds of surfers find their joy amongst the waves.
Ultimately it was the biggest hub for cultural and recreational activities that we had on the puna coast, and with your help and some major funding it can be restored to how it was pre lava.
Mahalos for your thoughts and considerations.

Galen Alpine
8083334606
Be super swell

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <galenalpine@hotmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Galen Alpine:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 13, 2023 that indicate support for the proposed project. We acknowledge the statements about traveling from Kapoho to Hilo, the cost of fuel, additional time, vehicle and highway wear, and the description of previous usage of the project site prior to the eruption.

The amount of funding available for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

JOSH GREEN, M.D.
GOVERNOR
KE KIA'ĀINA

KEITH A. REGAN
COMPTROLLER
KA LUNA HO'OMALU HANA LAULĀ

MEOH-LENG SILLIMAN
DEPUTY COMPTROLLER
KA HOPE LUNA HO'OMALU HANA LAULĀ

STATE OF HAWAI'I | KA MOKU'ĀINA O HAWAI'I
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES | KA 'OIHANA LOIHELU A LAWELAWE LAULĀ (P)23.076
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

MAY 15 2023

Trevor Vagay
The Limtiaco Consulting Group
1622 Kanakanui Street
Honolulu, Hawaii 96817

Dear Mr. Vagay:

Subject: Draft Environmental Assessment
Pohoiki Boat Ramp Dredging of Volcanic Debris
Pohoiki Bay Area, Puna District, Hawaii
TMK: (3) 1-3-008:014 por. and unencumbered land

Thank you for the opportunity to provide comments on the subject project. The project does not impact any of the Department of Accounting and General Services' projects or existing facilities, and we have no comments to offer at this time.

If you have any questions, your staff may call David DePonte of the Planning Branch at (808) 586-0492, or email at david.c.deponte@hawaii.gov.

Sincerely,

CHRISTINE L. KINIMAKA
Public Works Administrator

DD:mo

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <dagspwd@hawaii.gov>
Christine Kinimaka, Public Works Administrator
State of Hawaii Department of Accounting and General Services

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Administrator Kinimaka:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the letter dated May 15, 2023 (Ref. P23.076). We acknowledge the statements that the project does not impact any Hawaii Department of Accounting and General Services (DAGS) projects or existing facilities, and DAGS has no comments to offer at this time.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: David DePonte, DAGS Planning Branch (david.c.deponte@hawaii.gov)
Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: Zsoltima H <zsoltima1111@gmail.com>
Sent: Monday, May 15, 2023 11:20 AM
To: Trevor Vagay <Trevor@tlcghawaii.com>
Subject:

Aloha to whom it may concern .
I am a local fisherman.
Not for generations yet 23 years..we sold our boat due to the lava and now I am a fishing guide from shore. I would like to advocate to get us back in the water however most important not to damage the 110 degree hot pools.Not including the big one by the old ramp. That is the only one that should be dredged.
I know it's a sensitive topic ,however these healing ponds serve the community and give another unique natural delight for visitors. I think all is possible so every one gets what they want..we can holo again and my loved ones ,including me can enjoy the very hot ponds...ps I had never got staff infections in these with open wounds..in contrast I ended up several times with flesh eating kind from the old ponds. Thank you and I hope this was recieved.

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <zsoltima1111@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Zsoltima H.:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for your comments sent on May 15, 2023. We understand the comments as opposition to the proposed project. A project that retains the hot ponds is preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. The amount of funding available for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained.

DOBOR does not support the viewpoint that the ponds are a safe area for recreational activities such as swimming. Section 2.3. Water Quality in the Final EA will include additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. The following citations and links will be included in the Final EA:

Fecal bacteria found at a number of Hawaii beaches
By Paul Drewes / KITV4 / Jun. 20, 2023
https://www.kitv.com/news/local/fecal-bacteria-found-at-a-number-of-hawaii-beaches/article_cd3bac04-0ff1-11ee-9314-d3dd9fc8dd64.html

Thrill seekers jumping into polluted Ala Wai Canal waters spark major health concerns
By Jolanie Martinez / Hawaii News Now / Jun. 21, 2023
https://www.hawaiinewsnow.com/2023/06/22/thrill-seekers-jumping-into-ala-wai-canal-spark-major-health-concerns/

83,000 Hawaii homes dispose of sewage in cesspools. Rising sea levels will make them more of a mess
By Audrey McAvoy / Associated Press on KITV4 / July 6, 2023
https://www.kitv.com/news/local/83-000-hawaii-homes-dispose-of-sewage-in-cesspools-rising-sea-levels-will-make-them/article_9b95117b-7334-5251-ad33-e14225e2af20.html

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

Hawaii's Cesspool Crisis Has A Long History. It's Not Over Yet.
By Jessica Terrell / Civil Beat / July 9, 2023
https://www.civilbeat.org/2023/07/hawaiis-cesspool-crisis-has-a-long-history-and-its-not-over-yet/

Hawai'i Cesspool Hazard Assessment & Prioritization Tool: Web Application. Available online from http://hawaiicespooltool.org/

Vibrosis
https://health.hawaii.gov/docd/disease_listing/vibriosis/

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

STATE OF HAWAI'I
OFFICE OF PLANNING
& SUSTAINABLE DEVELOPMENT

235 South Beretania Street, 6th Floor, Honolulu, Hawai'i 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawai'i 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: https://planning.hawaii.gov/

JOSH GREEN, M.D.
GOVERNOR

MARY ALICE EVANS
ACTING DIRECTOR

Coastal Zone Management Program

Environmental Review Program

Land Use Commission

Land Use Division

Special Plans Branch

State Transit-Oriented Development

Statewide Geographic Information System

Statewide Sustainability Branch

DTS 202304270845NA

May 17, 2023

To: Dawn N. S. Chang, Chairperson
Department of Land and Natural Resources (DLNR)

From: Mary Alice Evans, Acting Director
Office of Planning and Sustainable Development

Attention: Finn McCall, Project Manager
DLNR – Division of Boating and Ocean Recreation (DOBOR)

Subject: Draft Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Island of Hawai'i

Thank you for the opportunity to provide comments for the proposed Pohoiki Boat Ramp restoration project. Our office was notified of the availability of the Draft Environmental Assessment (Draft EA) for public/agency review via email dated April 27, 2023.

It is our understanding that the proposed project reestablishes pre-eruption navigational access to the Pacific Ocean and returns the Pohoiki Boat Ramp facility to operational use. Because of volcanic activity and lava flows that impacted the Puna community in 2018, much of the area is inaccessible and the boat harbor currently inoperable. Re-establishing access to the Pacific Ocean from Pohoiki Bay for area residents is a priority of DLNR and DOBOR.

The proposed action will involve dredging the accumulated volcanic debris in Pohoiki Bay to restore the bay to a shape and depth that resembles pre-eruption conditions to the extent possible. In order to return the existing Pohoiki Boat Ramp facility to productive use, the proposed action will require slope stabilization to re-open the channel and safeguard the boat ramp entrance from seasonal ocean swells.

The Office of Planning and Sustainable Development (OPSD) has the following comments to offer:

1. Previous Comments:
We acknowledge that the Draft EA has addressed previous comments submitted in an early consultation request, DTS 202301111627NA, dated January 30, 2023. These included consistency with Hawaii Revised Statutes (HRS) § 205A-2 and verified the applicability of Special Management Area Use Permitting and Shoreline Setback Variances from the County of Hawai'i.

2. Coastal Zone Management Act (CZMA), Federal Consistency
We note that according to Section 2.3, page 2-22 of the Draft EA states that consultations with the U.S. Army Corps of Engineers (USACE) are on-going as the dredging and restoration action would reestablish the boat harbor's connection to the Pacific Ocean and must be permitted. Federal jurisdiction in regard to the applicability of Individual and/or Nationwide Permits is determined by the USACE. The proposed action involves actions involving submerged lands. As stated in our previous comments, if it is deemed that federal permits are necessary, then this project may be subject to CZMA federal consistency.

   OPSD is the lead state agency with the authority to conduct CZMA federal consistency reviews. We recommend that DLNR-DOBOR consult with our office on the applicability of CZMA federal consistency if federal permits are needed.

   Furthermore, the analysis found in Section 3.2 of the Draft EA (objectives and supporting policies of the Hawai'i CZM Program, HRS § 205-2) can be cited as support material in a potential federal consistency review. HRS § 205A-2 serves as the foundation of the enforceable policies of the State of Hawai'i.

3. Climate Change Adaptation/Sea Level Rise (SLR)
Section 2.7, page 2-29, states that the beach and nearshore areas at Pohoiki Bay including the boat ramp facility would be impacted by 3.2 feet of sea level rise, according to the Hawai'i Sea Level Rise Viewer (Hawai'i Climate Change Mitigation and Adaptation Commission, 2021)."

   Furthermore, Section 6, pages 6-1 to 6-3 of the Draft EA includes an evaluation on SLR impacts from the Significance Criteria Determination. Item 11, page 6-3 states "the Pohoiki Boat Ramp facility is existing infrastructure that was necessarily developed along the coastline due to its purpose. The proposed project involves dredging and does not add new infrastructure at Pohoiki Bay."

   From a long-term perspective, it may be beneficial for Final Environmental Assessment to consider climate change adaptation strategies involving the long-term viability of the boat ramp and its support infrastructure. Additionally, developing long-term operational strategies of the boat ramp and its support facilities it light of environmental changes due to climate change aligns with HRS § 226-109 - Climate Change Adaptation Priority Guideline.

Site-specific adaptation strategies that merit further consideration, may consider increasing the height of the support facilities to accommodate rising ocean levels, or related adaptation strategies that could lessen the impacts of a 3.2-foot or greater SLR coastal inundation scenario.

If you have any questions, please contact Joshua Hekekia on Environmental Assessment concerns as they relate to this OPSD response letter at (808) 587-2845 or Debra Mendes on CZMA federal consistency issues at (808) 587-2840.

c: Claire Oshiro, The Limtiaco Consulting Group, 1622 Kanakanui Street, Honolulu, Hawai'i 96817

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <dbedt.director@hawaii.gov>
Mary Alice Evans, Acting Director
Office of Planning and Sustainable Development

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Acting Director Evans:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the letter dated May 17, 2023 (Ref. DTS 202304270845NA). We appreciate the acknowledgement from the Office of Planning and Sustainable Development (OPSD) that the Draft Environmental Assessment (EA) addressed previous comments. The information pertaining to Coastal Zone Management Act (CZMA) federal consistency reviews is also appreciated.

Section 2.7. Natural Hazards in the Final EA will mention the climate change adaption strategies from OPSD's letter such as increasing the height of support facilities. Higher ocean levels or coastal inundation may be addressed with future improvements to DOBOR's Pohoiki Boat Ramp facility as necessary.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Joshua Hekekia, Planner, OPSD (joshua.k.hekekia@hawaii.gov)
Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: Leila Kealoha <pohakupelemaka@gmail.com>
Sent: Wednesday, May 17, 2023 2:45 PM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>; Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Pohoiki Boat ramp Draft EA Public Comment

Aloha Finn and Trevor,
Here is my submission of the public comment for the Pohoiki Boat Ramp project. Please acknowledge receipt of this email and the attached document.
Mahalo nui loa,
Leila
--
Executive Director
Pōhaku Pelemaka
13-3749 Old Kalapana Road
Pahoa, HI 96778
(808) 937-7991
pohakupelemaka@gmail.com

TO: State of Hawai'i, Department of Land and Natural Resources
4 Sand Island Access Road, Honolulu, HI 96819
Finn McCall, (808) 587-3250, finn.d.mccall@hawaii.gov

CC: The Limtiaco Consulting Group; 1622 Kanakanui Street, Honolulu, HI 96817
Trevor Vagay, (808) 596-7790, trevor@tlcghawaii.com

Pohoiki Boat Ramp Draft Environmental Assessment May 2023
Public Comment: Leila Kealoha

May 17, 2023

Aloha mai Kākou,

My name is Leila Kealoha and I am generational lawai'a (fisherfolk) of the Pohoiki region. I was born and raised in the lower Puna area and come from generations of families from these areas. I am submitting a public comment on the Pohoiki Boat Ramp Draft Environmental Assessment.

As it states in the Draft EA:

> The main objective of the proposed project is to restore navigational access to the Pacific Ocean, which is expected to benefit the Puna community as it continues to recover from the 2018 eruption. The removal of accumulated volcanic material from Pohoiki Bay is expected to allow the undamaged boat launch ramp to be utilized by fishermen and emergency rescue teams, which represents a return of pre-eruption functions. Outdoor recreation activities such as swimming and surfing, which were popular activities at Pohoiki Bay, may resume as a result of the proposed project. Excavation and dredging that restores Pohoiki Bay to a similar pre-eruption shape and depth would remove newly created beach and increase the area of nearshore water.
>
> DOBOR's project, which utilizes inundated areas for material placement, is unlikely to affect improvements at Isaac Hale Beach Park that would be accomplished by Hawaii County. The proposed project involves excavation and dredging at Pohoiki Bay, which would create short-term construction jobs but is unlikely to affect population levels or housing. The return of the Pohoiki Boat Ramp facility to productive use is expected to restore economic activities (e.g., commercial fishing and ocean/volcano tours) and fishing for subsistence (DOI, 2023.)

I am in support of the dredging at the Pohoiki boat ramp. Previous to the 2018 eruption and during, DOBOR reaped millions of dollars from boaters. The families of the area would like to ensure that there are proper and accountable measures put into place to ensure that our icebox is perpetuated for the generations to come. We need a plan for our boat ramp.

There are a few exceptions I would like taken into consideration. The first exception that I ask to be taken into consideration is that the DLNR DOBOR acquired the previous 10-years of funds paid to DOBOR for docking, launching and maintenance fees. This money can be used to offset costs that may be needed for current and future dredging of this project. Pohoiki boat ramp being the third largest producing boat ramp in the State deserves their money for maintenance dredging.

Secondly, DOBOR needs to review the long-term plan for the boat ramp while this project is in process. Once the boat ramp is open, DOBOR needs to only allow a certain number of permits, first being the local fisherman who have generational ties to the area. There should not be permits granted to companies such as “Suisan” of Hilo. A long-term plan should be crafted with the support of the existing fisherman families for the longevity of the fishing grounds used by these families.

I do not see there being any adverse effects of the dredging to the surrounding areas within the project boundaries. Surrounding property owners should have a voice in how any access route is designed if needed for hauling of the material not through the ramp area. Material should be removed from the Eastern boundary of the boat ramp and pier. We ask that preference be given for an 8-A disadvantaged local contractor to conduct the work.

I do ask that we use the County of Hawaii‘s parcel, TMK #130080950000 to place the dredged material. Taking the material to this site would give the County material to use for the future development of the replacement of the boat wash area that previously resided in the existing park facility of Isaac Kepo‘okalani Hale Beach Park. I would also provide material for the near future development of the expansion of the park on this 10-acre parcel directly located across the street from the park. This could alleviate costs of hauling to further facilities.

I appreciate the opportunity to provide testimony in support of the dredging of the Pohoiki Boat ramp project. It gives us great hope to look forward to accessing our icebox once again soon.

Me ke aloha pumehana,

Leila Kealoha

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <pohakupelemaka@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai‘i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Leila Kealoha:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the letter that was sent via email on May 17, 2023. We appreciate the statements of support for the proposed project. We also appreciate the mention of docking, launching and maintenance fees that DOBOR previously received. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment.

DOBOR will consider the suggestions about limiting the number of permits and prioritizing local fisherfolk who have generational ties to the area, gathering input from surrounding property owners about any access route for hauling that is beyond the ramp area, using an 8-A disadvantaged local contractor to conduct the restoration of Pohoiki Bay, and placing dredged material on the parcel owned by Hawaii County.

The amount of funding available for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: Gordon and Erin Dunnill <mokupapa10@yahoo.com>
Sent: Saturday, May 20, 2023 7:46 PM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>
Subject: [EXTERNAL] Fwd: Pohoiki inlet dredging

Sent from my iPad

Begin forwarded message:

> **From:** Gordon and Erin Dunnill <mokupapa10@yahoo.com>
> **Date:** May 20, 2023 at 2:37:17 PM HST
> **To:** pdobbyn@civilbeat.org
> **Subject: Fwd: Pohoiki inlet dredging**
>
> Sent from my iPad
>
> Begin forwarded message:
>
> > **From:** Gordon and Erin Dunnill <mokupapa10@yahoo.com>
> > **Date:** May 20, 2023 at 2:32:19 PM HST
> > **To:** trevor@tlcghawaii.gov
> > **Subject: Pohoiki inlet dredging**
> >
> > This is Gordon Dunnill, Maui resident for 51 years and frequent visitor to friends and family on the Big Island.
> > I'm curious if anyone has even carried the idea of all that volcanic debris ,as it is called, being placed there by Pele and as such should be left untouched where it is. Cultural Practitioners should question, as they so forcibly did about Mauna Kea, the idea of disturbing the Pohoiki sacred beach area.
> > Who chooses the appropriate protocol about such dilemmas, the cultural fashion of the day? What is the real agenda behind arbitrary choices of sacredness?
> > Did anyone protest the original building of the boat ramp?
> > Aloha,Malama Pono , Gordon
> > Sent from my iPad

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <mokupapa10@yahoo.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Gordon and Erin Dunnill:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 20, 2023 which consist of various questions. We understand your comments as opposition to the proposed project. No action is preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment.

The comments we received range from support for the proposed action to opposition (e.g., prefer no action or a different project). The boat ramp at Pohoiki was developed at the site of the former wharf. Robert Rycroft constructed the wharf at Pohoiki Bay during the mid-1880s to support his commercial activities and he allowed public use of the wharf. The cultural impact assessment report does not mention documented opposition to the original building of the boat ramp. In other words, the available documentation does not provide a record of the opposition if there was any.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: John Carse <jcarse.kaimu@yahoo.com>
Sent: Monday, May 22, 2023 10:13 AM
To: finn.d.mccall@hawaii.gov
Cc: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Pohoiki Boat Ramp EA

I would like to comment on the Draft Environment Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris project. My primary concern is with the time of this dredging. The EA states that this project could begin in 2024. However, the reconstruction of the Upper and Lower sections of Pohoiki Road is not expected to be completed until September 2024. If the boat ramp were opened before then the only access would be down Highway 137 (the Kalapana-Kapoho Coast Highway). This narrow, winding road has blind hills and curves, and long one-lane sections where trailered boats coming from opposite directions could not pass each other.

Additionally, large, lumbering fishing boats would not be able to maintain the legal minimum speed limit on this heavily used highway. And improving this highway so that it would be usable for fishermen would require cutting at least a hundred trees, many of them part of old-growth *kamani* forests.

If it were explicitly stated that the boat ramp would not be opened until the new road is finished this would not be a problem. However, if there is a possibility that the dredging would be completed before there is a safe access route, the massive tree-trimming and road improvement efforts that would be required should be considered a secondary impact of this project and addressed in this Environmental Assessment.

Specifically, my questions are: Will the dredging of the boat ramp be done before the Pohoiki Road is completed? nd if so, how will the traffic and vegetation surrounding Highway 137 be impacted? And what agency will be responsible for making this roadway safe and suitable for towing boats?

Thank you for addressing these concerns before issuing a Finding of No Significant Impact.

Truly,
John Carse

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <jcarse.kaimu@yahoo.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear John Carse:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 22, 2023 which primarily pertain to Pohoiki Road roadway improvements. We appreciate your description of the existing roadways that are under the jurisdiction of transportation agencies. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment.

DOBOR is not proposing improvements to Pohoiki Road or Kalapana-Kapoho Beach Road as part of its project. Safety concerns associated with insufficient width for trailered boats to pass each other on Highway 137 (the Kalapana-Kapoho Coast Highway) may require further input from and/or coordination with transportation agencies who have jurisdiction over the roadways. Possible measures that may address potential concerns include and are not limited to traffic control and/or travel restrictions.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

From: Harrington, Carrie <carrie_harrington@fws.gov>
Sent: Tuesday, May 23, 2023 5:24 PM
To: finn.d.mccall@hawaii.gov
Cc: Trevor Vagay <Trevor@tlcghawaii.com>; Polhemus, Dan <dan_polhemus@fws.gov>; Asman, Lindsy <Lindsy_Asman@fws.gov>
Subject: Draft EA for Pohoiki Boat Ramp Dredging of Volcanic Debris

Hello Finn,

Per Claire Oshiro's email requesting the U.S. Fish and Wildlife Service (Service) comments on the above draft EA, please find our comments below:

1. Please obtain an Official Species List (OSL) from our Information for Planning and Consultation (IPaC) online tool (https://ipac.ecosphere.fws.gov/). Directions are attached with some helpful tips provided below. The OSL will have a link below each species with Service recommended avoidance and minimization meaures. We recommend incorporating these into the project description. Additionally, for future planning, obtaining an OSL is now a requirement from the Service for consultation under Section 7 of the Endangered Species Act. You were correct to include listed seabirds, sea turtles, and bats into your project description, but there may be additional species with ranges in the project area and your IPaC species list is the best way to determine which species may be in your project action area. There may also be additional avoidance and minimization measures provided for these species that are not currently in your impacts and mitigation measures section.

2. Because this project occurs in and adjacent to water (ocean and ponds in the mauka portion of the project action area), you will need to coordinate with our office under the Fish and Wildlife Coordination Act (FWCA). Dan Polhemus, cc'd here, is the lead for all FWCA consultations/coordination, but please email pifwo_admin@fws.gov with the request and cc Dan. This ensures proper routing of your request. In the meantime, I am attaching our BMPs for work in or around aquatic environments.

3. Additional IPaC tips:

The US Fish and Wildlife Service has updated how we process section 7 consultations.

The very first step in our updated consultation process is to obtain an official species list in our new Information for Planning and Consultation (IPaC) online tool, for which a link can be found at the box in top left corner of the this website:

https://ecos.fws.gov/ecp/

Please see the attached pdf with detailed directions on how you obtain an official species list in IPaC.

Once you have entered basic project information, including a map of the project IPaC will generate a species list comprised of all federally listed species that may occur in the project area. Each species includes a link in which you will find avoidance and minimization measures (AMMs) for that species.

After completing all the steps in IPaC, you will need to formally submit the official species list. A copy will automatically be sent to our office. Each project is assigned a unique Project Code in IPaC. This Project Code should be provided to our office with any correspondences relating to a given project.

A few IPAC tips:

- If you are uploading a polygon and have more than one TMK in the project area, make sure all TMKs are in one polygon. Otherwise, you will get a project code for every TMK. Drawing on the map works best if there is one continuous project site vs distinct, separate project areas for the same reason.
- You can ignore any requests or links regarding additional document uploads or continuing your consultation in IPaC (e.g., Dkeys or Consultation Builder). The only thing you need to do is enter your basic project information and submit for an Official Species List.
- While the attached pdf of instructions will direct you to **https://ipac.ecosphere.fws.gov/**, several partners have gotten stuck at "create a Login.gov account." Our IT suggested accessing IPAC through ECOS may help reduce this issue by accessing IPaC by first visiting **https://ecos.fws.gov/ecp/**.
    - Your offical IPaC species list is based on species' ranges. IPaC generates a list of all federally listed species and other trust resources that could potentially be in the project area.
    - If the IPaC species list includes a species you do not think occur in the project area, explain why not in your consultation letter.
    - Implementing surveys is a good way to determine if a species present or not.
    - We recommend our partners incorporate all the species and their associated AMMs in their impacts analysis
    - The AMMS are there to help you avoid and minimize effects to listed species.

Please feel free to contact me if you need additional assistance.

Best Regards,
Carrie

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

Subject: IPaC generated official species list for the Pacific Islands Fish and Wildlife Office

Dear Action Agency or Applicant:

The Pacific Islands Fish and Wildlife Office (PIFWO) is transitioning to the Information for Planning and Consultation (IPaC) online portal, https://ipac.ecosphere.fws.gov/ for federal action agencies and non-federal agencies or individuals to obtain official species lists, including threatened and endangered species, designated critical habitat, and avoidance and minimization measures to consider in your general project design. IPaC has been used by continental USFWS offices to provide official species lists and avoidance and minimization guidance since 2017. Using IPaC expedites the process for species list distribution. Obtaining a species list in IPaC is relatively straightforward and takes minimal time to complete. Step by step instructions are included below.

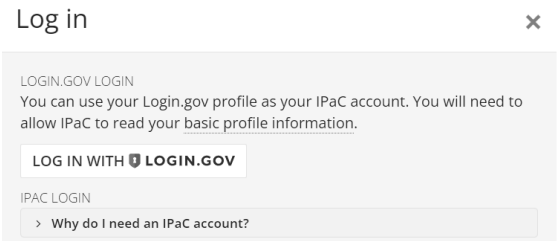
Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of your species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change the species list. Verification can be completed by visiting the IPaC website at regular intervals during project planning and implementation. An updated list may be requested through the IPaC system by completing the same process used to obtain the initial species list.

We hope this process provides efficiencies to our partners in obtaining a species list. For federal action agencies, it also opens additional IPaC functionality that the PIFWO office is still working on, such as the use of Determination Keys for informal section 7 programmatic consultations. We will let our agency partners know when that functionality becomes available.

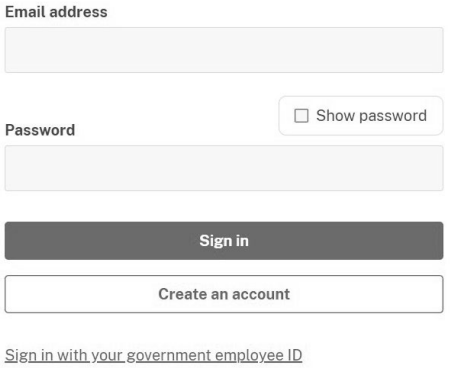
If you have questions about a species list obtained through the IPaC system or need assistance in completing an IPaC species list request, please contact the Service at 808-792-9400 or via email at pifwo_admin@fws.gov. We appreciate your efforts to conserve listed species across the Pacific Islands.

Instructions for Action Agencies and partners to obtain an official species list in IPaC

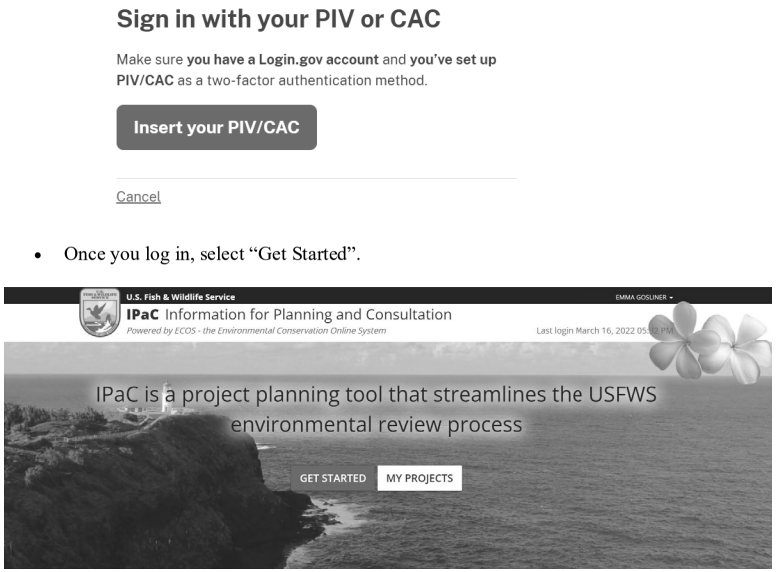
- Navigate to https://ipac.ecosphere.fws.gov/
- You can get an unofficial species list without logging in. However, if you want an official species list you will need to log in first using your Login.gov account. If you don't have an IPaC account, they are easy to create.



Select Log in with Login.gov and sign in using your email and password.

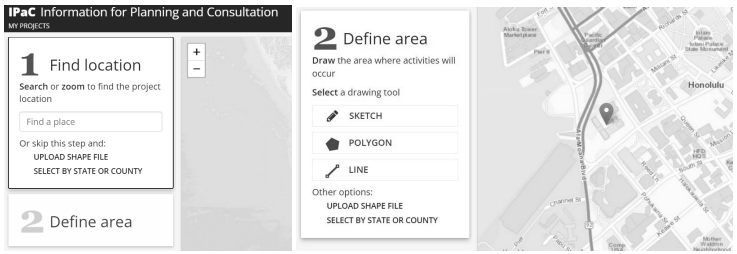


If you have a PIV or CAC card, you can sign in using that method as well.

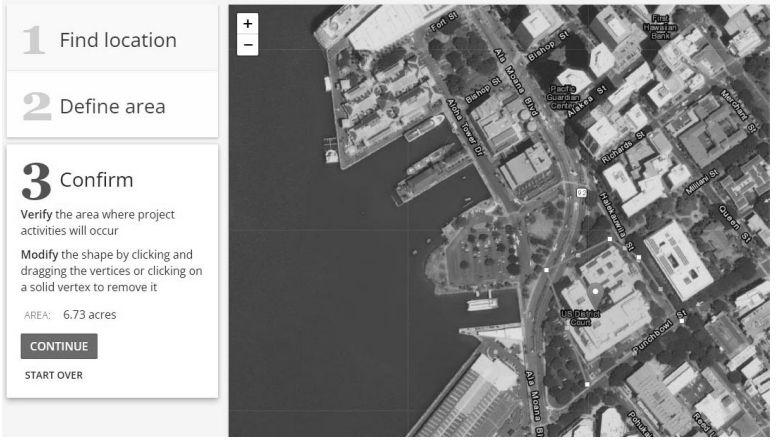


- Once you log in, select "Get Started".

- Define the action area: Identify the location of the proposed action by uploading an existing shapefile or by entering an address or coordinates of the action area. Once identified on the map, you can manually draw the action area using the drawing tools.

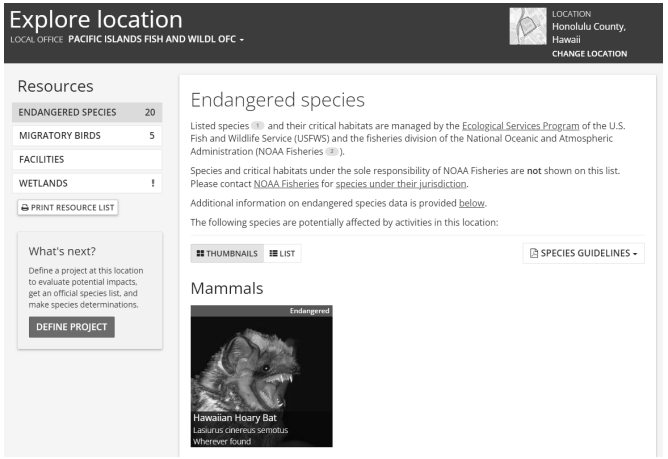


To help identify your action area you can choose between multiple base maps available.

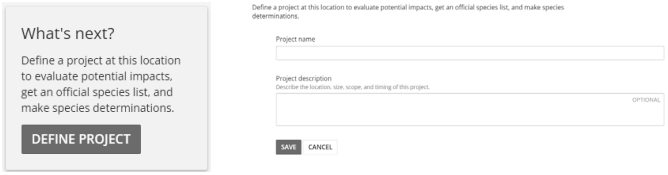


Press continue when you have finished drawing or uploading the action area location.

- The species information on the page that follows is not official. However, it identifies the project County, local Fish and Wildlife Field Office, species covered under NOAA Fisheries as well as Migratory Bird Treaty Act species. The list can be viewed in Thumbnail or List format.
- Once the species list populates you will see images of the species that may occur on, near, or transgress across your project. Click on SPECIES GUIDELINES on your top right to see Avoidance and Minimization measures to incorporate into your General Project Design Guidelines.

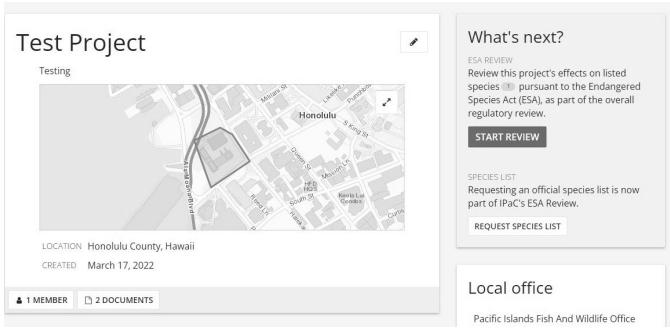


- Continue with the following steps to comply with the requirements of ESA section 7 to obtain an **official species list**.
- Select Define Project

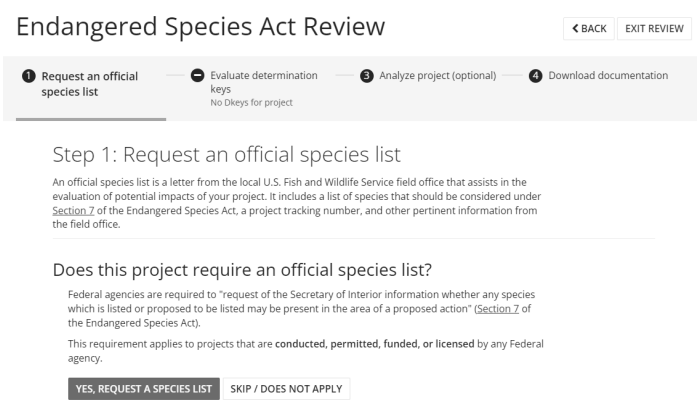


Enter the Project Name and a brief description of the project (a description is not mandatory, but recommended for future coordination with the Service). Click SAVE at bottom of page.

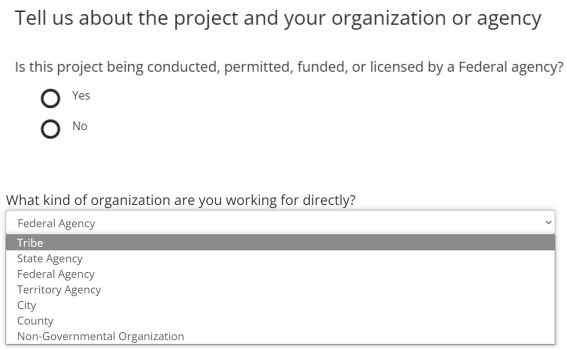
- At the bottom of the What's next box on the right, click Request Species List



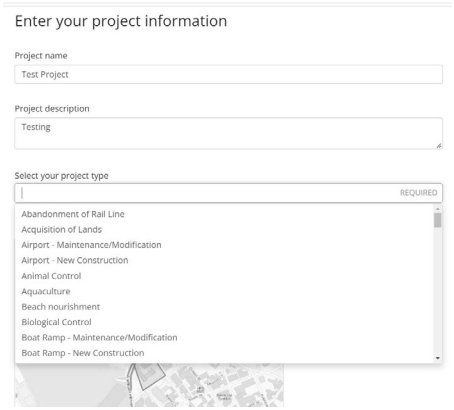
- on the following screen, click Yes, Request Species List



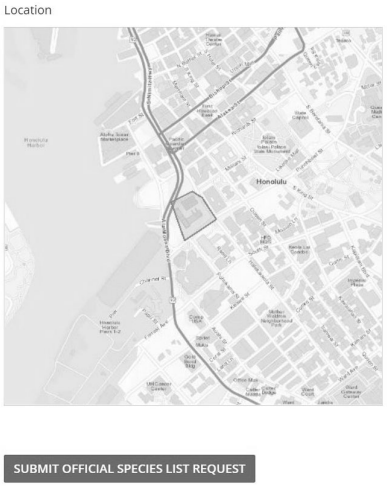
- Fill out the contact information for yourself or your agency. Contractors, state partners, and any other project proponents may request a species list and should be covered using the dropdown menus.



- From the pull-down menu for Classify Type of Project, select the project type that best fits the proposed action.

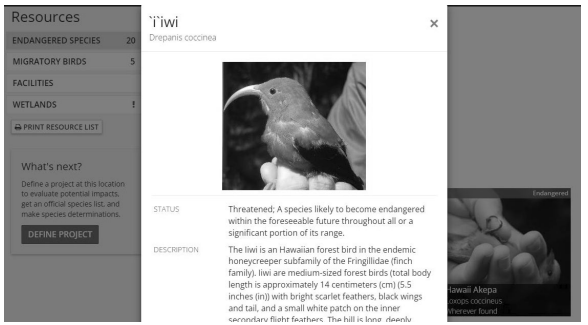


- Once all required sections are filled out, press SUBMIT OFFICIAL SPECIES LIST REQUEST



- An Official Species List should be generated and available for download in a couple of seconds.

- If you need additional information on a species, click on their name that is hot-linked to their species information page. A brief overview of the species' status, description and critical habitat will appear as well as a link to their ECOS species profile.



U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.

2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.

3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see https://www.fws.gov/policy/A1750fw1.html) can help to prevent attraction and introduction of non-native species.

5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (*e.g.*, with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.

6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <carrie_harrington@fws.gov>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Carrie Harrington:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 23, 2023. We appreciate the information about obtaining an Official Species List from the Information for Planning and Consultation online tool. We also appreciate the recommended standard best management practices for avoiding or minimizing impacts to fish and wildlife resources. DOBOR's contractor will be responsible for implementing measures that avoid or reduce the impacts to aquatic habitats from construction-related activities.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Dan Polhemus, U.S. Fish and Wildlife Service (dan_polhemus@fws.gov)
Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

May 23, 2023

State of Hawaii
Department of Land and Natural Resources
Attn: Mr. Finn McCall — via email: finn.d.mccall@hawaii.gov
4 Sand Island Access Road
Honolulu, Hawaii 96819

The Limtiaco Consulting Group, Inc. — via email: trevor@tlcghawaii.com
Attn: Mr. Trevor Vagay
1622 Kanakanui Street
Honolulu, Hawaii 96817

Gentlemen:

SUBJECT: Draft Environmental Assessment for the **Pohoiki Boat Ramp Dredging** located at Pohoiki Bay Area, Puna, Island of Hawaii; TMK: (3) 1-3-008:014 unencumbered land (new lava flow) on behalf of the DLNR, Division of Boating and Ocean Recreation

Thank you for the opportunity to review and comment on the subject matter. The Land Division of the Department of Land and Natural Resources (DLNR) distributed or made available a copy of your request pertaining to the subject matter to DLNR's Divisions for their review and comments.

At this time, enclosed are comments from the (a) Engineering Division and (b) Land Division-Hawaii District on the subject matter. Should you have any questions, please feel free to contact Darlene Nakamura at (808) 587-0417 or email: darlene.k.nakamura@hawaii.gov. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Enclosures
cc: Central Files

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

April 27, 2023

MEMORANDUM

FROM: ~~TO:~~ **DLNR Agencies:**
- X Div. of Aquatic Resources (glenn.r.higashi@hawaii.gov)
- ___Div. of Boating & Ocean Recreation
- X Engineering Division (DLNR.ENGR@hawaii.gov)
- X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
- ___Div. of State Parks
- X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
- X Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
- X Land Division – Hawaii District (gordon.c.heit@hawaii.gov)
- X Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

TO: ~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Draft Environmental Assessment for the **Pohoiki Boat Ramp Dredging**
LOCATION: Pohoiki Bay Area, Puna, Island of Hawaii; TMK: (3) 1-3-008:014 unencumbered land (new lava flow)
APPLICANT: Limtiaco Consulting Group on behalf of the DLNR, Division of Boating and Ocean Recreation

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https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2023-04-23-TEN.pdf

Please submit any comments by **May 22, 2023**. If no response is received by this date, we will assume your agency has no comments. Should you have any questions, please contact Darlene Nakamura directly via email at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:
( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(✓) Comments are included/attached.

Signed:
Print Name: Carty S. Chang, Chief Engineer
Division: Engineering Division
Date: May 17, 2023

Attachments

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Draft Environmental Assessment for the Pohoiki Boat Ramp Dredging
Location: Pohoiki Bay Area, Puna, Island of Hawaii
TMK(s): (3) 1-3-008:014 unencumbered land (new lava flow)
Applicant: Limtiaco Consulting Group on behalf of the DLNR, Division of Boating and Ocean Recreation

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high-risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR, Chapter 1, Subchapter B, part 60 reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM). The official FIRMs can be accessed through FEMA's Map Service Center (msc.fema.gov). Our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT) could also be used to research flood hazard information.

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7139.
- Kauai: County of Kauai, Department of Public Works (808) 241-4896.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: May 17, 2023

5/15/23

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

April 27, 2023

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources (glenn.r.higashi@hawaii.gov)
__Div. of Boating & Ocean Recreation
X Engineering Division (DLNR.ENGR@hawaii.gov)
X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
__Div. of State Parks
X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
X Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
X Land Division – Hawaii District (gordon.c.heit@hawaii.gov)
X Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Draft Environmental Assessment for the **Pohoiki Boat Ramp Dredging**
LOCATION: Pohoiki Bay Area, Puna, Island of Hawaii; TMK: (3) 1-3-008:014 unencumbered land (new lava flow)
APPLICANT: Limtiaco Consulting Group on behalf of the DLNR, Division of Boating and Ocean Recreation

Transmitted for your review and comment is information on the above-referenced subject matter. The DEA was published on April 23, 2023, by the State Environmental Review Program (formerly the Office of Environmental Quality Control) at the Office of Planning and Sustainable Development in the periodic bulletin, The Environmental Notice, available at the following link:

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Please submit any comments by **May 22, 2023**. If no response is received by this date, we will assume your agency has no comments. Should you have any questions, please contact Darlene Nakamura directly via email at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(✓) Comments are included/attached.

Signed: _____
Print Name: GORDON C. HEIT
Division: Land Division
Date: 5/16/23

Attachments

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

75 Aupuni Street, Room 204
Hilo, Hawaii 96720
PHONE: (808) 961-9590
FAX: (808) 961-9599

May 16, 2023

MEMORANDUM

TO: Russell Y. Tsuji, Administrator

FROM: Gordon C. Heit, Hawaii District Land Agent

SUBJECT: Draft Environmental Assessment for the Pohoiki Boat Ramp Dredging Project

LOCATION: Pohoiki Bay Area, Puna District, Island of Hawaii,
TMK: (3) 1-3-008:014 unencumbered land (new lava flow)

APPLICANT: Limtiaco Consulting Group on behalf of the DLNR, Division of Boating and Ocean Recreation.

Pursuant to your request for comments on the above matter, we offer the following:

The property identified by TMK: (3) 1-3-008: seaward of 014 is currently unencumbered land (new lava flow). The proposed project will restore navigational access to the existing boat ramp by removing accumulated volcanic material from Pohoiki Bay through excavation and dredging. The intent of this project is to return Pohoiki Bay to a shape and depth that resembles pre-eruption conditions to the extent possible.

The Land Division has no objections to the project as outlined in the Draft Environmental Assessment.

Please contact me should you have any questions.

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

May 23, 2023

State of Hawaii
Department of Land and Natural Resources
Attn: Mr. Finn McCall
4 Sand Island Access Road
Honolulu, Hawaii 96819

via email: finn.d.mccall@hawaii.gov

The Limtiaco Consulting Group, Inc.
Attn: Mr. Trevor Vagay
1622 Kanakanui Street
Honolulu, Hawaii 96817

via email: trevor@tlcghawaii.com

Gentlemen:

SUBJECT: Draft Environmental Assessment for the **Pohoiki Boat Ramp Dredging** located at Pohoiki Bay Area, Puna, Island of Hawaii; TMK: (3) 1-3-008:014 unencumbered land (new lava flow) on behalf of the DLNR, Division of Boating and Ocean Recreation

Thank you for the opportunity to review and comment on the subject matter. In addition to our previous comments dated May 23, 2023, enclosed are comments from the (a) Division of Aquatic Resources and (b) Office of Conservation & Coastal Lands on the subject matter. Should you have any questions, please feel free to contact Darlene Nakamura at (808) 587-0417 or email: darlene.k.nakamura@hawaii.gov. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Enclosures
cc: Central Files

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

April 27, 2023

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources (glenn.r.higashi@hawaii.gov)
__Div. of Boating & Ocean Recreation
X Engineering Division (DLNR.ENGR@hawaii.gov)
X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
__Div. of State Parks
X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
X Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
X Land Division – Hawaii District (gordon.c.heit@hawaii.gov)
X Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Draft Environmental Assessment for the **Pohoiki Boat Ramp Dredging**
LOCATION: Pohoiki Bay Area, Puna, Island of Hawaii; TMK: (3) 1-3-008:014 unencumbered land (new lava flow)
APPLICANT: Limtiaco Consulting Group on behalf of the DLNR, Division of Boating and Ocean Recreation

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BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(☑) Comments are included/attached.

Signed: *Brian Neilson*
Print Name: Brian Neilson
Division: State of Hawaii
Date: May 22, 2023

Attachments

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR |KA HOPE KIA'ĀINA

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

LAURA H.E. KAAKUA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL STREET, ROOM 330
HONOLULU, HAWAII 96813
Date: 5/19/23
DAR # 6397

MEMORANDUM
TO: Brian J. Neilson
DAR Administrator

FROM: Troy Sakihara TSS, Aquatic Biologist

SUBJECT: Draft Environmental Assessment (DEA) for the Pohoiki Boat Ramp Dredging

Request Submitted by: Russell Y. Tsuji, Land Administrator
Location of Project: Pohoiki Bay Area, Puna District, Hawai'i Island; TMK: (3) 1-3-008:014

Brief Description of Project:
The DLNR, Division of Boating and Ocean Recreation is proposing to dredge volcanic debris from the Pohoiki Bay area that has prevented access to the Pohoiki boat ramp for boat launching, navigation and retrieval since the 2018 lower Puna eruption. Out of four alternative actions, the preferred option in the DEA proposes the dredging of unconsolidated material and volcanic debris from the Pohoiki bay area to return it to pre-eruption conditions, as feasible. If fully funded, the preferred option may remove an estimated 175,000 cubic yards of material over approximately 11 acres. Volcanic debris to be dredged consists of sand, and bare rock, cobble and boulder.

Comments:
☐ No Comments ☒ Comments Attached

Thank you for providing DAR the opportunity to review and comment on the proposed project. Should there be any changes to the project plan, DAR requests the opportunity to review and comment on those changes.

Comments Approved: *Brian J. Neilson* Date: May 22, 2023
Brian J. Neilson
DAR Administrator

DAR# 6397

Brief Description of Project

Dredged material is to be transported by trucks and placed over 35 acres in the lava field to the northeast of the boat ramp and within a 50 foot setback from the shoreline. Also, said material is to be used to fill the anchialine pond (referred to as "hot pond" in the DEA) that formed behind the sand berm approximately 100 m to the west of the boat ramp. This is to address concerns raised by respondents and residents of the area regarding issues with trespassing and nuisance activities associated with the pond. In addition, the project area has been identified as potential habitat for Green sea turtles and Hawksbill turtles. Recommendations are made in the DEA for a biological monitor to be present on-site during the project to ensure proposed activities do not disturb these listed species. This was based on a floral and faunal survey conducted by biologists from AECOS, Inc. Impacts and mitigation measures for water quality outlined in the DEA include a required National Pollutant Discharge Elimination System permit, implementation of a storm water management plan, erosion control measures and Best Management Practices.

DAR# 6397

Comments

The DAR would like to clarify the description and note the existence of naturally formed anchialine ponds in the project area, which were referred to as "hot ponds" in the DEA. Biological surveys conducted by DAR from 2019 to 2020 indicated the presence of two native anchialine shrimp species including the endemic Halocaridina rubra, known commonly as ʻōpae ʻula, and the indigenous Metabetaus lohena in cryptic portions of the "hot pond". However, since 2020, water temperatures have increased to over 45 degrees Celsius in the "hot pond", therefore extirpating native anchialine shrimp species from that habitat. Despite the disappearance of anchialine shrimps from the pond, these species can travel through subterranean connections and recruit into other anchialine habitats, especially within the same aquifer. Accordingly, since 2022 to present, the DAR has expanded anchialine surveys into the new lava field to the north of Pohoiki and have recorded a series of new such habitats with ʻōpae ʻula and Metabetaus lohena. These surveys were conducted further north of the proposed placement area of dredged material in the lava field. Given the extirpation of anchialine species from the "hot pond", the numerous occurrences of anchialine species to the north of Pohoiki, the circumstances surrounding the proposed project, and the concerns and issues associated with the "hot pond" that were raised by respondents and residents of the area, the DAR is not opposed to the proposed filling of said pond with dredged material. While the filling of anchialine pond habitats would typically be discouraged based on DAR's efforts to protect these unique habitats, the proposed actions in this instance are not expected to have measurable impacts to native anchialine species or nearby anchialine or other aquatic habitats.

The DAR would also like to reiterate the recommendation to have individuals dedicated to monitoring the project area for listed marine species (i.e., Green sea turtles and Hawksbill turtles). While occurrences of these these turtles were not recorded during biological surveys, the area has been identified as suitable habitat for such, and it remains plausible that these species may enter the project area. Further, Green sea turtles and Hawksbill turtles can be relatively inconspicuous and difficult to see, underscoring the importance of staff actively monitoring the area for these animals during dredging activities.

OCCL HA 23-173
AW

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

2023 APR 27 P 3:26

April 27, 2023

MEMORANDUM

TO: **DLNR Agencies:**
- X Div. of Aquatic Resources (glenn.r.higashi@hawaii.gov)
- __Div. of Boating & Ocean Recreation
- X Engineering Division (DLNR.ENGR@hawaii.gov)
- X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
- __Div. of State Parks
- X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
- X Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
- X Land Division – Hawaii District (gordon.c.heit@hawaii.gov)
- X Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Draft Environmental Assessment for the **Pohoiki Boat Ramp Dredging**
LOCATION: Pohoiki Bay Area, Puna, Island of Hawaii; TMK: (3) 1-3-008:014 unencumbered land (new lava flow)
APPLICANT: Limtiaco Consulting Group on behalf of the DLNR, Division of Boating and Ocean Recreation

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BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(✓) Comments are included/attached.

Signed: A.E. Wills
Print Name: A.E. Wills
Division: OCCL
Date: 5/22/23

Attachments : Memo
COR HA-23-173

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

LAURA H.E. KAAKUA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
Office of Conservation and Coastal Lands

P.O. BOX 621
HONOLULU, HAWAII 96809

REF: OCCL: AW COR: HA 23-173

MEMORANDUM

TO: Russell Y. Tsuji, Administrator
Land Division Administrator

FROM: for Michael Cain, Administrator
Office of Conservation and Coastal Lands (OCCL)

SUBJECT: Draft Environmental Assessment for the Pohoiki Boat Ramp Dredging at Pohoiki Bay Area, Puna, Island of Hawaii; TMK (3) 1-3-008:014

The Office of Conservation and Coastal Lands (OCCL) reviewed the Draft Environmental Assessment (DEA) for the Pohoiki Boat Ramp Dredging Project. The preferred alternative to Restore Pre-Eruption Shape and Depth will involve extensive dredging which would likely constitute an identified land use under HAR 13-5-24 R-5 (D-1) Dredging, filling, or construction on submerged lands, including construction of harbors, piers, marinas, and artificial reefs. The Conservation District Use Permit for this land use will require approval by the Board of Land and Natural Resources.

OCCL offers the following comments on the DEA:

- The DEA does not address the rate of accumulation of materials within the proposed dredging area. The extensive accretion observed between July 2018 and May 2022 is not quantified to determine the rate of accumulation which resulted in a depth of 27 ft of sediment in the area. Analysis of the initial accumulation and accretion of the beach over the five years since the eruption may provide greater insights into the future sedimentation rate, and the timeframe boat ramp may remain operable following the proposed dredging.
- In addition to the post-project monitoring identified in section 4.4 of the DEA, OCCL recommends that the ongoing erosion of new volcanic materials by the ocean and subsequent deposition of those materials within the proposed project site be monitored and quantified during the permitting stages of the project. This monitoring may provide an estimate of the appropriate future maintenance dredging interval.
- The DEA acknowledges that establishment of a safe swim area is a public concern, and that restoration of the boat ramp may introduce future safety conflicts between boats and swimmers. The DEA further states that a safe swim area is currently outside the scope

of the proposed project. Previously, a "recognized hazard was created when boats entered or left the ocean since both children and motorboats would be moving in the water and in close proximity while waters were surging. Increased use of the boat ramp by boaters, swimmers and surfers increased the safety hazard.". The evaluation criteria for a CDUP documented in HAR 13-5-30 (c) includes "(8) The proposed land use will not be materially detrimental to the public health, safety and welfare.". Additionally, OCCL notes that our standard conditions as documented in HAR 13-5-42 (14) require that "Where any interference, nuisance, or harm may be caused, or hazard established by the use, the permittee shat be required to take measures to minimize or eliminate the interference, nuisance, harm or hazard.". Please propose mitigation to minimize potential harm or hazard to recreational users.

Should you have any questions, please feel free to contact Amy Wirts, Sea Grant Extension Agent and Coastal Lands Program Coordinator at DLNR OCCL at Amy.E.Wirts@hawaii.gov.

C: HDLO
County of Hawai`i Planning Department

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <dlnr@hawaii.gov>
Russell Y. Tsuji, Land Administrator
Department of Land and Natural Resources, Land Division

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Administrator Tsuji:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for two letters dated May 23, 2023. We appreciate your distribution of the Draft Environmental Assessment (EA) notification to the other divisions of the Department of Land and Natural Resources (DLNR). Responses to the four divisions are below.

Engineering Division (signed May 17, 2023)
We appreciate the information about the rules and regulations of the National Flood Insurance Program (NFIP) for development within Special Flood Hazard Areas (high-risk areas). We acknowledge that local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

Land Division - Hawaii District (signed May 16, 2023)
We acknowledge that the new lava flow seaward of TMK: (3) 1-3-008:014 is currently unencumbered land. We also acknowledge that DLNR's Land Division has no objections to the project as described in the EA.

Division of Aquatic Resources (signed May 22, 2023, Ref. DAR #6397)
Section 2.6. Flora and Faunal Resources of the Final EA will mention the naturally formed anchialine ponds and the detection of two native anchialine shrimp species during biological surveys conducted by DAR from 2019 to 2020. DAR's letter states that it is not opposed to the filling of the ponds in part because the water temperatures increased to over 45 degrees Celsius (or 113 degrees Fahrenheit) and extirpated native anchialine shrimp species from that habitat. DAR expanded its anchialine surveys and recorded new habitat with native anchialine shrimp species including the endemic *Halocaridina rubra* (or 'ōpae 'ula) and the indigenous *Metabetaus lohena*.

DAR also states in its letter that the filling of anchialine ponds habitats would typically be discouraged based on its efforts to protect these unique habitats; however, the proposed action in this instance is not expected to have measurable impacts to native anchialine species or nearby anchialine or other aquatic habitats.

We acknowledge the recommendation to have individuals actively monitoring for listed marine species (i.e., Green sea turtles and Hawksbill turtles) during dredging activities.

1622 Kanakanui Street • Honolulu, Hawaii 96817
(808) 596-7790 • tlcghawaii.com

Office of Conservation and Coastal Lands (signed May 22, 2023, Ref. COR HA-23-173)
We would appreciate suggested methods for assessing the accumulation rate during the past five years since there may have been an initial period of unknown duration with a higher volume of material production from new lava flow. The suggestion about monitoring and quantifying erosion during the permitting stages of the project is acknowledged. The information pertaining to the evaluation criteria for a Conservation District Use Permit is appreciated.

Sections 2.13. Recreational Resources and 3.8. Other Considered Plans will indicate that Hawai'i County envisions a different location for a safe swim area. As indicated in *Revitalize Pohoiki* (2022), which is a published plan to help guide improvements at Isaac Hale Beach Park, the safe swim area would be close to an existing parking area near the boat ramp. The Isaac Hale Beach Park improvements that will be undertaken by Hawai'i County is a separate effort that does not depend on DOBOR's proposed project.

The Hawai'i Department of Health (DOH) suspended its water quality testing at Pohoiki when the connection with the Pacific Ocean was severed. Water quality testing by DOH is expected resume after the connection between Pohoiki Bay and the Pacific Ocean is restored. The testing effort by DOH fulfills two different EPA requirements: (1) to immediately inform beach users when there is an elevated risk of gastrointestinal illness due to possible fecal contamination, and (2) to assess water quality over time to determine water quality impairment (i.e., does not meet water quality standards). The public is expected to benefit from the resumption of water quality testing by DOH since it notifies the public when there are indicators of public health concerns.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Darlene Nakamura, DLNR (darlene.k.nakamura@hawaii.gov)
Gordon Heit, Hawaii District Land Agent, DLNR (gordon.c.heit@hawaii.gov)
Glenn Higashi, DLNR DAR (glenn.r.higashi@hawaii.gov)
Amy Wirts, Sea Grant Extension Agent, OCCL (Amy.E.Wirts@hawaii.gov)
Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

From: Lotus Thomas <lotuscohous@gmail.com>
Sent: Tuesday, May 23, 2023 2:34 PM
To: Trevor Vagay <Trevor@tlcghawaii.com>; finn.d.mccall@hawaii.gov
Subject: Pohoiki Boat Ramp Dredging of Volcanic Debris--Draft EA

Greetings,

My name is Lotus Thomas, and I am a business and property owner and resident in Pahoa. I decided to move here in 2020, and one of the parts that I love the most about living here are the hot ponds at Pohoiki. I also have a degree in environmental planning (2007) and have specialized in facilitating public engagement throughout my career.

It's come to my attention that the draft EA does not adequately account for the public opinion of myself and hundreds of other local people I know who see the hot ponds as a crucial public benefit. The report calling it a "nuisance" is a misrepresentation of public opinion, and undoubtedly reflects a biased process.

I also feel that filling the hot ponds is not required for dredging the boat ramp, and that it was negligent on the part of the consultants to not propose an alternative that preserves the hot ponds as this further polarizes our community as though recreation and fishing are at odds which is a false argument.

Please let me know that you received this, and what the status is regarding adding an alternative that would preserve the hot ponds.

Thanks,

Lotus Q. Thomas, M.A.
Director of National Programs, The Cohousing Association of the US
https://www.cohousing.org/
LotusCohous@gmail.com
808.482.1311
Pahoa, HI

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <lotuscohous@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Lotus Q. Thomas, M.A.:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the email sent on May 23, 2023. We understand the comments as opposition to the proposed project. A project that retains the hot ponds is preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. DOBOR does not support the viewpoint that the ponds are a safe area for recreational activities such as swimming. It would not be reasonable for DOBOR to characterize the ponds as a crucial public benefit.

Section 2.3. Water Quality in the Final EA will include additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. The following citations and links will be included in the Final EA:

Fecal bacteria found at a number of Hawaii beaches
By Paul Drewes / KITV4 / Jun. 20, 2023
https://www.kitv.com/news/local/fecal-bacteria-found-at-a-number-of-hawaii-beaches/article_cd3bac04-0ff1-11ee-9314-d3dd9fc8dd64.html

Thrill seekers jumping into polluted Ala Wai Canal waters spark major health concerns
By Jolanie Martinez / Hawaii News Now / Jun. 21, 2023
https://www.hawaiinewsnow.com/2023/06/22/thrill-seekers-jumping-into-ala-wai-canal-spark-major-health-concerns/

83,000 Hawaii homes dispose of sewage in cesspools. Rising sea levels will make them more of a mess
By Audrey McAvoy / Associated Press on KITV4 / July 6, 2023
https://www.kitv.com/news/local/83-000-hawaii-homes-dispose-of-sewage-in-cesspools-rising-sea-levels-will-make-them/article_9b95117b-7334-5251-ad33-e14225e2af20.html

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Hawaii's Cesspool Crisis Has A Long History. It's Not Over Yet.
By Jessica Terrell / Civil Beat / July 9, 2023
https://www.civilbeat.org/2023/07/hawaiis-cesspool-crisis-has-a-long-history-and-its-not-over-yet/

Hawai'i Cesspool Hazard Assessment & Prioritization Tool: Web Application. Available online from http://hawaiicespooltool.org/

Vibrosis
https://health.hawaii.gov/docd/disease_listing/vibriosis/

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

From: Audrey Ichida <audreyichida@gmail.com>
Sent: Tuesday, May 23, 2023 7:14 AM
To: finn.d.mccall@hawaii.gov; Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Comment Letter Regarding: Pohoiki Boat Ramp Dredging of Volcanic Debris--Draft EA (AFNSI)

Hello,

Please find the attached letter with my public comments on the
Pohoiki Boat Ramp Dredging of Volcanic Debris--Draft EA (AFNSI)

The summary of my comments in the letter are also included in this email below:
Requested changes include:

1. Add a more complete transparent discussion of the opinions of the public regarding the hot ponds, including the opinions of those who utilize the hot ponds for swimming and beneficial recreational uses.
2. Reclassify the hot ponds as beneficial use for recreational swimming, specifically calm water swimming.
3. Discuss the impact of loss of one hot pond due to boat ramp dredging.
4. Specify which tests will be performed to identify "hazardous or toxic waste", including a Sampling and Analysis Plan with frequency of testing.
5. Remove the recovery funding that was received for 'Ahalanui Beach Park from the plan. Unless that funding can be used to maintain the existing hot ponds (excepting the pond at the boat ramp).
6. Add the hot pond along the former coastline and the hot pond along the coastal trail to the list of sites "not impacted" by the project.
7. Provide a 5th alternative that preserves the hot pond along the former coastline.

Thank you,
Audrey Ichida

Comment Letter Regarding: Pohoiki Boat Ramp Dredging of Volcanic Debris--Draft EA (AFNSI)

To:
State of Hawai'i, Department of Land and Natural Resources
Finn McCall
(808) 587-3250
finn.d.mccall@hawaii.gov
4 Sand Island Access Road, Honolulu, HI 96819

AND

The Limtiaco Consulting Group; 1622 Kanakanui Street, Honolulu, HI 96817
Trevor Vagay, (808) 596-7790, trevor@tlcghawaii.com

Regarding: Pohoiki Boat Ramp Dredging of Volcanic Debris--Draft EA (AFNSI)

This letter is in **support** of dredging to access the existing boat ramp. This letter is **opposed** to the suggested dredging scale and disposal plan. The four options examined in the draft EA are insufficient to meet community needs and are in direct conflict with some community needs. The county should provide an alternative option that meets the needs of both boat users and calm water swimming users. The current option suggested in the draft EA only considers the needs of boat users and is to the detriment of calm water recreators. The hot pond along the former shoreline should be designated as beneficial use, not as nuisance.

PDF Page 51 Draft EA: "The County of Hawai'i Department of Parks and Recreation is allocating $3.1 million of disaster recovery funds to improvements at Isaac Hale Beach Park, which includes recovery funding that was received for 'Ahalanui Beach Park (County of Hawai'i, 2022). The redevelopment of 'Ahalanui Park (which was completely inundated by lava such that shoreline access and coastal recreation no longer exists) is considered to be financially impractical (Ibid.)."

> It is inappropriate for $3.1 million in funds allocated for 'Ahalanui Park recovery to be used for filling in hot ponds at Isaac Hale Beach Park. 'Ahalanui Park included a warm water calm swimming area, so it is particularly wrong for funds meant to recover this type of recreation (calm water swimming) to be used to remove resources that currently support the exact type of recreation that was lost when 'Ahalanui Park was lost. The county should not use these funds for any project that does not include restoration of calm water recreation.

PDF Page 53 Draft EA: "Identified nuisances such as areas of trapped water that may be unsanitary may be eliminated as a result of the project. Nearby property owners appear to support this aspect of the project (see Section 2.8. Archaeological and Cultural Resources). Consultations with the USACE are on-going since DOBOR's project would restore the connection to the Pacific Ocean and must be permitted. Federal jurisdiction with regards to the applicability of Individual and/or Nationwide Permits is determined by the USACE and is valid for 5 years."

> It is biased to claim trapped water as a nuisance and shows the one-sidedness of the draft EA. It is inappropriate for the draft EA to claim trapped water "may be unsanitary" with no scientific support of such claim. US national standards for recreational waters (EPA's RWQC published in 1986 and 2012) are not useful for non-sewage impacted tropical waters (see Dr. Roger Fujioka – U. of Hawaii

large body of scientific literature). It is insufficient to claim health risk when no health risk-based testing is being performed. The EA should discuss both the beneficial use of calm water swimming, as well as the perception of nuisance that has also been voiced. It is not uncommon for coastal landowners to try to block public access to the ocean and shore features. It is inappropriate for the county to set a precedent where nearby property owners have more influence on nearby public lands than the general public. The voice of people who enjoy and utilize the hot ponds has been completely ignored in the draft EA, which results in an insufficient draft EA. The draft EA has not captured the breadth of public opinion and is therefore incomplete.

PDF Page 62 draft EA: "CSH noted in its report that several respondents are deeply concerned about specific behaviors that are occurring in the project area (e.g., nude swimming, littering, trespassing on privately-owned property, etc.) that do not relate specifically to cultural practices. Residents and tourists are visiting the hot ponds and black sand beach at Pohoiki. Respondents expressed support for the restoration of navigational access without further delay, material placement that eliminates the nuisance aspects of the hot ponds, and improved security and regulation of visitors to the area. Landowners who have encountered trespassers also support a physical delineation such as a wall between the public and private areas along Pohoiki Bay"

The illegal behaviors cited above are not resolved by the draft EA plans. The hot ponds should not be considered a nuisance. It is an undesirable precedent to set where the county only listens to nearby landowners' preferences with no presentation of the opinions stated in the public forums that are in support of calm water swimming areas. The draft EA should not label the hot ponds as nuisance. It is clear the boat ramp hot pond will be lost with the dredging, which is acceptable. It is unacceptable to fill in the hot ponds that are along the former shoreline or in the jungle along the coastal path. In addition, the characterization of the hot ponds as nuisance is biased and does not include discussion of the beneficial uses of the hot ponds. Most hot pond users are not engaged in the illegal behaviors cited above.

PDF pages 62-63 Draft EA: "The findings from the LRFI report indicate that five sites should be avoided and are not likely to be directly impacted by the project:
State Site Number Site Name
50-10-46-02507 historic habitation complex located within Isaac Hale Beach Park that is close to a location for dredged material placement
50-10-46-02530 Old Government Road Site Reference Site Feature
CSH-2 coastal foot trail
CSH-3 potential road interface with the historic Rycroft Road alignment (SIHP #50-10-46-30137)
CSH-4 *ahu* used for traditional healing practices that was reportedly constructed during the 1920s or earlier"

The list of sites that "should not be impacted" is agreeable, in particular the coastal foot trail and all features along the coastal trails should not be altered. The hot pond in the trees, next to the coastal trail should not be impacted and should be preserved, specifically when the planned access road shown on multiple maps (e.g. page 232 of the draft EA PDF) is created. Loss of the hot pond along the coastal trail would be unacceptable. The warm pond enclosed by sand on one side and the original shoreline on the other side should be added to the list of sites that should not be impacted.

PDF Page 65 Draft EA: "The presence of hazardous waste is not anticipated but if discovered, the DOH Indoor and Radiological Health Branch will be contacted. Hazardous or toxic waste that is encountered will be addressed and/or remediated in accordance with applicable State and federal laws, pertaining to the handling, treatment, and disposal of contaminated materials"

The draft EA is incomplete as it does not define or specify what tests will be performed to assess hazardous or toxic wastes. What chemical tests will be performed, at what frequency and what volume per dredge? Will radiological testing be performed?

PDF Page 69 draft EA: HRS §205A-2 specifically states policies "1. Recreational Resources (i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas".

The hot ponds are such a feature and the four options provided by the draft EA destroy hot ponds which is contrary to this policy (HRS §205A-2). To align with this policy the plans should include maintaining the hot ponds (excepting the pond on the boat ramp).

PDF Page 104 draft EA: "**4.6.1. Safe Swim Area**
For decades, community members have requested a safe swim area at Pohoiki that avoids conflicts with boaters. As a result of the lava inundation at Kalapana in 1990, the Puna community lacks a safe swim area for beginning swimmers and children. A petition was started in 2012 for the purpose of initiating public outreach and to document community consensus and public support for a public swimming area as part of the Phase II Pohoiki Regional Park. The petition effort documented support for the safe swim area from adjacent landowners, fishermen, kūpuna, lifeguards, educators and administrators, community leaders, and Pohoiki families, surfers and youth.
There was no legal swim area at Pohoiki Bay but the boat ramp area was used by children and surfers due to easy accessibility to the water. A recognized hazard was created when boats entered or left the ocean since both children and motorboats would be moving in the water and in close proximity while waters were surging. Increased use of the boat ramp by boaters, swimmers and surfers increased the safety hazard."

Section 4.6.1 is insufficient. It identifies the need for a swimming area with calm water and no boats, but it is not transparent that all four alternatives assessed **remove** a safe swimming area. This is an inaccurate and incomplete representation of impacts of the four alternatives.

Draft EA: Section 6 "Determination"

Section 6 Determination is inaccurate because it incorrectly states restoration of beneficial uses without acknowledging the loss of beneficial use of calm water swimming.

In summary, requested changes include:

1. Add a more complete transparent discussion of the opinions of the public regarding the hot ponds, including the opinions of those who utilize the hot ponds for swimming and beneficial recreational uses.
2. Reclassify the hot ponds as beneficial use for recreational swimming, specifically calm water swimming.
3. Discuss the impact of loss of one hot pond due to boat ramp dredging.
4. Specify which tests will be performed to identify "hazardous or toxic waste", including a Sampling and Analysis Plan with frequency of testing.

5. Remove the recovery funding that was received for ʻAhalanui Beach Park from the plan. Unless that funding can be used to maintain the existing hot ponds (excepting the pond at the boat ramp).
6. Add the hot pond along the former coastline and the hot pond along the coastal trail to the list of sites "not impacted" by the project.
7. Provide a 5th alternative that preserves the hot pond along the former coastline.

Thank you for consideration of these comments.

Sincerely,
Audrey Ichida, PhD
Environmental Consultant
Water Quality Specialist

From: Ocean Cat <thinkearthfirst@gmail.com>
Sent: Tuesday, May 23, 2023 11:58 AM
To: finn.d.mccall@hawaii.gov; Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Comment Letter Regarding: Pohoiki Boat Ramp Dredging of Volcanic Debris.

Aloha Finn Vagay of State of Hawaiʻi, Department of Land and Natural Resources and Trevor Vagay of The Limtiaco Consulting Group;

My name is Heather Garvey, Marine Biologist.

Please save some of these hot ponds or create more.
Fisherman are very important here, and I have been a fisherwoman my whole life, AND these hot ponds are very important too. We can save BOTH. It does not have to be one or another. Thousands of people really find peace and relaxation in those ponds, including me. How many places in the world is there volcanically heated soaking ponds? They should be fought for and deemed a treasure, not a nuisance.

I was there last night, laying down soaking in the hot water, steam rising up, and looked up at those amazing stars, with a little bright sliver of moon shining down on me, hearing the waves crashing and frogs chirping. Magical.

I have had so many magical and/or spiritual experiences in the larger pond, not the one connected to boat ramp. Please save it or create new ones.

Attached is a letter written by a good friend.

This letter is in support of dredging to access the existing boat ramp. This letter is opposed to the suggested dredging scale and disposal plan. The four options examined in the draft EA are insufficient to meet community needs and are in direct conflict with some community needs. The county should provide an alternative option that meets the needs of both boat users and calm water swimming users. The current option suggested in the draft EA only considers the needs of boat users and is to the detriment of calm water recreators. The hot pond along the former shoreline should be designated as beneficial use, not as nuisance.

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It is biased to claim trapped water as a nuisance and shows the one-sidedness of the draft EA. It is inappropriate for the draft EA to claim trapped water "may be unsanitary" with no scientific support of such claim. US national standards for recreational waters (EPA's RWQC published in 1986 and 2012) are not useful for non-sewage impacted tropical waters (see Dr. Roger Fujioka – U. of Hawaii large body of scientific literature). It is insufficient to claim health risk when no health risk-based testing is being performed. The EA should discuss both the beneficial use of calm water swimming, as well as the perception of nuisance that has also been voiced. It is not uncommon for coastal landowners to try to block public access to the ocean and shore features. It is inappropriate for the county to set a precedent where nearby property owners have more influence on nearby public lands than the general public. The voice of people who enjoy and utilize the hot ponds has been completely ignored in the draft EA, which results in an insufficient draft EA. The draft EA has not captured the breadth of public opinion and is therefore incomplete.

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The list of sites that "should not be impacted" is agreeable, in particular the coastal foot trail and all features along the coastal trails should not be altered. The hot pond in the trees, next to the coastal trail should not be impacted and should be preserved, specifically when the planned access road shown on multiple maps (e.g. page 232 of the draft EA PDF) is created. Loss of the hot pond along the coastal trail would be unacceptable. The warm pond enclosed by sand on one side and the original shoreline on the other side should be added to the list of sites that should not be impacted.

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PDF Page 104 draft EA: "4.6.1. Safe Swim Area
For decades, community members have requested a safe swim area at Pohoiki that avoids conflicts with boaters. As a result of the lava inundation at Kalapana in 1990, the Puna community lacks a safe swim area for beginning swimmers and children. A petition was started in 2012 for the purpose of initiating public outreach and to document community consensus and public support for a public swimming area as part of the Phase II Pohoiki Regional Park. The petition effort documented support for the safe swim area from adjacent landowners, fishermen, kūpuna, lifeguards, educators and administrators, community leaders, and Pohoiki families, surfers and youth.
There was no legal swim area at Pohoiki Bay but the boat ramp area was used by children and surfers due to easy accessibility to the water. A recognized hazard was created when boats entered or left the ocean since both children and motorboats would be moving in the water and in close proximity while waters were surging. Increased use of the boat ramp by boaters, swimmers and surfers increased the safety hazard."

Section 4.6.1 is insufficient. It identifies the need for a swimming area with calm water and no boats, but it is not transparent that all four alternatives assessed remove a safe swimming area. This is an inaccurate and incomplete representation of impacts of the four alternatives.

Draft EA: Section 6 "Determination"

Section 6 Determination is inaccurate because it incorrectly states restoration of beneficial uses without acknowledging the loss of beneficial use of calm water swimming.

In summary, requested changes include:

1. Add a more complete transparent discussion of the opinions of the public regarding the hot ponds, including the opinions of those who utilize the hot ponds for swimming and beneficial recreational uses.
2. Reclassify the hot ponds as beneficial use for recreational swimming, specifically calm water swimming.
3. Discuss the impact of loss of one hot pond due to boat ramp dredging.
4. Specify which tests will be performed to identify "hazardous or toxic waste", including a Sampling and Analysis Plan with frequency of testing.
5. Remove the recovery funding that was received for 'Ahalanui Beach Park from the plan. Unless that funding can be used to maintain the existing hot ponds (excepting the pond at the boat ramp).
6. Add the hot pond along the former coastline and the hot pond along the coastal trail to the list of sites "not impacted" by the project.
7. Provide a 5th alternative that preserves the hot pond along the former coastline.

Thank you for consideration of these comments.

Sincerely,
Audrey Ichida, PhD
Environmental Consultant
Water Quality Specialist

From: **Aleanu Artist** <imbert.clearpath@gmail.com>
Date: Tue, May 23, 2023 at 8:25 AM
Subject: Please preserve access to Pohoiki hot ponds/swimming
To: <finn.d.mccall@hawaii.gov>, <trevor@tlgchawaii.com>

Aloha:

I wanted to add my voice in support of designing dredging options that preserve as many of the hot ponds/calm swimming areas as possible at Isaac Hale park.

I support the renewed access for boaters and fishermen using the boat ramp, but I'm also a frequent user of the hot ponds, whose calm accessible mineral waters have been a notable benefit to my health and well being. Never in all my years of using the ponds have I experience adverse affects from the water quality of the ponds. Neither have I heard of anyone else having adverse experiences.

And I have a five year old granddaughter who would lose access to a safe calm swimming area under the current plans.

Please take the needs and interests of recreational swimmers and families into consideration when reviewing and designing the options for reopening boating access at Isaac Hale. It would be a welcome way to be the MOST inclusive to the entire Puna community.

In this context, I'm also expressing support for Audrey Ichida's well-researched letter to you regarding this topic.

Mahalo nui loa,

Aleanu Matthee
Puna Beach Palisades
--
Imbert

From: Leif Hansen <allleifsmail@gmail.com>
Sent: Tuesday, May 23, 2023 6:02 PM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>
Subject: [EXTERNAL] re: Dredging for Pohoiki Boat Ramp

To: Finn McCall
State of Hawai'i, Department of Land and Natural Resources

I understand how important the boat ramp and fishing industry is to the local community and am in full support that a creative "win win" solution can be found that creates a ramp AND preserves the rare jewel of the Pohoiki hot ponds. Myself and thousands of people over the years have enjoyed the relaxing, healing, community building waters of those hot ponds. I have too many happy memories to recount in this letter of finding solace, healing and connection with diverse Puna community members there.

Please do not let impatience, greed or fear have mix into your motives for a final decision.

Warmly
Leif
253-683-0148

Below is a letter that I believe you received from a friend, and I am in full agreement with the below statements.

In summary, requested changes include:
1. Add a more complete transparent discussion of the opinions of the public regarding the hot ponds, including the opinions of those who utilize the hot ponds for swimming and beneficial recreational uses.
2. Reclassify the hot ponds as beneficial use for recreational swimming, specifically calm water swimming.
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6. Add the hot pond along the former coastline and the hot pond along the coastal trail to the list of sites "not impacted" by the project.
7. Provide a 5th alternative that preserves the hot pond along the former coastline.
Thank you for consideration of these comments.

--

This letter is in support of dredging to access the existing boat ramp. This letter is opposed to the suggested dredging scale and disposal plan. The four options examined in the draft EA are insufficient to meet community needs and are in direct conflict with some community needs. The county should provide an alternative option that meets the needs of both boat users and calm water swimming users. The current option suggested in the draft EA only considers the needs of boat users and is to the detriment of calm water recreators. The hot pond along the former shoreline should be designated as beneficial use, not as nuisance.
PDF Page 51 Draft EA: "The County of Hawai'i Department of Parks and Recrea on is alloca ng $3.1 million of disaster recovery funds to improvements at Isaac Hale Beach Park, which includes recovery funding that was received for 'Ahalanui Beach Park (County of Hawai'i, 2022). The redevelopment of 'Ahalanui Park (which was completely inundated by lava such that shoreline access and coastal recreation no longer exists) is considered to be financially impractical (Ibid.)."

It is inappropriate for funds allocated for ‘Ahalanui Park recovery to be used for filling in hot ponds at Isaac Hale Beach Park. ‘Ahalanui Park included a warm water calm swimming area, so it is particularly wrong for funds meant to recover this type of recreation (calm water swimming) to be used to remove resources that currently support the exact type of recreation that was lost when ‘Ahalanui Park was lost. The county should not use these funds for any project that does not include restoration of calm water recreation.

PDF Page 53 Draft EA: “Identified nuisances such as areas of trapped water that may be unsanitary may be eliminated as a result of the project. Nearby property owners appear to support this aspect of the project (see Section 2.8. Archaeological and Cultural Resources). Consultations with the USACE are on-going since DOBOR’s project would restore the connection to the Pacific Ocean and must be permitted. Federal jurisdiction with regards to the applicability of Individual and/or Nationwide Permits is determined by the USACE and is valid for 5 years.”

It is biased to claim trapped water as a nuisance and shows the one-sidedness of the draft EA. It is inappropriate for the draft EA to claim trapped water “may be unsanitary” with no scientific support of such claim. US national standards for recreational waters (EPA’s RWQC published in 1986 and 2012) are not useful for non-sewage impacted tropical waters (see Dr. Roger Fujioka – U. of Hawaii large body of scientific literature). It is insufficient to claim health risk when no health risk-based testing is being performed. The EA should discuss both the beneficial use of calm water swimming, as well as the perception of nuisance that has also been voiced. It is not uncommon for coastal landowners to try to block public access to the ocean and shore features. It is inappropriate for the county to set a precedent where nearby property owners have more influence on nearby public lands than the general public. The voice of people who enjoy and utilize the hot ponds has been completely ignored in the draft EA, which results in an insufficient draft EA. The draft EA has not captured the breadth of public opinion and is therefore incomplete.

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The illegal behaviors cited above are not resolved by the draft EA plans. The hot ponds should not be considered a nuisance. It is an undesirable precedent to set where the county only listens to nearby landowners’ preferences with no presentation of the opinions stated in the public forums that are in support of calm water swimming areas. The draft EA should not label the hot ponds as nuisance. It is clear the boat ramp hot pond will be lost with the dredging, which is acceptable. It is unacceptable to fill in the hot ponds that are along the former shoreline or in the jungle along the coastal path. In addition, the characterization of the hot ponds as nuisance is biased and does not include discussion of the beneficial uses of the hot ponds. Most hot pond users are not engaged in the illegal behaviors cited above.

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State Site Number Site Name

50-10-46-02507 historic habitation complex located within Isaac Hale Beach Park that is close to a location for dredged material placement

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CSH-2 coastal foot trail

CSH-3 potential road interface with the historic Rycroft Road alignment (SIHP #50-10-46-30137)

CSH-4 ahu used for traditional healing practices that was reportedly constructed during the 1920s or earlier”

The list of sites that “should not be impacted” is agreeable, in particular the coastal foot trail and all features along the coastal trails should not be altered. The hot pond in the trees, next to the coastal trail should not be impacted and should be preserved, specifically when the planned access road shown on multiple maps (e.g. page 232 of the draft EA PDF) is created. Loss of the hot pond along the coastal trail would be unacceptable. The warm pond enclosed by sand on one side and the original shoreline on the other side should be added to the list of sites that should not be impacted.

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The draft EA is incomplete as it does not define or specify what tests will be performed to assess hazardous or toxic wastes. What chemical tests will be performed, at what frequency and what volume per dredge? Will radiological testing be performed?

PDF Page 69 draft EA: HRS §205A-2 specifically states policies “1. Recreational Resources (i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas”.

The hot ponds are such a feature and the four options provided by the draft EA destroy hot ponds which is contrary to this policy (HRS §205A-2). To align with this policy the plans should include maintaining the hot ponds (excepting the pond on the boat ramp).

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For decades, community members have requested a safe swim area at Pohoiki that avoids conflicts with boaters. As a result of the lava inundation at Kalapana in 1990, the Puna community lacks a safe swim area for beginning swimmers and children. A petition was started in 2012 for the purpose of initiating public outreach and to document community consensus and public support for a public swimming area as part of the Phase II Pohoiki Regional Park. The petition effort documented support for the safe swim area from adjacent landowners, fishermen, kūpuna, lifeguards, educators and administrators, community leaders, and Pohoiki families, surfers and youth.

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6. Add the hot pond along the former coastline and the hot pond along the coastal trail to the list of sites “not impacted” by the project.
7. Provide a 5th alternative that preserves the hot pond along the former coastline.

Thank you for consideration of these comments.

From: Leif Hansen <leif@sparkinteraction.com>
Sent: Tuesday, May 23, 2023 6:04 PM
To: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: ramp for Pohoiki Hot ponds

To:Trevor Vagay

I understand how important the boat ramp and fishing industry is to the local community and am in full support that a creative "win win" solution can be found that creates a ramp AND preserves the rare jewel of the Pohoiki hot ponds.

Myself and thousands of people over the years have enjoyed the relaxing, healing, community building waters of those hot ponds. I have too many happy memories to recount in this letter of finding solace, healing and connection with diverse Puna community members there.

Please do not let impatience, greed or fear mix into your motives for a final decision.

Warmly
Leif H. Hansen
253-683-0148

NOTE ADDED BY TLCG: email snipped since it has same content as 5/23/2023 email from Leif Hansen <allleifsmail@gmail.com>

From: lisa adeva samoy <lisamoyadeva@gmail.com>
Sent: Tuesday, May 23, 2023 10:26 PM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>
Subject: [EXTERNAL] please save hot ponds!!

I resend this letter and support wholely and urge you to take action to save the hot ponds at Pohoiki!

These ponds are very unique in the world and necessary to the health and well-being of local communities!!

Regarding: Pohoiki Boat Ramp Dredging of Volcanic Debris--The four options examined in the draft EA are insufficient to meet community needs and are in direct conflict with some community needs. The county should provide an alternative option that meets the needs of both boat users and calm water swimming users. The current option suggested in the draft EA only considers the needs of boat users and is to the detriment of calm water recreators. The hot pond along the former shoreline should be designated as beneficial use, not as nuisance.

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The list of sites that “should not be impacted” is agreeable, in particular the coastal foot trail and all features along the coastal trails should not be altered. The hot pond in the trees, next to the coastal trail should not be impacted and should be preserved, specifically when the planned access road shown on multiple maps (e.g. page 232 of the draft EA PDF) is created. Loss of the hot pond along the coastal trail would be unacceptable. The warm pond enclosed by sand on one side and the original shoreline on the other side should be added to the list of sites that should not be impacted.

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The hot ponds are such a feature and the four options provided by the draft EA destroy hot ponds which is contrary to this policy (HRS §205A-2). To align with this policy the plans should include maintaining the hot ponds (excepting the pond on the boat ramp).

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Section 4.6.1 is insufficient. It identifies the need for a swimming area with calm water and no boats, but it is not transparent that all four alternatives assessed remove a safe swimming area. This is an inaccurate and incomplete representation of impacts of the four alternatives.

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In summary, requested changes include:

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6. Add the hot pond along the former coastline and the hot pond along the coastal trail to the list of sites “not impacted” by the project.
7. Provide a 5th alternative that preserves the hot pond along the former coastline.

Thank you for consideration of these comments.

Sincerely,
Audrey Ichida, PhD
Environmental Consultant
Water Quality Specialist

From: Page Else <pageelse@gmail.com>
Sent: Tuesday, May 23, 2023 9:47 PM
To: finn.d.mccall@hawaii.gov; Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Pohoiki Draft EA AFNSI

I support the very thorough and well researched comments submitted by Audrey Ichida, Ph.D Environmental Consultant and water quality specialist. I support her requested changes and efforts to preserve calm and geothermal bathing opportunities. I believe the boat ramp is critical for Puna but I also believe recreation opportunities at Pohoiki are vital and possible. I don't believe we can't have both. That is usually said by companies when they want to take the easy way out and just make their profits.
I am a Puna resident and have owned my property in Nanawale Estates since 1986. Before the 2018 flow I went down to Ahalanui, Tidepools or Pohoiki about 4x per week. These excursions were essential to my happiness and well-being. I do utilize the hot ponds now at Pohoiki; not as often because we have had such extended inexplicable delays in road recovery, greatly increasing the drive time to Pohoiki.
Losing recreational opportunities at Pohoiki would be a significant impact. This should be examined in the context of how little ocean access is currently available in Puna.. A 5th alternative should be added to enable recreational features. Observations should be made during dredging to see where the hot water is coming in along the shoreline. Use that natural flow and the dredging spoils to create hot ponds. Plan for access so the boat traffic and pond footpaths are separate from each other, and not impacting private land. However, public access to the shoreline is guaranteed in Hawaii and the desires of the landowners should not preclude access and use by the public. Puna desperately needs more ocean access for recreation as well as for fishing.
Sincerely, Page Else

From: Paulette Gindi <paulettegindi@gmail.com>
Sent: Tuesday, May 23, 2023 5:11 PM
To: Trevor Vagay <Trevor@tlcghawaii.com>; finn.d.mccall@hawaii.gov
Subject: Regarding: Pohoiki Boat Ramp Dredging of Volcanic Debris--Draft EA (AFNSI)

Regarding: Pohoiki Boat Ramp Dredging of Volcanic Debris--Draft EA (AFNSI)

This letter is in support of dredging to access the existing boat ramp. This letter is opposed to the suggested dredging scale and disposal plan. The four options examined in the draft EA are insufficient to meet community needs and are in direct conflict with some community needs. The county should provide an alternative option that meets the needs of both boat users and calm water swimming users. The current option suggested in the draft EA only considers the needs of boat users and is to the detriment of calm water recreators. The hot pond along the former shoreline should be designated as beneficial use, not as nuisance.

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It is biased to claim trapped water as a nuisance and shows the one-sidedness of the draft EA. It is inappropriate for the draft EA to claim trapped water “may be unsanitary” with no scientific support of such claim. US national standards for recreational waters (EPA’s RWQC published in 1986 and 2012) are not useful for non-sewage impacted tropical waters (see Dr. Roger Fujioka – U. of Hawaii large body of scientific literature). It is insufficient to claim health risk when no health risk-based testing is being performed. The EA should discuss both the beneficial use of calm water swimming, as well as the perception of nuisance that has also been voiced. It is not uncommon for coastal landowners to try to block public access to the ocean and shore features. It is inappropriate for the county to set a precedent where nearby property owners have more influence on nearby public lands than the general public. The voice of people who enjoy and utilize the hot ponds has been completely ignored in the draft EA, which results in an insufficient draft EA. The draft EA has not captured the breadth of public opinion and is therefore incomplete.

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The hot ponds are such a feature and the four options provided by the draft EA destroy hot ponds which is contrary to this policy (HRS §205A-2). To align with this policy the plans should include maintaining the hot ponds (excepting the pond on the boat ramp).

PDF Page 104 draft EA: "4.6.1. Safe Swim Area For decades, community members have requested a safe swim area at Pohoiki that avoids conflicts with boaters. As a result of the lava inundation at Kalapana in 1990, the Puna community lacks a safe swim area for beginning swimmers and children. A petition was started in 2012 for the purpose of initiating public outreach and to document community consensus and public support for a public swimming area as part of the Phase II Pohoiki Regional Park. The petition effort documented support for the safe swim area from adjacent landowners, fishermen, kūpuna, lifeguards, educators and administrators, community leaders, and Pohoiki families, surfers and youth.

There was no legal swim area at Pohoiki Bay but the boat ramp area was used by children and surfers due to easy accessibility to the water. A recognized hazard was created when boats entered or left the ocean since both children and motorboats would be moving in the water and in close proximity while waters were surging. Increased use of the boat ramp by boaters, swimmers and surfers increased the safety hazard."

Section 4.6.1 is insufficient. It identifies the need for a swimming area with calm water and no boats, but it is not transparent that all four alternatives assessed remove a safe swimming area. This is an inaccurate and incomplete representation of impacts of the four alternatives.

Draft EA: Section 6 "Determination"

Section 6 Determination is inaccurate because it incorrectly states restoration of beneficial uses without acknowledging the loss of beneficial use of calm water swimming.

In summary, requested changes include:

1. Add a more complete transparent discussion of the opinions of the public regarding the hot ponds, including the opinions of those who utilize the hot ponds for swimming and beneficial recreational uses.
2. Reclassify the hot ponds as beneficial use for recreational swimming, specifically calm water swimming.
3. Discuss the impact of loss of one hot pond due to boat ramp dredging.
4. Specify which tests will be performed to identify "hazardous or toxic waste", including a Sampling and Analysis Plan with frequency of testing.
5. Remove the recovery funding that was received for ʻAhalanui Beach Park from the plan. Unless that funding can be used to maintain the existing hot ponds (excepting the pond at the boat ramp).
6. Add the hot pond along the former coastline and the hot pond along the coastal trail to the list of sites "not impacted" by the project.
7. Provide a 5th alternative that preserves the hot pond along the former coastline.

Thank you
Paulette Gindi
Community Member

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <audreyichida@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Audrey Ichida, Ph.D.:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the email sent on May 23, 2023 and statement of support for dredging to restore access to the boat ramp. We acknowledge the stated opposition to the scale of the project. We understand the overall comments as opposition to the proposed project. A project that retains the hot ponds is preferred. Several parties that referenced or reiterated your email are copied on this response: Heather Garvey, Aleanu Matthee, Leif Hansen, Lisa Adeva Samoy, Page Else and Paulette Gindi. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

Hot Ponds (Items 1., 2., and 3.)
Section 2.13. Recreational Resources in the Final EA will indicate that the ponds are utilized by adults and children for recreational purposes such as soaking and swimming, which are popular activities at Pohoiki Bay while the boat ramp facility is closed. We acknowledge the statement that most hot pond users are not engaged in activities perceived as nuisances (nude swimming, litering, trespassing on privately-owned property, etc.).

The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. DOBOR does not support the viewpoint that the ponds are a safe area for recreational activities such as swimming. It would not be reasonable for DOBOR to characterize the ponds as a beneficial use that should be preserved.

Section 2.3. Water Quality in the Final EA will include additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. The following citations and links will be included in the Final EA:

> Fecal bacteria found at a number of Hawaii beaches
> By Paul Drewes / KITV4 / Jun. 20, 2023
> https://www.kitv.com/news/local/fecal-bacteria-found-at-a-number-of-hawaii-beaches/article_cd3bac04-0ff1-11ee-9314-d3dd9fc8dd64.html
>
> Thrill seekers jumping into polluted Ala Wai Canal waters spark major health concerns
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1622 Kanakanui Street • Honolulu, Hawaii 96817
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> 83,000 Hawaii homes dispose of sewage in cesspools. Rising sea levels will make them more of a mess
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>
> Vibrosis
> https://health.hawaii.gov/docd/disease_listing/vibriosis/

Testing (Item 4.)
An appropriate testing program with a sampling and analysis plan would be warranted when there is a hazardous substance to test for. As indicated in the Draft EA, the presence of hazardous waste is not anticipated.

Funding (Item 5.)
The Final EA will state that the Federal Emergency Management Agency (FEMA) has awarded disaster funding to Hawai'i County that will be utilized for its projects (e.g., repairs to Pohoiki Road, water infrastructure, and park facilities). DOBOR's proposed project will not utilize funding that Hawai'i County receives for its projects. As of this writing, FEMA has not obligated disaster funding to the State of Hawai'i for construction of the proposed project. The amount of available funding for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained.

Listed Sites (Item 6.)
It would be inappropriate to include the ponds resulting from the 2018 eruption in a list of identified and evaluated archaeological historic properties. We acknowledge that the ponds are used and valued as recreational resources as stated in the comments received during the Draft EA comment period.

Sections 2.13. Recreational Resources and 3.8. Other Considered Plans in the Final EA will indicate that Hawai'i County envisions a different location for a safe swim area. As indicated in *Revitalize Pohoiki* (2022), which is a published plan to help guide improvements at Isaac Hale Beach Park, the safe swim area would be close to an existing parking area near the boat ramp.

Additional Alternative (Item 7.)
The Final EA will include a discussion of dredging and retaining the pond in Section 4.6.2. Dredge and Retain Pond. The suggested alternative of dredging to restore navigational access and

retaining one pond in the backshore area is not preferred by DOBOR for the reasons mentioned in this letter.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Heather Garvey (email on May 23, 2023, thinkearthfirst@gmail.com)
Aleanu Matthee (email on May 23, 2023, imbert.clearpath@gmail.com)
Leif Hansen (email on May 23, 2023, allleifsmail@gmail.com, leif@sparkinteraction.com)
Lisa Adeva Samoy (email on May 23, 2023, lisamoyadeva@gmail.com)
Page Else (email on May 23, 2023, pageelse@gmail.com)
Paulette Gindi (email on May 23, 2023, paulettegindi@gmail.com)
Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

From: Nick Moore <nijomo44@gmail.com>
Sent: Tuesday, May 23, 2023 4:26 PM
To: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Pohoiki

Trevor,

I know you're busy, so many mahalos for taking the time to read.

The natural hot ponds at Pohoiki are a treasured piece of our community in Puna. I beg you to reconsider removing them and find another way to build the boat ramp for fisherman.

These hot ponds are an incredibly special piece of nature and I believe they should be protected just as a national park. To destroy something so special that was given to us by Pele I believe is disrespectful to the Aina.

I beg you. These healing ponds are an essential part of the health of our community. Please find another way.

Mahalo,

Nicholas Jordan Moore

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <nijomo44@gmail.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Nicholas Jordan Moore:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the email sent on May 23, 2023. We understand the comments as opposition to the proposed project. A project that retains the hot ponds is preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. DOBOR does not support the viewpoint that the ponds are a safe area for recreational activities such as swimming. It would not be reasonable for DOBOR to characterize the ponds as a resource that should be protected like a national park.

Section 2.3. Water Quality in the Final EA will include additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. The following citations and links will be included in the Final EA:

Fecal bacteria found at a number of Hawaii beaches
By Paul Drewes / KITV4 / Jun. 20, 2023
https://www.kitv.com/news/local/fecal-bacteria-found-at-a-number-of-hawaii-beaches/article_cd3bac04-0ff1-11ee-9314-d3dd9fc8dd64.html

Thrill seekers jumping into polluted Ala Wai Canal waters spark major health concerns
By Jolanie Martinez / Hawaii News Now / Jun. 21, 2023
https://www.hawaiinewsnow.com/2023/06/22/thrill-seekers-jumping-into-ala-wai-canal-spark-major-health-concerns/

83,000 Hawaii homes dispose of sewage in cesspools. Rising sea levels will make them more of a mess
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https://www.kitv.com/news/local/83-000-hawaii-homes-dispose-of-sewage-in-cesspools-rising-sea-levels-will-make-them/article_9b95117b-7334-5251-ad33-e14225e2af20.html

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Hawaii's Cesspool Crisis Has A Long History. It's Not Over Yet.
By Jessica Terrell / Civil Beat / July 9, 2023
https://www.civilbeat.org/2023/07/hawaiis-cesspool-crisis-has-a-long-history-and-its-not-over-yet/

Hawai'i Cesspool Hazard Assessment & Prioritization Tool: Web Application. Available online from http://hawaiicespooltool.org/

Vibrosis
https://health.hawaii.gov/docd/disease_listing/vibriosis/

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

From: Abigail Raye <abigail_raye@yahoo.com>
Sent: Tuesday, May 23, 2023 6:13 PM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>
Subject: [EXTERNAL] Pohoiki Boat Ramp Dredging

To:
State of Hawai'i, Department of Land and Natural Resources Finn McCall
(808) 587-3250
finn.d.mccall@hawaii.gov

Hello and thank you for your time in reading this letter.

As a local community member residing in Kapoho, while I understand and am in full support of building the boat ramp for the local fishermen, it is with heavy concern that the current option suggested in the draft EA isn't considering the FULL community's needs, i.e calm water recreators...

The four options examined in the draft EA are insufficient to meet community needs and are in direct conflict with some community needs. The county should provide an alternative option that meets the needs of both boat users and calm water swimming users. The current option suggested in the draft EA only considers the needs of boat users and is to the detriment of calm water recreators. The hot pond along the former shoreline should be designated as beneficial use, not as nuisance.

These ponds have been a place of refuge, healing and peace for me and thousands of people from near and far.
These are SACRED ponds that should be held SACRED, respecting and preserving the natural gifts given by this aina! If there's any way to have a win/win to support ALL affected by this decision, both the boat ramp users and the calm water recreational users, me and thousands more would be so very grateful.

Mahalo and thanks for your efforts.

-Freeya Ray

From: Abigail Raye <abigail_raye@yahoo.com>
Sent: Tuesday, May 23, 2023 6:14 PM
To: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Pohoiki Boat Ramp Dredging

To:

The Limtiaco Consulting Group;
1622 Kanakanui Street, Honolulu, HI 96817 Trevor Vagay, (808) 596-7790, trevor@tlcghawaii.com

Hello and thank you for your time in reading this letter.

NOTE ADDED BY TLCG: email snipped since it has same content as 5/23/2023 6:13 PM email to Finn McCall

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <abigail_raye@yahoo.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Freeya or Abigail Raye:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for your comments sent on May 23, 2023. We understand the comments as opposition to the proposed project. A project that retains the hot ponds is preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. DOBOR does not support the viewpoint that the ponds are a safe area for recreational activities such as swimming. It would not be reasonable for DOBOR to characterize the ponds as a beneficial use that should be preserved.

Section 2.3. Water Quality in the Final EA will include additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. The following citations and links will be included in the Final EA:

Fecal bacteria found at a number of Hawaii beaches
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Vibrosis
https://health.hawaii.gov/docd/disease_listing/vibriosis/

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

From: Katie Roper <katie@sundarigardens.com>
Sent: Tuesday, May 23, 2023 9:14 PM
To: McCall, Finn D <finn.d.mccall@hawaii.gov>
Subject: [EXTERNAL] Opposition to Pohoiki Boat Ramp Proposal

Aloha,

I write you to humbly ask that you do not fill in the hot ponds to dredge for the boat ramp.

These ponds are incredible healing waters that are so special as a healing space for our community. I love boats and I believe we can find a win-win that supports the beneficial use of these ponds for many recreational purposes. If need be we can keep just the one inner forest pond perhaps, but I truly hope we can create a solution that allows us to keep both.

Best,
Katie Roper
Resident
12-261 W Pohakupele Loop
Pahoa, HI 96778

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <katie@sundarigardens.com>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Katie Roper:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the comments sent on May 23, 2023 that state your opposition to the project. A project that retains the hot ponds is preferred. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final Environmental Assessment (EA).

The Final EA will indicate that the ponds in the backshore area are viewed favorably by some community members and viewed as an unsanitary nuisance by some community members. DOBOR does not support the viewpoint that the ponds are a safe area for recreational activities such as swimming. It would not be reasonable for DOBOR to characterize the ponds as a beneficial use that should be preserved.

Section 2.3. Water Quality in the Final EA will include additional background information pertaining to water quality testing undertaken by the Department of Health, cesspools, and vibrosis. The following citations and links will be included in the Final EA:

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https://health.hawaii.gov/docd/disease_listing/vibriosis/

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)

From: Bobby Camara <kuabay@hawaiiantel.net>
Sent: Tuesday, May 23, 2023 5:12 PM
To: finn.d.mccall@hawaii.gov
Cc: Trevor Vagay <Trevor@tlcghawaii.com>
Subject: Bobby Camara comments RE Pohoiki Draft EA

NOTE ADDED BY TLCG: see next page

23 May 2023

To: Finn McCall, DoBOR, and Trevor Vagay, The Limtiaco Consulting Group
RE: Draft EA for Pohoiki Boat Ramp Dredging
From: Bobby Camara

"Draft Environmental Assessment for the Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
Prepared For: State of Hawai'i, Department of Land and Natural Resources, Division of Boating and Ocean Recreation
Prepared By: The Limtiaco Consulting Group, April 2023

Agency Determination: Anticipated Finding of No Significant Impact (AFONSI)"

Starting out with an Anticipated Finding Of No Significant Impact (AFONSI) causes a reader to wonder whether or not the environmental *assessment* is actually that, or is it a document assembled with information intended to support a FONSI?

Below: the statement is indeed how black sand is created. It seems that an entire 11 acre beach might be diifferent than a "sandbar".
"...Fresh black sand that was created as molten lava was chilled and shattered by the surf was transported by wave currents to Pohoiki Bay. On August 13, 2018, the boat ramp was blocked by a sandbar of accumulated volcanic material in Pohoiki Bay.

"... the lava flow formed a new land mass consisting of a new lava layer on existing land and accretion land consisting of entirely new land that extends into the Pacific Ocean. **Constant wave activity at the accretion land and ocean interface continuously produces sand, rock, and cobbles.** ... at Pohoiki Bay, which was approximately 1,000 feet wide at the mouth and extended inland approximately 450 feet. **Loose material transported along the coast by prevailing wave direction and ocean currents has accumulated in Pohoiki Bay since 2018,** such that the undamaged boat ramp facility remains landlocked."

I believe that it's extremely likely that said "loose material", or black sand, will continue to be transported by longshore drift currents from places adjacent to 2018 lava flows, and will accumulate on the shore of the former bay. It seems very likely that any material removed to create a channel, or if the beach is removed, will simply be replaced by additional sand carried by longshore currents.

".. Community members most impacted by the inoperable boat ramp have been adamant about the need to re-open the Pohoiki Boat Ramp facility, which is owned and maintained by the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DLNR - DOBOR)."

I am amazed that no information about numbers of Commercial Fisher Permits, catch totals, etc., is presented in the EA. How many people will benefit from the millions of dollars to be spent?

The information presented in this EA is poorly researched, often contradictory, and preparers seem oblivious about the obvious environmental histories of Puna ma kai, including repeated lava flows, severe earthquakes, and episodes of coastal subsidence. The latter is demonstrated in the place names Poho-iki and Ka-poho. "Poho", in the Hawaiian Dictionary by Pukui and Elbert:

> "**poho** 1. n. Hollow or palm of the hand, hollow of the foot, **depression, hollow**; container, receptacle, pouch, as for tobacco; box, as for matches; hollow of a canoe, divided into three parts (mua, waena, *hope*). See ex. below. *Poho kai*, hollow where sea remains at low tide."

We'ave witnessed such subsidence after severe earthquakes in 1975, and in 1989. Though subsidence was relatively minor at Pohoiki and Kapoho in 1989, it was sufficient to flood the coastal road NE of Pohoiki at high tides, as well as oceanfront properties and roads in Kapoho.

Characterizing a big new beach of black sand and cobbles, created by the direct action of Pelehonuamea as massive quantities of her lava flowed into the Pacific in Summer 2018 as "Volcanic Debris" is supremely insulting to those who understand and appreciate that without the untiring and relentless work of Pele producing untold episodes of molten lava flows, Hawai'i nei would not exist.

The descriptor "Volcanic Debris" seems to have been specifically chosen to greatly diminish the rare occurrence of the creation of a large new black sand beach. "Debris" is equated to rubbish, and so is something to be removed and thrown away. Black sand beaches are rare, but in Puna, during the thirty-five years of the Pu'u'ō'ō and Kupaianaha eruptions, we've seen beaches created, while others were buried by lava flows. From the EA: **"...Fresh black sand that was created as molten lava was chilled and shattered by the surf was transported by wave currents to Pohoiki Bay."[p1-1].** This is the only sentence I read that most accurately explains the process of creation of black sand when pāhoehoe lava flows into the ocean. The massive roiling clouds of steam and volcanic gases at the shore also contained copious amounts of shattered and exploded sand particles. Compare with: **"Basalt-based sand is created as mechanical processes erode volcanic headlands. The coastline in the project area is mostly rocky sea cliffs that face southeast. Black sand beaches along the coastline have formed from natural erosion and have been buried by subsequent lava flows." [p. 2-5].** Creation of sands by erosion does happen, and is how the beaches at Waipi'o, Waimanu and Pololū valleys, as well as the beach along Bayfront in Hilo formed. But that is NOT how the current beach at Pohoiki formed. The ahupua'a adjacent to, and NE of Pohoiki is Keoneloa, perhaps meaning "the long sand", along a bay named Niehu.

Because Pohoiki is an an area of high geologic hazard, I am bewildered because the EA contains only one reference to a geologic map produced by USGS, and no information regarding the eruptive history of the region. How is it possible to come to a well-reasoned determination without considering that information?

"1-9
"... Traditional accounts suggest that Puna was one of Hawai'i's wealthiest agricultural regions; however, volcanic eruptions in relatively recent times have destroyed much of Puna's best land."

Though accounts may suggest the above characterization, realistically it seems that other regions not impacted by frequent lava flows would be much more fruitful, such as the field systems and kaluulu of the Kona districts, and the lo'i kalo of windward valleys.

"1-14
The English missionary, William Ellis, documented his travel in Hawai'i in 1823; his detailed journal mentions several specific ahupua'a and villages of Puna but Pohoiki was not mentioned. **T. Stell Newman traveled in Hawai'i in 1823, reviewed Ellis's journal, and constructed a map of agricultural lands on different parts of the island."**

T. Stell Newman wrote in the 1970s, and certainly did not travel in Hawai'i in 1823.

"1-15
... Out-migration may have been exacerbated by destructive earthquakes in **in the spring of 1868 that caused a 75-mile stretch of the Puna-Ka'ū coastline to subside and the destruction of numerous coastal homes and villages by a tsunami.** The population of Puna was 2,200 people by 1860, and 800 people by 1890."

"1-16
An earthquake in 1975 caused the coastline at Pohoiki to subside by over a foot. The extent of agricultural development surrounding the Pohoiki Bay area is visible in a 1977 aerial photograph. In 1979, the USACE constructed the 90-foot long breakwater structure at Pohoiki Bay."

There have been other instances of regional coastal subsidence, as documented in the late 1800's and in 1924, as well as the two cited above, and the names Kapoho and Pohoiki document that.

"1-18
1.6. Project Schedule and Cost
An initial estimate for the proposed project was calculated in 2022 to be $40 million. DOBOR is requesting State funds to supplement anticipated federal funds from FEMA. No County funds are associated with the proposed project."

"funds from FEMA" and "County funds" should be clearly defined as taxpayer dollars. Folks seem to forget that detail, and don't understand that FEMA also pays for billions of dollars of damage from hurricane, tornado, flood, fire, etc., on the continent. Too, it's been said that FEMA funds are reimbused to State or County governments *after* they pay for fixes.

“2-5
The project area was formed from basaltic lava flows from the Kīlauea Volcano, which is one of the most active volcanoes on Earth. Basalt-based sand is created as mechanical processes erode volcanic headlands. The coastline in the project area is mostly rocky sea cliffs that face southeast. Black sand beaches along the coastline have formed from natural erosion and have been buried by subsequent lava flows.
...Constant wave action against structurally weak and friable (easily crumbled) lava flows produces sand and cobbles which are transported along the coast, especially during large wave events.”

Black sands in Puna are formed as pāhoehoe entering the ocean explodes and shatters.

2-18
As shown by the wave modeling, prevailing trade wind waves approach the shoreline from the east, thus moving debris from east to west in Pohoiki Bay. Similarly, south swells approaching from the southwest will move debris to the east. **Both wave types can be expected to quickly fill in discontinuities (such as a dredged cut) in the loose and mobile beach face and align it parallel to the wave crests.**

If discontinuities will be quickly filled, why spend millions of dollars to dredge?

“2-21
Local fishermen who have launched from Pohoiki Bay and fished in the waters off of Pohoiki for generations have stopped fishing altogether, are incurring higher expenses as a result of launching from Hilo, or continue to adjust profit goals to adjust for rising expenses (Spencer and Hammatt, 2023). Recreational opportunities in the Puna District have been decreasing as a result of lava flows. **The demand for outdoor recreational resources in the Puna District as expressed by the public is very high.** At this time, the overall community sentiment appears to support the return of the Pohoiki Boat Ramp facility to productive use due to the challenges associated with developing a boat launch facility in Puna that replaces the built facility at Pohoiki Bay.”

Again, please quantify “local fishermen”, as well as “generations”. If the first ramp was established in the 1960s, that‘s a lot different than if the first ramp had been established in 1900. In the “old days” resourceful, ingenious Puna fisherfolk along cliffed shores built log ladder-like structures. Those were lashed to cliff tops, and extended into the ocean forming a ramp, allowing canoes to ride a swell in and coast up the ramp.
If the public expresses a “very high” demand for recreational opportunities, why destroy and erase a big, new, black sand beach?

“2.7. Natural Hazards
... The area of Puna that contains the project site has a high volcanic hazard designation as assessed by the United States Geological Survey. **The high hazard risk assigned to Puna is due to the presence of Mauna Loa, which is an active volcano.** The project site is located within Zone 2, which represents areas that are adjacent and downslope of the more hazardous zone (Zone 1). The Zone 1 designation includes the summit and rift zones of Mauna Loa and Kīlauea. Fifteen to twenty percent of Zone 2 has been covered by lava since 1800, and 25 to 75 percent has been covered within the past 750 years.”

A map would be a useful illustration. And, please note that the “high hazard risk assigned to Puna” is because of Kīlauea, NOT Maunaloa!!!

“2-29
...
The shoreline in the project area is characterized by a moderate to high coastal hazard due to wave and tsunami exposure. The beach and nearshore areas at Pohoiki Bay including the boat ramp facility would be impacted by 3.2 feet of sea level rise, according to the Hawai‘i Sea Level Rise Viewer (Hawai‘i Climate Change Mitigation and Adaptation Commission, 2021).”

Might that “3.2 feet of sea level rise” impact the boat ramp? When?

“2-31
... Seven parties responded to CSH out of 28 individuals or groups who were contacted:”

It‘s a shame that Cultural Surveys Hawai‘i (CSH) apparently only emailed parties to be consulted. Perhaps information also sent by US Mail, or phone calls, would‘ve yielded greater participation.

“2-33
2.9. Visual Resources
As a result of the 2018 eruption, the waters of Pohoiki Bay have been replaced with a wide expanse of black sand beach. **Only a few areas of nearshore water remain at this time.”**

The entirety of the Pacific Ocean, both nearshore and offshore waters, lies adjacent to the beach.

“Impacts and Mitigation Measures
The proposed project does not add new urban structures to the landscape. **Dredging** that removes the accumulated volcanic material from Pohoiki Bay **is expected to improve the visual landscape for people who value the aesthetics of marine waters.** The wide expanse of black sand beach will be reduced as a result of the project.”

Again, the Island of Hawai‘i is surrounded by “the aesthetics of marine waters”. The beach will be removed during the project.

“2-34
newly formed accretion land is expected to be consistent with the existing landscape which includes old and recent lava flows. **No mitigation is warranted or proposed because the effects of the project on visual resources are expected to be less than significant.”**

Sigh...if the new beach is seen as part of “visual resources” as is removed, it seems to me that the effects on visual resources will be catastrophically significant.

“p 3-1
3.2. Hawai‘i Coastal Zone Management Program
Any significant development within the SMA requires permit approval from the appropriate County. For the County of Hawai‘i, the SMA permit process is administered by the Department of Planning. The project area is within the SMA. Per Rule 9. SMA for Hawai‘i County, which applies to all shoreline development, “Development” does not include the following uses, activities or operations:

(R) Plan, design, construct, operate and maintain any lands or facilities under the jurisdiction of the Division of Boating and Ocean Recreation of the State Department of Land and Natural Resources.”

How absurd. “Development” doesn‘t include work on the DoBOR ramp which‘ll involve destruction of a scenic beach? Where else in Hawai‘i nei would such work at DoBOR sites that involved the destruction of a beach be tolerated?

“3-3
3. Scenic and Open Space Resources
Objectives. Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.
Policies. Identify valued scenic resources in the coastal zone management area;
Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;
Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and
Encourage those developments that are not coastal dependent to locate in inland areas.
The project involves dredging and is not expected to diminish coastal scenic view areas or open space resources.

“4. Coastal Ecosystems
Objectives. Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.
Policies. Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
Improve the technical basis for natural resource management;
Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;
Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and
Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

“3-4
9. BeachProtection
Objectives. Protect beaches for public use and recreation.

So by dredging a channel through a new beach, there will no effects on any coastal ecosystems, or scenic coastal views, and that work will not alter a natural landform?

6-3
6. DETERMINATION
The proposed project is not likely to have a significant impact on the physical or human environment based on the analysis presented in this document. DOBOR anticipates that the appropriate determination is a Finding of No Significant Impact (FONSI). The supporting rationale for this finding as set forth in HAR §11-200.1-13 is discussed below.
(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;
The Pohoiki Boat Ramp facility is existing infrastructure that was necessarily developed along the coastline due to its purpose. The proposed project involves dredging and does not add new infrastructure at Pohoiki Bay.
(12) Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies; or
The proposed project involves dredging Pohoiki Bay, which is unlikely to have a substantial adverse effect on scenic vistas and view planes.”

I simply do not comprehend how the writers can be so singularly focussed on the boat ramp and not see or understand the impacts any work will have on the new, big, black sand beach, scenic vistas, view planes, marine biota, anchialine hot pools, as well as numerous other resources. Hot anchialine pools have been common along coastal Puna ma kai, and have been referred to as “Waiwelawela” in texts and on historic maps.

Mahalo for the opportunity to comment.

Bobby Camara
16-1397 35th Avenue
Kea‘au HI 96749

THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 7, 2023

SENT VIA EMAIL ONLY: <kuabay@hawaiiantel.net>

Subject: Response to Draft Environmental Assessment for the Proposed Pohoiki Boat Ramp Dredging of Volcanic Debris in the Pohoiki Bay Area, Puna District, Hawai'i
TMK: (3) 1-3-008:014 por. and unencumbered land (new lava flow)

Dear Bobby Camara:

On behalf of the Department of Land and Natural Resources, Division of Boating and Ocean Recreation (DOBOR), we thank you for the letter sent via email on May 23, 2023. We acknowledge your comments which are critical of specific information in the Draft Environmental Assessment (EA), and DOBOR's determination. Written comments transmitted to DOBOR and the responses (including this letter) will be included with the Final EA. Relevant information that helps to improve the EA narrative will be incorporated, and the responses to specific comments are below.

Agency Determination
The environmental review process requires disclosure of the document type (e.g., Draft EA, Final EA, etc.) along with a determination (e.g., Anticipated Finding of No Significant Impact, Finding of No Significant Impact, etc.). The disclosure of the determination is consistent with Hawaii Administrative Rules §11-200.1-18 Preparation and contents of a draft environmental assessment and §11-200.1-21 Preparation and contents of a final environmental assessment.

Project Summary
The Final EA will include following statement regarding the use of debris: "For the purpose of this document, volcanic debris is defined as broken down lava flow fragments and fresh black sand that was created as molten lava contacted the ocean and was chilled, shattered by surf, and transported by wave currents. Volcanic debris that has accumulated in Pohoiki Bay may also be referred to as volcanic material."

Section 1.1. Introduction and Background
The sentence in the Final EA will be revised as follows: "On August 13, 2018, a visible sandbar of accumulated volcanic material in Pohoiki Bay was blocking the boat ramp."

The comments pertaining to loose material or black sand that will continue to be transported by wave action are acknowledged.

The statement about including the Commercial Fisher Permits and catch totals is acknowledged; however, the objectives of the proposed project are understandable without this information. The following statement will be included in the Final EA: "As a result of the project, fisherfolk would provide fresh fish for the local community to purchase and consume, earn income, and feed their families with their catch. The government would receive tax revenue from commerce."

The description of subsidence after severe earthquakes in 1975 and in 1989 is appreciated.

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Section 1.4. Historical Setting
We appreciate the comment pertaining to T. Stell Newman (1971) and have corrected the reference in the Final EA. Several itemized comments identified by page numbers (e.g., 1-9. 1-15, 1-16, and 1-18), will be considered; however, the excerpts from the cultural impact assessment report will remain unchanged.

Section 1.6. Project Schedule and Cost
The statements about taxpayer dollars will be considered. The Final EA will indicate that DOBOR is requesting State funds to supplement federal funds that may be obligated by FEMA for construction. No funding from Hawai'i County and no disaster recovery funds that Hawai'i County received from FEMA will be utilized for DOBOR's project. The amount of available funding for the project is expected to affect the extent of the dredging effort. For example, if the dredged area is reduced to a wide channel, more black sand beach at Pohoiki Bay would be retained.

Section 2.1.3. Geology and Geomorphology
The Final EA will state that black sands in Puna were formed as pāhoehoe enters the ocean, explodes, and shatters.

Section 2.1.2. Winds and Waves
The question about spending millions of dollars to dredge does not affect this section of the EA. Dredging more material from Pohoiki Bay means there would be a smaller volume of material that remains. The wave currents would consequently affect or move a smaller volume of material than what previously existed.

Section 2.2.1. Socioeconomic and Environmental Justice
The boat ramp was developed at the site of the former wharf. Robert Rycroft constructed the wharf at Pohoiki Bay during the mid-1880s to support his commercial activities and he allowed public use of the wharf, which was abandoned by the 1940s. The history of commercial endeavors at Pohoiki Bay including the wharf constructed during the mid-1880s for Robert Rycroft's business is described in Section 1.4. Historical Setting. The statement about quantifying local fishermen and generations is acknowledged but not necessary to understand that the history of modern usage includes commercial activities (e.g., providing fish for purchase by the local community) and recreational activities. The beach in dredged areas would necessarily be removed in order to restore the connection between Pohoiki Bay and the Pacific Ocean, which is the objective of the project.

Section 2.7. Natural Hazards
A map of lava flow hazard zones for Hawai'i Island will be included in Appendix E. The reference to Mauna Loa will be corrected to Kīlauea in the Final EA.

As stated in Section 2.1.5. Tide and Water Level Rise, current State guidelines are to plan for 3.2 feet of SLR by 2100.

Section 2.8. Archaeological and Cultural Resources
Cultural Surveys Hawaii, Inc. received your written comments include the critique of its communication method for its consideration.

Section 2.9. Visual Resources
The project strives to remove volcanic material from Pohoiki Bay to restore navigational access but will not eliminate all of the black sand beach at Pohoiki, especially if funding constraints reduce the scope of the project. The aesthetics of a wide expanse of black sand beach, which contrasts with the distant Pacific Ocean, will be reduced as a result of the project. Excavated and dredged volcanic material that is placed on newly formed accretion land is expected to be consistent with the existing landscape which includes old and recent lava flows. The stark contrast between lava and black sand, and the nearshore water and distant Pacific Ocean will be available from the Pohoiki Bay area as a result of the proposed project.

Section 3.2. Hawaii Coastal Zone Management Program
The definition of development in the Special Management Area rules is beyond the scope of the project. DOBOR's stated objective is to restore navigational access that previously existed, which necessarily removes existing beach in the dredged area. Scenic view areas will continue to have scenic elements such as black sand beach, nearshore water, and the distant ocean.

Section 6. Determination
From DOBOR's perspective, the proposed project is consistent with the objective of restoring pre-eruption conditions at Pohoiki Bay. The ability to launch boats from Pohoiki Bay for rescue operations is another important objective of the project. The Final EA will include the comments that were received from other agencies such as the DLNR - Division of Aquatic Resources (DAR). Two native anchialine shrimp species were detected by DAR during its biological surveys from 2019 to 2020. The letter from DAR (Ref. DAR #6397) states that it is not opposed to the filling of the ponds at the backshore area in part because the water temperatures increased to over 45 degrees Celsius (or 113 degrees Fahrenheit) and extirpated native anchialine shrimp species from that habitat. DAR expanded its anchialine surveys into the new lava field north of Pohoiki and recorded new habitat with native anchialine shrimp species including the endemic *Halocaridina rubra* (or ʻōpae ʻula) and the indigenous *Metabetaus lohena*.

You are welcome to contact me at (808) 596-7790 or by email to trevor@tlcghawaii.com if you have any questions.

Best regards,
The Limtiaco Consulting Group, Inc.

Trevor Vagay, P.E.
Associate Principal

c: Finn McCall, Project Manager, DOBOR (finn.d.mccall@hawaii.gov)