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Sanford's Service Center
Leilani Quarry

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

KAUAEA AHUPUA'A, PUNA DISTRICT, ISLAND OF HAWAI'I



APPLICANT:

Sanford's Service Center

PREPARED BY:

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APRIL 2026

SANFORD'S SERVICE CENTER

Kauaea Ahupua'a, Puna District, Island of Hawai'i

Tax Map Key: (3) 1-3:009:005

Draft Environmental Impact Statement

Applicant:

Sanford's Service Center
15-2628 Keaau-Pahoa Road
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Approving Agency:

Land Use Commission
State of Hawai'i

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This environmental document was prepared pursuant to Hawai'i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Hawai'i Administration Rules, Chapter 11-200.1, Environmental Impact Statement Rules.

April 2026

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Abbreviations

AAQS	Ambient Air Quality Standards
AIS	Archaeological Inventory Survey
ALISH	Agricultural Lands of Importance to the State of Hawai'i
BLNR	Board of Land and Natural Resources
BMP	Best Management Practice
CAA	Clean Air Act
CDUP	Conservation District Use Permit
CIA	Cultural Impact Assessment
CO	carbon monoxide
CO_2	carbon dioxide
CWA	Clean Water Act
CZM	Coastal Zone Management
dBA	A-weighted decibels
DLNR	Department of Land and Natural Resources
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EPA	Environmental Protection Agency
ESA	Endangered Species Act
GHG	greenhouse gas
HAR	Hawai'i Administrative Rules
HDOA	Hawai'i Department of Agriculture
HDOH	Hawai'i Department of Health
HDOT	Hawai'i Department of Transportation
HEPA	Hawai'i Environmental Policy Act
HFNA	Hawai'i Floriculture and Nursery Association
HRS	Hawai'i Revised Statutes
L	limited
LFA	Little Fire Ants
LSB	Land Study Bureau
LUC	Land Use Commission
LUPAG	Land Use Pattern Allocation Guide
MSL	mean sea level
NPDES	National Pollutant Discharge Elimination System

R resource

ROD Rapid ʻŌhiʻa Death

SHPD State Historic Preservation District

SLU State Land Use

SLUDBA State Land Use District Boundary Amendment

SO_2 sulfur dioxide

SPP Site Preservation Plan

TMK Tax Map Key

TCP Traditional Cultural Property

USFWS U.S. Fish and Wildlife Service

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Executive Summary

Executive Summary

ES.1 Description of the Action

Sanford's Service Center, Inc., with authorization by the landowner, Kamehameha Schools, proposes to reclassify up to approximately 94.108 acres of land in the Puna District on Hawai'i Island from the State Land Use Conservation District (Limited (L) subzone) to the Agricultural District. This administrative action would allow the continuation and expansion of mining and quarrying activities for black-colored, low-density cinder at the Leilani Quarry. The Proposed Action responds to changes in State land use regulations that, since 2011, have prohibited mining in the Conservation District's L subzone—resulting in Sanford's current operations being maintained under legal nonconforming status. The reclassification would align State land use designations with existing County zoning and anticipated General Plan updates, supporting improved long-term consistency in land use permitting and oversight.

At Leilani Quarry, Sanford's Service Center produces a low-density, black-colored cinder that is highly valued by the local horticultural and nursery industry. The peak monthly volume of cinder that Sanford's Service has extracted is an average of 6,200 yards per month in 2023. The current average monthly extraction volume for 2025 is only 3,200 yards per month, as the Applicant has reduced the amount of extracted material in order to extend the lifespan of Leilani Quarry. The volume of remaining black cinder reserves cannot be precisely estimated as the subsurface extent of the deposit is revealed progressively during extraction and cannot be accurately determined through non-invasive methods. However, the Applicant estimates that the available resource under the current License Area could be exhausted as soon as mid-2026.

The Proposed Action facilitates both administrative clarity and economic resilience by enabling expanded access to a strategic mineral resource critical to Hawai'i's horticultural and nursery industries. Black cinder sourced from the Leilani Quarry plays a vital role in statewide agricultural productivity, particularly for crops such as orchids and anthuriums, and is in high demand due to its unique properties. Continued access to this resource supports commercial and non-commercial agriculture, contributes to local employment, and addresses supply vulnerabilities highlighted by the 2018 Kīlauea eruption. At the same time, the Proposed Action incorporates measures to avoid sensitive cultural and natural features, including restrictions on quarrying near the culturally valued Pu'u Kali'u, and commits to biosecurity and native revegetation practices to minimize environmental impacts.

ES.2 Significant Adverse Impacts

The resource analysis presented in **Chapter 3** identifies localized effects on various environmental resources. These impacts vary in intensity and duration but are generally determined to be less than significant due to site-specific constraints, avoidance measures, and mitigation commitments.

However, the Proposed Action would result in a significant adverse impact associated with the irrevocable commitment of a natural resource: the low-density volcanic cinder of Puʻu Kaliʻu. As detailed in **Section 3.4** (Geology and Soils), quarrying activities would extract and permanently remove cinder from the flanks of this volcanic feature. Because this material is nonrenewable on human timescales, its extraction constitutes a permanent loss of geological resource value. The impact meets the Hawaiʻi Environmental Policy Act (HEPA) criterion (HAR § 11-200.1-13) for significance due to the irreversible nature of the resource commitment and the long-term alteration of the landscape.

Cumulative impacts analysis (**Section 4.1.4**) identifies a significant impact from the interaction of geological and cultural effects associated with cinder extraction at Pu'u Kali'u. While physical disturbance to the summit is avoided, ongoing extraction from the lower slopes constitutes an irreversible alteration of a landform whose physical presence is central to its cultural meaning — a meaning grounded in living community testimony, including accounts of the pu'u's diminishing visible profile, its irreplaceability as a whole landform, and its embodiment in a hula bearing its name within the Kanakaole family tradition. Considered together, the permanent loss of cinder substrate and the continued diminishment of a named, storied place would constitute a significant cumulative impact under HAR § 11-200.1-13(b)(8), even if impacts to cultural resources and cultural practices are each assessed as less than significant in isolation; once bulldozed, the landform cannot be reconstructed, and its loss would sever intergenerational connections between the community and this place. Community perspectives documented in the Cultural Impact Assessment (CIA) (**Appendix E**) reflect a range of views, including conditional support for continued mining and quarrying activities.

ES.3 Proposed Mitigation Measures

As described in **Chapter 3**, a variety of mitigation measures have been incorporated to address the localized environmental impacts of the Proposed Action. These impacts vary in intensity and duration but are generally determined to be less than significant due to site-specific constraints, avoidance measures, and mitigation commitments. For each resource area, the Environmental Impact Statement (EIS) identifies appropriate mitigation strategies, including best management practices and standard operating procedures.

However, to address the significant adverse impact associated with the irrevocable commitment of the cinder resource at Puʻu Kaliʻu, and to avoid broader cultural impacts, a set of specific mitigation measures is proposed Consistent with the terms of the quarry license agreement and as reflected in all action alternatives, a preservation buffer will be maintained around the summit of Puʻu Kaliʻu above 1,050 mean sea level (MSL), ensuring that the most culturally and physically prominent portion of the landform remains undisturbed throughout the life of the project.

In addition, the CIA recommends the formation of a Cultural Advisory Group to provide ongoing guidance on culturally appropriate practices and mitigation strategies throughout the life of the project. To meet the intent of the CIA's recommendations, the Applicant will designate a point-person (in consultation with the community) to respond to culturally related considerations or concerns on the project as warranted. This will ensure continued engagement with Native Hawaiian cultural practitioners and community members, ensuring that cultural perspectives remain integrated into project implementation and decision-making over time.

To further mitigate biological impacts, particularly with respect to *Cyrtandra nanawaleensis*, a federally endangered plant species identified within the Petition Area, the Proposed Action includes preservation buffers and species-specific management measures. Although this species is not located in an area accessible to mining and quarrying activities and is therefore not at direct risk from the

Proposed Action, avoidance protocols have been incorporated to ensure its continued protection. These include habitat buffering, monitoring, and the implementation of site-specific protocols consistent with agency consultation and regulatory requirements.

As part of the long-term stewardship of the Petition Area, the Proposed Action also incorporates a Landscaping and Biosecurity Plan (**Appendix D**), which serves as a mitigation measure for impacts to natural resources resulting from quarry activities. This plan emphasizes the phased revegetation of closed quarry areas using native plant species appropriate to the lowland wet forest context of the Puna District. By prioritizing native outplanting over previously used non-native species, the plan supports the reestablishment of ecological structure and function in disturbed areas. In tandem with best management practices for invasive species prevention, including quarantine protocols, gear sanitation, and monitoring, the plan provides a framework for ecological recovery and long-term habitat management that aligns with both conservation and cultural values of the site.

Together, these measures are intended to minimize or avoid further adverse impacts to cultural and biological resources, reinforce the stewardship of the Petition Area, and ensure that the Proposed Action remains aligned with community and cultural expectations.

ES.4 Alternatives Considered

This EIS evaluates two administrative alternatives for achieving regulatory consistency and enabling the continuation and expansion of mining and quarrying activities at the Leilani Quarry. These alternatives are focused on the land use entitlement pathway and do not alter the physical scope or nature of the proposed mining and quarrying operations. As such, the environmental impacts associated with the action are not expected to differ meaningfully between alternatives.

Alternative 1a involves a State Land Use District Boundary Amendment (SLUDBA) to reclassify 94.108 acres within the Petition Area from the State Conservation District (L subzone) to the State Agricultural District. This pathway would bring the project into conformance with the County of Hawai‘i's existing Agricultural zoning and anticipated General Plan updates, while allowing mining and quarrying to proceed under a Special Permit issued by the Land Use Commission (LUC).

Alternative 1b also involves a SLUDBA to reclassify the Petition Area to State Agricultural District but reduces the footprint to 83.1 acres. Under Alternative 1b, summit areas of the pu‘u above 1,050 MSL are excluded from the Petition Area, as well as the nearby Ha‘iwale Gulch and adjacent ridge. Past and current mining and quarrying activities do not occur and cannot occur on upper flanks of the pu‘u, the summit of the pu‘u, or near Ha‘iwale Gulch due to inaccessible topography. However, exluding these areas from the Petition Area safeguards the cultural integrity of the pu‘u and ensures better continued protection of *Cyrtandra nanawaleensis* into the future.

Alternative 2 would pursue a reclassification of approximately 94.108 acres of the Conservation District subzone from L to Resource (R), allowing mining and quarrying activities to continue under a Conservation District Use Permit (CDUP) issued by the Board of Land and Natural Resources (BLNR). While this approach would retain the land within the Conservation District, it would reestablish mining and quarrying as allowable uses under current regulations.

Across Alternatives 1a, 1b, and Alternative 2, the connected action is the same: continued mining and quarrying activities within the 73.075-acre License Area, with 21.033 acres maintained as preservation buffers. Because the scope, location, and regulatory conditions of these operations would remain unchanged under all alternatives, the potential environmental impacts are often identical. As

such, the resource analyses presented in Chapter 3 evaluate these alternatives collectively in terms of environmental consequences and only differentiate across Alternative 1a, 1b, and Alternative 2 as applicable.

A No Action Alternative was also considered. Under this scenario, the Petition Area would retain its current Conservation District (L subzone) designation, and Sanford's Service Center would be unable to expand its operations beyond the existing 30-acre area authorized under legacy permits. Once that footprint is fully mined, operations would cease, and the site would be stabilized and closed in accordance with the existing Landscaping and Biosecurity Plan. While the No Action Alternative would avoid the additional environmental impacts associated with expansion, it would not meet the purpose and need for the project and would constrain the availability of a strategic agricultural input critical to Hawai'i's horticultural sector.

ES.5 Unresolved Issues

The primary unresolved issue associated with the Proposed Action concerns the cumulative cultural implications of quarrying activities on Pu'u Kali'u and other culturally valued landforms in the region. While no specific traditional or customary practices or direct genealogical connections to Pu'u Kali'u were identified during the CIA, Native Hawaiian respondents have raised general concerns about the incremental loss of cultural integrity across the landscape due to the continued extraction of cinder from Pu'u Kali'u, a wahi pana (storied place). This issue remains unresolved, as it reflects an ongoing balance between resource use and cultural preservation that is not readily mitigated through standard regulatory mechanisms.

In addition, while mitigation measures and summit preservation buffers have been proposed to address these concerns, the long-term efficacy of these measures will depend on how they are implemented and maintained. The Proposed Action has attempted to balance economic necessity with cultural sensitivity, but the cumulative cultural impact and intergenerational values associated with landforms like Pu'u Kali'u will require ongoing dialogue and stewardship.

ES.6 Compatibility with Land Use Plans and Policies

The Proposed Action demonstrates strong alignment with applicable federal, state, and county land use plans and policy frameworks. At the federal level, the project is consistent with the Clean Air Act (CAA), Clean Water Act (CWA), and Endangered Species Act (ESA) through implementation of best management practices, avoidance of regulated discharges, and protective measures for federally listed species. Informal consultation with the U.S. Fish and Wildlife Service (USFWS) confirmed that no incidental take permitting is required, and the project has committed to voluntarily implementing species-specific safeguards.

At the state level, the Proposed Action aligns with the objectives of the Hawai'i State Planning Act (Chapter 226, HRS), which calls for balanced economic development and natural resource stewardship. The project supports local agricultural productivity and economic self-sufficiency by maintaining access to a strategic horticultural input, while also advancing ecological management through native revegetation and biosecurity protocols. Additionally, the Proposed Action is consistent with the Hawai'i Coastal Zone Management (CZM) Program, particularly in relation to the management of inland development, protection of ecological and cultural resources, and preservation of scenic character.

At the county level, the Proposed Action aligns with both current and anticipated future planning designations. Although the Petition Area is presently within the State Conservation District, it lies within

the County's Agricultural zoning (Ag-20a) and is expected to be redesignated as Productive Agricultural in the forthcoming General Plan update. Mining and quarrying are conditionally permitted within the Agricultural District, subject to approval of a Special Permit. The Proposed Action therefore supports improved alignment between State and County land use designations, contributing to more coherent and efficient long-term planning, permitting, and regulatory oversight.

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Chapter 1

Introduction

Chapter 1

Introduction

This Draft Environmental Impact Statement (EIS) has been prepared in accordance with the requirements of Chapter 343, Hawai‘i Revised Statutes (HRS) and Chapter 11-200.1, Hawai‘i Administrative Rules (HAR), to support a State Land Use District Boundary Amendment (SLUDBA) to reclassify lands at Kauaea, Puna District, Island of Hawai‘i, from the State Land Use (SLU) Conservation District to the SLU Agricultural District (Proposed Action). This environmental review is required under Chapter 343, HRS because the Proposed Action involves the reclassification of lands within the SLU Conservation District, a trigger for environmental review pursuant to HRS § 343-5(a)(7).

The Proposed Action would provide improved land use conformance for the Applicant, Sanford's Service Center, enabling the continuation and expansion of mining and quarrying activities for a low-density, black-colored cinder at Leilani Quarry. This particular cinder is highly valued by the local horticultural and nursery industry.

A previous Environmental Impact Statement Preparation Notice (EISPN) for the Proposed Action was published in *The Environmental Notice* on July 23, 2019, under the prior rules (Chapter 11-200, HAR). That EISPN supported a SLU District Boundary Amendment for the same lands. However, a Draft EIS was never published.

On August 9, 2019, amendments to Chapter 11-200, HAR became effective, resulting in the adoption of Chapter 11-200.1, HAR. Under HAR § 11-200.1-4, projects initiated under the previous rules may continue to follow those rules if they are completed within five years of the new rules' effective date. Since no Draft EIS was completed for this project within that timeframe, a Second EISPN was published in *The Environmental Notice* under Chapter 11-200.1, HAR on January 8, 2025. A notice of withdrawal of the 2019 EISPN was also published in *The Environmental Notice* on January 8, 2025.

1.1 Project Summary

Type of Document:	Draft Environmental Impact Statement (Draft EIS)
Project Name:	Sanford's Service Center Leilani Quarry State Land Use District Boundary Amendment
Applicant:	Sanford's Service Center, Inc. P.O. Box 1321 Pāhoa, Hawai‘i 96788

Agent:	G70 111 S. King St., Suite 170 Honolulu, HI 96813 Contact: Mark Kawika McKeague, FAICP Phone: (808) 523-5866 Email: LeilaniQuarryProject@g70.design
Accepting Authority:	State of Hawai'i Land Use Commission
HRS Chapter 343 Triggers:	Reclassification of Conservation District Lands under HRS § 343-5(a)(7)
Project Location:	Kauaea Ahupua'a, Puna District, island of Hawai'i
Judicial District:	Puna
Petition Area:	94.108 acres
Tax Map Keys (TMK): Landowners and Administrators	(3) 1-3-009:005: Trustees of the Estate of Bernice Pauahi Bishop (Kamehameha Schools)
State Land Use District	Conservation District, Limited (L) subzone
County of Hawai'i Zoning:	Agricultural District (Ag-20a)
State of Hawai'i Permits and Approvals	• State District Boundary Amendment, Land Use Commission • Special Permit, Land Use Commission • Site Preservation Plan (completed), State Historic Preservation Division
County of Hawai'i Permits and Approvals	• Special Permit, Windward Planning Commission • General Plan Amendment (if required), Hawai'i County Council

1.2 Project Description and Location

The property owner, Kamehameha Schools, at the request of its licensee, Sanford's Service Center, Inc. (Sanford's Service Center), intends to petition the State of Hawai'i Land Use Commission (LUC) to amend the SLU District designation for the approximately 94.108-acre Petition Area from Conservation district to Agricultural district.

The approximately 94.108-acre Petition Area is part of a larger 694.5-acre encompassing parcel, identified as TMK (3) 1-3-009:005 (**Figure 1-1** and **Figure 1-2**). Currently, Sanford's Service Center holds a license from Kamehameha Schools to conduct mining and quarrying activities within a 73.075-acre portion of the property (License Area). An additional 21.032 acres are designated as Buffer Areas to minimize impacts to surrounding forested lands. Together, the License Area and Buffer Areas comprise the approximately 94.108-acre Petition Area (**Figure 1-3**).

The boundary of the Petition Area was established through consultation between Kamehameha Schools (Petitioner) and Sanford's Service Center (Applicant), taking into account property boundaries, the presence of historical and natural resources, and the provisions of the license agreement. These provisions include a prohibition on any modification to the summit of Puʻu Kaliʻu by establishing a preservation buffer around the summit above 1,050 MSL. Puʻu are often culturally significant, associated with moʻolelo of specific regions, and may be linked to traditional and customary practices. While the area near Puʻu Kaliʻu contains the desired cinder material, the Petition Area boundary was established to remain within the constraints of property boundaries while respecting the most culturally and physically prominent portion of the landform. Furthermore, because the precise locations of desirable cinder deposits are not fully known in advance, petitioning for a smaller area would be neither practical nor economical.

Leilani Quarry and the Petition Area occupy relatively small portions of the encompassing parcel. The Petition Area is located within the State Land Use Conservation District, specifically the L subzone (**Figure 1-4**). Under a 2011 amendment to Chapter 13-5, HAR, mining and quarrying were removed from the list of allowable land uses within the L subzone. Under current rules, mining and quarrying activities are only allowable within the Resource (R) subzone of the Conservation District, as specified in HAR § 13-5-24.

Current mining and quarrying activities within the Petition Area are authorized under legal nonconforming status, pursuant to Conservation District Use Permits (CDUPs) issued by the Board of Land and Natural Resources (BLNR). On February 27, 1987, the BLNR approved CDUP HA 1957 for an initial 15-acres of Commercial Cinder Removal and access road. On January 26, 1990, the BLNR approved an amendment to CDUP HA 1957 to expand the Commercial Cinder Removal to another 15-acres. On April 7, 2008, the BLNR Chairperson approved the continuation to mine cinder and cinder soil subject to the existing permits and additional terms and conditions. Sanford's Service Center has conducted mining and quarrying activities within approximately 30 acres of the Petition Area under these permits.

The Petition Area is also located within the Hawaiʻi County zoning designation of Agricultural (Ag-20a) (**Figure 1-5**). Mining and quarrying activities are conditionally permitted within the County's Agricultural District, subject to issuance of a Special Permit under Hawaiʻi County Code § 25-5-72.

At Leilani Quarry, Sanford's Service Center produces a low-density, black-colored cinder that is highly valued by the local horticultural and nursery industry. The peak monthly volume of cinder that Sanford's Service has extracted is an average of 6,200 yards per month in 2023. The current average monthly extraction volume for 2025 is only 3,200 yards per month, as the Applicant has reduced the amount of extracted material in order to extend the lifespan of Leilani Quarry. The volume of remaining black cinder reserves cannot be precisely estimated as the subsurface extent of the deposit is revealed progressively during extraction and cannot be accurately determined through non-invasive methods. However, the Applicant estimates that the available resource under the current License Area could be exhausted as soon as mid-2026.

The Proposed Action is necessary to ensure that both existing and proposed mining and quarrying activities within the Petition Area conform with applicable land use designations at both the State and County levels. The Proposed Action consists of an administrative action to amend the State Land Use District Boundary to reclassify the Petition Area from the SLU Conservation District to the SLU Agricultural District, and a connected action to expand mining and quarrying activities within the Petition Area under a Special Permit granted by the Land Use Commission.

1.3 Purpose and Need

The purpose of the Proposed Action is to allow Sanford's Service Center to continue and expand its existing mining and quarrying activities within the Petition Area by reclassifying the Petition Area from the SLU Conservation District to the SLU Agricultural District. This reclassification would align the State Land Use designation with the County of Hawai'i's Agricultural Zoning designation (Ag-20a) and the County's anticipated update to the General Plan, which is expected to redesignate the Petition Area from Conservation to Productive Agricultural. The Proposed Action supports consistency not only in administrative land use classifications but also in broader policy goals articulated in the Hawai'i State Plan and the Hawai'i County General Plan, which promote responsible resource use, economic self-sufficiency, and sustainable land management.

The Proposed Action would enable Sanford's Service Center to expand mining and quarrying operations within a 73.075-acre portion of the Petition Area, subject to approval of a Special Permit from the LUC. The remaining 21.032 acres within the Petition Area would be preserved as buffer areas. A 2011 amendment to Title 13-5, HAR, removed mining and quarrying as allowable uses in the L subzone of the Conservation District, the current designation of the Petition Area. Since then, Sanford's mining and quarrying activities have operated under legal nonconforming status, limited to a 30-acre area authorized under CDUPs. Without the Proposed Action, Sanford's Service Center's operations would remain constrained to this permitted footprint.

Sanford's Service Center produces a low-density black cinder, which is a critical input for the horticultural and nursery industries, as well as non-commercial consumers. This material supports root stability, water retention, and aeration in growing media, and is especially valued by anthurium and orchid producers. These sectors comprise a significant portion of Hawai'i's diversified agriculture industry. Statewide, floriculture and nursery products generated around $43.9 million in annual revenue as of 2023, with black cinder playing an essential role in production (HDOA, 2024). According to estimates from the Hawai'i Floriculture and Nursery Association (HFNA), approximately 60–70% of commercial growers rely on black cinder in their operations, and the majority of the State's available supply is sourced from the Puna region. Sanford's Service Center is highly valued in the floriculture and nursery industry due to its reliable retail of consistently high-quality cinder for nurseries across the State. Support letters from industry leaders are included in **Section 6.3** and **Appendix I**.

In 2018, the Lower East Rift Zone volcanic eruption disrupted black cinder production in Puna, prompting the Governor to issue an emergency proclamation to support disaster response and protect the region's economic stability. Local agencies, in partnership with HFNA, launched efforts to identify alternative black cinder sources (DLNR, 2018). These efforts were institutionalized by the passage of Act 191 (2021), which directed State resources toward identifying and securing alternative quarry sites. A Department of Land and Natural Resources (DLNR) report published in 2021 summarized the limited availability of viable alternative sources and reaffirmed the importance of maintaining existing supply chains (DLNR, 2021).

Given the State's formal recognition of black cinder as a strategic resource, the continued operation and expansion of Sanford's Service Center is essential to the resilience of Hawai'i's horticultural economy. Supply limitations and instability in the black cinder market could have cascading effects on agricultural production, export value, and local employment.

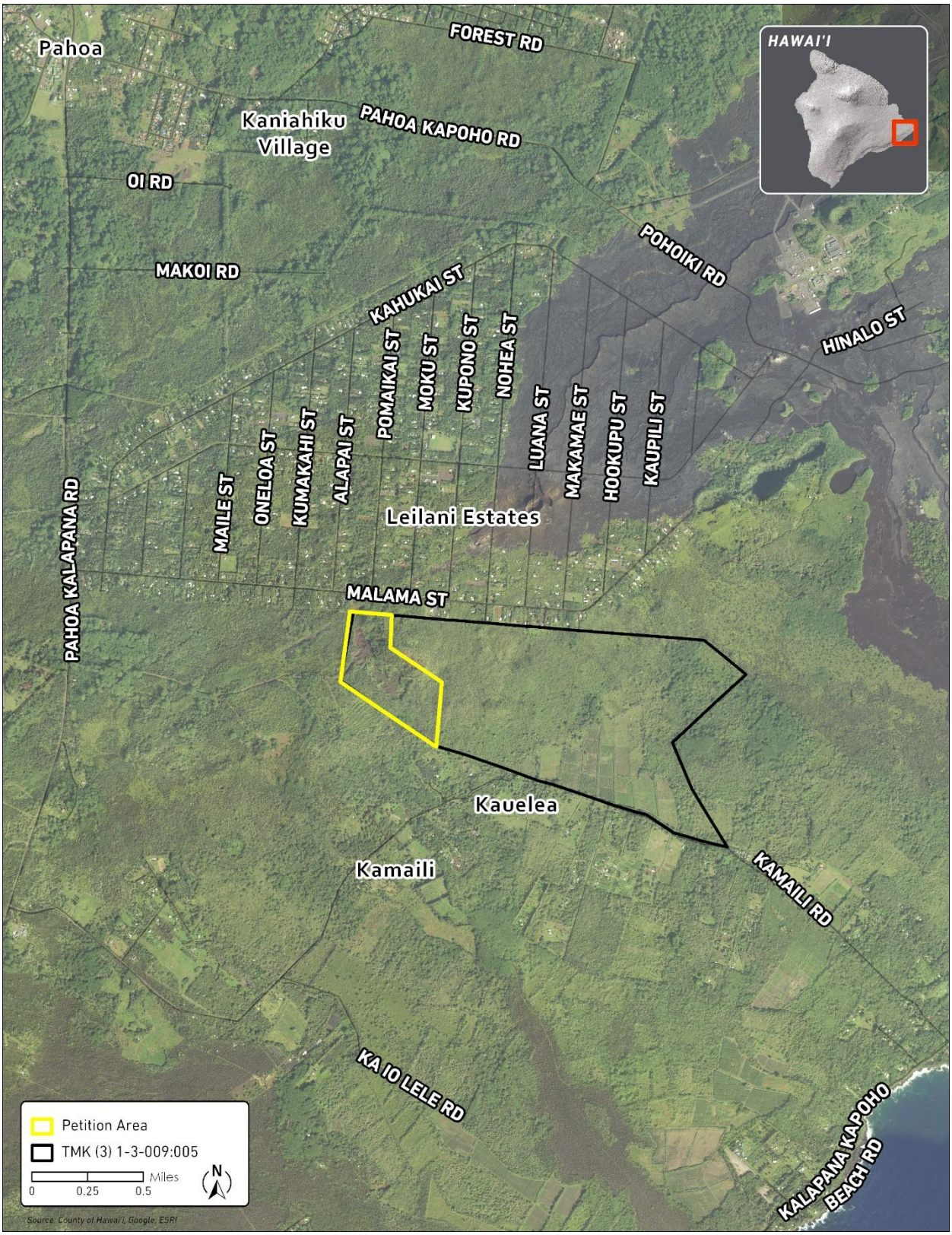


Figure 1-1 **TMK and Petition Area**

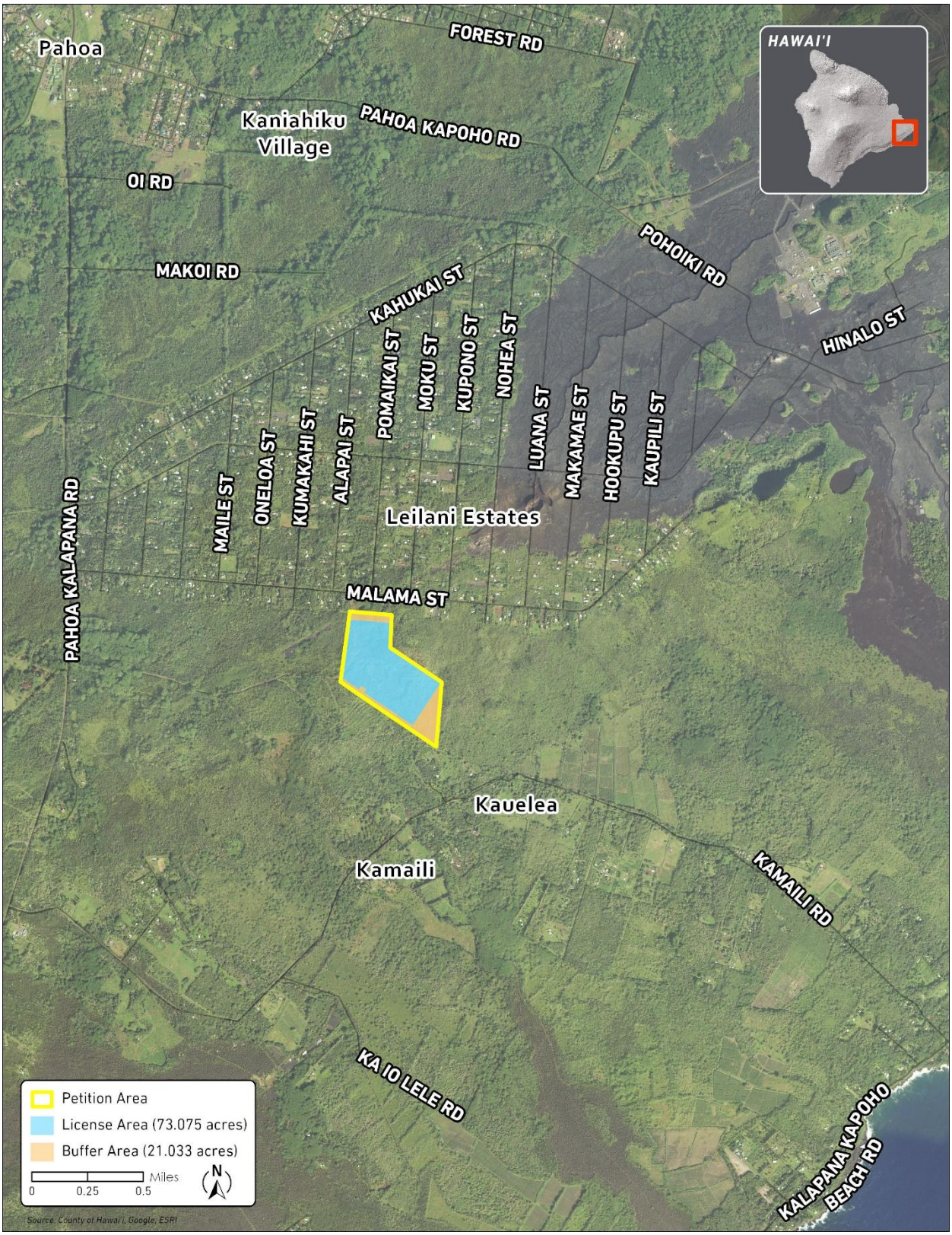


Figure 1-2 **Petition, License, and Buffer Areas**

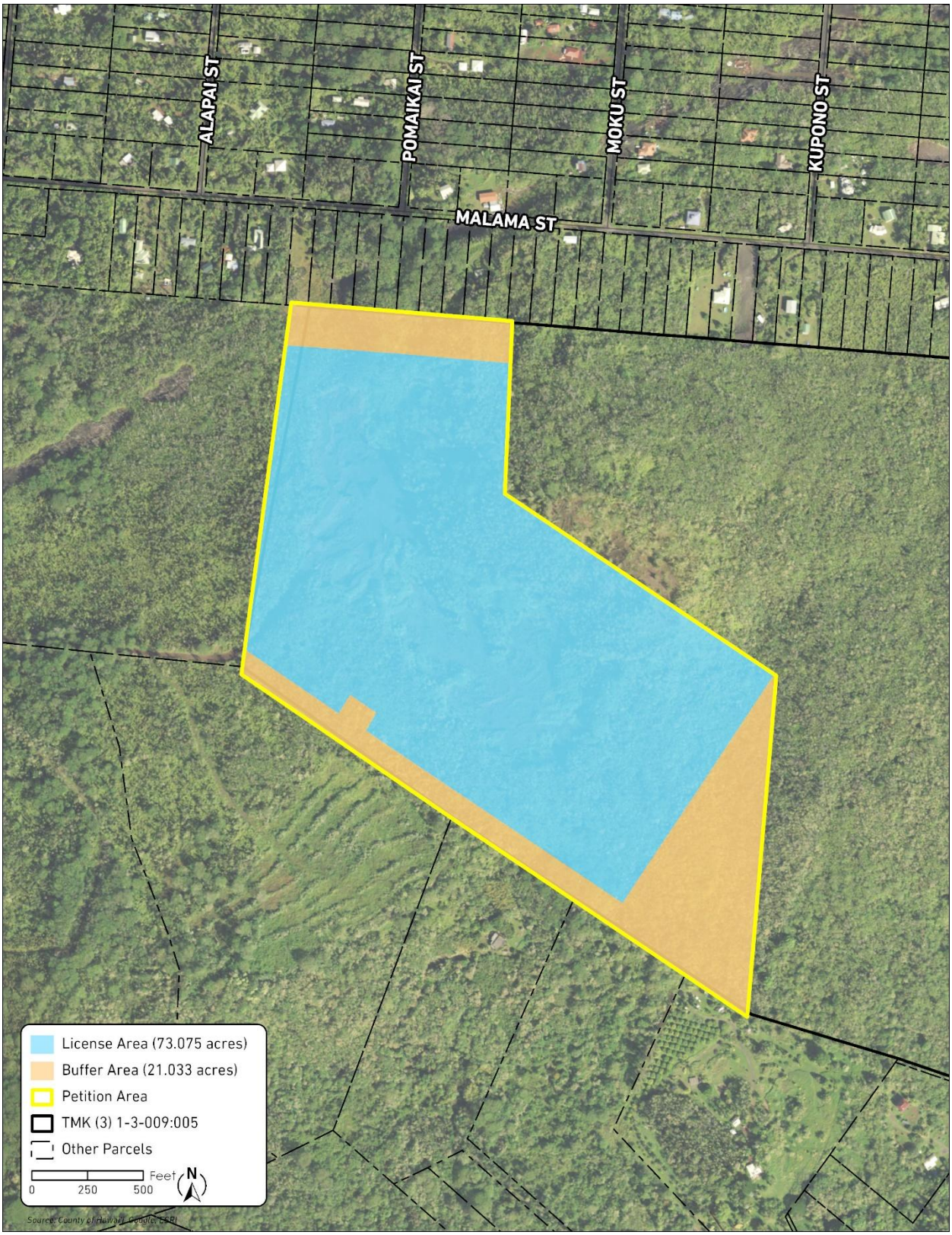


Figure 1-3 **TMK and Petition, License, and Buffer Areas**

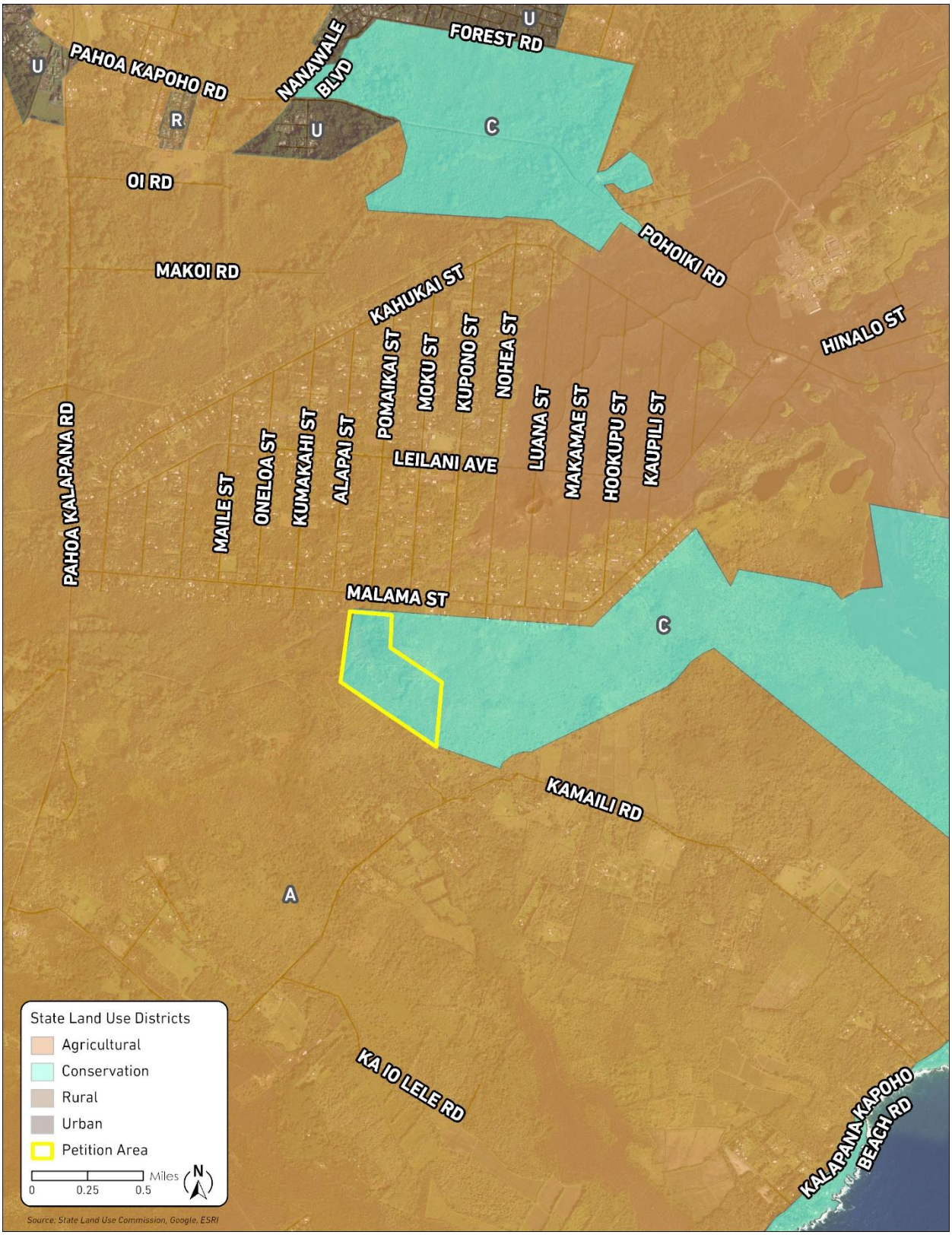


Figure 1-4 **State Land Use District Map**

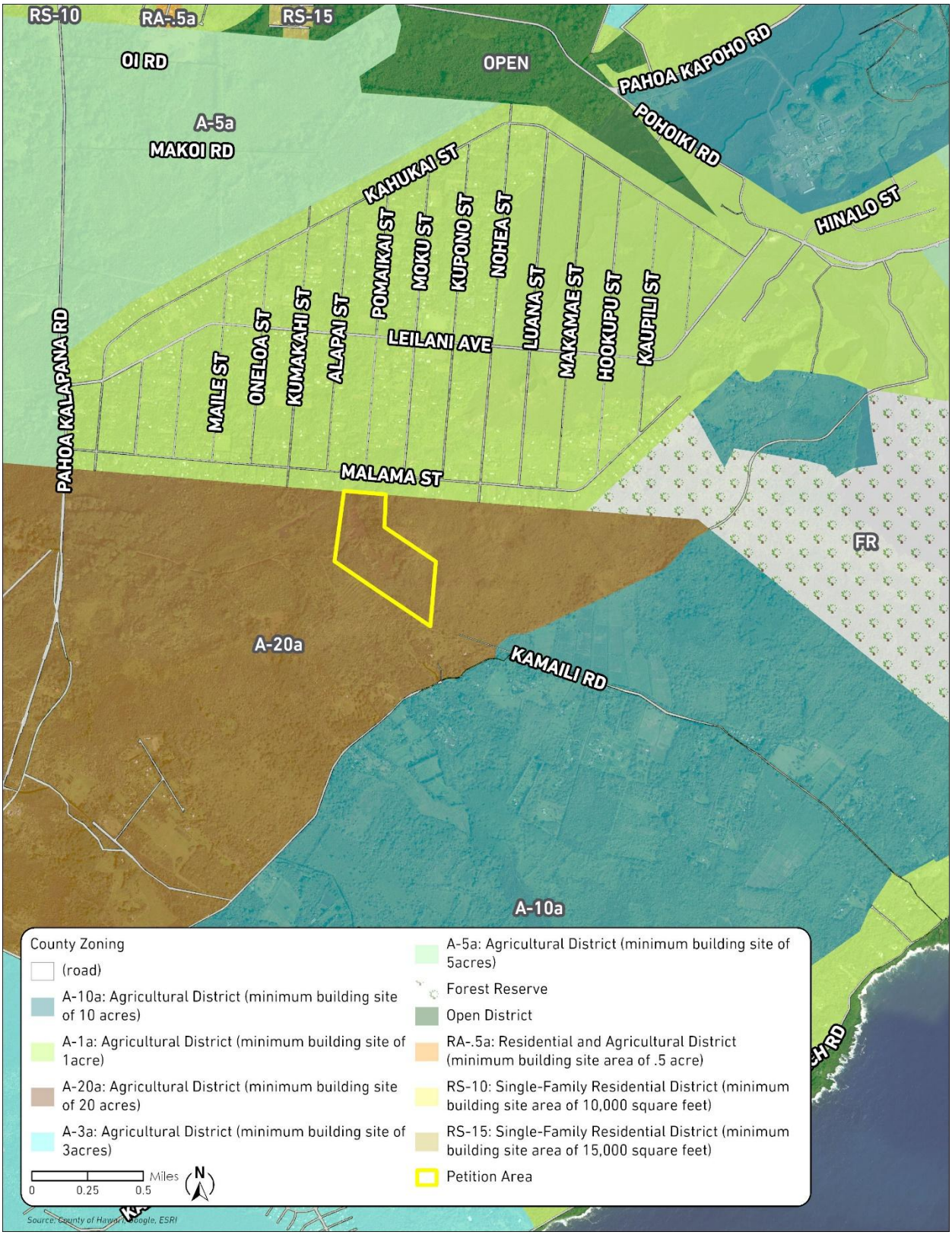


Figure 1-5 **County Zoning Districts**

Concurrently, the Proposed Action implicates broader ecological trade-offs. While the area proposed for expansion contains secondary forest with limited agricultural value, it nonetheless forms part of a larger native-dominated ecosystem. These considerations are analyzed in **Chapter 3** and further assessed in **Chapter 5**, where the balance between resource extraction and conservation objectives is evaluated. The Proposed Action will be subject to ongoing biosecurity, invasive species, and revegetation protocols that support ecosystem stewardship and long-term habitat management.

The Proposed Action seeks to reconcile environmental and ecological management with economic necessity by enabling the managed expansion of a resource critical to the State's agricultural supply chain. Without this action, Sanford's Service Center's long-term quarrying operations would be jeopardized, and the local floriculture, horticulture, and agricultural industries would face increased risks of supply instability, economic losses, and pressure to develop alternative quarry sites elsewhere on the island with potentially greater environmental and economic costs.

1.4 Environmental Review Process

The environmental review process for the Proposed Action is governed by the Hawai'i Environmental Policy Act (HEPA), which is codified in Chapter 343, HRS and Chapter 11-200.1, HAR. The purpose of HEPA is to ensure that environmental concerns are given appropriate consideration in decision-making, alongside economic and technical considerations.

Reclassification of lands within the SLU Conservation District, as proposed under this project, is a trigger for environmental review under Chapter 343, HRS. HEPA provides two primary levels of environmental review: Environmental Assessments and EISs. In this case, the Applicant, in coordination with the Petitioner, consulted with the LUC, and the LUC determined that an EIS would likely be required for the Proposed Action. As allowed under HRS § 343-5(e), the Applicant proceeded directly to preparation of an EIS.

The Land Use Commission formally agreed to serve as the accepting authority for the EIS and authorized publication of the EISPN. The EISPN was published in *The Environmental Notice* on January 8, 2025, initiating the environmental review process and notifying agencies and the public of the Proposed Action. The EISPN process also began the public scoping phase, where agencies, stakeholders, and members of the public were invited to provide input on the scope of the Draft EIS.

This section outlines the key steps in the environmental review process, including scoping, preparation of the Draft EIS, and preparation of the Final EIS. Each phase of the process is described in the subsections that follow.

1.4.1 Scoping

Scoping is an important part of the environmental review process under HEPA, governed by Chapter 343, HRS and Chapter 11-200.1, HAR. The purpose of scoping is to notify agencies, organizations, businesses, and the public of the Proposed Action and to solicit input regarding environmental issues, potential impacts, and areas of concern to be addressed in the Draft EIS.

The EISPN for the Proposed Action was published in *The Environmental Notice* on January 8, 2025. In accordance with HAR § 11-200.1-23(c), agencies, organizations, and individuals were invited to submit written comments regarding the environmental effects of the Proposed Action during the initial 30-day comment period, which was set to end on February 7, 2025.

To support the scoping process, a virtual public scoping meeting was held on January 20, 2025, to provide an overview of the Proposed Action and allow agencies, businesses, organizations, and members of the public to ask questions or provide comments. One member of the public attended this meeting, but no verbal comments were provided.

Following the initial scoping period, the Applicant and Petitioner voluntarily extended the public comment period and scheduled a second virtual scoping meeting to ensure that all interested parties had ample opportunity to provide input. The notice of the extended comment period and the second scoping meeting was published in *The Environmental Notice* on February 23, 2025. The second virtual scoping meeting was held on March 3, 2025, and the public comment period was extended to March 7, 2025. No members of the public attended the second scoping meeting, and no verbal comments were provided.

In total, 37 written comment submissions were received during the extended scoping period, including:

- 13 submissions from agencies,
- 1 submission from the public,
- 19 submissions from businesses, and
- 4 submissions from organizations.

These written comments are reproduced in **Appendix I**, and responses are provided in **Section 6.3**.

Scoping Consultation

The following entities have received copies of the EISPN or notifications of its availability and were formally invited to participate in the EIS process:

Federal Agencies

Department of Agriculture, Natural Resources Conservation Service

Department of the Interior, Fish and Wildlife Service

Department of the Interior, Geological Survey, Hawaii Volcano Observatory

Department of the Interior, Geological Survey, Biological Resources Division

Environmental Protection Agency, Region IX

State Agencies

Department of Agriculture

Department of Accounting and General Services

Department of Business, Economic Development & Tourism, Office of Planning

Department of Hawaiian Home Lands

Department of Health

Department of Land and Natural Resources

DLNR, State Historic Preservation Division

Department of Public Safety

Department of Transportation

Environmental Planning Office

Office of Environmental Quality Control

Office of the Governor, Hawai'i Island Liaison

Office of Hawaiian Affairs

State Land Use Commission

University of Hawai'i, Environmental Center

County of Hawai'i Agencies

Civil Defense Agency

Department of Environmental Management

Department of Finance

Department of Public Works

Department of Water Supply

Fire Department

Planning Department

Police Department

Elected Officials, Community Organizations, and Other Organizations

County Councilmember Matt Kanealii-Kleinfelder, County Council District 5

Mayor Kimo Alameda

Representative Greggor Ilagan, State House District 4

Senator Joy San Buenaventura, State Senate District 2

Utility Companies

Hawai'i Electric Light Company, Inc.

Hawaiian Telcom, Inc.

Libraries

Hawai'i State Library

Hilo Public Library

Kea'au Library

Pāhoa Public Library

Newspapers

Hawai'i Tribune Herald

West Hawai'i Today

Civic Society

Big Island Association of Nurserymen

Association of Hawaiian Civic Clubs

Cave Conservancy of Hawai'i

Sierra Club

Hawai'i Export Nursery Association

Hawai'i Floriculture and Nursery Association

Historic Hawai'i Foundation

Hawai'i Island Chamber of Commerce

Hui Iwi Kuamo'o

Puna Aha Council

Sierra Club, Moku Loa Group

The EISPN was made available at the Pāhoa Public Library and sent to the *Hawai'i Tribune Herald* and *West Hawai'i Today*. A copy has also been deposited with the Hawai'i Documents Center.

1.4.2 Draft EIS

This Draft EIS documents the scoping outreach efforts conducted for the Proposed Action and summarizes the comments received during the scoping meetings and public comment period. Copies of all written comments submitted during the EISPN comment period are presented in Appendix I. The Applicant's responses to comments considered substantive are included in Section 6.3.

The Draft EIS evaluates the potential environmental impacts of Alternative 1a, Alternative 1b (the Preferred Alternative) Alternative 2, and the No Action Alternative. The analysis addresses impacts to the natural, cultural, and human environments and discloses whether any impacts would be considered significant under the significance criteria set forth in HAR § 11-200.1-13.

The Draft EIS will be made available for a 45-day public review and comment period, during which agencies, organizations, and members of the public are invited to submit comments on the adequacy of the document and the analysis it contains. Comments received on the Draft EIS will be reviewed and considered in the preparation of the Final EIS.

1.4.3 Final EIS

Following the public review and comment period on the Draft EIS, the EIS will be revised to incorporate and respond to all substantive comments received. The Final EIS will include copies of all written comments submitted on the Draft EIS, along with the Applicant's responses, in accordance with HAR § 11-200.1-26.

The Final EIS will also include any necessary revisions to the environmental analysis and proposed mitigation measures based on input received from agencies, organizations, businesses, and members of the public during the Draft EIS comment period.

The Final EIS will be published in *The Environmental Notice* and submitted to the accepting authority, the LUC, for review and consideration of acceptability. If accepted, the Final EIS will serve as a resource for agency decision-making regarding the Proposed Action.

1.4.4 Acceptability Determination

In accordance with HAR § 11-200.1-28, the LUC will review the Final EIS to determine whether it meets the content and procedural requirements of HEPA and adequately discloses the potential environmental impacts of the Proposed Action, including direct, indirect, and cumulative effects. The LUC's review will also consider whether the Final EIS sufficiently identifies mitigation measures to avoid or minimize significant impacts, and whether it adequately responds to comments received during the Draft EIS public comment period.

Acceptance of the Final EIS is required before the LUC can proceed with decision-making on the Proposed Action, including consideration of the requested SLUDBA and associated Special Permit. The LUC's determination regarding acceptability of the Final EIS will be published in *The Environmental Notice*, consistent with HEPA requirements.

1.5 List of Required Permits and Approvals

In accordance with HAR § 11-200.1-23, the Draft EIS must include a list of all permits and approvals anticipated to be required from federal, state, and county agencies to implement the Proposed Action.

Table 1-1 identifies the permits and approvals currently anticipated to be required. This list will be updated as necessary as the Proposed Action advances through the environmental review process.

Table 1-1 Anticipated Permits and Approvals

Permits and Approvals	Agency
State of Hawai'i	
State Land Use District Boundary Amendment	State Land Use Commission
Special Permit	State Land Use Commission
Site Preservation Plan (completed)	Department of Land and Natural Resources, State Historic Preservation Division
County of Hawai'i	
Special Permit	Windward Planning Commission
General Plan Amendment (if necessary)	Hawai'i County Council

Chapter 2

Description of the Proposed Action and Alternatives

Chapter 2

Description of the Proposed Action and Alternatives

This chapter identifies and evaluates the Proposed Action along with reasonable alternatives, including the No Action Alternative, in accordance with Chapter 11-200.1, HAR. The purpose of this alternatives analysis is to consider a range of potential options that could reasonably achieve the project's objectives, while avoiding or minimizing adverse environmental effects.

Alternatives were evaluated based on their ability to:

- Fulfill the project's purpose and need, including providing for the continued operation and expansion of Sanford's Service Center's mining and quarrying activities at Leilani Quarry
- Comply and conform with applicable regulatory frameworks, including State Land Use and County Zoning requirements, and County General Plan
- Avoid or minimize environmental impacts
- Maintain long-term operational and economic feasibility

Table 2-1 provides a comparative evaluation of the alternatives considered, using key criteria discussed above, to assess each alternative's ability to meet the project's objectives. The table offers a high-level summary to support the selection of the Preferred Alternative, discussed in Section 2.1.2.

Section 2.2.3 also identifies alternatives that were considered but eliminated from further analysis, with an explanation of why those alternatives were deemed infeasible or unreasonable.

Table 2-1 Evaluation of Alternatives

Evaluation Criteria	Alternative 1a	Alternative 1b	Alternative 2	No Action Alternative
Fulfills purpose and need				
Provides regulatory consistency				
Minimizes environmental impacts				
Provides long-term viability				

Green – Key criterion is fully met
Yellow – Key criterion is partially met
Red – Key criterion is not met

2.1 Proposed Action

2.1.1 Alternative 1a: Land Use District Boundary Amendment

Under Alternative 1a, Kamehameha Schools, at the request of its licensee, Sanford's Service Center, would petition the State of Hawai'i LUC to amend the SLU District designation for the approximately 94.108-acre Petition Area from Conservation District, L subzone to Agricultural District (**Figure 2-1 Alternative 1a Petition Area**).

Reclassification to the SLU Agricultural District would align the Petition Area's designation with the adjacent lands, the area's County zoning designation (Agricultural, Ag-20a), and anticipated County land use policy updates in the County's General Plan 2045. Mining and quarrying activities within the Agricultural District are a permitted use with a Special Permit, which would be sought from the LUC pursuant to HRS § 205-6.

This alternative would provide Sanford's Service Center with long-term operational certainty, ensuring regulatory consistency for both existing and future mining and quarrying activities. By aligning State and County land use designations, Alternative 1a would resolve the existing nonconformance issue created by the 2011 amendments to Chapter 13-5, HAR, which removed mining and quarrying as allowable uses in the L subzone.

Additionally, Alternative 1a supports the State's interest in maintaining a reliable supply of low-density black cinder for Hawai'i's floriculture and nursery industries, which depend on this resource for potting media and other horticultural applications. The volume of black cinder reserves cannot be precisely estimated as the subsurface extent of the deposit is revealed progressively during extraction and cannot be accurately determined through non-invasive methods. However, this alternative would provide access to additional extractable material, extending the operational lifespan of the quarry.

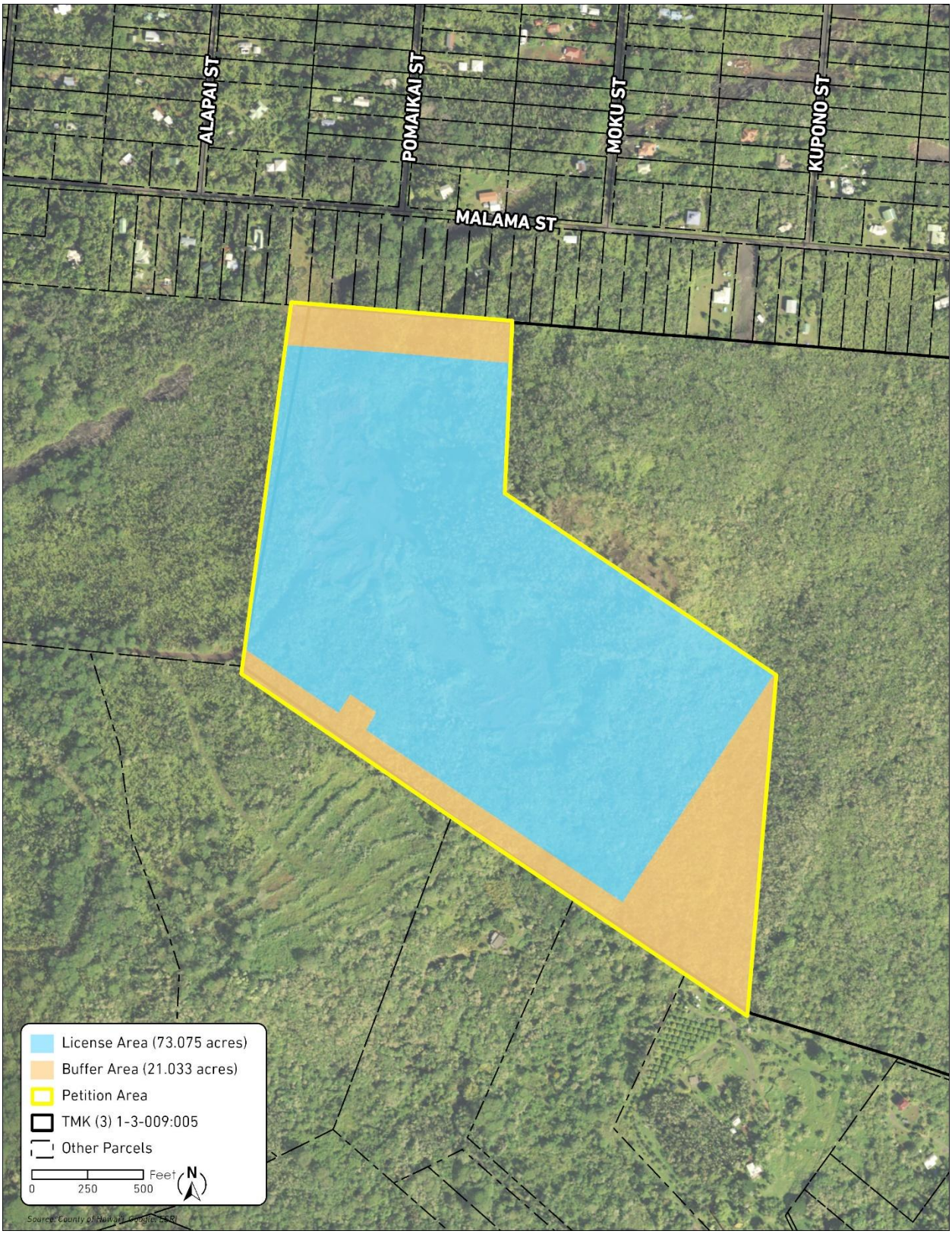


Figure 2-1 **Alternative 1a Petition Area**

2.1.2 Alternative 1b: Land Use District Boundary Amendment, Modified (Preferred Alternative)

Similar to Alternative 1a, under Alternative 1b, Kamehameha Schools, at the request of its licensee, Sanford's Service Center, would petition the State of Hawai'i LUC to amend the SLU District designation of the Leilani quarry. However, under Alternative 1b, the petition for a SLUDBA would be reduced to 83.1 acres. Specifically, the petition area under Altnerative 1b intentionally excludes areas of the pu'u higher than 1,050 above MSL, the nearby ridge, and Ha'iwale Gulch (**Figure 2-2 Alternative 1b Petition Area**). This area of the pu'u and ridge are inaccessible to Sanford's Service Senter due to steep grade and license restrictions which prohibit any alteration to the summit of the pu'u.

As in Alternative 1a, reclassification to the SLU Agricultural District would align the Petition Area's designation with the adjacent lands, the area's County zoning designation (Agricultural, Ag-20a), and anticipated County land use policy updates in the County's General Plan 2045. Mining and quarrying activities within the Agricultural District are a permitted use with a Special Permit, which would be sought from the LUC pursuant to HRS § 205-6.

This alternative would provide Sanford's Service Center with long-term operational certainty, ensuring regulatory consistency for both existing and future mining and quarrying activities. By aligning State and County land use designations, Alternative 1b would resolve the existing nonconformance issue created by the 2011 amendments to Chapter 13-5, HAR, which removed mining and quarrying as allowable uses in the L subzone.

Additionally, Alternative 1b supports the State's interest in maintaining a reliable supply of low-density black cinder for Hawai'i's floriculture and nursery industries, which depend on this resource for potting media and other horticultural applications. For these reasons, Alternative 1b is the Preferred Alternative.

Because it is unknown what and how much subsurface resources are available in an area until mining occurs, it is not possible to estimate exactly how much of the resource is available in the Petition Area or to estimate with any certainty the lifespan of mining operations within the Petition Area. The average monthly extraction volume in 2025 was approximately 3,200 yards per month. While it is impossible to estimate the expanded lifespan that would result from this alternative due to geological considerations, would provide access to additional extractable material, extending the operational lifespan of the quarry.

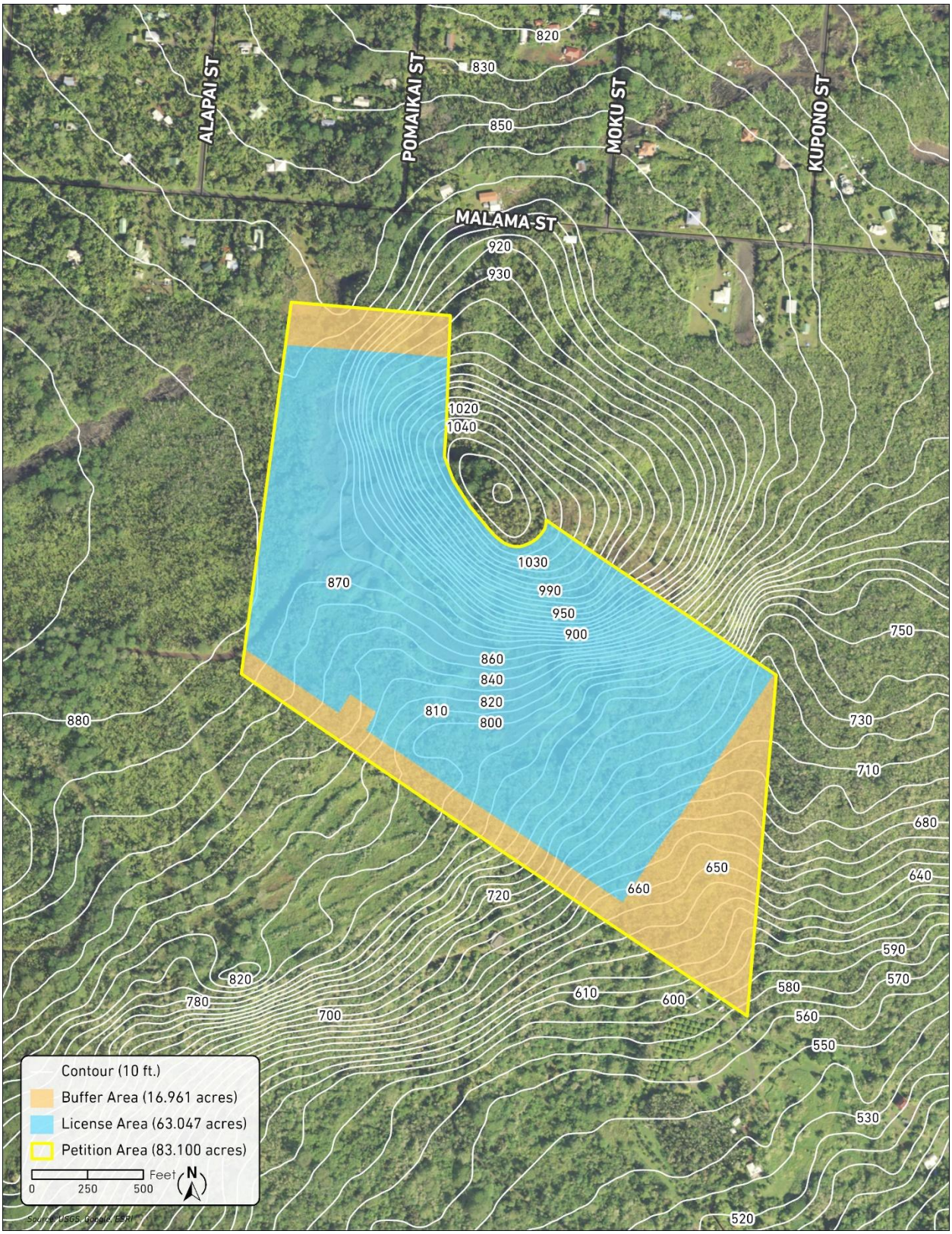


Figure 2-2 **Alternative 1b Petition Area**

2.2 Alternatives Considered

2.2.1 Alternative 2: Conservation District Subzone Reclassification

Under Alternative 2, Sanford's Service Center would submit to the BLNR for a Conservation District Use Application to reclassify the Petition Area from the L subzone to the R subzone. In the R subzone, mining and quarrying activities are allowable with an approved management plan and a CDUP from BLNR in accordance with HAR § 13-5-24 and Chapter 183C, HRS.

This alternative would provide a regulatory pathway to authorize the continuation and expansion of mining and quarrying activities. However, it would not resolve the underlying land use inconsistency with the County zoning designation, which classifies the area as Agricultural (Ag-20a) where such activities are conditionally permitted through a Special Permit.

Furthermore, continuance under the Conservation District would retain the need for project-specific approvals, including CDUPs issued by BLNR. CDUPs often include site-specific conditions addressing resource management, cultural site preservation, and natural resource protections.

The Conservation District was established in 1961 with the passage of Act 187, SLH 1961. State land use district maps, including those for the Conservation District were later adopted in 1964. The Petition Area was originally designated as Agricultural. In 1974 maps, the Petition Area was designated as Conservation, although research has not indicated why this area was designated as Conservation. As indicated in the State of Hawai'i Land Use Districts and Regulations Review (Eckbo et al., 1969) report by the LUC, recent lava flows, particularly in the dry areas of the island, are barren and unproductive. It was concluded that seemingly the highest and best use would be as wilderness areas and that such lands have been recognized and are for the most part in the Conservation District. (Eckbo et al. page 36). Based on the foregoing, it is more consistent to have the area re-designated in the SLU Agricultural District similar to the surrounding areas.

Overall, while administratively feasible, Alternative 2 would offer less regulatory consistency and could introduce greater regulatory uncertainty for Sanford's Service Center operations compared to Alternative 1. However, similar to Alternatives 1a and 1b, Alternative 2 could provide access to additional extractable material than presently available subject to obtaining a new CDUP which would presumably have the same restrictions as Alternatives 1a and 1b (i.e. no mining of the Pu'u), but without resolving the underlying land use inconsistency.

2.2.2 Alternative 3: No Action

The No Action Alternative serves as the baseline condition against which the potential environmental and social impacts of the Proposed Action and other alternatives are compared. Under the No Action Alternative, the State Land Use District designation of the Petition Area would remain within the Conservation District, specifically within the L subzone. Sanford's Service Center would continue to conduct mining and quarrying activities as a legal nonconforming use under the terms of the existing CDUPs. However, mining and quarrying would remain confined to the currently permitted area, and no expansion beyond that footprint would be allowed.

Once the extractable cinder within the permitted area is exhausted, Sanford's Service Center would be required to terminate its operations at Leilani Quarry and initiate the final Grading and Landscaping Plan as required by the existing CDUP. Without the ability to expand into adjacent areas within the Petition Area, the long-term viability of Sanford's Service Center's operations at Leilani Quarry would

be severely constrained. This would, in turn, disrupt the supply of the unique low-density black cinder that is critical to the local floriculture and nursery industries, potentially resulting in supply shortages and higher costs for these sectors. Under the No Action Alternative, the Applicant estimates that the available resource under the current License Area could be exhausted as soon as mid-2026.

The No Action Alternative would also represent a missed opportunity to bring the State and County land use designations for the Petition Area into better consistency. While there is no requirement for these designations to align, achieving greater consistency between the two can help support clearer long-term planning and permitting. By contrast, the Proposed Action would establish a more consistent land use framework, reducing ambiguity for future regulatory review processes. Although the No Action Alternative would avoid the direct environmental impacts associated with expanded mining and quarrying activities, it would not meet the purpose and need of the Proposed Action and would result in adverse economic effects on the horticultural and nursery sectors that rely on the Leilani Quarry's specialized cinder.

2.3 Alternatives Dismissed from Further Study

As part of the alternatives development process, Sanford's Service Center considered whether the Proposed Action could reasonably be achieved at an alternative location, either at another existing Sanford's Service Center quarry or at a newly developed site elsewhere on Hawai'i Island. All but one of these location-based alternatives were ultimately dismissed from further consideration based on several factors related to ownership, accessibility, resource availability or quality, economic feasibility, geological, and environmental and cultural considerations. One potential site adjacent to the Leilani Quarry is assumed to yield nursery grade cinder due to its proximity to the current Leilani Quarry, but its quality is unknown, it is unknown whether there would be sufficient quantities to serve the current demand by the industry, and quarrying at that location would require implementing quarrying operations on a brand new, undisturbed site, as well as a special permit as it is on agricultural zoned lands. Accordingly, this alternative was dismissed from further study at this time.

The primary factor contributing to the dismissal of other alternative locations was the unique geological composition of the low-density black cinder found at Leilani Quarry, as well as ownership challenges and access to alternative locations. This particular material is essential to the local floriculture and nursery industries, where it is used extensively as a potting medium and soil amendment. Other Sanford's Service Center quarries on the island do not contain cinder with the same low-density properties, and substitution with alternative materials would not meet the industry's specialized requirements. Given the critical importance of this resource to Hawai'i's floriculture sector, relocating operations to a site with lower-quality material would not fulfill the purpose and need of the Proposed Action. As noted above, the adjacent property is only assumed to yield nursery grade cinder, due to its proximity to the current Leilani Quarry, but it is unknown whether nursery grade cinder is present on the adjacent property. The Proposed Action is crucial, as the Leilani Quarry is currently the sole supplier of nursery grade black cinder on the Island of Hawai'i. It is currently unknown whether any other location on the island contain the specific type of cinder found at Leilani Quarry in sufficient quantities to serve the current demand by the industry.

In addition to the resource limitations, relocation to an alternative site would impose significant economic and logistical challenges. Site acquisition or access and development at a new location would require extensive permitting, site preparation, infrastructure construction, and operational startup costs, all without the assurance that the newly identified site would contain commercially viable cinder. These uncertainties, combined with the availability of known, high-quality cinder within the Petition Area, would cause undue economic hardship, to an already struggling floriculture industry.

Environmental and cultural impacts due to development of the potential quarry site on any alternative site would need to be studied, to determine any significant impact. The Petition Area already contains an active quarry operation, and substantial portions of the site have been previously disturbed by past and ongoing mining and quarrying activities. Expansion within the Petition Area would therefore be expected to result in fewer new environmental and cultural impacts compared to the establishment of a quarry in an undeveloped area including the adjacent property. Additionally, the Petition Area's cultural and archaeological resources have already been the subject of extensive study, resulting in a comprehensive preservation and management framework. This level of understanding and documented consultation would not be available at a new site, further increasing regulatory uncertainty and the potential for conflicts with cultural or natural resources.

For these reasons, the Proposed Action has been determined to be the most feasible at this time to continue serving the floricultural industry without interruption.

Chapter 3

Affected Environment and Environmental Consequences

Chapter 3

Affected Environment and Environmental Consequences

3.1 Introduction

Chapter 3 describes the affected environment (existing conditions) for resources evaluated in this EIS and discloses the potential environmental consequences of Alternatives 1a, 1b, and Alternative 2, and the No Action Alternative (see Chapter 2). Identification of the existing conditions and evaluation of the potential environmental consequences adhere to HEPA, codified at Chapter 343, HRS and Chapter 11-200.1, HAR.

The following subsections discuss how Chapter 3 is organized and outline the information provided under discussion of each resource area. Sections 3.2 through 3.13 discuss individual resource areas.

3.1.1 Environmental Resource Sections

Environmental resources include aspects of the natural, cultural, and human environment. This EIS evaluates the potential for impacts on the following resource areas.

- Land Use
- Biological Resources
- Geology and Soils
- Water Resources
- Noise
- Hazardous Substances
- Traditional and Customary Practices
- Cultural Resources
- Historic and Archaeological Resources
- Air Quality and Greenhouse Gases
- Socioeconomics and Local Economy
- Traffic
- Solid Waste

3.1.2 Existing Conditions

Under HEPA, HAR § 11-200.1-24(i) requires that an EIS "fully declare the environmental implications of the proposed action." To meet this requirement, the existing conditions within the affected environment must first be identified before the potential environmental consequences can be evaluated.

The environmental analysis is therefore conducted in two steps: (1) establishing the existing conditions within the affected environment, and (2) disclosing the potential environmental consequences of the Alternatives 1a, 1b, and Alternative 2, and the No Action Alternative.

Each resource area section includes a description of existing conditions, which presents the current environmental, physical, cultural, and socioeconomic conditions within the Petition Area. These existing conditions establish the baseline against which the potential impacts of action alternatives are compared.

The existing conditions analysis relies on a combination of site-specific studies, technical reports, agency consultations, and publicly available data. Where available, prior survey findings, including archaeological inventory surveys, cultural impact assessments, biological resource assessments, and infrastructure evaluations, are summarized to provide a comprehensive understanding of the affected environment. Existing conditions reflect all ongoing activities to date, including current activities and existing management measures.

3.1.3 Analysis Methodology

This section describes the methodology for determining the environmental consequences associated with each alternative. For each resource area, the analysis follows a consistent process that includes:

- Description of existing conditions (as detailed in Section 3.1.2)
- Evaluation of direct and indirect impacts of the Alternatives 1a, 1b, and Alternative 2, and the No Action Alternative
- Determination of whether impacts meet the definition of a "significant effect" (significant impacts) under HAR § 11-200.1-2

Significant impacts under HAR § 11-200.1-2 are defined as:

> *The sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State's environmental policies or long-term environmental goals and guidelines as established by law, or adversely affect the economic welfare, social welfare, or cultural practices of the community and State.*

For each resource, the analysis considers both the context and intensity of the impact. Context refers to the geographic extent of the impact, with a focus on the Petition Area, while intensity considers the severity of the impact, including its duration, reversibility, and potential for cumulative or secondary effects.

In accordance with HAR § 11-200.1-13, the following criteria are applied to assess significance:

- Irreversible commitment of natural or cultural resources
- Cumulative impacts when considered with past, present, and reasonably foreseeable future actions
- Substantial adverse change in natural systems, cultural landscapes, or archaeological features
- Impact on traditional and customary Native Hawaiian rights and practices
- Consistency with State and County environmental policies, plans, and objectives
- Adverse effects on public health, safety, or welfare

If the analysis determines that an impact meets the criteria for significance, it is disclosed as a significant impact, and, where feasible, mitigation measures are proposed to reduce its severity. If an impact is determined to be less than significant, the rationale is provided, including the consideration of standard operating procedures, existing regulations, and voluntary mitigation commitments that contribute to minimizing adverse effects.

The analysis explicitly distinguishes between impacts associated with the action alternatives (administrative action and subsequent mining and quarrying activities) and those resulting from unrelated or ongoing activities in the vicinity of the Petition Area. The No Action Alternative serves as the baseline for evaluating the relative magnitude and significance of the action alternatives' impacts.

3.1.4 Applicability of Alternatives

Alternatives 1a, 1b, and Alternative 2 analyzed in this EIS consist of an administrative action intended to provide regulatory conformance and enable the continuation and expansion of ongoing mining and quarrying activities within the Petition Area. Specifically, Alternative 1a and Alternative 1b (the Preferred Alternative) is a SLUDBA to reclassify the Petition Area from the Conservation District to the Agricultural District.

Alternative 1a would reclassify the entire 94.108-acre Petition Area from the State Conservation District (L subzone) to the Agricultural District to enable Sanford's Service Center to continue and expand black cinder quarrying operations. This change would align State and County land use designations, allowing mining under a Special Permit and resolving regulatory inconsistencies created by 2011 rule amendments that removed quarrying as an allowable use in the L subzone.

Alternative 1b, the Preferred Alternative, proposes a reduced 83.1-acre reclassification that excludes inaccessible portions of Puʻu Kaliʻu, and Hāʻiwale Gulch. Both alternatives aim to support long-term operational certainty and reinforce the State's interest in securing a critical resource for Hawaiʻi's floriculture and nursery industries. Alternative 1b is preferred due to its more refined boundaries that respect physical constraints and cultural sensitivities while still achieving planning and permitting consistency.

An additional alternative, Alternative 2, would instead pursue a Conservation District subzone reclassification from the L subzone to the R subzone. Both alternatives represent distinct administrative pathways to achieve the same outcome: allowing the continuation and expansion of mining and quarrying activities in conformance with applicable land use regulations.

Mining and quarrying activities are allowable under both the Agricultural District (subject to a Special Permit from the Windward Planning Commission) and the R subzone (subject to a CDUP from the

BLNR). Consequently, the potential environmental impacts across Alternatives 1a, 1b, and Alternative 2 are fundamentally tied to the physical mining and quarrying activities (considered a connected action), not to the administrative pathway through which they are authorized.

Alternative 1b (the Preferred Alternative) however, would generally result in fewer adverse impacts in certain resource areas due to its smaller Petition Area footprint and the intentional exclusion of culturally and visually sensitive features, such as the summit of Puʻu Kaliʻu, the adjacent ridge, and Hāʻiwale Gulch.

As such, the resource analyses presented in Chapter 3 evaluate the potential environmental impacts of the proposed mining and quarrying activities generally. The analysis distinguishes impacts across Alternatives 1a, 1b, and Alternative 2 only if an alternative would result in a materially different impact to a given resource area. In most cases, the intensity and extent of impacts are similar across all action alternatives. Where differences do exist, such as reduced land disturbance or cultural resource avoidance under Alternative 1b, these distinctions are explicitly analyzed and distinguished within the relevant resource sections.

3.2 Land Use

Surrounding land uses include the agricultural subdivision of Leilani Estates to the north and forested, undeveloped land to the east and west. The nearest residential structures are located over 2,000 feet from the Leilani Quarry. The Petition Area is accessed via a private road from Pahoa-Kalapana Road (State Route 130), crossing two privately owned parcels.

3.2.1 Agricultural Value of Land

Existing Conditions

The Agricultural Lands of Importance to the State of Hawaiʻi (ALISH) map series (OPSD, 2024) identifies three categories of valuable agricultural land in the state: Prime Agricultural Lands, Unique Agricultural Lands, and Other Important Agricultural Lands. The Petition Area contains lands designated as Other Important Agricultural Lands, but no lands classified as Prime or Unique Agricultural Lands (Figure 3-1). Other Important Agricultural Lands are recognized for their statewide or local importance for agricultural use, although they do not meet the criteria for Prime or Unique status. Other Important Agricultural lands do not have the optimal soil quality, water availability, or climate conditions found in Prime Agricultural Lands. However, these lands may support alternative agricultural activities rather than intensive crop production. Other Important Agricultural Lands make up roughly 18 percent of the County of Hawaiʻi's land area.

The current classifications of soil and agricultural value show that the land within the Petition Area is composed largely of hydrous loam (a mixture of sand, silt, and clay with a high moisture content) (Figure 3-2). The University of Hawaiʻi Land Study Bureau (LSB) classification assigns soils productivity ratings from A (highest) to E (lowest). The Petition Area is made up of land classified as C, D, and E, which represent lower productivity categories (Figure 3-3). Soil classification of "C" denotes medium productivity, often supporting limited or marginal agricultural activities. These soils can sustain some types of crops with proper management but are not optimal for high-yield production. Soil classification of "D" indicates soils of low productivity. These lands generally require substantial amendments, such as fertilizers or irrigation, to achieve minimal agricultural viability. They are often considered unsuitable for significant agricultural endeavors without extensive intervention. Soil classification of "E" represents the lowest level of productivity. These soils are typically considered unsuitable for

agriculture due to extreme limitations, such as poor soil quality, steep slopes, rocky terrain, or severe erosion. Land in this category generally cannot support crops or even pasture without extensive and costly modifications, making it impractical for agricultural use.

The Petition Area is underlain by a distinctive cinder substrate derived from past volcanic activity, which produces a low-density, black "popcorn" cinder material uniquely suited to horticultural applications. This specific type of cinder has become a critical input in Hawai'i's nursery industry due to its porosity, drainage properties, and compatibility with containerized plant growth. Unlike other volcanic soils, the cinder found at the Petition Area is relatively unconsolidated and accessible, facilitating small-scale extraction with limited mechanical disturbance. These qualities distinguish the site from other lands with similar LSB classifications, which may lack the physical cinder deposits or possess overly compacted or weathered substrates unsuitable for this purpose. Thus, while the soils in the Petition Area are of low to marginal agricultural productivity, they hold significant value for mineral resource extraction.

According to an archaeological assessment conducted by Haun & Associates (**Appendix G**), the makai portions of the parcel were historically used for crop production and pasturing. However, the Petition Area does not include land currently considered valuable for agricultural crop production.

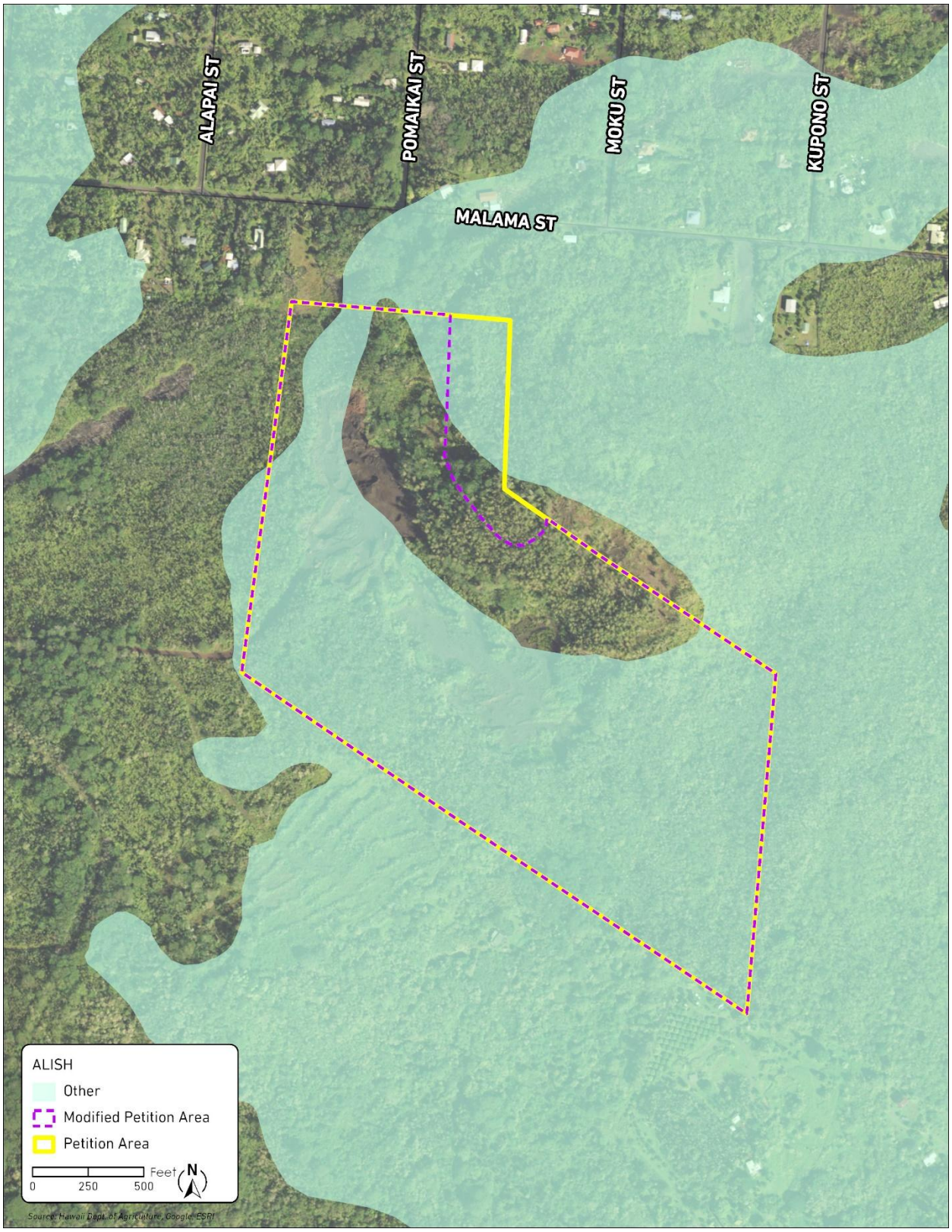


Figure 3-1 **Agricultural Lands Important to the State of Hawai'i**

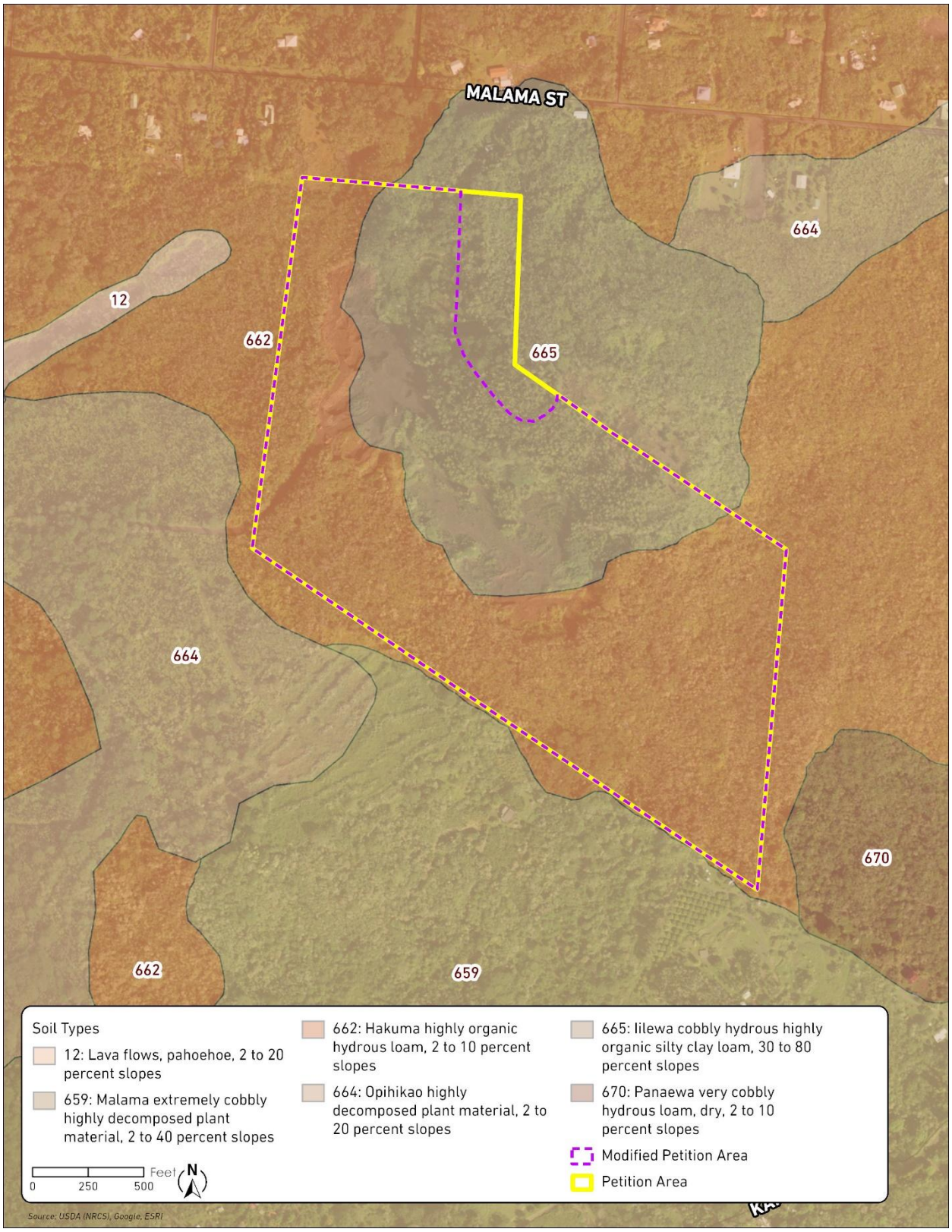


Figure 3-2 **Soil Types**

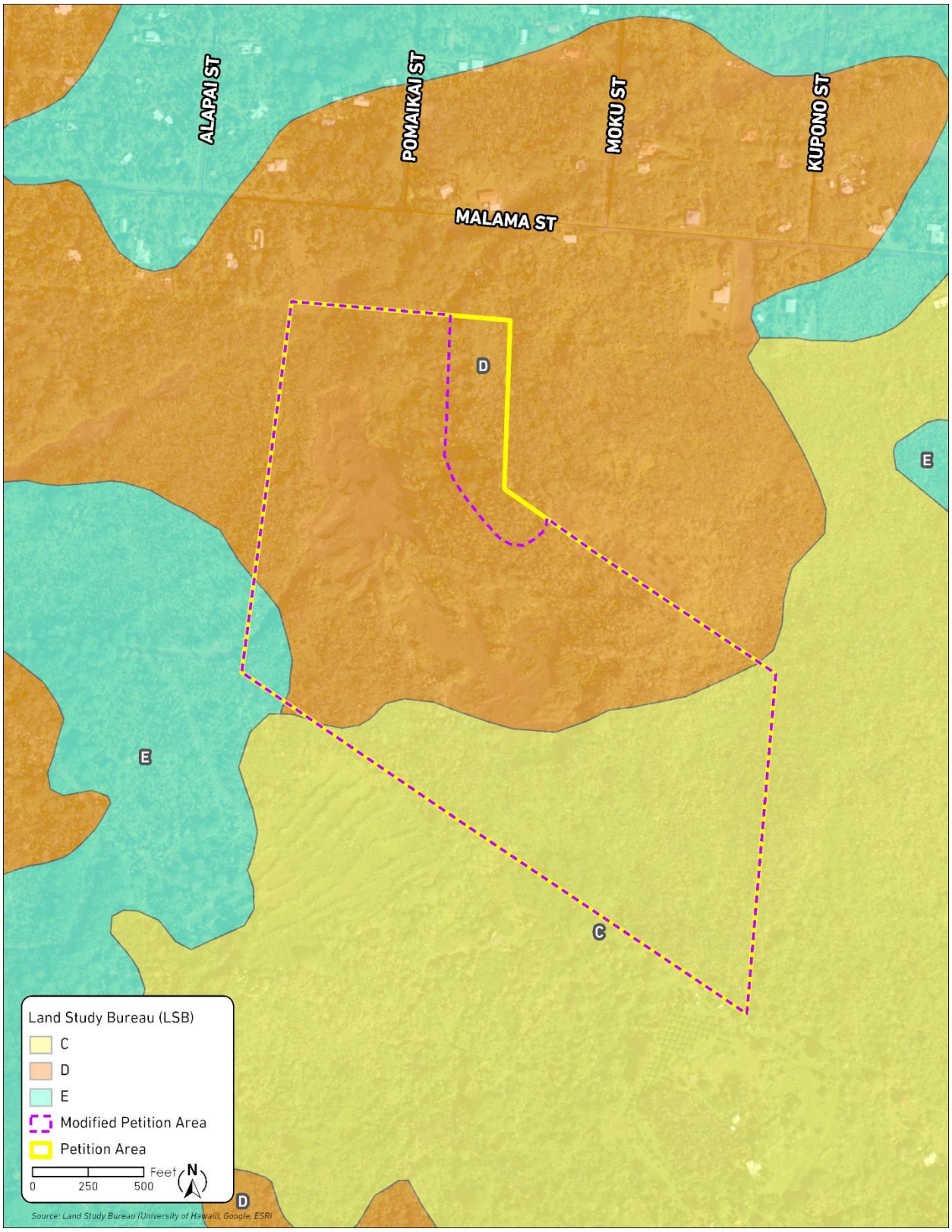


Figure 3-3 **Land Study Bureau Soil Classifications**

Environmental Analysis

As discussed above, the soils within the Petition Area are characterized by low to marginal productivity, with LSB ratings of C, D, and E, indicating limited suitability for crop production without significant intervention. While portions of the Petition Area are classified as Other Important Agricultural Lands under the ALISH system, these lands are not actively used for commercial crop production and are not recognized for their suitability for high-value or intensive agricultural operations.

The Petition Area's historical use for limited pasturing and crop production was constrained by the poor soil quality, uneven topography, and presence of rocky substrates, all of which limit the viability of conventional agriculture within the area. Alternatives 1a, 1b, and Alternative 2 would not interfere with the broader agricultural potential of adjacent lands, which would retain their existing land use designations and agricultural value.

Given these factors, Alternatives 1a, 1b, and Alternative 2 are not anticipated to result in a significant adverse impact on the agricultural value of lands within the Petition Area or the surrounding region. No mitigation measures are proposed, as the project would not result in the loss of Prime Agricultural Lands, Unique Agricultural Lands, or actively cultivated lands.

No Action Alternative

Under the No Action Alternative, as detailed in Section 2.2.2, the SLU District designation of the Petition Area would remain within the Conservation District, L subzone. Mining and quarrying activities would continue only within the currently permitted 30-acre area, with no further expansion. Once the permitted quarry area is fully mined, Sanford's Service Center would be required to implement the Grading and Landscaping Plan to stabilize and revegetate the site.

Because no expansion of quarrying would occur, the majority of the Petition Area would remain unaffected by future mining and quarrying activities. Lands outside the currently permitted area would retain their Other Important Agricultural Lands designation under the ALISH classification system, and the soils would continue to be classified as C, D, and E by the LSB, indicating low to marginal agricultural productivity.

Without the proposed district boundary amendment and accompanying land use changes, no new agricultural activities would be introduced within the Petition Area. The combination of low soil productivity, rocky terrain, and historic disturbances would continue to limit the area's potential for sustained or economically viable agricultural production. These constraints would make it unlikely that the land would contribute to meaningful commercial agriculture, particularly without significant investment in soil amendments, irrigation, and other infrastructure.

In summary, the No Action Alternative would preserve the existing agricultural designations and classifications but would not improve the practical agricultural value or economic productivity of the land due to its inherent physical limitations and environmental constraints.

3.2.2 Recreational Resources

Existing Conditions

There are no public or private recreation areas or easements within the Petition Area, larger parcel property, or surrounding parcels. The lower Puna shoreline is located approximately 3 miles makai to the southeast.

Environmental Analysis

Because of the lack of recreational resources within the Petition Area and surrounding lands, it is expected that Alternatives 1a, 1b, or Alternative 2 would have no impacts on recreational resources.

No Action Alternative

Because there are no existing public or private recreational resources, designated recreation areas, or access easements within the Petition Area, the larger parcel, or the immediately surrounding parcels, the No Action Alternative would result in no change to recreational resources in the area. The absence of designated recreational facilities or public access would persist, and the Petition Area would remain unavailable for any formal or informal recreational uses.

The lower Puna shoreline, approximately 3 miles makai of the Petition Area, would continue to serve as the nearest recreational resource. The No Action Alternative would not introduce new public access routes or recreational facilities that could enhance or expand recreational opportunities in the area.

3.2.3 Scenic Resources

Existing Conditions

The County of Hawai'i General Plan 2005 and the Final Recommended Draft General Plan 2045 highlight several scenic areas across the island, drawing attention to the natural beauty of the volcanoes, grasslands, and coastal waters. These scenic values are particularly notable in regions where the lush uplands sharply contrast with the more arid lowlands and the rugged lava flows juxtapose the windswept grasslands. Although the General Plan does not specifically identify viewplanes or sites within the Petition Area, it does recognize the coast of Puna and the inland volcanic regions as being of significant scenic value.

The visual landscape of the Petition Area was altered by the 2018 Kīlauea eruption, which created the Fissure 8 spatter cone approximately 0.7 miles northeast of Pu'u Kali'u. This new volcanic feature has changed the viewplane from the north, and Pu'u Kali'u is visible from the recent lava flow near Fissure 8, as shown in **Figure 3-4.** Ongoing mining and quarrying activities at the Leilani Quarry do not impact the profile of Pu'u Kali'u, as the existing license prohibits any alteration to the summit or the overall profile of the cinder cone.

Views of the Leilani Quarry (elevation of approximately 880 to 900 feet), and the summit of Pu'u Kali'u (elevation of approximately 1,070 feet) remain obscured from all other directions due to a combination of natural vegetation, the quarry's lower topography, and the surrounding terrain. Specifically, views are obscured from Malama Street, Pahoa-Kalapana Road (SR 130), Kamali'i Road, and Kalapana-Kapoho Road (SR 137, known as the "Red Road") and from the closest residences in Leilani Estates on Malama Street (**Figure 3-5**).



Figure 3-4 **Pu'u Kali'u As Seen From Fissure 8**

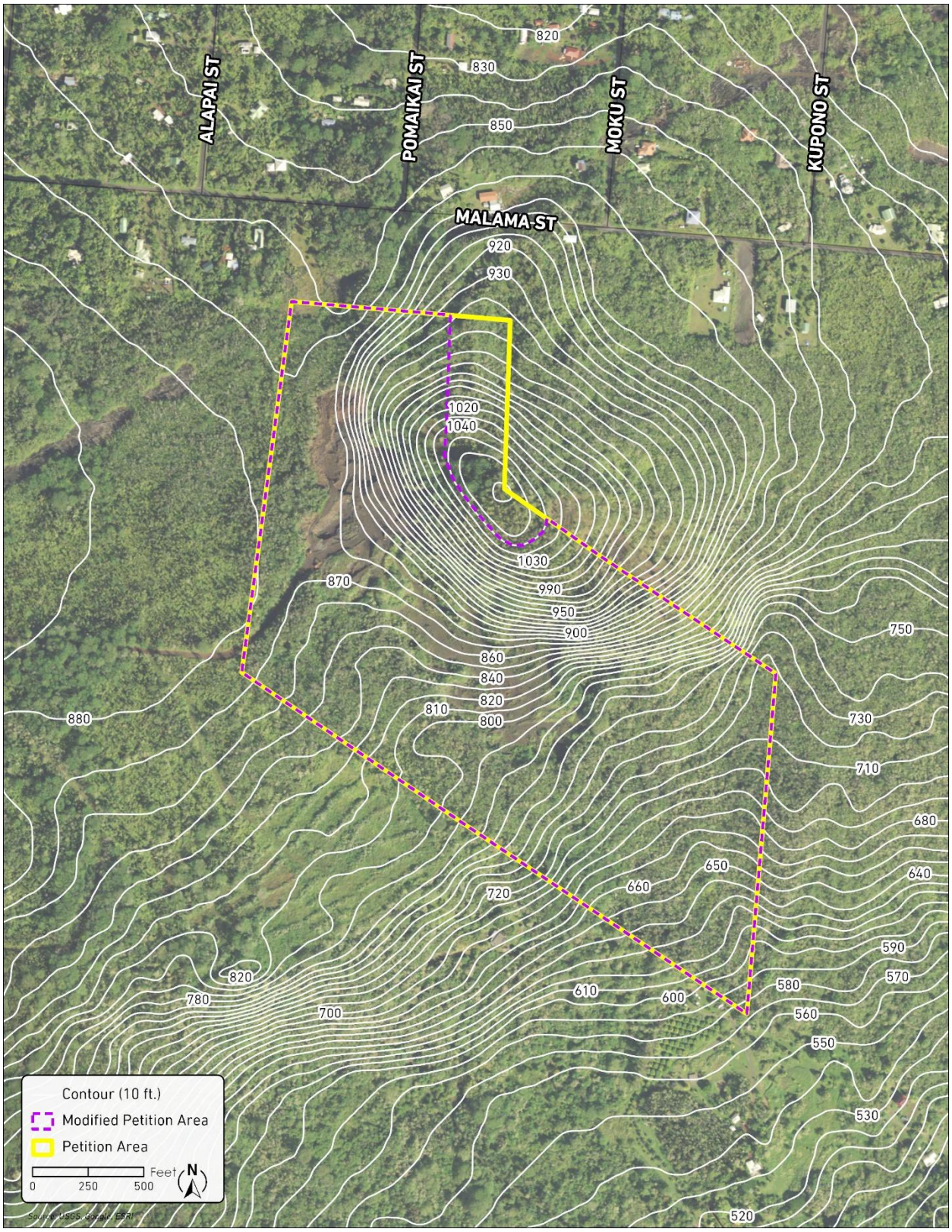


Figure 3-5 **Topography of Petition Area**

Environmental Analysis

Mining and quarrying activities at the Leilani Quarry are subject to license conditions that explicitly prohibit any modification to the summit of Puʻu Kaliʻu, ensuring that the landform's visual integrity is preserved. The combination of natural topography, surrounding forested areas, and the relatively low elevation of the quarry floor serves to screen ongoing and future quarrying activities from adjacent properties and nearby public roadways. These physical characteristics significantly limit the visual prominence of the active quarry site within the surrounding landscape. Moreover, present and future mining and quarrying activities only occur during the day, thereby limiting any visual disturbance from artificial light at night.

Under Alternatives 1a and 2, these existing visual buffers would be retained, and no changes to the summit profile or significant alteration of the natural landforms would occur. The perimeter vegetative buffers, which provide both visual screening and ecological value, would continue to be maintained and supplemented as necessary to minimize visibility of disturbed areas.

Under Alternative 1b, the modified Petition Area excludes the summit of Puʻu Kaliʻu above 1,050 feet MSL, thereby ensuring that the summit itself is removed from the Proposed Action. While Alternatives 1a and 2 also include license conditions that prohibit alteration of the summit, Alternative 1b provides a higher degree of certainty and enforceability by removing the summit from the Petition Area entirely. This exclusion more definitively preserves the physical integrity of the puʻu.

Due to the absence of designated scenic resources within the Petition Area, the limited visibility of the quarry from public viewpoints, and the continuation of existing site management practices, Alternatives 1a, 1b, and Alternative 2 are not anticipated to result in significant adverse impacts on scenic resources or identified viewplanes. The existing visual character of Puʻu Kaliʻu and the surrounding landscape would be preserved, and no mitigation measures are warranted.

No Action Alternative

The scenic character of the Petition Area and its surroundings would remain largely unchanged under the No Action Alternative. The visual prominence of Puʻu Kaliʻu and its unaltered summit profile would continue to contribute to the area's scenic value, in alignment with the terms of the existing quarry license that prohibit modification to the summit or overall profile of the cinder cone.

Because the current mining and quarrying activities are confined to a relatively small, obscured area, and views of the Petition Area are already limited from surrounding public roadways and adjacent residential areas by natural vegetation and topography, the No Action Alternative would not introduce new visual impacts. The Fissure 8 spatter cone, a product of the 2018 Kīlauea eruption, would remain a dominant feature in the broader visual landscape, and the Petition Area's role in the regional viewshed would remain minor.

In summary, under the No Action Alternative, the Petition Area would retain its existing visual character, with no additional alteration to scenic resources, no expanded visual disturbances, and no changes to existing viewplanes.

3.3 Biological Resources

3.3.1 Flora

Existing Conditions

The Puna District contains some of Hawai'i's last remaining native lowland wet forests (Dupuis, 2012). The vegetation in the Petition Area is classified as Lowland Wet 'Ōhi'a/Lama Forest, which is dominated by 'Ōhi'a (*Metrosideros polymorpha*) and Lama (*Diospyros sandwicensis*), typically found on young volcanic terrains on windward Hawai'i Island (Gagne & Cuddihy, 1990). Over the last century, land conversion for agriculture and residential development has fragmented the landscape, leading to the invasion of alien plant species and degradation of native plant communities (Cuddihy & Stone, 1990; Dupuis, 2012). In Dupuis' survey of lowland wet forest reserves, the following proportions of absolute canopy cover were estimated: 'ōhi'a (44%), strawberry guava (*Psidium cattleianum*) (30%), hala (*Pandanus t*ectorius) (30% strictly in the lowest 100 meters elevation zone), lama (8%), kōpiko (*Psychotria hawaiiensis*) (8%), albizia (*Falcataria moluccana*) (8%), cecropia (*Cecropia obtusifolia*) (7%), *Melastoma septemnervium* (5%), and ironwood (*Casuarina equisetifolia*) (3%) (Dupuis, 2012).

The vegetation within the Petition Area has been influenced by a combination of natural and human-induced factors, including historical land use, invasive species, and natural disturbances. The forest canopy, primarily composed of 'ōhi'a, has experienced declines due to Rapid 'Ōhi'a Death (ROD), contributing to changes in species composition as non-native plants become more prevalent. Past activities such as sugar cane cultivation and mining and quarrying have modified the landscape, resulting in areas of regrowth that include both native and introduced species. The 2018 Kīlauea eruption further affected vegetation, with some native plant populations showing signs of decline. Rare species such as *Cyrtandra nanawaleensis* and *Polyscias hawaiensis* have been observed in the area, though in limited numbers.

Three biological surveys have been completed in the petition area in 2013, 2019, and 2024. These surveys are summarized below and inform the existing conditions of the Petition Area on which the analysis of the alternatives is based.

Terry and Hart, 2013

In 2013, Ron Terry, Ph.D., and Patrick J. Hart, Ph.D. of Geometrician Associates, LLC performed a high-level biological survey of a 309-acre area of the property encompassing, but not particularly distinguishing, the Petition Area (**Appendix A**). The survey described the canopy as 10 to 15 meters high with a well-developed shrub and fern layer of native and alien species, with scattered emergent 'ohe (*Polyscias hawaiiensis*). Anthropogenic, or human-caused, disturbance has been a critical factor influencing vegetation. They described the study area as a mosaic of patches with undisturbed surface along with areas affected by sugar cane cultivation, roads and railroad beds, papaya farming, and cinder mining. Of the 130 plant species observed within the 309-acre study area, 20 are indigenous (found in Hawai'i and elsewhere) and 20 are endemic (found only in Hawai'i). Of particular note is the large number of individuals of rare species in forests dominated by 'ōhi'a, including *Polyscias hawaiensis* and the listed endangered species *Cyrtandra nanawalensis*.

In 2013, Terry and Hart documented a relatively large population of *Cyrtandra nanawaleensis* within the 'ōhi'a-dominated forest in the northeastern quadrant of the study area. The survey identified more than a hundred individuals, suggesting that the species was still well-established at the time. The plants were primarily found in steep, mossy 'a'a boulder terrain with dense vegetation, including 'ōhi'a,

ʻieʻie (*Freycinetia arborea*), *Clidemia*, and strawberry guava. Due to the difficult terrain and thick vegetation, the surveyors suggested that additional individuals were likely present but undetected. They also recorded two separate individuals on the western margin of the proposed 34.195-acre quarry expansion area, with another small cluster near the extreme eastern boundary of the study site. At the time of the survey, *Cyrtandra nanawaleensis* had been proposed for federal listing as endangered, reflecting concerns about its restricted range and potential threats from habitat degradation.

Rathburn and Johansen, 2019

In 2019, Johnathen Rathbun and Jennifer Johansen also did a botanical study of the Petition Area (**Appendix B**). The study examined the impacts of ROD, invasive species, and the 2018 Kīlauea eruption on native vegetation in the Petition Area. Three primary vegetation zones were identified: the active quarry site, previously quarried areas with regrowth dominated by non-native ironwood and invasive groundcover and degraded native forest patches outside quarry disturbances. Severe declines in native ōʻhiʻa tree populations due to ROD have led to a shift toward invasive understory species like strawberry guava, resulting in further ecological degradation and reduced biodiversity. The endangered plant *Cyrtandra nanawaleensis* was found within the Petition Area but outside quarry-affected zones.

By 2019, *Cyrtandra nanawaleensis* appeared to have declined significantly in the Petition Area. Rathbun and Johansen identified a single population in what they called "Haʻiwale Gulch," located on the north slope of Puʻu Kaliʻu at approximately 900 feet in elevation. This population consisted of only six individuals growing in a cluster alongside *Cyrtandra paludosa*, making it difficult to determine whether some plants were distinct individuals or part of a clonal colony. The survey noted the species' characteristic broad, obovate leaves with coarse hairs, but no flowers or fruit were observed at the time. The habitat surrounding this population was increasingly degraded, with invasive plants such as strawberry guava, *Trema orientalis*, and *Melochia umbellata* becoming dominant. The survey emphasized concerns about ongoing habitat disturbance and the likelihood that, without intervention, *Cyrtandra nanawaleensis* could continue to decline.

LaGrande, 2024

In November 2024, Maya LeGrande conducted a follow-up biological survey of the Petition Area (**Appendix C**). The 2024 survey classifies the forest as characterized by a disturbed Lowland Wet ʻŌhia Forest, modified by geological and anthropogenic forces over the last few centuries, most recently the 2018 Lower East Rift Zone (Kīlauea) eruption. Within the 2024 study, LeGrande recognizes the native habitat on and around Puʻu Kaliʻu as poor, with declining numbers of native species due to residual damages from the 2018 eruption, ROD, and continued landscape modifications. Rare floral species identified include one *Polyscias hawaiensis* tree and two populations of *Cyrtandra nanawaleensis*, both in declining numbers in their home ranges. The 2024 survey confirmed the severe decline in the ʻōhiʻa tree populations, as identified in the preceding biological studies, due to ROD.

LeGrande's 2024 survey confirmed a continuing decline in the *Cyrtandra nanawaleensis* population, with only five mature individuals and a few seedlings observed across two distinct populations. The first population, located at approximately 1,021 feet in elevation, consisted of three mature plants and a few seedlings growing on mossy logs. The second population, found further upstream at 1,045 feet, contained only two individuals. Both populations were situated in degraded forest dominated by invasive species such as strawberry guava and *Miconia*, with additional signs of disturbance from feral pigs. The study reinforced previous findings that *Cyrtandra nanawaleensis* remains highly vulnerable to habitat loss and degradation. The continued presence of the species in the Petition Area was

significant, but its declining numbers highlighted the need for appropriate conservation efforts to protect its remaining habitat and prevent further population loss.

Existing Conservation Management Measures

Sanford's Service Center's current operations within the Petition Area are subject to a License Agreement with Kamehameha Schools, which requires specific protective measures for the federally listed endangered species *Cyrtandra nanawaleensis*. Sanford's Service Center is required to consult with government authorities to establish a minimum 70-foot protective buffer around all known populations of *Cyrtandra nanawaleensis* within the licensed area. Once established, fencing must be installed and maintained around the buffer areas to prevent encroachment and protect Cyrtandra habitat from operational activities.

Sanford's Service Center must also comply with all applicable federal and state conservation laws pertaining to *Cyrtandra nanawaleensis* and its habitat. In addition, Sanford's Service Center is required to keep Kamehameha Schools advised of any specific mitigation measures undertaken to protect *Cyrtandra nanawaleensis* within the licensed area.

These protective measures are enforceable under the License Agreement, ensuring that Sanford's Service Center's quarrying operations minimize impacts on *Cyrtandra nanawaleensis* and provide for ongoing coordination with Kamehameha Schools and government agencies to protect this endangered species.

Existing Rapid 'Ohia Death Biosecurity Measures

On March 17, 2025, the Hawai'i Department of Agriculture (HDOA) collected cinder samples from Sanford's Service Center for routine ROD testing. On March 27, 2025, HDOA notified Sanford's Service Center that all samples tested negative for the presence of ROD pathogens. This annual testing is conducted by HDOA to confirm that cinder intended for inter-island transport is free of ROD and complies with applicable biosecurity protocols (C. Yamamoto, personal communication, March 14 and 27, 2025). Further biosecurity measures are presented in the 2024 Landscaping Plan (**Appendix D**), including strategies such as cleaning and decontaminating equipment and personal gear to prevent the spread of ROD or other undesirable materials (i.e., pests, invasive weeds, etc.)

Environmental Analysis

Multiple biological surveys conducted in 2013, 2019, and 2024 document the progressive degradation of the Petition Area's forest ecosystem, with all three surveys consistently describing the prevalence of invasive species, habitat disturbance, and declining native forest cover (Terry & Hart, 2013; Rathbun & Johansen, 2019; LeGrande, 2024). These conditions are attributable to historical land use practices (including sugar cane cultivation), the spread of invasive species such as strawberry guava and ironwood, and the effects of ROD.

The most intact native habitats and remaining occurrences of rare or endangered plant species are outside of the primary impact area associated with mining and quarrying activities. Specifically, Ha'iwale Gulch, identified in the 2019 survey as a higher-value native habitat, lies within the Petition Area under Alternative 1a and Alternative 2, but would not be directly affected by the proposed expansion of mining and quarrying operations due to inaccessible topography (Rathbun & Johansen, 2019).

The surveys conducted by Terry and Hart (2013), Rathbun and Johansen (2019), and LeGrande (2024) collectively illustrate a clear trend of ecological decline within the Petition Area. The 2013 survey documented a mix of native and non-native species, with areas of historical disturbance heavily colonized by invasive vegetation (Terry & Hart, 2013). By 2019, native species were increasingly outcompeted, particularly by strawberry guava and ironwood, prompting recommendations to focus conservation efforts outside the Petition Area, particularly in Ha'iwale Gulch (Rathbun & Johansen, 2019). The 2024 survey confirmed these trends, documenting further loss of native cover, particularly linked to ROD outbreaks, invasive species dominance, and feral pig activity (LeGrande, 2024).

The federally endangered species *Cyrtandra nanawaleensis* was documented on the north slope of Pu'u Kali'u. The 2024 survey identified five mature individuals and a small number of seedlings in two distinct clusters, both located outside the proposed areas of quarry expansion (LeGrande, 2024). These populations occur within degraded habitat dominated by non-native species, further reducing the likelihood of direct or indirect impacts from mining and quarrying activities.

Existing conservation management measures are prescribed under the existing quarry license, which requires the preservation of vegetative buffers and prohibits any alteration to the summit of Pu'u Kali'u. These measures serve to protect portions of the Petition Area's visual and ecological integrity, though they do not specifically include broader ecological restoration or invasive species management efforts.

Alternative 1a and 1b

Alternatives 1a and 1b consist of a SLUDBA to reclassify the Petition Area to the SLU Agricultural District and the connected action of continuing mining and quarrying activities within the Petition Area under a Special Permit from the LUC.

Based on the documented biological conditions, including the predominance of invasive species, the historical degradation of native plant communities, and the avoidance of direct impacts on *Cyrtandra nanawaleensis*, the Alternatives 1a and 1b are not anticipated to result in significant adverse impacts on native flora within the Petition Area. However, additional mitigation measures, including invasive species management and revegetation strategies, are proposed and discussed below.

Alternative 1b further reduces the potential for adverse impacts on native flora by excluding Ha'iwale Gulch from the Petition Area altogether. This gulch, identified in the 2019 biological survey, contains the most intact native habitat within the broader parcel. By formally omitting this area from the boundaries of the Petition Area, Alternative 1b ensures that no potential future mining and quarrying activities could inadvertently encroach upon this higher-value native ecosystem. In doing so, Alternative 1b offers enhanced safeguards for the most ecologically sensitive portions of the site, including for *Cyrtandra nanawaleensis*, and represents the alternative with the least potential biological impact among those considered.

Alternative 2

Alternative 2 would reclassify the Petition Area from the L subzone to the R subzone within the SLU Conservation District. This administrative action would allow for the continuation of mining and quarrying activities within the Petition Area, subject to approval of a CDUP by the BLNR. The CDUP process would likely include a formal review of potential impacts to biological resources and would incorporate conditions to avoid or minimize harm to native plant communities and sensitive species, including the federally endangered *Cyrtandra nanawaleensis*.

Based on biological surveys conducted in 2013, 2019, and 2024, occurrences of *Cyrtandra nanawaleensis* are located outside the areas proposed for continued quarrying and within terrain that is physically inaccessible for such activities. As a result, no direct or indirect impacts to this species are anticipated under Alternative 2. Furthermore, given the already degraded condition of the Petition Area's vegetation, the continuation of mining and quarrying activities in previously disturbed areas, combined with required CDUP protections and proposed mitigation measures regarding relandscaping (**Appendix K**), is not expected to result in significant adverse impacts to native flora. Accordingly, potential impacts to biological resources under Alternative 2 are anticipated to be less than significant.

No Action Alternative

Under the No Action Alternative, as detailed in **Section 2.2.2**, Sanford's Service Center would cease quarrying operations upon completion of activities within the currently permitted area. Once operations conclude, Sanford's would be required to implement the Grading and Landscaping Plan required by the existing CDUP. This plan is intended to stabilize the site, reduce erosion, and encourage vegetation regrowth within the actively quarried area.

The revegetation efforts under this plan would provide some level of control over invasive species within the former quarry footprint, particularly in areas subject to active planting or ground cover establishment. However, the plan would not extend to the broader, undisturbed portions of the Petition Area, where no long-term vegetation management commitments exist. In those areas, the existing trend of invasive species proliferation — particularly strawberry guava, *Miconia*, *Clidemia*, and other aggressive non-native species — would likely continue or accelerate in the absence of ongoing land management.

The overall species composition within the Petition Area would continue to shift, with non-native species gradually replacing native flora, especially in areas already affected by ROD, past land use disturbances, and edge effects from adjacent land uses. The current patchwork of lowland wet forest, regrowth areas, and disturbed lands would likely become increasingly dominated by invasive species, particularly along disturbed edges and where ground cover is sparse.

With the cessation of quarrying, the conservation management measures tied to Sanford's operations, including the Cyrtandra-specific buffers and fencing requirements, would no longer apply, removing a structured mechanism for habitat protection in those areas. Although portions of the revegetated quarry could develop a mixed canopy over time, the broader ecological trajectory would likely trend toward further loss of native species diversity unless active invasive species control measures were implemented by a future land manager — an outcome not required under the No Action Alternative.

In summary, under the No Action Alternative, the Grading and Landscaping Plan would provide localized stabilization and some vegetation recovery within the quarried footprint, but the broader Petition Area would experience continued degradation due to unchecked invasive species spread, habitat fragmentation, and limited mechanisms for preserving or enhancing native plant populations. The federally listed *Cyrtandra nanawaleensis* would face increased risk due to the loss of project-specific protections, while the overall floral community would shift further toward invasive dominance in the absence of ongoing, site-wide land management and conservation actions.

Recommended Mitigation

To minimize potential impacts, Sanford's Service Center will establish buffer zones around areas with known *Cyrtandra nanawaleensis* populations, following USFWS avoidance and minimization measures for listed plant species and in accordance with the License Agreement with Kamehameha Schools. As

required by the License, Sanford's Service Center will also install and maintain fencing around these buffer zones to prevent encroachment and protect *Cyrtandra* habitat from operational activities.

Should any individuals be identified within the expansion area, Sanford's Service Center will comply with the ESA §10(a)(1)(B), which may include the development of a Habitat Conservation Plan and the securing of an Incidental Take Permit if avoidance is not feasible.

To further mitigate ecological impacts across the Petition Area, Sanford's Service Center will implement an updated Landscaping and Biosecurity Plan, prepared by LeGrande (2024), to guide revegetation efforts and invasive species management (**Appendix D**). This plan builds upon prior site stabilization requirements and integrates site-specific ecological restoration strategies that account for the current degraded condition of the lowland wet forest.

The Landscaping and Biosecurity Plan includes:

- Pre-quarry botanical surveys to document existing native plant populations and adjust buffer zones as necessary.
- Selective outplanting of appropriate native species in reclaimed quarry areas, with a focus on establishing a native canopy and understory consistent with Lowland Wet ʻŌhiʻa Forest assemblages.
- Ongoing invasive species control and vegetation maintenance to support successful reforestation and limit the spread of strawberry guava (*Psidium cattleianum*), *Miconia* (*Miconia calvescens*), *Clidemia* (*Clidemia hirta*), and other aggressive non-native species that threaten native species recruitment.
- Targeted fencing may be installed around revegetated areas and intact habitats to reduce disturbance from feral pigs, which are a known threat to both *Cyrtandra nanawaleensis* and regenerating native vegetation.
- Comprehensive biosecurity protocols, including:
    - Cleaning equipment and personal gear prior to site entry.
    - Decontaminating boots and field gear with a 70% alcohol solution to prevent the introduction or spread of pathogens, including those responsible for ROD.
    - Limiting the movement of soil, gravel, and organic material from off-site sources to prevent the introduction of additional invasive species or pathogens.

By ensuring these mitigation strategies are implemented, mining and quarrying activities will be carried out in a manner that minimizes ecological impacts, avoids disturbance to federally endangered species, and supports long-term conservation goals through revegetation, invasive species control, and habitat enhancement efforts focused on reclaimed quarry areas and remaining intact habitats, such as Haʻiwale Gulch.

3.3.2 Fauna

Existing Conditions

The fauna within the Petition Area reflects the broader ecological trends of lowland wet forests in Puna, where native species persist in diminishing numbers amid increasing dominance by non-native and invasive fauna. The region supports a mix of native and introduced bird species, with ʻamakihi and

'apapane remaining present but outnumbered by invasive birds such as Japanese white-eyes and house finches. The Hawaiian hoary bat is expected to use the area but has not been directly observed in surveys. While the terrain includes some potentially suitable seabird nesting habitat, no evidence of nesting by endangered seabirds has been documented. The most significant ongoing impact to native fauna is the presence of feral pigs, which disturb the forest floor, uproot native vegetation, and contribute to the spread of invasive plants. Other introduced mammals, including rats, mongooses, and feral cats, likely pose predation risks to native birds and invertebrates. Over the course of multiple surveys, the pattern of increasing disturbance and habitat degradation has remained consistent, with native species persisting in small numbers despite the challenges posed by invasive species and ongoing ecological change.

Terry and Hart, 2013

The 2013 faunal survey identified a total of twelve bird species within the Petition Area, including three native species: Hawai'i 'Amakihi (*Hemignathus virens*), 'Apapane (*Himatione sanguinea*), and 'Io, the Hawaiian Hawk (*Buteo solitarius*). These native birds were observed in lowland 'ōhi'a forest, though the researchers noted that the elevation and habitat conditions were less favorable for other native forest bird species that typically inhabit higher elevations. Non-native birds, including the Japanese White-eye, Northern Cardinal, and House Finch, were dominant in the area, with the Japanese White-eye being the most frequently detected species. The survey included an assessment of potential seabird habitat, identifying an area of 'uluhe fern near the summit of Pu'u Kali'u as a possibly suitable nesting site for the Hawaiian Petrel (*Pterodroma sandwichensis*), Newell's Shearwater (*Puffinus auricularis newelli*), and Band-rumped Storm-Petrel (*Oceanodroma castro*). However, nocturnal surveys conducted during the study did not detect any seabird activity in the Petition Area.

The endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) was not observed during the survey, but given its widespread distribution on the island of Hawai'i, the researchers presumed it to be present at least occasionally. While no specific bat surveys were conducted, the Petition Area includes a mix of native and alien vegetation that could provide suitable roosting habitat. The study also documented the presence of various non-native mammals, including feral pigs, goats, dogs, cats, rats, mice, and mongooses, all of which contribute to habitat degradation and pose risks to native wildlife. The survey concluded that invertebrates, including the endangered Hawaiian picture-wing fly (*Drosophila heteroneura*), were unlikely to occur due to the lack of suitable habitat in the Petition Area.

Rathbun and Johansen, 2019

The 2019 biological study reaffirmed several findings from the 2013 survey, particularly regarding the presence of potential habitat for the Hawaiian hoary bat and the suitability of certain areas for endangered seabirds. While no hoary bats were observed, the researchers noted that tall trees in undisturbed sections of the forest could provide roosting habitat. The study also identified suitable conditions for endangered and threatened bird species, including the Hawaiian hawk, Hawaiian petrel, Newell's shearwater, and Band-rumped Storm-Petrel, which may occasionally pass through the area. The researchers observed that non-native mammals, particularly feral pigs and mongooses, continued to impact the ecosystem, contributing to vegetation disturbance and potentially preying on native birds and their eggs. While no systematic bird counts were conducted, the study confirmed that native forest birds persisted but were increasingly outnumbered by invasive bird species.

LeGrande, 2024

The 2024 study confirmed and expanded upon the results of the 2013 and 2019 surveys, recognizing potential habitat for several protected species, including the Hawaiian hawk ('Io), Hawaiian hoary bat

(ʻŌpeʻapeʻa), and endangered seabirds (Hawaiian petrel, band-rumped storm petrel, and Newell's shearwater). While these species were not directly observed, the study emphasized that suitable conditions for their presence remain within undisturbed portions of the landscape. Feral pigs continued to be the most significant disturbance factor, with increasing evidence of rooting, wallowing, and damage to native vegetation. The study also noted that invasive bird species remained dominant, while native forest birds, though still present, were likely continuing to decline. No new observations of seabird activity were recorded, aligning with previous studies that found no direct evidence of nesting within the Petition Area. The survey reinforced the ongoing trend of habitat degradation, particularly due to the spread of invasive species and non-native predators.

Existing Little Fire Ant Biosecurity Measures

On March 17, 2025, HDOA conducted routine testing for Little Fire Ants (LFA) at Sanford's Service Center using peanut butter bait sticks, the standard method for detecting LFA presence. On March 27, 2025, HDOA notified Sanford's Service Center that no LFA were detected. This annual testing is carried out by HDOA to verify that cinder intended for inter-island transport is free of invasive ant species and remains in compliance with applicable biosecurity protocols (C. Yamamoto, personal communication, March 14 and 27, 2025).

Environmental Analysis

Alternatives 1a, 1b and Alternative 2, along with the continuation of mining and quarrying activities, is expected to have less than significant impacts on fauna. The biological surveys conducted in 2013, 2019, and 2024 have consistently shown that the Petition Area's native ecosystem is heavily degraded and primarily occupied by non-native species, with only small populations of native fauna remaining. Native forest birds such as ʻamakihi and ʻapapane have been documented in the area, but their populations are already impacted by habitat degradation and competition from invasive bird species. While the endangered Hawaiian hoary bat has not been directly observed, the presence of large trees suggests the potential for occasional roosting habitat. Additionally, seabirds such as the Hawaiian petrel, Newell's shearwater, and band-rumped storm petrel may pass through the area but have not been found nesting within the Petition Area. The Hawaiian hawk has been observed but is known to use a variety of habitats, including areas altered by human activity.

The primary sources of potential impact to fauna include vegetation removal during the quarry expansion, which could eliminate potential roosting or foraging habitat for native species, and disturbances from increased human activity in the area. However, given the current state of the ecosystem, these effects are expected to be minimal. The most intact habitat areas and the majority of native species observations have occurred outside of the Petition Area in locations such as Haʻiwale Gulch, which will remain undisturbed by the mining and quarrying activities. Additionally, many of the species in question, including the Hawaiian hawk and Hawaiian hoary bat, are known to persist in human-altered landscapes.

Feral pigs, which are a major ecological stressor, are expected to continue impacting native species regardless of the mining and quarrying activities. The surveys indicate that invasive species and habitat degradation have already shaped the existing faunal community, and the continuation of mining and quarrying activities is unlikely to introduce new significant stressors beyond those already affecting wildlife in the area.

No Action Alternative

Under the No Action Alternative, as detailed in **Section 2.2.2**, Sanford's Service Center would cease mining and quarrying activities once activities within the currently permitted area are complete. Upon cessation, Sanford's Service Center would implement the Grading and Landscaping Plan required under the existing CDUP and the 2025 Landscaping Plan. These plans would guide site stabilization and revegetation within the currently quarried footprint, helping to reduce erosion and encourage some regrowth of vegetation.

For native and non-native fauna across the broader Petition Area, the cessation of active quarrying would not result in meaningful habitat improvement, nor would it resolve the underlying ecological stressors that have shaped the area's faunal community. The dominance of non-native species, including invasive birds, rodents, mongooses, and feral cats, would continue unabated. In particular, feral pigs, identified in all biological surveys as the most significant disturbance factor, would likely expand their range into revegetated areas, accelerating soil disturbance, native vegetation loss, and the spread of invasive plants.

The absence of active management or targeted conservation measures after Sanford's Service Center's withdrawal would remove any site-specific efforts to monitor or mitigate impacts on native species, such as pre-disturbance surveys, nest avoidance buffers, or seasonal protections for species like the Hawaiian hoary bat and Hawaiian hawk. While some passive habitat recovery may occur within the revegetated quarry footprint, this process would be heavily influenced by invasive species competition, limiting the suitability of the site for native fauna.

The species composition within the Petition Area would continue shifting toward non-native dominance, particularly in the absence of structured invasive species control or habitat restoration efforts beyond the revegetation of the quarried area. Native forest birds such as 'amakihi and 'apapane would likely persist in small numbers where suitable canopy remains, but they would face increasing pressure from invasive bird species and degraded habitat quality.

For species like the Hawaiian hoary bat, which relies on larger, mature trees for roosting, the No Action Alternative would leave the remaining mature forest intact, preserving some existing roosting potential. However, the revegetation of the quarried area would not be expected to provide suitable roosting habitat in the near term, as newly planted trees would take decades to develop the structural complexity required for bat roosting. With no active management to enhance bat habitat, overall habitat quality for the species would likely continue to decline as invasive species alter the forest structure over time.

In summary, under the No Action Alternative, the limited revegetation associated with the Grading and Landscaping Plan would offer localized benefits within the quarried area, but the broader Petition Area would remain subject to ongoing degradation driven by invasive species, feral pigs, and the lack of active conservation management. Native fauna would persist in small numbers where habitat allows, but the long-term trend toward declining native species populations and increasing dominance by invasive fauna would likely continue.

Recommended Mitigation

To further reduce the potential for impacts on native fauna in the Petition Area, Sanford's Service Center will implement avoidance and minimization measures recommended by the USFWS. These measures include:

- Avoiding the removal of woody plants taller than 15 feet during the Hawaiian hoary bat birthing season (June 1 through September 15) to prevent harm to roosting mothers and pups.
- Fully shielding outdoor lighting to prevent seabird disorientation and collisions.
- Conducting pre-disturbance surveys for native birds, particularly during the breeding season (March 1 through September 30).
- Performing nocturnal surveys to monitor for seabird activity in the Petition Area.
- Establishing buffer zones around active Hawaiian hawk nests, maintaining a 1,600-foot protective distance during breeding seasons until fledging occurs.
- Preserving any trees containing a Hawaiian hawk nest, as these nests may be reused in future breeding seasons.
- If major vegetation removal or otherwise disruptive operations are expected, consider deploying acoustic sound meters for a month in advance of the change in operations to detect the presence of the Hawaiian hoary bat. If bats are detected, avoidance and minimization measures will be implemented to protect their habitat.

By implementing these measures, mining and quarrying activities will be conducted in a manner that minimizes potential impacts on native wildlife while allowing mining and quarrying activities to proceed within an already impacted landscape.

3.4 Geology and Soils

Existing Conditions

The Petition Area is located in the lower portion of the Puna District, which has been shaped by Kīlauea Volcano through ongoing processes of creation and inundation. Most areas away from Pu'u Kali'u are older than 10,000 years (Wolfe and Morris, 1996). However, only about 10% of Kīlauea's surface terrain is older than 1,000 years. The remaining 90% of Kīlauea's surface is covered by lava flows younger than 1,000 years, with around 20% being less than 200 years old. The Petition Area is primarily underlain by pāhoehoe and 'a'ā lava flows aged between 400 and 750 years, including the cinder cone of Pu'u Kali'u. A small area of younger lava flow from 1955 is also present within the site (**Source:** *USGS, 2021*

Figure 3-6). A site located on Kīlauea has about a 1% probability of being covered by lava in a 10-year period.

Hawai'i Island faces geologic hazards, particularly lava flows and earthquakes. The U.S. Geological Survey classifies the Petition Area, located mostly within the East Rift Zone of Kīlauea Volcano, as within Lava Flow Hazard Zone 1 on a scale of 9 to 1, with 1 being the highest risk (Wright et al. 1992,). Lava Flow Hazard Zone 1 also includes summits and rift zones of Kīlauea and Mauna Loa, where vents have been historically active. In terms of seismic risk, Hawai'i Island is rated Zone 4 Seismic Hazard (Uniform Building Code, Appendix Chapter 25, Section 2518), indicating a high risk of earthquake damage, particularly to poorly designed or constructed structures. The vicinity of the Petition Area has recently experienced large earthquakes, including the magnitude 7.7 Kalapana earthquake in 1975 (USGS, 2017) and the May 4, 2018, 6.9 magnitude earthquake, with an epicenter about 10.5 miles southwest of the Petition Area (USGS, 2018). Proximity to the lower East Rift Zone implies a relatively higher intensity and probability of shaking, with a peak ground acceleration of 1.25g (1.25 times

normal gravitational acceleration) at a 2% probability in 50 years. The lava flow hazard zones of the Petition Area are shown in **Figure 3-7**.

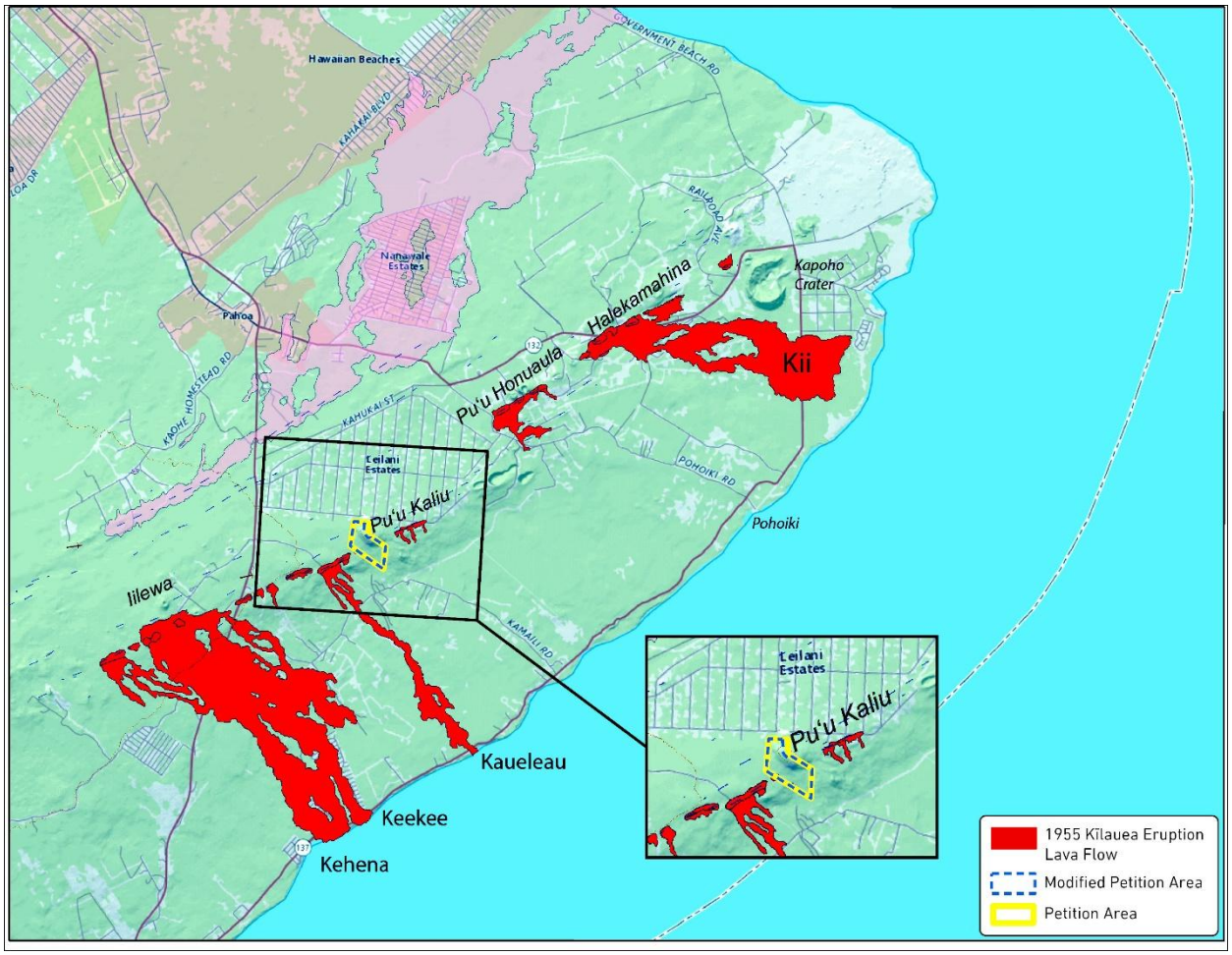
On April 30, 2018, after a period of enhanced summit inflation indicated by tiltmeter and GPS data, magma within and beneath Pu'u O'o drained and triggered the collapse of the crater floor (USGS, 2018). Within hours, earthquakes began migrating towards the east, indicating the movement of magma in that direction. On May 2, ground cracks appeared in and adjacent to Leilani Estates, with the first lava emerging on May 4. Kīlauea then entered a dramatic eruption phase, with lava and gases effusing from a number of fissures in the lower East Rift Zone, particularly Fissure 8 located in Leilani estates, approximately 0.7 miles northeast of Pu'u Kali'u. Activity from Fissure 8 ceased on August 5, 2018. The Petition Area was not indundated during this eruption by lava, with the exception of a small area in the far northwest corner. However, the Petition Area was impacted by volcanic gases and the Leilani Quarry halted operation temporarily due to poor air quality. Since activities at the Leilani Quarry are industrial and involve minimal permanent structures and infrastructure, rapid evacuation of personnel and equipment is possible. Generally, all on-site equipment can be mobilized in a short time, and the equipment utilized by mining and quarrying activities is not vulnerable to major earthquakes. Due to the site's proximity to the lower East Rift Zone, Sanford's Service Center has developed a Draft Evacuation Plan (**Appendix F**) to assist with planning and responding to hazards that may affect access to and from the quarry or pose threats to worker safety at the Leilani Quarry. This Draft Evacuation Plan identifies hazards, evacuation triggers, evacuation protocols, and specific protocols for specific hazards, including lava flows, volcanic gasses, wildfires, earthquakes, and wind and weather events.

The vicinity of the Leilani Quarry is also known for potential geothermal resources due to its proximity to the East Rift Zone of Kīlauea. However, the Petition Area is located outside the Kapoho and Kama'ili Geothermal Resource Subzones, and geothermal development within the Petition Area is unlikely (GeothermEx, Inc., 2005). The Petition Area is nearly entirely mapped and has a 95% probability of high temperature ground water in this assessment; however, the Ashigo No. 1 well, located about 0.2 miles southwest of the Petition Area, was developed as a geothermal potential test well, and did not show results of geothermal resource development in the area. The Petition Area is not located within a Geothermal Resource Subzone, per Act 296-83.

Mining and quarrying activities at the Leilani Quarry yield black cinders—also known as lapilli or scoria—that are highly valued in Hawai'i's horticultural sector for their unique physical and chemical properties. These cinders are primarily used as a soil amendment in the cultivation of container-grown crops such as anthuriums and orchids, where they are mixed with other soil and non-soil components to improve weight, drainage, and aeration. The cinders are formed under high-temperature, gas-rich volcanic conditions, resulting in a pyroclastic material with a porous, unconsolidated structure and low bulk density. Their morphology, characterized by a high surface-area-to-volume ratio and the preservation of intersecting bubble forms, produces a foamlike, almost fractal texture that is especially effective for promoting root aeration and moisture retention.

These structural features also provide ideal conditions for soil microbes, which colonize pore spaces and assist in mineralogic weathering processes. This microbial activity enhances the availability of macronutrients essential for plant metabolism and photosynthesis, further contributing to the value of the cinder as a growing medium. The physical characteristics of the low-density "popcorn" cinder found at Pu'u Kali'u are not widely replicated elsewhere in the state. Its combination of porosity, friability, and drainage capacity has led to its recognition as a strategic resource for Hawai'i's floriculture and nursery industries, as discussed in **Section 1.3**.

Once an area has been fully mined, Sanford's Service Center implements procedures outlined in the Landscaping and Biosecurity Plan (**Appendix D**) to stabilize and revegetate the site. While mining and quarrying activities cause localized depressions and other alterations due to excavations, the areas are re-stabilized after mining and quarrying activities are complete.



Source: USGS, 2021

Figure 3-6 **2021 Geological Map of the State of Hawai'i**

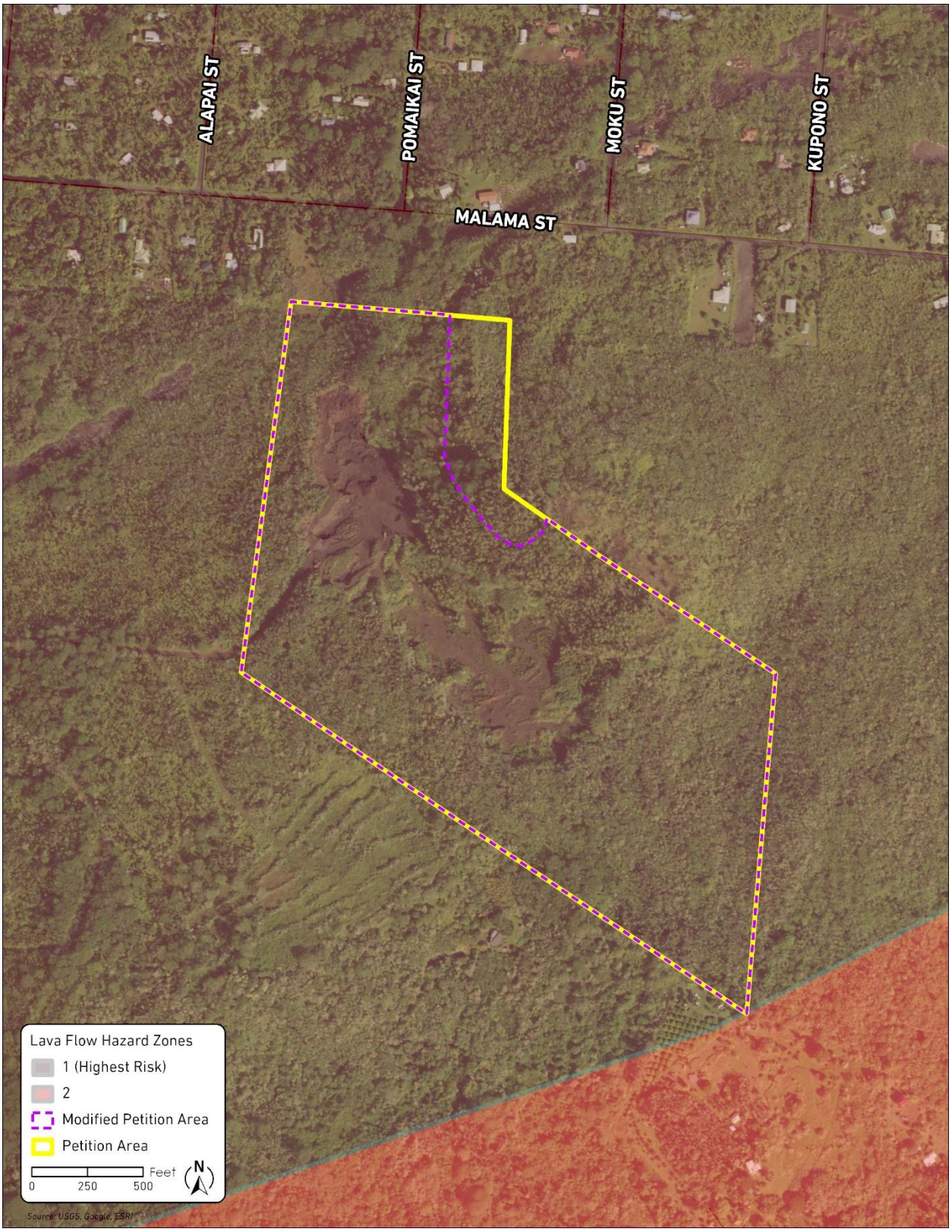


Figure 3-7 **Lava Flow Hazard Zones**

Environmental Analysis

Alternatives 1a, 1b, and Alternative 2 would involve the continuation of cinder mining and quarrying activities at the Leilani Quarry within the Petition Area. These activities would entail the excavation and removal of volcanic cinder, a non-renewable mineral resource, resulting in localized topographic modification through the creation of shallow depressions and excavation pits. While the topographic alterations would be modest and consistent with existing land uses in the Petition Area, the extraction of cinder represents an irreversible commitment of a geologic resource.

While the volume of material proposed for extraction under the action alternatives is moderate compared to large-scale mining operations, its removal from the subsurface constitutes a permanent loss of this specific geologic substrate. As such, the action meets the threshold of a significant impact under HAR § 11-200.1-13 due to the irrevocable commitment of a non-renewable natural resource.

Although impacts to geological stability are not anticipated, as the excavation depths are shallow and the area is not located on steep or unstable slopes, the commitment of this resource is not reversible and must be acknowledged as significant. Mining and quarrying activities would not compromise the structural integrity of the surrounding terrain or increase the risk of slope failure or subsidence. Furthermore, the location of the quarry within an area previously impacted by the 2018 Kīlauea eruption does not pose a direct geological hazard to the operation, given that the site lies upslope and outside the primary lava inundation zone. Nevertheless, the presence of volcanic hazards in the region underscores the need for continued operational readiness and emergency evacuation protocols.

As the excavation and removal of low-density volcanic cinder constitutes a permanent loss of a finite geologic resource, this impact is considered significant under HAR § 11-200.1-13. While the physical footprint of extraction may be limited and site management practices will mitigate other environmental effects, the irreversible nature of resource removal cannot be offset. This irrevocable commitment of cinder as a substrate is further discussed in **Section 4.4,** Irreversible and Irretrievable Commitments of Resources, and **Section 4.5**, Unavoidable Adverse impacts, which evaluates the long-term environmental tradeoffs associated with mining and quarrying activities.

No Action Alternative

Minor, overall beneficial impacts on the topography of the site would occur from the No Action Alternative (**Section 2.2.2**), as mining and quarrying activities would continue only within the current 30-acre area. Localized depressions and other alterations from excavation would continue until the permitted quarry area is fully mined. Once the area is fully mined, Sanford's Service Center would be required to implement the Grading and Landscaping Plan to stabilize and revegetate the site.

In the long term, the No Action Alternative would result in the cessation of operations in the Petition Area. This would result in minor, overall beneficial impacts on the topography of the site, as the localized depression and alterations from excavation would be halted, and the topography would be stabilized due to the implementation of the Grading and Landscaping Plan. Beneficial impacts from the No Action Alternative are limited, however, as current mining and quarrying operations only minimally alter the topography. In the long term, the topography would only be recovering from slight modifications.

Further, the No Action Alternative would result in no change in the feasibility and safety at the quarry in the short term. The quarry is still within proximity to Fissure 8, and the on-site infrastructure would remain. However, the structures and equipment on the quarry are easily mobilized, therefore making evacuation quick and simple. Eventually, if mining and quarrying activities are concluded as a result of the No Action Alternative, the potential threat of inundation at the Leilani Quarry due to geological

activities would cease to exist, as there would be no more personnel or equipment in the Petition Area. Therefore, the No Action Alternative would have minor, overall beneficial impacts on site feasibility and safety in the long term.

Mitigation Measures

Consistent with the terms of the quarry license agreement and as reflected in all action alternatives, a preservation buffer will be maintained around the summit of Puʻu Kaliʻu above 1,050 MSL, ensuring that the most culturally and physically prominent portion of the landform remains undisturbed throughout the life of the project.

3.5 Water Resources

Existing Conditions

Due to the young and porous nature of the terrain in the Petition Area, surface water features are not found in the area and are likely to only result from transient ponding after heavy rainfall (Mink and Lau, 1993). There are no wetlands or enduring surface water features located within several miles of the Petition Area (USFWS, 2021), and the ocean is approximately 3 miles southeast of the Petition Area. The extreme hydraulic permeability of the terrain, combined with the area's young geological age, results in the rapid infiltration of rainfall. Consequently, there are no stream channels or transient flow channels within the area.

The standard practice at the Leilani Quarry is to maintain the ground surface at a fairly level grade, free of steep changes, to facilitate safe vehicle movement. Stormwater runoff, sometimes referred to as "sheet flow," is rare at the Leilani Quarry due to the highly permeable cinder surface. During heavy rains, sheet flow might occur; however, runoff is always contained on-site because the quarry's elevation is lower than the surrounding areas. The lack of surface water features in lower Puna indicates that runoff does not typically occur, and all rainfall is either infiltrated or returned to the atmosphere via evapotranspiration.

The floodplain status for the Petition Area is Zone X. As defined by the Federal Emergency Management Agency, a Zone X floodplain status represents areas of minimal flood hazard. These areas are outside the 100-year floodplain (where there is a 1% annual chance of flooding) and are generally considered to have a low to moderate risk of flooding. Zone X includes both areas of 0.2% annual chance of flooding (500-year floodplain) and areas of minimal flood risk.

Groundwater in the Hawaiian Islands is generally characterized by a basal fresh lens found near sea level, becoming increasingly brackish near the shoreline. Volcanic rift zones can result in perched, high-level water in some locations. No site-specific information on the groundwater conditions under the Petition Area exists. According to Mink and Lau (1993), the area is situated above the Kalapana Aquifer System of the Kīlauea Aquifer Sector, stating, "High-level groundwater occurs in the rift zone. Basal water extends an unknown distance inland. Along the coast, basal springs are frequent. Geothermal conditions prevail in and near the rift zone" (Mink and Lau, 1993). It is therefore reasonable to assume that groundwater in the area may be affected by hydrothermal conditions and may have a high mineral content.

Sanford's Service Center currently implements management measures at the Leilani Quarry to limit these potential adverse impacts on water resources. These management measures consist of standard operating procedures to reduce potential pollutants, such as the use of drip pans to trap leaking fluid from equipment. Further details and management measures are described in Section 3.7.

Environmental Analysis

Activities at the Leilani Quarry by nature cause soil disturbances and have potential to release a minimal amount of contaminants. However, these activities cannot be reasonably expected to impact groundwater in any significant way, due to several reasons. Firstly, there would be a negligible change in the volume of infiltrated rainwater or leaching contaminants relative to the total volume of groundwater. Due to the biochemical and chemical activity and filtration of the vadose zone, impurities generally do not reach groundwater, and those that do are volumetrically reduced in concentration by many orders of magnitude. Second, the combined effects of biological decomposition, filtration action of bedrock, and mineralogical processes on nutrients and other chemical constituents of the infiltrate render them neutralized. In fact, if the depth to groundwater is large enough, infiltrating rainfall or leaching contaminants may not actually reach groundwater. Activities at the Leilani Quarry are not those that introduce impurities to the ground surface. Mining and quarrying activities may reduce the volume of evapotranspiration by removing vegetation, but this effect is negligible compared to the overall volume of groundwater present. The construction activity that most closely resembles the Leilani Quarry activities is grading, which is not an activity that is reasonably scrutinized for potential impacts on groundwater. No significant changes to groundwater sustainability, volume, or sustainable yield are expected from continued mining and quarrying activities.

Continued mining and quarrying activities are not expected to have significant impacts on water resources due to the absence of surface water features in the area. Quarrying activities, by nature, disturb the soil; however, the high permeability of the terrain and the low elevation of the quarry ensure that stormwater runoff is minimal. The lack of surface water features also indicates that no impacts on stream banks, stream waters, wetlands, or other waters of the U.S. would occur.

Therefore, Alternatives 1a, 1b and Alternative 2 are not expected to have a significant adverse impact on the water resources of the Petition Area. No further mitigation measures beyond the existing management measures are necessary to reduce the impacts of continued mining and quarrying activities on water resources.

No Action Alternative

Under the No Action Alternative, described in Section 2.2.2, mining and quarrying activities at Sanford's Service Center's Leilani Quarry would continue within their current license area in the short term. There would be no new impacts on water resources, as current mining and quarrying activities have negligible impacts on water resources.

In the long term, mining and quarrying activities at Sanford's Service Center would be forced to stop due to the No Action Alternative. However, as the current operations at the Leilani Quarry already have negligible impacts on water resources and any potential impacts are minimized by existing management measures, the No Action Alternative would similarly result in minimal to no adverse impacts on water resources.

3.6 Noise

Existing Conditions

Noise generated at the Leilani Quarry primarily comes from a front-end loader used to excavate and move cinder material, as well as gravel trucks transporting the cinders. Occasionally, the use of a non-mechanical sieve also produces noise. However, these noise-generating activities are confined to the

quarry's operational hours, and ambient noise levels at the quarry are generally low. Other intermittent sources of noise in the area include tour helicopters passing overhead.

The topography of the Southeast Rift Zone of Kīlauea Volcano places the Leilani Quarry at a lower elevation than the nearby Leilani agricultural subdivision. This natural grade change, along with dense vegetation and hummocky terrain, helps to mask noise transmission from the quarry to adjacent properties. A review of property tax information reveals that several residences are located within a half-mile of the quarry, with the closest residence being approximately 1,050 feet.

Adjacent properties of the Petition Area are within the Agricultural State Land Use District, which are designated within Class C zoning districts. The maximum permissible sound levels in Class C zoning districts are 70 decibels pursuant to Chapter 11-46, HAR. The Leilani Quarry is currently within a Conservation District, where the more stringent Class A zoning noise standards apply (maximum 55 decibels). If the SLUDBA is approved, the Petition Area will be designated as Agricultural District, making Class C noise standards applicable (**Table 3-1**). Noise during industrial activities is normally mitigated through compliance with the Hawai'i Department of Health (HDOH) Community Noise Control Rules and HAR § 11-46-4, Maximum permissible sound levels in dBA. HAR § 11-46-4 defines maximum permissible noise levels for agricultural, construction and industrial activities equipment and prescribes mitigation measures to achieve these.

The U.S. Environmental Protection Agency (EPA) recommends a maximum outdoor noise level of 55 decibels to allow for intelligible communication (EPA, 1974). A front-end loader, the loudest and most frequently used equipment at the Leilani Quarry, has noise levels of 71 to 84 decibels at 50 feet (EPA, 1971). Other equipment used at the Leilani Quarry includes quieter gravel trucks and non-mechanical sieves. Sound is attenuated by distance by an inverse-square law, meaning that for every doubling in distance from a noise source, the noise is diminished by a factor of one-fourth (1/4), corresponding to a change of -6 decibels. For a receptor located 1,000 feet from a front-end loader, the noise will be diminished by distance to 47 to 60 decibels. Therefore, the front-end loader operated at the Leilani Quarry may be perceptible at the distance of the nearest residence of approximately 1,000 feet and would be roughly equivalent to the volume of moderate speech. This does not account for considerations such as attenuation of sound due to topography and vegetation, meaning this is a conservative estimate of noise levels at a distance from the quarry.

Additionally, no noise complaints have been reported against the Leilani Quarry. While one nearby resident mentioned hearing the front-end loader and backup beeper from their property, this type of noise is exempt from state noise regulations under HAR § 11-46-5 due to its requirement by federal occupational safety regulations. Existing management measures to minimize noise pollution currently implemented by Sanford's Service Center includes continued compliance with noise regulations, such as limiting work to daylight hours.

Environmental Analysis

Alternatives 1a, 1b, and Alternative 2 will not increase the amount of noise generated by activities at the Leilani Quarry. Further, there is a 200-foot established buffer between the proposed license area and the nearest residential area, as shown in **Figure 1-3**. The noise produced by the front-end loader, which ranges from 71 to 84 decibels at a distance of 50 feet, will be reduced to approximately 59 to 72 decibels at 200 feet (EPA, 1971). However, this adjustment does not account for the masking effects of terrain and vegetation and is therefore a conservative estimate. Even if mining and quarrying activities transition to the northern portion of the license area, noise associated with mining and quarrying activities would still likely be within Class C noise standards.

Overall, Alternatives 1a, 1b and Alternative 2 are expected to cause less than significant adverse impacts associated with noise. No further mitigation measures beyond the existing management measures are necessary to minimize noise.

No Action Alternative

In the short term, the No Action Alternative, as detailed in Section 2.2.2, would result in minor, overall beneficial impacts from noise, as mining and quarrying activities would stay within the current 30-acre footprint and remain at a fair distance from nearby residences. With Sanford's Service Center's current conditions, there have been no noise complaints reported against the Leilani Quarry, and this would be expected to remain true under the No Action Alternative.

In the long term, as mining and quarrying activities cease due to the No Action Alternative, there would be no noise sources in the Petition Area. Therefore, the No Action Alternative would result in minor, overall beneficial impacts.

Table 3-1 Maximum Permissible Sound Levels in A-weighted decibel (dBA)

Zoning Districts	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Class A	55 dBA	45 dBA
Class B	60 dBA	50 dBA
Class C	70 dBA	70 dBA

3.7 Hazardous Substances

Existing Conditions

A review of the Petition Area's history and a site reconnaissance revealed no evidence of hazardous materials being used or stored on the site. Continued mining and quarry are unlikely to cause any significant hazardous substances, toxic waste, or dangerous conditions. Mining and quarrying activities at the Leilani Quarry involve the use of small quantities of fuel for machinery, well below the quantities of oil defined by EPA for the Spill Prevention, Control, and Countermeasure Regulation to apply (EPA, 2010). These vehicles and equipment are fueled using portable tanks stored in quarry operators' vehicles, and fueling generally occurs off-site. The equipment is well-maintained, and standard safety measures, such as the use of drip pans, are employed to reduce the potential for fluid leaks during fueling activities. Additionally, workers are trained in the use of spill kits, which are available on-site for prompt spill response.

Environmental Analysis

Given the nature of the mining quarrying activities, Alternatives 1a, 1b and Alternative 2 do not present a significant risk of environmental accidents or the release of hazardous materials. As such, Alternatives 1a, 1b and Alternative 2 are not expected to have significant adverse impact regarding hazardous substances. By maintaining existing good operational practices, including minimal handling of potentially hazardous substances, off-site fueling and regular maintenance, any risk associated with hazardous materials will be effectively minimized. No further mitigation measures are deemed necessary beyond existing standard safety procedures.

No Action Alternative

Under the No Action Alternative, as detailed in Section 2.2.2, mining and quarrying activities at Sanford's Service Center's Leilani Quarry would stay in the current active footprint, and the quarry would eventually cease operations. There would be no new impacts from hazardous substances in the short term, as current mining and quarrying activities have less than significant impacts from hazardous substances.

In the long term, there would be no potential for the release of hazardous substances, as mining and quarrying activities would be ceased and there would be no equipment within the Petition Area. Therefore, in the long term, there would be minor, overall beneficial impacts as a result of the No Action Alternative.

3.8 Traditional and Customary Practices

Existing Conditions

The Puna District, including the ahupua'a of Kauaea where the Petition Area is located, has historically supported a variety of traditional and customary practices, particularly related to subsistence and resource gathering. The CIA (Appendix E), updated in 2019 by Orr and Haun through archival research and ethnographic interviews with cultural practitioners and long-term residents of the Opihikaō and Pāhoa communities, provides the primary basis for characterizing traditional and customary practices in the vicinity of the Petition Area.

Gathering of culturally significant plants has been an important practice in Puna, with species such as kukui (*Aleurites moluccana*), niu (*Cocos nucifera*), 'ōhi'a lehua (*Metrosideros polymorpha*), māmaki (*Pipturus albidus*), and hala (*Pandanus tectorius*) traditionally collected for medicinal, ceremonial, and practical uses. Kukui nuts have been used for oil, dye, and lei-making, while niu has provided food, drink, and fiber for weaving. 'Ōhi'a lehua wood has been utilized in the construction of homes and heiau, and its flowers are valued for lei-making. Māmaki leaves have long been used in herbal medicine, and hala has played a role in traditional weaving and cordage.

The CIA documents that gathering practices have historically extended to the area in the vicinity of Pu'u Kali'u. One ethnographic consultant, a cultural practitioner with familial ties to Opihikaō spanning multiple generations, described accessing the Pu'u Kali'u area with her grandfather to gather 'ōhi'a logs for ulua poles, noting that her grandfather served as the navigator for such cultural excursions into the area (Orr and Haun 2019, p. 55). The same consultant identified the broader Pu'u Kali'u area as a location where lā'au lapa'au, including maile hohono used in traditional medicine, was gathered, and described the presence of culturally significant native species including 'ōhi'a, 'ie'ie, uluhe, and maile throughout the area (Orr and Haun 2019, p. 55). While these accounts reflect historical and intergenerational patterns of access and use rather than documented ongoing practice within the Petition Area, they establish that the area in the vicinity of Pu'u Kali'u has served as a meaningful cultural landscape for gathering and subsistence activities.

The CIA does not document active or currently ongoing gathering practices within the Petition Area or the broader encompassing parcel at the time of the study. Factors contributing to this include the area's history of land disturbance, including past sugarcane cultivation and ongoing cinder mining and quarrying activities, the proliferation of invasive vegetation, and the diminishment of intact native forest communities within the Petition Area.

Pig hunting is another practice historically associated with Puna. Hunting remains an ongoing activity in the broader district, primarily conducted for subsistence and recreational purposes, and may be

viewed as a continuation of traditional Hawaiian practices. The CIA notes that pig hunting has occurred in the general vicinity of the Petition Area, though there is no evidence of it being a longstanding or customary practice specific to the Petition Area.

The CIA also documents the community's longstanding reliance on cinder as a practical cultural resource. Ethnographic consultants described the critical role that cinder plays in sustaining cultivation practices across Puna, where rocky volcanic soils require amendment to support planting. One consultant noted that over thirty years of farming a five-acre lot in Maku'u required between thirty and fifty semi-trucks of cinder and dirt, characterizing access to cinder as essential to the ability of Puna residents to grow food and cultivate their 'āina (Orr and Haun 2019, p. 57). While cinder mining itself is not a traditional or customary practice, it provides material that supports the local horticultural industry and community cultivation practices, including efforts to propagate native species used in lei-making, herbal medicine, and ecological restoration across Hawai'i.

Environmental Analysis

Alternatives 1a, 1b and Alternative 2 are not anticipated to result in significant adverse impacts on traditional and customary Native Hawaiian practices within the Petition Area. The CIA prepared for the project (**Appendix E**) did not identify any ongoing or regular engagement in traditional or customary practices within the Petition Area or broader encompassing parcel.

While interviewees acknowledged that cultural practices such as gathering of lā'au lapa'au and materials for hula have historically occurred in the vicinity of Pu'u Kali'u and the broader Puna District, the CIA did not document any active or sustained traditional and customary practices currently taking place within the Petition Area. The conversion of portions of the landscape for past agricultural use, existing cinder mining activities, and natural disturbances (such as lava flows) has contributed to changes in vegetation and habitat, reducing the availability of native plants traditionally gathered for cultural uses.

The current absence of intact native forest communities, along with the proliferation of non-native vegetation, further diminishes the area's suitability for traditional gathering practices. No evidence was found to indicate that the Petition Area serves as an active or relied-upon resource area for subsistence hunting or other traditional access purposes at this time. Moreover, continued mining and quarrying activities do not involve the restriction or alteration of any known access routes customarily used for cultural practices, nor would it introduce new barriers to potential access for cultural purposes in the future.

Based on the findings of the CIA, there are no currently-documented ongoing traditional and customary practices occurring within the Petition Area. However, it is recognized that cultural practices may not always be formally recorded and that the broader landscape holds significance for Native Hawaiian traditions. Given the existing degraded environmental conditions and the absence of identified cultural resource use within the immediate Petition Area, the Alternatives 1a, 1b, and Alternative 2 are not anticipated to result in significant impacts on traditional and customary practices or access under the criteria set forth in HAR § 11-200.1-13. The Applicant remains committed to ongoing consultation with the community and cultural practitioners to ensure that any emerging concerns are respectfully considered and addressed.

No Action Alternative

Under the No Action Alternative, as detailed in **Section 2.2.2**, Sanford's Service Center would cease mining and quarrying activities upon completion of activities within the currently permitted area,

followed by implementation of the Grading and Landscaping Plan to stabilize and revegetate the quarried footprint. No further mining and quarrying activities would occur within the Petition Area, and no additional land use changes or development would take place.

The CIA (**Appendix E**) indicates that while traditional and customary practices such as plant gathering and pig hunting have historically occurred across Puna, there is no evidence of regular or sustained engagement in these practices within the Petition Area. As such, the cessation of mining and quarrying activities would not meaningfully alter access to cultural resources or practices.

The broader forest would continue shifting toward non-native dominance, which could further reduce the availability of culturally significant plants in the Petition Area. Species such as kukui, niu, ʻōhiʻa lehua, māmaki, and hala would persist in the region, but their presence within the Petition Area itself would likely decline further as invasive species spread.

Pig hunting, which occurs more broadly in Puna, is not documented as a longstanding customary practice tied to the Petition Area. The cessation of mining and quarrying activities would have no direct effect on hunting access.

In summary, the No Action Alternative would not materially affect traditional and customary practices within the Petition Area due to the absence of documented ongoing practices. However, the continued spread of invasive species would likely further reduce the availability of culturally significant plants over time, though these plants would remain accessible in other parts of Puna.

Recommended Mitigation

Notwithstanding the absence of identified traditional and customary practices requiring mitigation, the CIA recommended the establishment of a cultural advisory group to address potential cultural issues that could possibly arise in the future. To meet the intent of the CIA's recommendations, the Applicant will designate a point-person (in consultation with the community) to respond to culturally related considerations or concerns on the project. This will ensure continued engagement with Native Hawaiian cultural practitioners and community members, ensuring that cultural perspectives remain integrated into project implementation and decision-making over time.

Additionally, consistent with the terms of the quarry license agreement and as reflected in all action alternatives, a preservation buffer will be maintained around the summit of Puʻu Kaliʻu above 1,050 MSL, ensuring that the most culturally and physically prominent portion of the landform remains undisturbed throughout the life of the project.

Ka Paʻakai Analysis

In *Ka Paʻakai o ka ʻĀina v. Land Use Commission*, 94 Hawaiʻi 31 (2000), the Hawaiʻi Supreme Court articulated a three-part framework to ensure that constitutionally protected traditional and customary Native Hawaiian rights are adequately considered in land use decisions. The Court held that agencies must (1) identify the specific cultural practices and resources associated with the area, (2) assess the potential impact of the proposed action on those practices and resources, and (3) determine feasible measures to avoid or reasonably protect Native Hawaiian rights. State and local agencies making land use decisions that may impact Native Hawaiian cultural resources and practices are required to perform this *Ka Paʻakai* analysis.

The Petition Area, located within the ahupuaʻa of Kauaea in the Puna District, is part of a region historically associated with gathering, hunting, and other customary subsistence practices. According to the CIA prepared for the Proposed Action (**Appendix E**), culturally significant plants such as ʻōhiʻa

lehua, māmaki, hala, kukui, and niu are traditionally gathered in Puna for medicinal, ceremonial, and practical use. Pig hunting also occurs broadly in the district. However, the CIA found no evidence of ongoing or site-specific traditional and customary practices occurring within the Petition Area itself. Factors contributing to this include the area's history of disturbance (e.g., agriculture, mining), the absence of intact native forest, and the proliferation of invasive vegetation.

The Proposed Action—whether under Alternative 1a, 1b, or Alternative 2—involves the continuation of mining and quarrying activities within a defined area that has already been partially altered by past uses. The CIA concluded that the Proposed Action would not interfere with access to traditional or customary practices, nor would it restrict any known access routes or actively used cultural resource areas. No significant adverse impacts to traditional and customary practices are anticipated.

Notwithstanding the absence of identified traditional and customary practices requiring mitigation, to fulfill the third step of the KPA analysis, the project proposes feasible and appropriate mitigation measures to respect and protect reasonably protect practices and resources found to exist. To meet the intent of the CIA's recommendations, the Applicant will designate a point-person (in consultation with the community) to respond to culturally related considerations or concerns on the project. Additionally, the Preferred Alternative (Alternative 1b) will exclude the flanks and summit of Puʻu Kaliʻu above 1,050 MSL to prohibit any physical alteration or visual degradation. Should any new information regarding cultural practices within the Petition Area emerge, the Applicant has committed to reassessing and addressing such concerns through coordination with cultural practitioners.

3.9 Cultural and Archaeological Resources

3.9.1 Cultural Resources

Existing Conditions

The Puna District, including the ahupuaʻa of Kauaea where the Petition Area is situated, contains cultural resources shaped by a long history of volcanic activity, diverse native ecosystems, and traditional Hawaiian land use. The region is deeply storied, with the CIA (**Appendix E**) documenting a rich array of moʻolelo, mele, ʻōlelo noʻeau, and place names tied to Puna's unique cultural and spiritual landscape.

While the CIA's archival research found no documented oral histories or moʻolelo specifically associated with Puʻu Kaliʻu, puʻu are nonetheless recognized as culturally valued landforms. Across the pae ʻāina, puʻu are often regarded with reverence and understood in the context of Native Hawaiian belief as physical manifestations of the elemental and spiritual forces embodied in Pele and the volcanic landscape of Hawaiʻi Island. The CIA notes that volcanic cinder cones throughout the landscape carry legends connected to Pele and are understood as evidence of her presence and power across Puna District (Orr and Haun 2019, p. 58).

The CIA further documents that a hula bearing the name of Puʻu Kaliʻu was learned and performed within the community through the hula tradition of the Kanakaole family, and that an ethnographic consultant's granddaughter was subsequently named Kaliʻu in direct recognition of that hula and its connection to the landform, reflecting the landform's living significance within Native Hawaiian cultural traditions of naming and oral transmission (Orr and Haun 2019, p. 31).

As such, Puʻu Kaliʻu may be considered part of the cultural landscape as a wahi pana (storied place) or wahi kūpuna (ancestral place), contributing to a broader understanding of the Petition Area's

cultural significance. An ethnographic consultant with familial ties to Opihikaō spanning multiple generations further noted awareness of legends specifically associated with Puʻu Kaliʻu, referencing potential moʻolelo in historical Hawaiian-language sources including the works of Fornander, suggesting the puʻu's place within the storied landscape of Puna (Orr and Haun 2019, p. 55). The CIA's archival research was unable to corroborate these specific references within the sources reviewed; however, the absence of corroboration within the scope of that review does not foreclose the existence of such moʻolelo in the broader Hawaiian-language documentary record.

One consultee expressed concern about the ongoing mining and quarrying activities' effects on Puʻu Kaliʻu, stating that unlike discovered iwi kūpuna, a bulldozed site, such as a puʻu, cannot be relocated and can never be rebuilt (Orr and Haun 2019, p. 56-57). The consultee communicated this hypothetical loss as primarily affecting the keiki of the community, as they would lose that connection to the historic landform, and further noted that the name of a landform carries a relationship to the activity or event connected to that place and time.

The same consultee emphasized awareness of the observable diminishment of Puʻu Kaliʻu over the years of mining and quarrying activities, noting that the landform's visible profile has subsided as a result of cinder extraction (Orr and Haun 2019, p. 54). The consultee emphasized that they are not against the Proposed Action, with the condition that Sanford's takes the local community into consideration during expansion. The consultee emphasized that the quarrying of cinder is essential to the community; they mentioned that residents rely on cinder and dirt for their plantings at home. The consultee stated that puʻu have been historically mined, and the gathering of cinder is something that needs to be done in the area for the good of the community (Orr and Haun 2019, p. 57).

The CIA also recommends further consultation to evaluate whether culturally significant fauna such as the endangered Newell's shearwater (*Puffinus auricularis newelli*) may be present in the vicinity of Puʻu Kaliʻu. To date, no biological surveys have documented nesting behavior at the site. Other notable natural features in the region include lava tubes and caves, which in traditional times served as shelter, water collection sites, and sometimes burial locations. However, there are no documented culturally significant caves or freshwater features within the Petition Area itself.

Vegetation within the Petition Area consists of a mix of native and introduced species, some of which hold historical and cultural importance. Dominant native plants such as ʻōhiʻa lehua (*Metrosideros polymorpha*) are traditionally valued for their use in construction, canoe-making, and lei-making. Other culturally significant species present include hapuʻu (*Cibotium* spp.), used for food and bedding; māmaki (*Pipturus albidus*), important in traditional medicine; maile (*Alyxia oliviformis*), used in ceremonial lei-making; and the climbing plant ʻieʻie (*Freycinetia arborea*), which has cultural uses in weaving and adornment. Introduced canoe plants such as kukui (*Aleurites moluccana*) and niu (*Cocos nucifera*) have also become embedded in local cultural practices and beliefs.

Despite the presence of these species, the cultural integrity of the landscape has been substantially altered by historical and contemporary land uses, including sugarcane cultivation, past cattle grazing, and mining and quarrying activities. These disturbances have contributed to the proliferation of invasive species such as strawberry guava, African tulip, and albizia, which now dominate large portions of the Petition Area. As a result, the cultural significance of the current plant communities has been diminished, though isolated native vegetation and the broader cultural landscape still retain elements of significance for Native Hawaiian practices and beliefs.

Environmental Analysis

Alternatives 1a, 1b and Alternative 2 are not anticipated to result in significant impacts on cultural resources.

The project area has been previously disturbed by past land uses, including sugarcane cultivation, cattle grazing, and ongoing quarry operations, which have altered the landscape and contributed to the dominance of non-native vegetation. Given this existing level of disturbance, continued mining and quarrying activities are not expected to alter or remove known cultural resources. No Traditional Cultural Properties (TCPs) have been identified within the Petition Area. The CIA, does, however, document living cultural associations with Puʻu Kaliʻu, including a hula bearing the name of the puʻu that was learned within a distinguished hula tradition.

The alteration of Puʻu Kaliʻu's form through mining and quarrying activities constitutes a less than significant impact, even in the absence of specific cultural resources tied to the site. Notably, the summit of Puʻu Kaliʻu would remain undisturbed due to the terms of the quarry license agreement and the inaccessibility of that topography, further limiting the potential for adverse impacts on cultural resources.

In isolation, the removal of cinder from the flank of Puʻu Kaliʻu does not constitute a significant adverse impact from an irrevocable commitment of a cultural resource in isolation under HAR § 11-200.1-13(b)(1), nor on cultural practices of the community and State under HAR § 11-200.1-13(b)(4). However, when considered alongside geological impacts (see **Section 3.4**), the cumulative and irreversible nature of the extraction has broader implications for the cultural landscape of the area. These cumulative effects are addressed in **Section 4.1.4** (Analysis of Cumulative Impacts) and **Section 4.4** (Irreversible and Irretrievable Commitment of Resources).

Alternatives 1a and 1b

Alternatives 1a and 1b consist of a SLUDBA to reclassify the Petition Area to the SLU Agricultural District and the connected action of continuing mining and quarrying activities within the Petition Area under a Special Permit from the LUC.

Under Alternative 1a, the summit of Puʻu Kaliʻu would remain undisturbed under the terms of the quarry license agreement and due to inaccessible topography, which inhibits mining and quarrying. Under Alternative 1b, the footprint of the Petition Area would be reduced to not include the summit of the puʻu above 1,050 MSL. By formally omitting this area from the boundaries of the Petition Area, Alternative 1b ensures that no potential future mining and quarrying activities could inadvertently encroach upon the summit. In doing so, Alternative 1b offers enhanced safeguards and represents the alternative with the least potential impact among those alternatives considered.

In summary, Alternatives 1a and 1b are not anticipated to result in significant impacts on cultural resources.

Alternative 2

Alternative 2 would reclassify the Petition Area from the L subzone to the R subzone within the SLU Conservation District. This administrative action would allow for the continuation of mining and quarrying activities within the Petition Area, subject to approval of a CDUP by the BLNR. The CDUP process would likely include a formal review of potential impacts to cultural resources.

Under Alternative 2, the summit of Puʻu Kaliʻu would remain undisturbed under the terms of the quarry license agreement and due to inaccessible topography, which inhibits mining and quarrying. As such, Alternative 2 is not anticipated to reuslt in significant impacts on cultural resources.

No Action Alternative

Under the No Action Alternative, as detailed in **Section 2.2.2**, Sanford's Service Center would cease mining and quarrying activities within the currently permitted area, followed by implementation of the Grading and Landscaping Plan to stabilize and revegetate the quarried footprint. No additional land use changes would occur within the Petition Area.

The physical cultural resources within the Petition Area, including culturally significant plants, would persist but face continued pressure from invasive species. Without active management, the presence of culturally valuable species, such as ʻōhiʻa lehua, hapuʻu, maile, māmaki, and ʻieʻie, would likely decline over time following regional trends. Puʻu Kaliʻu, recognized as a culturally valued landform, would remain undisturbed, consistent with existing protections under the License Agreement.

In summary, the No Action Alternative would allow for the continued protection of Puʻu Kaliʻu under the existing License Agreement, but the condition of cultural plant resources would likely degrade further due to the spread of invasive species and the absence of ongoing stewardship.

Recommended Mitigation

Although no direct impacts to documented traditional cultural properties, practices, or identified cultural sites are anticipated, the Alternatives 1a, 1b, and Alternative 2 would result in direct physical impacts to Puʻu Kaliʻu, a landform recognized for its cultural value. While these impacts are not considered significant under HAR §11-200.1-13, they are culturally meaningful and warrant mitigation.

Dust suppression strategies will be implemented to reduce airborne particulates and avoid deposition on surrounding vegetation or potential gathering areas located outside the active quarry zone. Noise mitigation measures will also be incorporated to limit disturbances to the broader cultural soundscape, helping to preserve the auditory character of the landscape. These measures aim to reduce both physical and sensory impacts that could affect the integrity of the cultural environment.

In accordance with the license agreement and guided by cultural consultation, a preservation buffer will be maintained around Puʻu Kaliʻu, preventing quarrying activity from encroaching on its summit or upper slopes. Although extraction will occur along the lower flanks of the puʻu, efforts will be made to ensure that its overall form remains recognizable and that the cultural value of the landform is honored throughout the life of the project.

Notwithstanding the absence of identified cultural resources requiring mitigation, the CIA recommended the establishment of a cultural advisory group to address potential cultural issues that could possibly arise in the future. To meet the intent of the CIA's recommendations, the Applicant will designate a point-person (in consultation with the community) to respond to culturally related considerations or concerns on the project. This will ensure continued engagement with Native Hawaiian cultural practitioners and community members, ensuring that cultural perspectives remain integrated into project implementation and decision-making over time.

Additionally, consistent with the terms of the quarry license agreement and as reflected in all action alternatives, a preservation buffer will be maintained around the summit of Puʻu Kaliʻu above 1,050 MSL, ensuring that the most culturally and physically prominent portion of the landform remains undisturbed throughout the life of the project.

3.9.2 Archaeological Resources

Existing Conditions

In 2012, Haun & Associates conducted an extensive Archaeological Inventory Survey (AIS) of a 309-acre parcel that includes the approximately 94.108-acre Petition Area in Kauaea Ahupua'a, Puna District, Hawai'i. The fieldwork was carried out over 65 person-days between November 26 and December 21, 2012, using systematic pedestrian surveys, detailed mapping, photography, and written documentation in accordance with DLNR-State Historic Preservation District (SHPD) protocols. The final report, published in August 2013, summarizes these efforts and provides a comprehensive record of the archaeological resources within the Petition Area (**Appendix G**).

The survey identified six archaeological sites throughout the larger area, four of which are located within the Petition Area. These include Site 2972, a historic triangulation station at the summit of Pu'u Kali'u, in use since 1895; Site 29725, a historic survey marker located near the access road; Site 29724, a complex of four historic roads; and Site 29723, a 4.5-meter-wide segment of the prehistoric Kauaea Trail situated in the southwestern corner of the Petition Area. Notably, Site 29723 was assessed as culturally significant under Criterion E for its historical importance, and SHPD concurred with this assessment (**Appendix G**).

The significance of these archaeological resources is evaluated using the criteria established in Chapter 6E, HRS and the National Historic Preservation Act. These statutes set forth a framework for assessing historic properties, including TCPs, that contribute to the community's cultural identity by maintaining integrity of location, design, setting, and association. The DLNR-SHPD has reviewed and approved the AIS findings, confirming that the identified archaeological sites warrant protection despite disruptions from prehistoric lava flows and subsequent agricultural activities.

Moreover, applying McEldowney's (1979) settlement pattern model, Haun & Associates categorized the Petition Area within the Upland Agricultural Zone—a region characterized by scattered residences among agricultural plots. The combination of prehistoric and historic features, including the culturally significant Kauaea Trail, reveals a long history of human activity and land use that is deeply embedded in the traditional ahupua'a system of Hawai'i.

Environmental Analysis

It is anticipated that Alternatives 1a, 1b and Alternative 2 would have less than significant impacts on the historic and archaeological resources in the Petition Area. The 2013 AIS conducted by Haun & Associates documented six archaeological sites over a 309-acre parcel, including four sites within the approximately 94.108-acre Petition Area.

These sites include:

- Site 29727 – a historic triangulation station at the summit of Pu'u Kali'u (in use since 1895)
- Site 29725 – a historic survey marker near the access road
- Site 29724 – a complex of four historic roads
- Site 29723 – a 4.5-meter-wide segment of the prehistoric Kauaea Trail in the southwestern corner of the Petition Area

The spatial distribution of these sites relative to the active quarrying areas suggests that these resources remain outside the direct impact area of the quarry. Some potential localized effects are possible to the archaeological resources, such as ground vibrations from quarrying activities that may impact subsurface archaeological features. However, the overall adverse impact on these archaeological and historic features is expected to be minimal since they are not located in the active quarry.

No Action Alternative

Under the No Action Alternative, as detailed in **Section 2.2.2**, Sanford's Service Center would cease mining and quarrying activities within the currently permitted area and would implement the Grading and Landscaping Plan to stabilize and revegetate the quarried footprint. Mining and quarrying activities would remain in the current footprint, and the remainder of the Petition Area would remain undeveloped.

The four documented archaeological sites within the Petition Area—including the triangulation station at Puʻu Kaliʻu (Site 29727), the historic survey marker (Site 29725), the historic road complex (Site 29724), and the segment of the prehistoric Kauaea Trail (Site 29723)—would remain physically intact under the No Action Alternative.

The cultural significance of the Kauaea Trail, recognized under Criterion E for its historical importance, would be preserved in place, with no alterations to the trail segment within the Petition Area. The triangulation station at Puʻu Kaliʻu, which has been protected from quarrying under the terms of Sanford's License Agreement, would also remain undisturbed.

While the physical preservation of these sites would be maintained, the long-term integrity of the surrounding landscape would continue to be influenced by invasive species encroachment, natural weathering, and the absence of active cultural resource management. However, none of these passive processes are expected to result in significant degradation of the archaeological sites themselves, particularly in the absence of additional land use changes.

In summary, under the No Action Alternative, the documented archaeological resources within the Petition Area would remain intact and undisturbed, consistent with existing protections and SHPD-approved preservation measures. The absence of future mining and quarrying activities would further ensure the physical preservation of these resources, though no active site management would occur.

Recommended Mitigation

To safeguard both identified and potential archaeological resources during the expansion, a comprehensive Site Preservation Plan (SPP) has been developed by Haun & Associates (**Appendix H**). This plan integrates specific mitigation measures to protect known sites while ensuring the preservation of any unanticipated discoveries that may emerge during quarry activities.

Key mitigation measures include:

- Protection of Site 29723 (Kauaea Trail): The SPP mandates the establishment of a 10-foot permanent buffer and a 15-foot temporary buffer during mining, along with fencing, to protect the culturally significant prehistoric trail. These measures ensure that the trail's integrity is maintained throughout the project, preventing any physical impacts while allowing for continued recognition of its historical importance.

- Preservation of Site 29727 (Triangulation Station): Quarrying activities have been planned in such a way that the historic triangulation station at the summit of Puʻu Kaliʻu will not be impacted. The quarry expansion will be confined away from the mountain slopes, ensuring that this historically significant feature remains undisturbed.
- Contingency Protocol for Unanticipated Discoveries: While no direct impacts on known archaeological resources are anticipated, the project acknowledges that Puna's volcanic landscape contains lava tubes, caves, and other subsurface features, which may contain undocumented cultural or historical sites. Should any previously unidentified archaeological resources be encountered during mining and quarrying activities, the Applicant will immediately halt work in the affected area and notify the SHPD in accordance with Chapter 13-280, HAR. Further consultation will take place with SHPD to determine significance and, if appropriate, mitigation measures.
- Minimization of Indirect Impacts on Archaeological Sites: To prevent indirect impacts on archaeological and cultural resources in the surrounding area, the project will implement dust suppression strategies to reduce airborne particulates that could affect nearby historic features or exposed rock surfaces. Additionally, the potential for ground vibrations from quarrying activities to impact subsurface archaeological features, such as lava tubes, will be monitored to ensure that any concerns are addressed proactively.

These mitigation measures have been reviewed and approved by DLNR-SHPD, confirming that they meet state standards for protecting significant archaeological resources (**Appendix H**). Collectively, the measures outlined in the SPP, combined with strict adherence to state preservation regulations and ongoing consultation with cultural stakeholders, will ensure that the cultural heritage of the Petition Area is safeguarded while allowing mining and quarrying activities to proceed responsibly

3.10 Air Quality and Greenhouse Gases

Existing Conditions

Air quality in the Petition Area is generally good, with typical trade wind patterns helping to disperse emissions and prevent pollutant build-up. Air pollution in the Puna District is primarily derived from volcanic emissions containing sulfur dioxide (SO_2), which converts into particulate sulfate and produces volcanic haze or "vog." The northeast trade winds typically carry these emissions away from the Petition Area towards the Kaʻū District (**Figure 3-8**). However, during periods of kona (westerly) or southerly winds, there may be more vog in Puna District.

The Clean Air Act of 1972 as amended (CAA), along with subsequent legislation, regulate air emissions from stationary, area, and mobile sources. Both the EPA and the State of Hawaiʻi have established Ambient Air Quality Standards (AAQS) to maintain air quality in the interest of public health. At present, seven parameters are regulated, including particulate matter, SO_2, hydrogen sulfide, nitrogen dioxide, carbon monoxide (CO), ozone, and lead. Hawaiʻi's AAQS are in some cases more stringent than the National Ambient Air Quality Standards (NAAQS). In particular, Hawaiʻi's one-hour AAQS for CO is four times more stringent than the national limit.

Volcanic activity has had significant impacts on air quality in the area. The 2018 Kīlauea eruption caused severe air quality impacts, temporarily halting quarry activities. However, the overall volcanic emissions from Kilauea volcano are currently within a rate representative of noneruptive conditions (USGS, 2024). The HDOH maintains a network of air quality monitoring stations in the area, including stations at Leilani Estates, Pahoa High School, and Kalapana. These stations typically report no

detectable SO_2, with occasional concentrations below 1 ppm. Sanford's Service Center has a Draft Evacuation Plan (**Appendix F**) in place to protect workers in the event of poor air quality conditions resulting from volcanic activity. This plan includes protocols for monitoring air quality and evacuating personnel if conditions become hazardous.

Mining and quarrying activities at the Leilani Quarry may produce minor impacts on air quality that are not apparent beyond the Petition Area boundary, including fugitive dust from excavation and vehicle movement, as well as vehicle exhaust emissions that contain particulates, CO and carbon dioxide (CO_2). However, mining and quarrying activities at the Leilani Quarry generate virtually no dust due to several key factors. These include nearly daily rainfall, low truck traffic, and the method of mining employed at the site. The quarry does not use a rock crusher, only screens are used to process material, and no blasting is performed due to the soft and easily extractable nature of the cinders.

The mined material has only a small fines content, and therefore the only dust produced is from physical disturbance of the cinders or by vehicle wheels. Areas not being actively mined are quickly revegetated. Consequently, dust generation is minimal.

Furthermore, all truckloads are covered to mitigate any potential dust emissions. Despite the proposed continuation of mining and quarrying activities, the number of vehicles accessing the Petition Area and the operational machinery are not expected to increase, suggesting little to no increase in vehicle exhaust emissions. Because the levels of criteria pollutants in Hawai'i are consistently below Federal and State AAQS, and because the prevailing trade winds rapidly carry pollutants offshore, increases in levels of criteria pollutants in the Petition Area and at the locations of sensitive receptors nearby would not be expected to occur.

Environmental Analysis

Continued mining and quarry activities are expected to generate mild fugitive dust emissions during excavation and transport activities. However, the primary air quality impact concern is related to the potential for volcanic emissions, which are beyond the control of the proposed quarrying operations.

Overall, Alternatives 1a, 1b, and Alternative 2 are expected to have less than significant adverse impacts regarding air quality. No additional mitigation measures, aside from existing dust control measures and the Draft Evacuation Plan, are necessary.

No Action Alternative

Under the No Action Alternative, as detailed in **Section 2.2.2**, there would be no new impacts on air quality and greenhouse gases in the short term, as current mining and quarrying activities have less than significant impacts on air quality and greenhouse gases (GHG). In the long term, as Leilani's Quarry would be shut down, no fugitive dust, however minimal, would be generated in the area due to the lack of equipment or vehicles. Therefore, the No Action Alternative would have minor, overall beneficial impacts on air quality and GHG in the long term.

Volcanic emissions are the current primary air quality concern. In the short term of the No Action Alternative, the workers' potential exposure to poor air quality conditions resulting from volcanic activity would remain the same. The same Draft Evacuation Plan would be in effect to protect workers and potentially evacuate workers depending on conditions. As mining and quarrying activities would eventually halt as a result of the No Action Alternative, there would be no personnel on site. Therefore, the No Action Alternative would have minor, beneficial impacts regarding workers' potential exposure to poor air quality conditions in the long term.

Recommended Mitigation

Air quality impacts associated with mining and quarrying activities will primarily result from fugitive dust generated during excavation, material handling, and vehicle movement, as well as exhaust emissions from diesel-powered equipment. While compliance with HDOH air quality standards will be maintained, additional measures will be implemented to minimize potential impacts on air quality and nearby communities.

Dust control strategies will include regular water spraying on haul roads, covering material loads during transport, and stabilizing exposed surfaces to minimize particulate matter generation. Wind barriers will be used where necessary, particularly in areas with prevailing winds that could carry dust toward adjacent properties.

Equipment and vehicle emissions will be minimized through regular maintenance, the use of low-emission machinery where feasible, and optimized haul routes to reduce unnecessary fuel consumption. Additionally, while GHG emissions from quarrying activities are expected to be relatively minor on a regional scale, efforts will be made to explore opportunities for emission reductions, such as fuel-efficient equipment or alternative energy sources for auxiliary power needs. These measures will ensure that air quality impacts are managed responsibly while allowing the project to proceed in compliance with state and federal regulations.

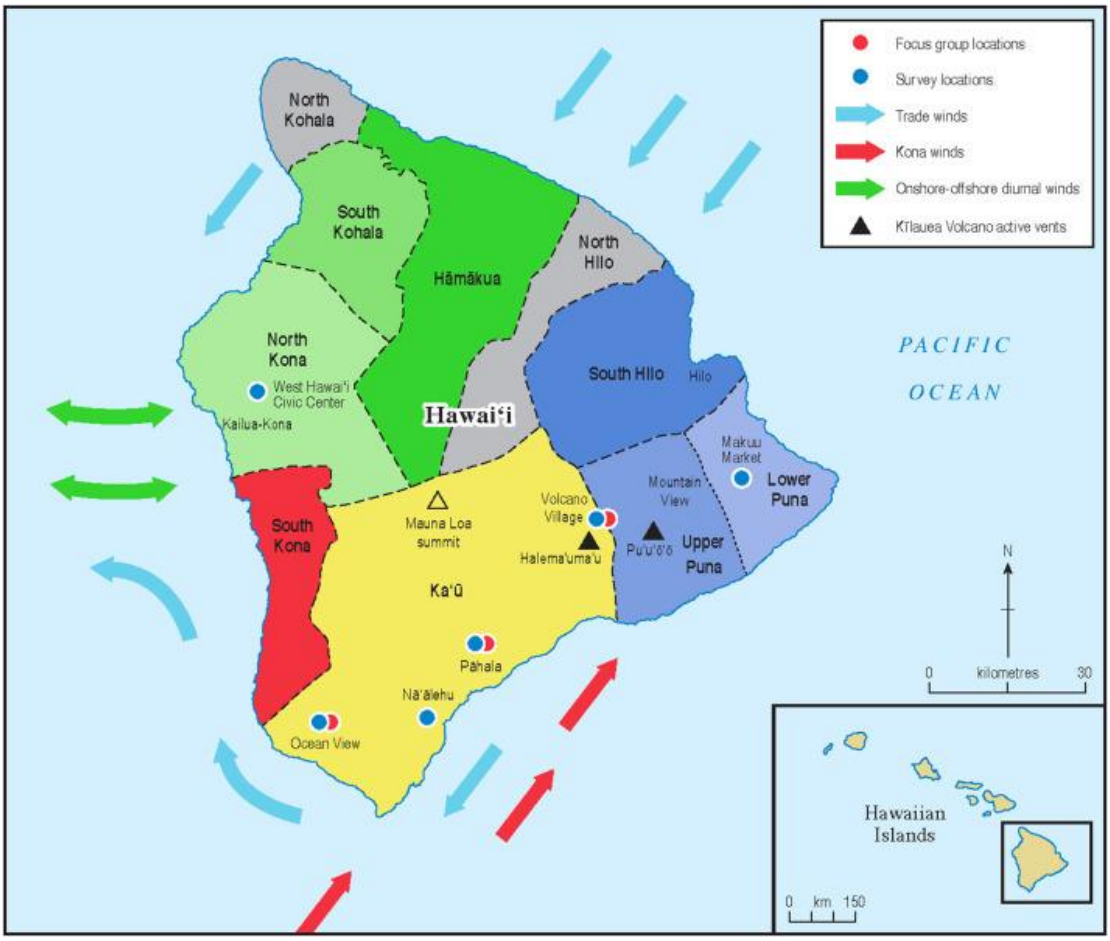


Figure 3-8 **Island of Hawai'i Wind Patterns**

3.11 Climate

Existing Conditions

The Island of Hawai'i is known to be one of the most climatically diverse regions on the globe, claiming ten out of the 29 total individual climate classifications from the Koppen-Geiger Climate Classification System. Of the five original climate groups, Hawai'i Island has four: Humid Tropical Climates, Arid and Semi-Arid Climates, Temperate Climates, and Ice Climates, with 10 subgroups divided between the original four. Hawai'i Island's climate diversity has been attributed to three factors: topographic relief (a wide range of elevation due to the large mountains), large-scale synoptic wind field (persistent northeast trade wins), and local circulation (heating and cooling of land and water, creating localized wind regimes) (IHVB, n.d.).

The Petition Area is located in the Puna District, which is classified as a Humid Tropical Climate, specifically the Tropical Continuously Wet subgroup. The Tropical Continuously Wet climate of Hawai'i Island spans from the Puna coastline in the south, north to the Hāmākua coast, and as far mauka as the Mauna Kea volcano. The distinguishing factor of this climate is that there is no distinct dry season, and regions in the Tropical Continuously Wet subcategory may experience over 300 inches of rainfall annually (Paiva, 2015).

The climate in the Puna District aligns with the characteristics of the Tropical Continuously Wet subcategory. It is warm and wet, averaging about 115 to 120 inches of rain annually (Giambelluca, et al., 2013). The mean annual temperature is approximately 76 degrees Fahrenheit. The Petition Area experiences consistent temperatures throughout the year, with relatively high humidity levels. Northeasterly trade winds are the prevailing winds in the area, contributing to the moderate climate. These climatic conditions support the dense vegetation surrounding the Petition Area.

Environmental Analysis

Continued mining and quarry activities would have no long-term impacts on atmospheric conditions or rainfall. Mining and quarrying activities at the Leilani Quarry have a current estimated GHG emissions of about 30 metric tons of CO_2 equivalent per year. In comparison, the total GHG emissions in the State of Hawai'i was 20.32 million metric tons of CO_2 equivalent in 2022 (HDOH, 2025). GHG emissions will not increase as mining and quarry activities transition locations, as the amount of heavy machinery and transportation trucks are not expected to increase as a result of the Alternatives 1a, 1b, and Alternative 2.

Construction activities may result in minor, short-term disturbances, such as localized dust generation, but these effects are expected to be minimal. Dust control measures will be implemented, including watering of exposed areas during dry periods to suppress dust (see Section 3.10).

The Proposed Action is expected to have no significant adverse impacts on regional climate patterns. No additional mitigation measures are deemed necessary for the climate as the mining and quarrying activities will not significantly alter existing climate patterns in the region.

No Action Alternative

In the short term, the No Action Alternative, as detailed in Section 2.2.2, would cause no new impacts on climate, as the continued mining and quarrying activities would have no long-term impacts on climate, and only cause minor, short-term disturbances, such as localized dust generation.

In the long term, as the Leilani Quarry's operations cease, these disturbances would also cease. However, there would be no significant impacts resulting from the cessation of mining and quarrying activities, as disturbances from operations are very minute and temporary.

Recommended Mitigation

Equipment and vehicle emissions will be minimized through regular maintenance, the use of low-emission machinery where feasible, and optimized haul routes to reduce unnecessary fuel consumption. Efforts will be made to explore opportunities for emission reductions, such as fuel-efficient equipment or alternative energy sources for auxiliary power needs. Additionally, mitigation measures, including emergency shutdown of all operations, will be implemented in the instance of extreme weather events to prevent the transmittal of pollutants via sheet flow. These measures will work to ensure that GHG emissions and other contaminants are kept minimal to prevent long-term impacts on climate.

3.12 Socioeconomics and Local Economy

Existing Conditions

Hawai'i County has experienced sustained and rapid population growth for decades, notably in the Puna District, which encompasses the Petition Area. The Puna District's population grew by 83% from 1980 to 1990, followed by 51% growth between 1990 and 2000, 45% between 2000 and 2010, and another 14% between 2010 and 2020. Despite a lack of basic infrastructure such as paved roads and water in most subdivisions, the relatively inexpensive lots, typically ranging in size from one to three acres, have attracted residents from the continent and other parts of the State of Hawai'i who seek affordable property. As of 2023, the Puna District was home to approximately 52,000 residents (Dobbyn, 2024). The Puna District makes up about 20% of Hawai'i County's total population (USCB, 2020).

The basis of the economy of Puna has evolved from cattle ranching and sugar to diversified agriculture, various services for the growing population, commuting to Hilo, and tourism, which has been stimulated by being home to Kīlauea, one of the world's most active volcanoes. Some census-designated places in Puna, such as Mt. View, Hawaiian Acres, Fern Acres, and Eden Roc, are growing bedroom communities for Hilo's workforce. This is evidenced by the heavy flow of Hilo-bound traffic during the AM rush hour, which is also derived from school traffic.

The broader economic landscape of the Puna District, Hawai'i Island, and the State of Hawai'i has faced substantial challenges in recent years. The 2018 Kīlauea eruption caused approximately $415 million in lost revenue from reduced tourism and $28 million in agricultural damages (LaJeunesse, 2020), including the loss of 800 homes. Additionally, the COVID-19 pandemic exacerbated economic difficulties, resulting in significant declines across various sectors, particularly tourism, accommodation, and food service, further straining socioeconomic conditions, especially in terms of employment and income. These impacts were particularly severe for small businesses, with revenue losses of approximately 50%. Economic recovery from the COVID-19 pandemic was slower in the State of Hawai'i compared to the total U.S. economy. Hawai'i's overall economy was fully recovered to pre-pandemic levels by late 2023, whereas the U.S. economy had fully recovered since early 2021. Tourism-related sectors, as of mid-2024, have only recovered to 93% of pre-pandemic levels, yet the Agricultural sector had grown by 21.5% (DBEDT, 2024).

Hawai'i's economy has long been recognized as vulnerable due to its heavy reliance on tourism and military spending. In response, efforts to diversify the economy have focused on agriculture, among

other sectors. Sanford's Service Center is part of a diversified agricultural industry and is not directly reliant on or supported by the tourism industry. Sanford's Leilani Quarry plays an important role in the local economy, particularly through its contribution to the nursery industry. The quarry produces a low-density, black-colored cinder that is highly valued for its application in potted plants (see Section 3.4). The nursery industry on Hawai'i Island, consisting of 83 certified nurseries, relies heavily on this material (HDOA, N.D.). The cinder from the Leilani Quarry supports a significant portion of the state's nursery industry.

In 2018, the Lower East Rift Zone eruption immediately disrupted black cinder production, thereby jeopardizing the horticultural and nursery industry. In response, the Office of the Governor issued an emergency proclamation to support disaster response victims and protect the economy of East Hawai'i. Local government, in conjunction with the HFNA, began an emergency effort to identify alternative sources of black cinder (DLNR, 2018). Following this emergency response, Act 191 was signed into law in July 2021, which called for the use of State funds and efforts for the purpose of identifying alternative black cinder sources. The status of the black cinder site survey is presented in a 2021 DLNR report, detailing the allocation of additional funds and further surveys to identify new black cinder quarry sites (DLNR, 2021).

Unfortunately, there is limited information concerning the economic productivity of mines, as government agencies generally categorize mining and construction together due to the role of engineered material in construction. As a result, data sources, including the State Department of Business, Economic Development, and Tourism, provide employment figures for "Natural Resource, Mining & Construction" as a combined category rather than for mining alone. According to the Census of Agriculture, the total value of crops in the County of Hawai'i, including greenhouse and nursery crops (excluding livestock and poultry), was $514.5 million in 2022 (Vilsack, 2024). Further, in 2022, the horticulture industry was valued at $119 million within the State of Hawai'i. This represents 0.1% of the 2022 $10.3 billion County of Hawai'i gross product (USDA, 2022).

Sanford's Service Center provides direct employment for 25-30 individuals in the Puna District, a predominantly agricultural region where stable job opportunities are essential to supporting the local economy. The operation plays a key albeit limited role in sustaining rural employment, particularly for lower-income workers who often face higher rates of unemployment and economic hardship compared to urban areas.

Beyond direct employment, the revenue generated by the quarry operation contributes directly to local wages and small businesses, ensuring that economic benefits remain within the state rather than being lost to external corporations or imports. As a supplier of black cinder, an essential resource for agricultural production and landscaping, the operation indirectly supports Hawai'i's broader agricultural sector, nurseries, and construction trades, reinforcing the stability of rural businesses that depend on these materials.

The continuation of this operation helps strengthen economic resilience in Puna, providing consistent employment, supporting small-scale businesses, and reducing reliance on imported materials. As a locally owned and operated business, Sanford's Service Center is committed to sustaining the livelihoods of rural workers and contributing to the economic sustainability of Hawai'i's agricultural and construction industries.

Environmental Analysis

Alternatives 1a, 1b, and Alternative 2 are expected to continue supporting regional socioeconomics and the local economy, particularly the horticultural and nursery industries. These action alternatives

ensure that socioeconomic factors such as employment, income, housing availability, and infrastructure demand remain stable. Further, the Leilani Quarry's production of black cinders is considered essential to local nurseries, with no current alternative sources of the same quality. This material allows for cost-effective transportation of plants, bolstering the profitability of local agriculture and supporting the export of potted plants.

Alternatives 1a, 1b, and Alternative 2 (and the continuation of mining and quarrying activities) would result in overall beneficial socioeconomic impacts and impacts on the local economy.

No Action Alternative

Under the No Action Alternative (Section 2.2.2), mining and quarrying activities at Sanford's Service Center's Leilani Quarry would temporarily continue within the current 30-acre footprint. There would be overall beneficial impacts on socioeconomics and the local economy, due to the employment offered by Sanford's Service Center and the cinder's significance in the horticultural and nursery industries. However, these would be only minor to moderate in comparison to the positive impacts on the local economy expected from Alternatives 1a, 1b, and Alternative 2 and resultant continuation of mining and quarrying activities.

In the long term, the No Action Alternative would have significant, overall negative impacts on socioeconomics in the vicinity of the Petition Area and the local economy, as the current 25-30 employees hired by Sanford's Service Center would have to be let go once mining operations cease. This has the potential to put strain on local socioeconomic conditions in Puna and East Hawai‘i. Additionally, Sanford's Service Center is one of the only reliable sources of the cinder used in the horticultural and nursery industries. Without the Leilani Quarry, local nurseries would face a disruption in supply, potentially leading to the use of lower-quality materials. Therefore, the No Action Alternative would negatively impact the agricultural economy on Hawai‘i Island.

Recommended Mitigation

While Alternatives 1a, 1b, and Alternative 2 are not anticipated to result in significant negative socioeconomic impacts, Sanford's Service Center remains committed to supporting the local economy and workforce. As part of its ongoing operations, Sanford's Service Center will explore opportunities to collaborate with local trade schools and workforce development programs to expand job training and certification opportunities for heavy equipment operators, truck drivers, and quarry workers. Additionally, partnerships with local suppliers and businesses will continue to ensure that economic benefits remain within Hawai‘i, reinforcing the sustainability of the Puna District's economy. To maintain transparency and community engagement, the company will provide avenues for local businesses and community members to stay informed about job opportunities, project developments, and any emerging concerns related to its continued operations.

3.13 Traffic

Existing Conditions

The Petition Area, the Leilani Quarry, is accessed via a private gravel road connected to State Route 130, approximately 2.75 miles south of the intersection with State Route 132, near Pāhoa. Current quarry operations generate approximately six gravel truck trips daily, along with two additional trips by the loader operator. The total daily vehicle trips associated with the quarry amount to roughly 14 trips. The Applicant has no plans to increase the scale of their operation or to increase vehicle traffic to the Leilani Quarry.

According to the Hawai'i Department of Transportation (HDOT), State Route 130 experiences an Annual Average Daily Traffic volume of 5,500 vehicle trips in the vicinity of the quarry access road (HDOT, 2020). Quarry operations contribute approximately 0.5% of the total traffic on this segment of State Route 130. Given the current scale of operations, no increase in vehicle traffic is anticipated.

Environmental Analysis

The anticipated impacts of continued mining and quarrying activities on local traffic patterns are expected to remain minimal. Despite planned continuation of quarry activities, the number of vehicle trips generated is not expected increase, thereby maintaining the current impact level of approximately 14 daily vehicle trips. This volume remains negligible relative to the overall traffic on State Route 130 and does not warrant further detailed traffic analysis. Therefore, it is anticipated that Alternatives 1a, 1b, and Alternative 2 would have less than significant impacts on traffic.

If necessary, minor adjustments, such as optimizing vehicle scheduling, could be considered to further mitigate any potential traffic disruptions. However, based on current operations and HDOT traffic data, additional mitigation measures are not required.

No Action Alternative

With the No Action Alternative (Section 2.2.2), mining and quarrying activities at Sanford's Service Center's Leilani Quarry would continue at the current size of operations. The number of trucks travelling to and from the site due to mining and quarrying operations is six, and this is not expected to change between the alternatives. Therefore, in the short term, there are no new significant impacts on traffic resulting from the No Action Alternative.

In the long term, the No Action Alternative would result in the Leilani Quarry's operations shutting down, and there would therefore be no vehicles moving in and out of the Petition Area. However, as the current vehicle traffic resulting from Sanford's Service Center is very minimal, the No Action Alternative would not result in any new impacts on traffic in the area.

Recommended Mitigation

While continued mining and quarrying activities are not expected to result in significant traffic impacts, proactive mitigation measures will be implemented to ensure continued safe and efficient travel conditions on Route 130 and local roads. Quarry truck trips will be scheduled to avoid peak commuter traffic periods, and all vehicles transporting materials will be covered to prevent dust and debris from affecting roadway safety.

Coordination with HDOT and local transportation agencies will continue to ensure compliance with traffic regulations, and periodic internal reviews of truck volumes will be conducted to confirm that operations remain within anticipated levels. If changes in roadway conditions or community concerns arise, the Applicant will work with HDOT to assess whether further mitigation measures are warranted.

Additionally, a community feedback process will be established to address any concerns related to quarry-related traffic. By implementing these measures, the project will minimize potential traffic disruptions while ensuring continued responsible operations.

3.14 Solid Waste

Existing Conditions

Solid waste on Hawai'i Island is handled at two sanitary landfills and 21 County Transfer Stations. The only solid waste generated from mining and quarrying activities is green waste, such as vegetation cuttings generated during vegetation clearing, which remains onsite.

Environmental Analysis

The Proposed Action and associated mining and quarrying activities are not expected to generate significant changes to solid waste in volumes or types.

No Action Alternative

With the No Action Alternative (Section 2.2.2), mining and quarrying activities at Sanford's Service Center's Leilani Quarry would continue at the current size of operations. Generated green waste would remain consistent in volume and type and would remain onsite. Therefore, in the short term, there are no new significant impacts on traffic resulting from the No Action Alternative.

In the long term, the No Action Alternative would result in the Leilani Quarry's operations shutting down, and there would therefore be no solid waste generated. However, as the mining and quarrying activities are not expected to generate changes to solid waste in significant volumes or types, the No Action Alternative would not result in any new impacts on traffic in the area.

Recommended Mitigation

As the Proposed Action and associated mining and quarrying activities are not expected to generate significant changes to solid waste in volumes or types and generated green waste will remain onsite, no mitigation measures are necessary.

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Chapter 4

Cumulative Impacts and Other Environmental Considerations

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Cumulative Impacts and Other Environmental Considerations

4.1 Cumulative Impacts

Cumulative impacts result from the incremental impact of the Proposed Action when combined with other past, present, and reasonably foreseeable future actions, regardless of the entity undertaking such actions. Individually minor actions can become cumulatively significant when viewed in the context of broader environmental changes over time. This analysis considers cumulative impacts in accordance with HAR § 11-200.1-2.

The cumulative impact analysis focuses on the Petition Area and its surrounding lands within the Puna District. The analysis considers past actions as well as ongoing and reasonably foreseeable future actions based on published plans, agency consultation, and publicly available environmental documentation.

4.1.1 Past Actions

The cumulative environmental conditions within and surrounding the Petition Area reflect a history of land uses and natural events that have shaped the existing physical, ecological, and cultural landscape. Historical agricultural activities played a prominent role in the early development of the Puna District, including past sugarcane cultivation and informal pasturing. Although large-scale plantation agriculture ceased several decades ago, portions of the surrounding lands continue to bear evidence of prior agricultural conversion, with remnant clearings, altered soils, and the introduction of non-native plant species that persist today.

The establishment of the Leilani Estates residential subdivision to the north of the Petition Area represents a key land use transition from agriculture to residential development. Leilani Estates, which was initially subdivided in the 1960s, introduced low-density rural residential development into a formerly agricultural landscape. This shift from agricultural to residential use altered land cover, fragmented native vegetation, and established new infrastructure and access patterns in the immediate vicinity of the Petition Area.

Documented cinder mining and quarrying activities have also influenced conditions in the Petition Area. Sanford's Service Center has operated mining and quarrying activities in the Petition Area under a license agreement with Kamehameha Schools, extracting low-density black cinder valued by the local horticultural and nursery industries. Quarrying activities were first authorized through CDUP HA-1957, which was approved by the BLNR in 1987. The initial CDUP permitted cinder removal over a 15-acre area. In 1990, BLNR approved an amendment that expanded the licensed area by an additional 15 acres, resulting in a total permitted area of 30 acres. In 2008, Sanford's Service Center received BLNR approval to continue its operations. After 2011 Conservation District rule

amendments removed mining and quarrying from the list of allowable uses in the L subzone, Sanford's Service Center's operations were classified as a legal nonconforming use under State land use regulations. Mining and quarrying activities have continued under this regulatory framework, including restrictions to avoid altering the summit profile of Puʻu Kaliʻu and maintaining buffer areas around the active quarry and endangered species. Sanford's Service Center has conducted some mining outside of the licensed area and has engaged with the Office of Conservation and Coastal Lands to discuss potential solutions.

While specific quantitative data on past environmental impacts from quarrying activities are limited, documented changes to the site include the clearing of vegetation across the permitted 30-acre area and the establishment of non-native tree species during earlier revegetation efforts. More recent management practices have emphasized ecological restoration using native species and improved biosecurity protocols. Implementation of the 1991 Landscaping Plan, and its 2025 update, has guided outplanting, invasive species control, and erosion mitigation in mined areas. Additionally, past approvals have required avoidance of Puʻu Kaliʻu's summit profile, the establishment of visual and ecological buffer zones, and adherence to fugitive dust and noise regulations to minimize environmental and community impacts. These cumulative effects and mitigations have shaped the environmental baseline for ongoing and future operations.

The most significant environmental event influencing the cumulative setting of the Petition Area was the 2018 Kīlauea eruption, which covered approximately 13.7 square miles of the lower Puna District. Lava flows associated with this eruption destroyed approximately 700 homes and dramatically altered the physical landscape, particularly in areas directly downslope from the Petition Area. Although the Petition Area itself was not covered by lava, the eruption's broader environmental effects — including changes to regional hydrology, air quality, and biological resources — continue to shape conditions in the Puna District. The eruption's impacts were not limited to physical changes; it also triggered economic and social disruption, influencing property values, infrastructure repair priorities, and community planning efforts.

These past actions (agricultural land conversion, residential subdivision development, documented licensed cinder mining and quarrying, and the 2018 Kīlauea eruption) have collectively shaped the cumulative environmental context for the Petition Area and surrounding lands.

4.1.2 Present Actions

The current environmental conditions within and surrounding the Petition Area are shaped by ongoing land uses and activities, including Sanford's Service Center's mining and quarry activities, residential uses in Leilani Estates, agricultural activities on nearby lands, and infrastructure maintenance on the surrounding roadway network. Together, these actions contribute to the environmental baseline against which the Proposed Action's incremental contribution to cumulative impacts will be evaluated. Environmental impacts and effects associated with current activities and the Proposed Action are discussed and analyzed in Chapter 3.

Within the Petition Area itself, Sanford's Service Center continues to conduct mining and quarrying activities under its recognized legal nonconforming use status. These operations, which were initially authorized by CDUPs issued in 1987 and expanded in 1990, are carried out under a license agreement with Kamehameha Schools. The operations focus on the extraction of low-density black cinder, known locally as "popcorn cinder," which is highly valued for its horticultural properties, particularly as a lightweight growing medium for Hawaiʻi's nursery industry. Mining and quarrying activities include excavation, screening, stockpiling, and hauling of cinder materials, with operations

limited to areas inside designated preservation buffers, in accordance with permit conditions and license terms. Ongoing mining and quarrying activities, including active excavation sites, heavy equipment use, and material stockpiles, defines the primary land use within the Petition Area today.

The quarry generates vehicular traffic associated with the transport of extracted materials, contributing to overall vehicle movements in the area. On average, approximately six gravel trucks per day travel along the private access easement connecting the quarry to Pāhoa-Kalapana Road (State Route 130). This traffic, while relatively low in volume, represents a regular component of the area's transportation activity and contributes incrementally to roadway wear and traffic conditions along the easement and the state highway.

Immediately north of the Petition Area, Leilani Estates remains an active rural residential subdivision. Despite the significant impacts of the 2018 Kīlauea eruption, which directly affected portions of the subdivision, Leilani Estates continues to support a resident population and remains subject to ongoing community management and infrastructure maintenance. Between 2010 and 2020, the population of Leilani Estates declined from 1,560 residents to approximately 1,139 residents, reflecting the combined effects of the eruption and broader demographic trends. This ongoing residential use, with its associated domestic water, wastewater, and utility demands, contributes to the cumulative pattern of land use within the region, maintaining the residential-agricultural interface that characterizes the area surrounding the Petition Area.

In addition to residential uses, agricultural activity persists on lands surrounding the Petition Area, with papaya farming representing one of the more prominent agricultural land uses in the Puna District. The presence of nearby agricultural lands, coupled with the long-standing importance of agriculture to the Puna economy, contributes to the land use mosaic that defines the present environmental setting.

The rural nature of the Petition Area and surrounding lands means that public infrastructure and utility services are relatively limited. The primary infrastructure feature in the area is State Route 130, which serves as the principal transportation corridor connecting lower Puna to Pāhoa and Hilo. Routine maintenance activities along State Route 130, including pavement repairs, vegetation management, and drainage maintenance, represent the primary form of ongoing infrastructure management in the vicinity. Utility infrastructure, including electrical transmission lines and telecommunications infrastructure, is also subject to periodic maintenance to ensure continued service to Leilani Estates and other nearby areas.

Collectively, these ongoing quarrying, residential, agricultural, and infrastructure maintenance activities define the present environmental conditions of the Petition Area and surrounding lands. These present actions establish the existing environmental baseline, providing the necessary context for assessing the potential cumulative effects of the Proposed Action.

4.1.3 Reasonably Foreseeable Future Actions

The environmental conditions surrounding the Petition Area are anticipated to be shaped by a range of reasonably foreseeable future actions, including the continuation and expansion of mining and quarrying activities within the Petition Area, as well as broader regional infrastructure improvements, community resilience efforts, and ongoing land use trends in the Puna District. Together, these actions contribute to the cumulative environmental context in which the Proposed Action's potential incremental impacts will be evaluated.

The Proposed Action includes the continuation and phased expansion of mining and quarrying activities within the Petition Area. These future actions, which would occur following the requested SLUDBA to the Agricultural District, are directly analyzed as part of this Draft EIS. The continuation of quarrying activities would involve the progressive extraction of low-density black cinder, the stockpiling of mined materials, and ongoing site management to ensure compliance with environmental regulations and license conditions. These activities, which are integral to the Proposed Action, are therefore not treated as external cumulative actions but rather as part of the project's long-term environmental footprint.

In addition to project-specific future activities, broader regional infrastructure improvements are also reasonably foreseeable. HDOT periodically updates the Statewide Transportation Improvement Program, which outlines planned transportation projects across the state. While no specific projects have been identified within or immediately adjacent to the Petition Area, the Statewide Transportation Improvement Program, along with the Federal-Aid Highways 2035 Transportation Plan, identifies a long-term need for improved roadway capacity, safety, and connectivity throughout Puna (HDOT 2014). These efforts are expected to focus on upgrades to State Route 130, which serves as the primary transportation corridor for lower Puna, including areas near the Petition Area.

Ongoing and future community resilience initiatives, particularly those shaped by the aftermath of the 2018 Kīlauea eruption, represent another category of reasonably foreseeable future actions. Post-eruption recovery efforts have emphasized improving emergency preparedness, enhancing infrastructure resilience, and promoting land use policies that reduce future volcanic hazard risks. County and state agencies continue to evaluate options for improving evacuation routes, flood control, and emergency response capabilities in lower Puna. These initiatives, many of which are incorporated into the Puna Regional Circulation Plan and the County's hazard mitigation plan, are expected to influence the long-term environmental and infrastructural context of the region (Hawai'i County Planning Department, 2005a; Hawai'i County Civil Defense Agency, 2020).

In parallel, ongoing land use trends will contribute to the evolving environmental conditions in and around the Petition Area. Leilani Estates, which borders the Petition Area to the north, remains an inhabited residential subdivision despite the impacts of the 2018 eruption. Gradual rebuilding is anticipated in portions of the subdivision that were not directly covered by lava flows, contributing to the reestablishment of residential land uses in the immediate area. While some lots may remain undeveloped due to proximity to recent lava flows or ongoing uncertainty about future hazards, Leilani Estates is likely to retain its character as a low-density rural residential community over the foreseeable future.

Agricultural activities are also expected to persist in the broader Puna region, including areas near the Petition Area. Papaya cultivation has historically been one of the dominant agricultural activities in lower Puna, and although the eruption severely affected some papaya farms, agricultural operations continue in unaffected areas. In addition to papaya, diversified agriculture, small-scale farming, and nursery operations are expected to remain integral to the district's rural economy. The County of Hawai'i's ongoing updates to the General Plan and the Puna Community Development Plan emphasize the importance of preserving agricultural lands and supporting diversified agriculture as part of the region's economic development strategy (Hawai'i County Planning Department, 2005b, 2008, 2024).

Collectively, these reasonably foreseeable future actions (ranging from the continuation and expansion of mining and quarrying within the Petition Area to regional infrastructure upgrades, hazard mitigation investments, residential rebuilding, and continued agricultural activity) will all

contribute to the future environmental conditions that form the cumulative baseline for evaluating the Proposed Action's impacts. When considered alongside past and present actions, these reasonably foreseeable future actions define the broader cumulative environmental setting within which the Proposed Action will occur.

4.1.4 Analysis of Cumulative Impacts

This analysis of cumulative impacts evaluates how the Proposed Action, in combination with past, present, and reasonably foreseeable future actions, may create cumulative impacts, consistent with the requirements of HAR § 11-200.1-2 and the significance criteria outlined in HAR § 11-200.1-13.

The environmental conditions in and around the Petition Area reflect a landscape shaped by decades of agricultural land conversion, subdivision and residential development, mining and quarrying activities, and volcanic activity. These forces, individually and collectively, have established the existing physical, biological, and socioeconomic characteristics of the area. The Proposed Action, which involves the continuation and managed expansion of cinder quarrying at the Leilani Quarry, would contribute to the ongoing land use and environmental modifications in the region. This includes the continued extraction of natural resources, gradual changes to topography, and potential cumulative albeit less than significant effects on air quality, traffic, and visual character. While quarrying has been an established activity in this area, the expansion will be further managed to minimize long-term environmental impacts and align with best practices for resource conservation and land stewardship.

The Proposed Action's incremental contribution to cumulative impacts would primarily occur at the site level, through localized changes to land cover, topography, vegetation, and visual character, as well as temporal increases in noise and dust generation. These impacts, which are addressed in the resource analyses presented in **Chapter 3**, would be confined to the Petition Area and its immediate surroundings. The Proposed Action would not induce new development patterns, introduce new or incompatible land uses, or result in offsite environmental changes of regional significance.

Importantly, the Proposed Action represents a continuation of an existing and long-established land use on the property and in the area. Cinder extraction has occurred within the Petition Area for over three decades under regulatory oversight, with operational controls in place to minimize environmental impacts. As such, the Proposed Action would not initiate new types of environmental stressors, nor would it fundamentally alter the cumulative environmental trajectory of the Puna District, where agriculture, resource extraction, and rural residential uses have long coexisted. Furthermore, a number of residences were destroyed in the 2018 Kīlauea eruption and the nearby residential population has decreased. Therefore, cumulative impacts to residential uses are diminished.

However, cumulative impacts must also be evaluated for their potential to emerge through the interaction of effects across resource areas, consistent with HAR § 11-200.1-13, which recognizes that individual effects, while not significant alone, may collectively result in a significant impact when viewed in combination. This is particularly relevant for the Proposed Action's impacts to the geological integrity of Puʻu Kaliʻu, as described in **Section 3.4**, and the cultural value of the puʻu as a storied landform, as documented in **Section 3.9** and the CIA (**Appendix E**). While physical disturbance to the summit is avoided, the irreversible extraction of cinder from the lower slopes constitutes a direct alteration of a geologic feature whose physical presence is central to its cultural meaning. As documented in **Section 3.9.1** and the CIA (**Appendix E**), this cultural meaning is grounded in living community testimony: ethnographic consultants described the observable diminishment of Puʻu

Kali‘u's visible profile over decades of cinder extraction, emphasized the irreplaceability of the landform as a whole, and noted that a hula bearing the name of Pu‘u Kali‘u was learned and performed within the community through the hula tradition of the Kanakaole family. This reflects the pu‘u's embodied significance within Native Hawaiian traditions of naming, hula, and place-based cultural transmission.

When considered together, the loss of irreplaceable cinder substrate and the ongoing physical diminishment of a landform that is culturally valued by some would be considered a significant cumulative impact under HAR § 11-200.1-13(b)(8), even if impacts to cultural resources and cultural practices were assessed as less than significant in isolation. As acknowledged in the CIA, the landform, once bulldozed, cannot be relocated or rebuilt, and that its loss would sever intergenerational connections between the community and a named, storied place (Orr and Haun 2019). Community responses documented in the CIA indicate a range of perspectives, including conditional support for mining provided that cultural values are respected and community dialogue continues. These perspectives do not negate the cumulative impact but instead underscore the importance of meaningful mitigation grounded in cultural stewardship.

The Applicant's designation of a point-person (in consultation with the community) to respond to culturally related considerations or concerns provides an appropriate and adaptive mitigation framework for addressing these intersecting impacts. This will serve as a mechanism for ongoing dialogue, transparency, and culturally informed decision-making throughout the life of the project. In this context, cultural impact mitigation is not limited to avoidance or documentation but must include a process of collaborative stewardship responsive to evolving cultural understandings and community priorities. Additionally, consistent with the terms of the quarry license agreement and as reflected in all action alternatives, a preservation buffer will be maintained around the summit of Pu‘u Kali‘u above 1,050 MSL, ensuring that the most culturally and physically prominent portion of the landform remains undisturbed throughout the life of the project.

The Proposed Action's cumulative impacts must also be considered in the context of lower Puna's broader environmental conditions, including the lasting physical and socioeconomic changes resulting from the 2018 Kīlauea eruption. In this context, many of the Proposed Action's site-level contributions remain minor when compared to the scale and intensity of regional change. The Proposed Action does not preclude or interfere with ongoing community recovery, infrastructure resilience planning, or future agricultural or residential uses in the region.

In terms of economic and social contribution, the Proposed Action supports established sectors of the local economy, particularly the horticultural and floricultural industries, which rely on access to locally sourced black cinder for growing media. The continued operation of the Leilani Quarry also supports employment opportunities for local working families, consistent with the County's economic development goals for rural Puna.

In summary, while many of the Proposed Action's cumulative effects are limited in scope and consistent with the historic land use character of the region, the combined geological and cultural impact to Pu‘u Kali‘u represents a significant cumulative impact under HEPA. This determination affirms the importance of continued cultural consultation and mitigation throughout the life of the project, to be carried out through the designated community cultural representative and stewardship commitments identified in this EIS.

4.2 Potential Secondary Impacts

Secondary impacts, also referred to as indirect impacts, are those effects caused by a proposed action that may occur later in time or farther removed in distance, but are still reasonably foreseeable. These impacts can include changes in land use patterns, population density, or growth rates, and their associated effects on public services, infrastructure, and natural systems. Under HAR § 11-200.1-24(f), secondary impacts must be considered as part of this Draft EIS.

For the Proposed Action, potential secondary impacts are anticipated to be minimal. The continuation and expansion of quarrying operations within the Petition Area would not introduce a new land use type to the area, nor would it establish new infrastructure or land access that could induce development on adjacent lands. The Proposed Action is confined to the existing operational footprint and is consistent with the Petition Area's established use as a licensed quarry for over three decades. As such, the Proposed Action is unlikely to influence broader land use changes or stimulate unplanned development in the vicinity.

The Proposed Action is also not expected to result in growth-inducing impacts. Quarrying activities at Sanford's Service Center rely on a small, stable workforce, and no significant workforce expansion is anticipated. As a result, the Proposed Action would not generate new residential demand or materially contribute to changes in population density or growth rates in lower Puna.

Similarly, the Proposed Action would not place new demands on public services or infrastructure. The quarry's operations do not require connection to municipal water, sewer, or electrical services, and access is limited to the existing private haul road connecting the Petition Area to State Route 130. With an average of approximately six gravel truck trips per day, the Proposed Action's contribution to roadway usage is minor and well within the capacity of the existing transportation system. No new infrastructure investments or expansions would be required to accommodate the Proposed Action.

While the Proposed Action itself does not induce population growth or major infrastructure demands, it does provide a beneficial secondary economic effect by supplying locally sourced black cinder to Hawai‘i's horticultural and floricultural industries, which rely on this material for growing media. This ongoing supply chain relationship supports the continued viability of these sectors, which contribute to Hawai‘i's agricultural economy. This secondary economic benefit is consistent with the County's policy objectives to support diversified agriculture and rural economic development, as reflected in the Hawai‘i County General Plan and the Puna Community Development Plan.

Overall, the Proposed Action's secondary impacts are limited in scope and do not trigger the types of indirect effects, such as growth inducement or substantial changes to public service demand, that could lead to significant secondary impacts. The Proposed Action's secondary and indirect impacts are therefore anticipated to be less than significant.

4.3 Relationship Between Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity

The analysis of short-term uses versus long-term productivity is stipulated under HAR § 11-200.1-24(m). The Proposed Action will result in both short-term and long-term environmental and land use effects. In the short term, continued cinder quarrying will provide essential materials for local agriculture, construction, and landscaping industries, contributing to economic activity and employment in the Puna District. However, this activity also involves temporary environmental disruptions, including vegetation removal, dust emissions, increased truck traffic, and changes to the site's topography. Mitigation measures, such as dust suppression, noise controls, and phased extraction practices, will be implemented to minimize immediate impacts on surrounding land uses and natural resources.

Mining and quarrying activities at the Leilani Quarry involve the extraction of black cinder, a finite resource, and result in localized environmental changes, including land disturbance, vegetation removal, and temporary impacts to soils, air quality, and noise levels. However, these impacts are balanced by the long-term economic benefits of supporting Hawai'i's horticultural and floricultural industries, which depend on a reliable local source of black cinder for plant propagation and soil enhancement.

The primary short-term environmental effects of the Proposed Action include the removal of surface soils, alteration of topography, and the incremental loss of forest cover within the Petition Area. The mining and quarrying activities could disturb up to approximately 75 acres of land, which may lead to changes in drainage patterns and localized erosion potential as identified in Section 3.4, Geology and soils. However, the affected area consists largely of degraded forest, where biological surveys have documented ongoing decline due to ROD, invasive species, and past land disturbances, including the effects of the 2018 Kīlauea eruption. Given these existing conditions, the incremental removal of degraded vegetation within the Petition Area is not expected to result in a significant reduction in regional biodiversity or ecological function.

Air quality impacts, including dust generation from excavation and truck transport, are another short-term environmental effect of quarrying operations. As discussed in Section 3.10, Air Quality and Greenhouse Gases, these effects would be temporary, localized, and controlled through best management practices, such as watering active work areas and limiting vehicle speeds on unpaved roads. Noise levels will also increase during mining and quarrying activities, but given the existing buffer distance and topographic characteristics between the Petition Area and residential properties in Leilani Estates, noise impacts are expected to be limited in geographic extent and managed within regulatory thresholds.

From a long-term productivity perspective, the Proposed Action provides economic stability to Hawai'i's nursery industry, a sector that contributes to local agriculture and rural employment. Alternative sources of black cinder, such as imports or quarrying at other locations, are likely to result in similar or greater environmental impacts, given the logistical and regulatory challenges associated with alternative extraction sites. By utilizing an existing licensed site with an established land use, the Proposed Action represents a more efficient use of land and resources compared to opening new quarry sites in undisturbed areas.

Over the long term, the project will permanently alter the landscape, as areas of excavation will not naturally regenerate to their original condition. To address this, a long-term site management and restoration strategy will be developed to ensure that, upon the completion of quarrying activities,

disturbed areas can be stabilized and potentially repurposed for compatible uses, such as agricultural production, conservation, or controlled reforestation. To further ensure that long-term environmental productivity is maintained, the Proposed Action incorporates landscape restoration measures, as outlined in the Pu'u Kali'u Landscaping & Biosecurity Plan (**Appendix D**). As quarrying operations conclude in specific areas, revegetation efforts will be implemented using appropriate native and non-invasive species to stabilize the landscape and prevent the spread of invasive plants. These efforts will help mitigate the long-term visual and ecological impacts of quarrying, ensuring that the land retains potential for future ecological or alternative land uses. Unlike permanent land use changes, such as urbanization or infrastructure development, quarrying is a resource extraction activity that allows for site reclamation following project completion.

In summary, the incremental loss of degraded forest and temporary environmental impacts are an acceptable trade-off to support long-term economic productivity in the region. The Proposed Action ensures that the environmental uses of the Petition Area remain flexible in the long term while providing immediate and sustained benefits to Hawai'i's agricultural sector. Given that no significant adverse long-term effects on land use, public health, or environmental resources have been identified, and that environmental restoration measures are integrated into the project, the Proposed Action is considered a balanced and responsible use of resources that aligns with both short-term and long-term regional planning objectives.

4.4 Irreversible and Irretrievable Commitments of Resources

The Proposed Action involves the continued extraction of black cinder, a finite natural resource that, once removed, cannot be naturally replenished within a human timescale. This represents an irreversible commitment of geological resources, as quarrying permanently alters the landform and removes material that could otherwise serve future natural or cultural functions. Additionally, the project will result in the consumption of nonrenewable energy sources, particularly through the use of diesel-powered quarrying equipment and transportation vehicles. GHG emissions associated with these activities will contribute to the state's overall carbon footprint, albeit at a relatively minor scale compared to larger industrial operations. While mining will alter portions of the pu'u at lower elevations, the overall landform will remain intact, as mining and quarrying activities are prohibited near the summit under the terms of the license agreement. Mining and quarrying activities will, however, minorly modify elevations and drainage patterns within the actively mined portions of the Petition Area.

The existing forest and vegetative cover within the current quarry footprint has already been removed as part of past mining and quarrying activities, representing a long-term transformation of land use. As the quarry expands, additional forest and vegetative cover within the Petition Area may also be removed to accommodate increased mining and quarrying activities. The Pu'u Kali'u Landscaping and Biosecurity Plan (**Appendix D**) will guide revegetation efforts in areas where mining has ceased. These efforts will prioritize native plant species to support ecological function, stabilize the land, and reduce the potential for invasive species establishment. This post-mining revegetation is intended to promote long-term habitat recovery and enhance the integration of the quarry footprint into the surrounding landscape over time.

In addition to landform and vegetation changes, the mining and quarrying activities require the irretrievable use of fossil fuels to power excavation, transport, and processing equipment. Diesel consumption by heavy machinery and transport vehicles represents a long-term commitment of non-renewable energy resources. While the scale of operations remains relatively low, fuel usage over the lifespan of the quarry will contribute to cumulative resource consumption.

Archaeological sites and known populations of *Cyrtandra nanawaleensis* are located outside the active quarry footprint and will be preserved within the Petition Area through avoidance measures and buffer zones. These resources are not at risk of direct impact, and long-term preservation efforts will ensure they remain protected from disturbance.

While these resource commitments are unavoidable for continued quarry operations, mitigation measures will be implemented to reduce unnecessary resource depletion and environmental degradation. These measures include optimizing extraction efficiency, maintaining equipment to reduce fuel consumption and emissions, and incorporating sustainable land management practices where feasible. Although the loss of black cinder and fuel resources is irretrievable, the long-term economic benefits of supporting local construction, agriculture, and infrastructure projects provide an offsetting public benefit. Furthermore, efforts to plan for the site's post-extraction use will help ensure that the land retains long-term functional value, even after quarrying operations cease.

4.5 Unavoidable Adverse Impacts

While the Proposed Action at Leilani Quarry will result in some unavoidable adverse impacts, the resource analysis in **Chapter 3** concludes that these impacts are expected to be less than significant through the implementation of best management practices, standard operating procedures, and regulatory compliance. In accordance with HAR § 11-200.1-24(n), this section highlights the most pronounced unavoidable adverse impacts of the Proposed Action. For a full analysis of all resource impacts, including those determined to be less than significant, please refer to **Chapter 3**.

Scenic Resources

As discussed in **Section 3.2**, under Scenic Resources, the Proposed Action will result in localized visual changes within the Petition Area. However, the natural topography, vegetation buffers, and surrounding terrain obscure views of the quarry from public viewpoints. The 2018 Kīlauea eruption introduced new volcanic features, such as the Fissure 8 spatter cone, which now dominates the broader visual landscape. Due to these factors, the scenic impact of the Proposed Action is expected to be minimal. To mitigate visual impacts, the Proposed Action will implement progressive site stabilization and vegetative restoration measures, particularly in areas that are no longer actively mined. Stockpiles and equipment will be strategically placed to minimize visual prominence from public viewpoints, and excavation activities will be phased to reduce unnecessary land disturbance. However, because quarrying involves the permanent removal of materials, some visual impacts will remain irreversible. Long-term planning for post-extraction land use will help mitigate those impacts.

Biological Resources

As detailed in **Section 3.3**, Biological Resources, the removal of additional forest and vegetation will be necessary within the Petition Area as mining and quarrying activities expand. While much of the vegetation within the existing quarry footprint has already been cleared, further land disturbance will result in the limited loss of plant cover, potential displacement of wildlife, and changes to habitat conditions. The affected area consists largely of non-native and invasive species.

One unavoidable impact of land clearing is the potential for the increased establishment and spread of invasive species, particularly in newly disturbed areas where soil conditions and open landscapes create opportunities for rapid colonization. Without proper management, invasive plants could outcompete native species and alter the ecological balance of the surrounding landscape. To address this concern, ongoing revegetation efforts as outlined in the Pūʻu Kaliʻu Landscaping and

Biosecurity Plan (**Appendix D**) will focus on stabilizing disturbed areas and prioritizing native plant restoration once mining concludes. While best management practices and site restoration efforts will help mitigate habitat disturbance and vegetation loss, some permanent changes to the biological environment are unavoidable due to the nature of quarrying activities. Long-term efforts to control invasive species, promote native habitat regeneration, and integrate land restoration measures will help minimize the ecological footprint of the project over time.

Geology and Soils

As discussed in **Section 3.4**, Geology and Soils, the Petition Area is underlain by pāhoehoe and ʻaʻā lava flows ranging from 400 to 750 years old, with a small portion covered by 1955 lava flows. The U.S. Geological Survey classifies the Petition Area within Lava Flow Hazard Zone 1, which represents the highest risk for future lava inundation. Although the 2018 Kīlauea eruption impacted areas nearby, the Petition Area itself was not inundated by lava. The Proposed Action could result in permanent modification of Puʻu Kaliʻu's lower elevations, but the summit and overall landform will remain intact, as quarrying in those areas is restricted under the license agreement.

Water Resources

As described in **Section 3.5**, Water Resources, potential impacts include localized sedimentation and stormwater runoff from disturbed areas. However, the high permeability of the terrain means that stormwater infiltrates quickly, minimizing prolonged surface runoff. Best management practices, including erosion control measures, will be implemented to ensure that any impacts to water resources remain less than significant.

Noise

As analyzed in **Section 3.6**, noise from quarry operations is an unavoidable impact, particularly during active excavation, material processing, and truck loading. The limited amount of equipment such as front-end loaders, crushers, and haul trucks generate continuous and intermittent noise, which may be perceptible to nearby properties depending on wind direction and topography. While the Petition Area is not located near densely populated residential zones, increased quarry activity could contribute to cumulative noise levels. Mitigation measures, including the use of equipment mufflers, strategic placement of stockpiles as noise buffers, and scheduling activities during standard operational hours, will be implemented to reduce noise levels. However, the nature of quarrying operations means that some level of background noise will persist throughout the life of the project. Any noise complaints from the community will be addressed through a designated reporting and response process.

Air Quality and Greenhouse Gases

As described in **Section 3.10**, Air Quality and Greenhouse Gases, quarrying activities generate airborne particulates, primarily from excavation, material handling, and vehicle movement on unpaved surfaces. While dust suppression measures, such as water spraying and wind barriers, will be implemented to minimize emissions, some level of fugitive dust is unavoidable. This may temporarily affect localized air quality, particularly during dry and windy conditions. Additionally, the use of diesel-powered equipment and haul trucks will contribute to greenhouse gas emissions and air pollutants, including particulate matter, nitrogen oxides, and sulfur oxides. Although emissions will be managed in compliance with HDOH air quality regulations, air quality impacts cannot be completely eliminated.

Cultural and Archaeological Resources

As discussed in **Section 3.9**, while no known traditional or ongoing customary practices have been documented within the Petition Area, the summit of Puʻu Kaliʻu is recognized as a culturally valued landform. The continuation of quarrying operations will not disturb the puʻuʻs summit, but some modifications to its extended base will occur. Additionally, past archaeological investigations have identified a prehistoric trail (Site 29723) and a historic triangulation station (Site 29727) near the Petition Area, both of which require preservation. As mentioned above, quarrying of Puʻu Kaliʻuʻs summit are prohibited under the license agreement. Continued engagement with cultural practitioners and stakeholders will be prioritized to address the continued respectful manner in which the operations will continue.

Traffic

As discussed in **Section 3.13**, truck traffic to and from the site is not expected to increase beyond existing levels, and no significant impacts to roadway capacity or infrastructure are anticipated. The quarry already operates within established traffic routes, and no additional transportation corridors will be required.

4.6 Unresolved Issues

In accordance with HAR § 11-200.1-24(q), this section identifies unresolved issues associated with the Proposed Action and discusses how they may be addressed in the future. While the proposed expansion of mining and quarrying activities at Leilani Quarry includes some outstanding matters, they will be appropriately addressed through subsequent approvals, agreements, and regulatory compliance.

Conformance with State Land Use Law requires obtaining necessary approvals before the expansion of mining and quarrying activities can occur. The project must first receive approval for a SLUDBA to reclassify the Petition Area from the Conservation District to the Agricultural District. Following this reclassification, the project must then secure a Special Permit from the LUC to mining and quarrying activities within the State Agricultural District.

Regarding the Hawaiʻi County General Plan 2045, the Final Recommended Draft has been released and is currently under public review and awaiting adoption. The draft plan does not indicate any issues of inconsistency or nonconformance with the Proposed Action. However, since the plan is not yet finalized, unforeseen changes could necessitate an amendment to ensure alignment with County policies. Ongoing coordination with regulatory agencies, including Hawaiʻi County, the LUC, and DLNR may be necessary to ensure compliance with permit conditions and other regulatory requirements.

The long-term management of the site, particularly concerning quarry closure and post-quarry land use, is another unknown consideration. While the Puʻu Kaliʻu Landscaping and Biosecurity Plan (**Appendix D**) will guide revegetation efforts following operations, additional considerations for closure may be necessary depending on agreements between the licensee and licensor. Such agreements fall outside the scope of this EIS and would be addressed through separate negotiations as part of long-term site planning.

Addressing these considerations will require continued coordination, regulatory approvals, and planning efforts to ensure compliance with State and County requirements while minimizing long-term environmental and operational impacts.

Chapter 5

Land Use Plans, Policies, and Controls

Chapter 5

Land Use Plans, Policies, and Controls

5.1 Federal Policies

This section evaluates the Proposed Action's consistency with applicable federal policies, specifically the CAA, the CWA, and the ESA. These federal statutes establish national environmental standards and requirements, each designed to protect specific aspects of environmental quality and biological resources.

While the CAA and CWA are federal laws, their implementation and enforcement often occur at the state level through federally delegated authorities. In Hawai‘i, the HDOH administers key aspects of these federal environmental laws, such as air and water quality management.

In contrast, the ESA is administered exclusively by federal agencies, notably the USFWS. Implementation of the ESA involves direct federal oversight and coordination, including formal and informal consultations with federal agencies, to ensure actions do not negatively affect endangered species or their habitats.

The following subsections discuss the Proposed Action's consistency with the CAA, CWA, and ESA, clearly differentiating between state-administered federal mandates and direct federal oversight.

5.1.1 Clean Air Act

Background: The CAA, administered by the EPA, establishes National AAQS designed to protect public health and environmental quality. These standards are aimed at controlling emissions of harmful pollutants, including particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, and lead. Although the CAA is a federal statute, its implementation is largely delegated to states. In Hawai‘i, the HDOH enforces compliance with the CAA through the HAR, particularly 11-60.1, HAR, which regulates air pollution control and fugitive dust emissions.

Discussion: The Proposed Action, involving expanded mining and quarrying activities at the Leilani Quarry, intersects directly with fugitive dust control regulations prescribed in HAR § 11-60.1-33. Quarry operations, particularly excavation, handling, transport, and stockpiling of cinder material, inherently pose a risk of generating dust emissions. To ensure compliance with state regulations and by extension, the federal CAA, the Applicant currently implements BMPs required by HAR § 11-60.1-33. These practices include regular water application to suppress dust, careful handling and management of excavated materials, timely revegetation of disturbed areas to minimize dust generation, and covering truckloads during transport to prevent dust dispersal. The area’s abundant rainfall also ensures that fugitive dust is further minimized.

These BMPs and the area’s abundant rainfall ensure that fugitive dust emissions from the Proposed Action remain well below regulatory thresholds, protecting local air quality and mitigating potential health or nuisance impacts to nearby communities.

Consequently, the Proposed Action fully conforms with both state and federal air quality requirements under the CAA.

5.1.2 Clean Water Act

Background: The CWA establishes the federal framework for regulating the discharge of pollutants into the waters of the United States and maintaining surface water quality standards. Administered by the EPA, the CWA provides regulatory guidelines for controlling pollution through permitting programs, primarily the National Pollutant Discharge Elimination System (NPDES) program. In Hawai'i, the HDOH has been delegated authority by the EPA to administer and enforce the NPDES permit system, which regulates point-source discharges and certain stormwater runoff.

Discussion: The Proposed Action includes land-disturbing activities associated with mining and quarrying operations, which typically have potential implications under the CWA due to stormwater runoff and erosion control concerns. However, the nature of mining and quarrying activities at the Petition Area, characterized by highly permeable soils, the lack of defined watercourses, and generally high infiltration rates, greatly reduces the potential for surface water runoff.

As a result, no direct discharges to waters of the U.S. or state waters are anticipated. Furthermore, given that quarry operations do not involve stormwater discharges into surface waters, obtaining an NPDES permit under the CWA is not expected to be necessary for the Proposed Action. Nonetheless, the Applicant will continue implementing best management practices for erosion and sediment control to further minimize any potential water quality impacts.

5.1.3 Endangered Species Act

Background: The ESA, administered by the USFWS, provides a framework for the conservation and protection of federally listed threatened and endangered plant and animal species and their habitats. Under the ESA, federal agencies must ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species or destroy or adversely modify their critical habitats. Federal projects that may incidentally affect listed species typically require consultation with the USFWS under Section 7 of the ESA. Non-federal actions that have potential impacts on endangered species or their habitats may require consultation to determine if an Incidental Take Permit under Section 10 of the ESA is necessary.

Discussion: There have been a total of three biological surveys of the Petition Area, with detailed findings documented in **Section 3.3**, Biological Resources. Across these surveys, one federally endangered plant species, *Cyrtandra nanawaleensis*, was identified in the Petition Area. However, quarry expansion would avoid direct impacts to this species per the existing license agreement and associated avoidance measures, in addition to the Petition Area's topography which naturally protects and buffers the observed species' population from direct impacts of the Proposed Action.

Although Newell's shearwater (*Puffinus newelli*), an endangered seabird species, is known in broader areas of the Puna district, no seabird nesting sites or related habitat uses were documented within the Petition Area across the three biological surveys. Additionally, ongoing quarry operations have historically refrained from the use of artificial lighting or nighttime operations, effectively mitigating any indirect impacts to seabird populations.

In March 2025, informal consultation with the USFWS was conducted, resulting in a determination that Section 10 (Incidental Take Permitting) of the ESA was not applicable to the Proposed Action, as

the project's activities are not anticipated to result in incidental take of federally listed species. Despite the absence of a formal permitting requirement, the Applicant has committed to voluntarily following best management practices recommended by the USFWS to further protect endangered and threatened species potentially occurring in the vicinity.

Therefore, while the Proposed Action has a nexus with the ESA due to the presence of *Cyrtandra nanawaleensis* and potential considerations for other federally listed species, the project has been determined to conform fully to ESA requirements through avoidance, minimization strategies, and voluntary implementation of USFWS-recommended practices. No further ESA compliance action is anticipated for the Proposed Action at this time.

5.2 State of Hawai‘i Policies

5.2.1 Coastal Zone Management Program

Background:

The Hawai‘i Coastal Zone Management (CZM) Program was established under the federal *Coastal Zone Management Act of 1972* and is implemented through Chapter 205A, HRS. Hawai‘i's CZM Program aims to balance the conservation of coastal resources with responsible community and economic development. The program is administered by the Office of Planning and Sustainable Development within the State of Hawai‘i.

As defined in HRS §205A-1, Hawai‘i's coastal zone encompasses *"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."* Accordingly, the entire island of Hawai‘i, including inland areas such as the project site, falls within the coastal zone and is subject to CZM policy considerations — even if it lies outside a County-administered Special Management Area.

The CZM Program is built around ten enforceable objectives and related supporting policies codified in HRS §205A-2, which address: recreational resources; historic resources; scenic and open space resources; coastal ecosystems; economic uses; coastal hazards; managing development; public participation; beach protection; and marine resources.

Under HRS §205A-4, all agencies implementing actions in the coastal zone must give full consideration to ecological, cultural, historic, esthetic, recreational, scenic, and open space values, as well as to coastal hazards and the needs for economic development.

Discussion: The Proposed Action involves the reclassification of approximately 94.108 acres in the Puna District of Hawai‘i Island from the SLU Conservation District (L subzone) to the Agricultural District. The reclassification will enable continued and expanded cinder mining and quarrying activities at the Leilani Quarry, with approximately 73.075 acres designated for quarrying and 21.033 acres reserved as buffer areas.

Although the Petition Area is not located within the County of Hawai‘i Special Management Area, it is within the State's coastal zone and has been evaluated for conformance with the ten CZM objectives under HRS §205A-2. Table 5-1 provides a discussion of this conformance.

Table 5-1 CZM Objectives, Hawai'i Revised Statues §205A-2
Recreational Resources: The Petition Area is located inland and is not accessible for, or used in, recreational activities. The Proposed Action will not impact public recreational resources.
Historic Resources: The project includes compliance with an accepted Archaeological Inventory Survey and a Site Preservation Plan. Preservation measures include permanent fencing of Site 29723 and mitigation protocols for inadvertent discoveries, in conformance with applicable SHPD requirements and CZM historic preservation goals.
Scenic and Open Space Resources: While inland, the Petition Area is visually buffered and not prominent from public viewpoints. Restoration with native species following quarry closure, as described in the Landscaping and Biosecurity Plan (**Appendix D**), will support scenic and open space values over the long term.
Coastal Ecosystems: The Proposed Action is not adjacent to coastal waters or sensitive shoreline habitats. The Landscaping and Biosecurity Plan (**Appendix D**) includes Best Management Practices (BMPs) to prevent the introduction or spread of invasive species and to promote revegetation with appropriate native species, supporting ecological integrity.
Economic Uses: The Leilani Quarry produces a unique, low-density black cinder used extensively by the State's nursery industry. Continued access to this resource directly supports agricultural productivity and contributes to the local and statewide economy.
Coastal Hazards: The Petition Area is not located in a tsunami evacuation zone, flood hazard area, or coastal erosion zone. Revegetation and erosion control measures will mitigate potential site-specific hazards such as sediment runoff.
Managing Development: The project is undergoing review under Chapter 343, HRS and requires discretionary approval by the State LUC. These reviews ensure that development is evaluated comprehensively for environmental and land use compatibility.
Public Participation: The environmental review process has provided opportunities for agency and public comment through the EISPN and Draft EIS. The project has incorporated cultural consultation and community engagement consistent with CZM public participation policies.
Beach Protection: The Petition Area is inland and does not affect shoreline processes or beach systems. No impacts to public beach access or beach erosion are expected.
Marine Resources: There is no physical or hydrological connection between the Petition Area and marine resources. The proposed activities will not result in discharges or actions that would impact nearshore or offshore marine environments.

5.2.2 Hawai'i State Planning Act

Background: The Hawai'i State Planning Act, codified under Chapter 226, HRS, provides a comprehensive framework guiding the long-term growth, economic development, and resource management strategies across the state. This statute articulates statewide goals, objectives, and policies for achieving balanced and sustainable economic, social, and environmental outcomes. Specifically, the Act emphasizes responsible economic growth, protection of Hawai'i's unique natural and cultural resources, and ensuring social and economic benefits to local communities.

Discussion: The project supports the objectives of the Hawai'i State Planning Act by fostering economic development while conserving natural resources. This alignment with state policies ensures balanced growth and resource management across the state (**Table 5-2**).

Table 5-2 Hawai'i State Plan, Hawai'i Revised Statues Chapter 226
§226-4 State goals.
In order to guarantee, for the present and future generations, those elements of choice and mobility that ensure that individuals and groups may approach their desired levels of self-reliance and self-determination, it shall be the goal of the State to achieve:
(1) A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai'i present and future generations.
(2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.
(3) Physical, social, and economic well-being, for individuals and families in Hawai'i, that nourishes a sense of community responsibility, of caring, and of participation in community life."
Discussion: *The Proposed Action supports HRS §226-4 by facilitating ongoing local economic productivity through the continued and expanded mining and quarrying of black cinder, a critical resource for Hawai'i's horticultural and nursery industries. Environmental considerations, such as the biosecurity and landscaping plan, proactive measures to prevent invasive species spread, and preservation of significant cultural and archaeological sites, ensure the protection of natural and cultural resources, thereby preserving the quality of the natural environment. Additionally, by adhering to strict conditions that protect scenic and cultural resources, and minimize noise and air quality impacts, the Proposed Action aligns with state goals promoting social and community responsibility.*
§226-6 Objectives and policies for the economy in general.
(a) Planning for the State's economy in general shall be directed toward achievement of the following objectives:
(1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawai'i's people.
Discussion: *The Proposed Action supports this objective by enabling the continuation and expansion of mining and quarrying activities at Leilani Quarry, directly sustaining local employment opportunities and contributing to diversified job choices and income stability within the Puna region.*
§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 Hawai'i's economy.
(b) To achieve the federal expenditures objective, it shall be the policy of this State to:
(1) Encourage the sustained flow of federal expenditures in Hawai'i that generates long-term government civilian employment.
(2) Promote Hawai'i's supportive role in national defense.
(3) Promote the development of federally supported activities in Hawai'i that respect state-wide economic concerns, are sensitive to community needs, and minimize adverse impacts on Hawai'i's environment.
(4) Increase opportunities for entry and advancement of Hawai'i's people into federal government service.
(5) Promote federal use of local commodities, services, and facilities available in Hawai'i.
(6) Strengthen federal-state-county communication and coordination in all federal activities that affect Hawai'i.
(7) Pursue the return of federally controlled lands in Hawai'i that are not required for either the defense of the nation or for other purposes of national importance, and promote the mutually beneficial exchanges of land between federal agencies, the State, and the counties.

Table 5-2 Hawai'i State Plan, Hawai'i Revised Statues Chapter 226
Discussion: *The Proposed Action indirectly supports the objectives of §226-9 by providing a locally-sourced and commercially valuable resource (black cinder) that is important for Hawai'i's horticultural industry, including nurseries that may supply federal installations or projects. By securing a stable, locally available commodity, the Proposed Action helps facilitate federal procurement of local materials and supports broader state economic resilience. Furthermore, by aligning local land use designations through the SLUDBA, the Proposed Action helps enhance clarity and efficiency in permitting and land use, supporting improved state-county coordination which can indirectly benefit federal-state-county interactions in land management.*
§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 Hawai'i's land-based, shoreline, and marine resources.
(2) Effective protection of Hawai'i'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:
(1) Exercise an overall conservation ethic in the use of Hawai'i's natural resources.
(2) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.
(4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.
(5) Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.
(6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawai'i.
(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.
Discussion: *The Proposed Action conforms to these objectives by enabling continued mining and quarrying activities that provide essential black cinder resources critical to Hawai'i's nursery industry, exemplifying prudent use of locally important land-based resources. Protective measures, including clearly defined buffer zones around mining areas, preservation of the culturally and physically prominent Pu'u Kali'u summit, invasive species control protocols, and ecological restoration following excavation, demonstrate effective resource management without generating significant environmental damage. The Proposed Action also incorporates a comprehensive biosecurity plan to prevent invasive species impacts, safeguards archaeological and cultural resources through established preservation buffers, and includes best practices for revegetation to maintain ecosystem functions. Collectively, these measures ensure compatibility between mining and quarrying activities and the ecological integrity of the area, promoting beneficial multiple uses without incurring costly or irreparable environmental damage.*
§226-12 Objective and policies for the physical environment–scenic, natural beauty, and historic resources.
(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawai'i's scenic assets, natural beauty, and multi-cultural/historical resources.
(b) To achieve the scenic, natural beauty, and historic resources objectives, it shall be the policy of this State to:
(1) Promote the preservation and restoration of significant natural and historic resources.
(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.
(4) Protect those special areas, structures, and elements that are an integral and functional part of

Table 5-2 Hawai'i State Plan, Hawai'i Revised Statues Chapter 226
Hawai'i's ethnic and cultural heritage.
Discussion: *The Proposed Action aligns with §226-12 objectives by incorporating explicit measures for the preservation of significant natural, cultural, and historic resources within the Petition Area. Specifically, the summit and profile of Pu'u Kali'u will remain undisturbed, preserving existing views and vistas. Archaeological and cultural resources, such as a historically significant trail, will be protected through established buffer zones and preservation plans. Additionally, proposed mitigation of ongoing consultation with cultural practitioners ensures traditional knowledge informs site management, protecting the area's scenic, natural, and historic values.*
§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 Hawai'i'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 Hawai'i's land and water resources.
(3) Promote effective measures to achieve desired quality in Hawai'i's surface, ground and coastal waters.
(4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai'i's people.
(5) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.
Discussion: *The Proposed Action supports these objectives through responsible land management practices, including implementation of biosecurity measures, revegetation of disturbed areas with appropriate native plants, and strict erosion control. Compliance with State regulations regarding fugitive dust and noise management (HAR §11-60.1-33 and Chapter 11-46, HAR) ensures the protection of local air and aural quality, thus safeguarding public health. The quarry's location and operational procedures inherently reduce risks associated with flooding, erosion, and other natural hazards, thereby aligning project implementation with the State's goal to minimize environmental and human risks.*
§226-25 Objectives and policies for socio-cultural advancement—culture.
(a) Planning for the State's socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawai'i's people.
(b) To achieve the culture objective, it shall be the policy of this State to:
(1) Foster increased knowledge and understanding of Hawai'i's ethnic and cultural heritages and the history of Hawai'i.
(2) Support activities and conditions that promote cultural values, customs, and arts that enrich the lifestyles of Hawai'i's people and which are sensitive and responsive to family and community needs.
(3) Encourage increased awareness of the effects of proposed public and private actions on the integrity and quality of cultural and community lifestyles in Hawai'i. (4) Encourage the essence of the aloha spirit in people's daily activities to promote harmonious relationships among Hawai'i's people and visitors.
Discussion: *The Proposed Action aligns with these cultural advancement objectives by incorporating extensive consultation with cultural advisors. A CIA has identified culturally significant resources and recommended ongoing involvement of cultural practitioners to safeguard cultural identities, traditions, and practices. Additionally, the preservation of the summit of Pu'u Kali'u and associated archaeological sites ensures that the cultural and historical integrity of the area is maintained,*

Table 5-2 Hawai'i State Plan, Hawai'i Revised Statues Chapter 226
enhancing the awareness and understanding of traditional resources, while fostering harmonious community relationships through respectful and inclusive management practices.
§226-26 Objectives and policies for socio-cultural advancement–public safety.
(a) Planning for the State's socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:
(1) Assurance of public safety and adequate protection of life and property for all people.
(2) Optimum organizational readiness and capability in all phases of emergency management to maintain the strength, resources, and social and economic well-being of the community in the event of civil disruptions, wars, natural disasters, and other major disturbances.
(d) To further achieve public safety objectives related to emergency management, it shall be the policy of this State to:
(1) Ensure that responsible organizations are in a proper state of readiness to respond to major war-related, natural, or technological disasters and civil disturbances at all times.
(2) Enhance the coordination between emergency management programs throughout the State.
Discussion: *The Proposed Action conforms with these objectives by maintaining rigorous site management practices and compliance measures that minimize risks associated with quarry operations, ensuring the protection of public health and safety. The project incorporates proactive management of potential hazards through adherence to state standards for air quality (fugitive dust) and noise control, as well as specific emergency preparedness and response measures, including a defined biosecurity and landscaping plan. Additionally, the absence of nighttime operations and use of artificial lighting reduces risks to public safety and wildlife, further contributing to community well-being. These measures ensure organizational readiness and capability to effectively manage risks associated with ongoing operations and potential natural disturbances, aligning the project with statewide goals for public safety and emergency preparedness.*

5.2.3 Hawai'i State Functional Plans

Background: Hawai'i's State Functional Plans serve as policy frameworks that implement the broader goals of the Hawai'i State Plan, established under Chapter 226, HRS These plans provide guidance for government decision-making, resource allocation, and program development across key sectors. Each Functional Plan focuses on a specific policy area, such as agriculture, conservation, energy, employment, historic preservation, housing, tourism, transportation, and water resources. The plans are developed by relevant state agencies and approved by the Governor, ensuring alignment with the state's long-term planning priorities.

The LUC and other regulatory agencies consider the State Functional Plans when reviewing land use amendments, permits, and development proposals. These plans help assess whether proposed actions support state policy objectives related to economic development, resource conservation, and public welfare. As such, the Proposed Action must be evaluated for consistency with applicable State Functional Plans, particularly those related to agriculture and conservation lands.

Discussion: The Proposed Action aligns with the objectives of both the Agriculture Functional Plan and the Conservation Lands Functional Plan by balancing economic sustainability with responsible land management. The Agriculture Functional Plan emphasizes supporting agricultural industries and maintaining the viability of agricultural lands. While the project involves mining and quarrying rather than direct agricultural production, locally sourced cinder is essential for Hawai'i's nursery and

horticultural industries. Reclassifying the Petition Area to the Agricultural District ensures expanded mining and quarrying activities conform with the district's intended uses.

The Conservation Lands Functional Plan prioritizes responsible resource management and environmental protection. Although the Proposed Action transitions the Petition Area out of the Conservation District, it incorporates measures such as biosecurity protocols, revegetation efforts, and provides protections for cultural and archaeological resources. Existing Standard Operating Procedures and BMPs minimize environmental impacts as discussed in **Chapter 3**, ensuring sustainable land use aligned with state planning objectives.

5.2.4 State Land Use Law (Chapter 205, HRS)

Background: The Hawai'i State Land Use Law, codified as Chapter 205, HRS, governs land use and planning statewide. The law classifies all lands into four distinct land use districts, each administered by the State LUC: Urban, Rural, Agricultural, and Conservation. Each district has specific intended uses designed to protect Hawai'i's unique natural, agricultural, cultural, and economic resources.

The Agricultural District primarily supports agricultural activities, including crop cultivation, livestock raising, and related commercial activities. Mining and quarrying operations are permissible within this district upon obtaining a Special Permit from the State LUC.

The Conservation District is intended to conserve, protect, and preserve natural and cultural resources. It comprises multiple subzones reflecting varying resource sensitivity: Protective, Limited, Resource, General, and Special. Currently, the Petition Area is within the L subzone, designed for low-intensity, controlled uses to protect resources. Mining and quarrying activities are not permissible within the L subzone but may be permitted within the R subzone, which accommodates sustainable uses of natural resources.

The Urban District accommodates high-intensity uses, including residential, commercial, and industrial developments, typically supported by significant public infrastructure. The Rural District allows low-density residential development and small-scale agricultural activities, serving as a transition between urban and agricultural lands. Neither the Urban nor Rural District classifications are applicable to the Proposed Action, as the Petition Area is not intended for urban-scale development or rural residential purposes.

Discussion: The Proposed Action and Alternative 2 both fully comply with the Hawai'i State Land Use Law, Chapter 205, HRS. The Proposed Action and Preferred Alternative—reclassifying the Petition Area from the Conservation District (L subzone) to the Agricultural District—aligns the existing and intended mining and quarrying uses with regulatory requirements, facilitating consistency with State and County land use regulations. This change would align the intended uses with existing Hawai'i County zoning (Agricultural, A-20a), simplifying regulatory oversight while maintaining rigorous environmental and cultural resource protections.

Alternative 2, changing the Conservation subzone designation from L to R, also conforms with Chapter 205, as mining and quarrying are permissible activities within the R subzone, subject to issuance of a CDUP by the BLNR. This alternative, although regulatory compliant, involves a more complex permitting process without added environmental or administrative benefits compared to the Proposed Action.

Currently, Sanford's Service Center operates Leilani Quarry as a legally established, nonconforming use within the Conservation District, L subzone. Nonconforming status arose due to amendments to Conservation District rules in 2011, which removed mining and quarrying activities as allowable uses within the L subzone. Approval of either the Proposed Action or Alternative 2 would resolve this nonconformance by establishing regulatory consistency for ongoing and future quarrying activities.

As noted in **Section 1.2** of the EIS, current mining and quarrying activities within the Petition Area are authorized under legal nonconforming status pursuant to CDUPs issued by BLNR. On February 27, 1987, the BLNR approved CDUP HA-1957 for an initial 15-acres of Commercial Cinder Removal along with an access road. On January 26, 1990, the BLNR approved an amendment to CDUP HA-1957 to expand the Commercial Cinder Removal another 15-acres. On April 7, 2008, the BLNR Chairperson approved the continuation to mine cinder and cinder soil subject to the existing permits and additional terms and conditions. Sanford's Service Center has conducted mining and quarrying activities within the approximately 30 acres of the Petition Area under these permits which are attached as **Appendix K**.

As noted in **Section 1.2** and **Section 3.9** of the EIS, the existing license from the landowner, Kamehameha Schools, to Sanford's Service Center, prohibits any alteration to the summit of Puʻu Kaliʻu, despite the fact that a portion of Puʻu Kaliʻu is included in the CDUP area.

Likewise, as noted in **Section 3.3** of the EIS, the license from landowner, Kamehameha Schools, requires specific protective measures for the federally listed endangered species *Cyrtandra nanawaleensis*. Sanford's Service Center is required to establish a minimum 70-foot protective buffer around all known populations of *Cyrtandra nanawaleensis* within the licensed area. Again, portions of this area are within the CDUP area.

Notwithstanding Sanford's Service Center's adherence to the constraints of the license, it appears that Sanford's Service Center had conducted some mining activities to the south and east of the boundary of the CDUP 30-acre area, but that are largely within the Petition Area. As such, the impacts to these areas have been included in this EIS as they would have existed had all mining activity taken place within the CDUP area, and as they currently exist.

Sanford's Service Center has engaged with Office of Conservation and Coastal Lands to discuss potential solutions. To avoid mining outside of the CDUP area and in compliance with the license, Sanford's Service Center has marked the boundary of the CDUP area with yellow flagging markers Sanford's Service Center's compliance with the CDUP Permit Conditions are outlined in **Appendix K**. It is presumed that upon reclassification of the Petition Area these permit conditions would be replaced by permit conditions in any Special Permit.

5.2.5 Hawai'i 2050 Sustainability Plan

Background: The Hawai'i 2050 Sustainability Plan was initially adopted in 2008 to serve as a long-range planning and policy framework for achieving a more sustainable future for the State of Hawai'i. The Plan identifies sustainability as the state's foremost priority, aiming to balance economic, community, and environmental well-being.

In 2020, the Plan was updated for the "Decade of Action" (2020–2030) to address urgent challenges and accelerate progress toward Hawai'i's sustainability goals (OPSD, 2020). This update aligns the 2050 Plan with current climate science, statewide planning initiatives, and the United Nations Sustainable Development Goals (SDGs). It includes 8 focus areas and 38 strategies, ranging from promoting local agriculture and economic diversification to advancing clean energy, climate resilience, sustainable communities, and traditional ecological knowledge.

Discussion: The Proposed Action is consistent with several strategic goals identified in the Hawai'i 2050 Sustainability Plan, particularly those under the focus areas of Local Agriculture, Green Workforce Development, Diversified Economy, and Institutionalizing Sustainability. The Proposed Action furthers the goals of the Hawai'i 2050 Sustainability Plan by maintaining land in agricultural and resource-based use, promoting sustainable economic activities, and aligning with climate resilience, environmental protection, and workforce development objectives

Support for Local Agriculture (Strategies 1–3): The Proposed Action provides long-term land tenure for agricultural and resource-based uses, thereby supporting agricultural livelihoods and helping to preserve land for agricultural purposes. The preservation and availability of agricultural land directly supports the goals of improving food security, advancing sustainable agricultural practices by using local cinder, and strengthening access to inputs which support the local horticultural and floricultural industries.

Green Workforce Development (Strategy 4): By formalizing land use designations that enable long-term investment in agricultural and conservation-related industries, the Proposed Action can help sustain green job pathways, especially in sectors such as agriculture, natural resource management, and biosecurity.

Economic Diversification and Resilience (Strategies 5–6): The Proposed Action helps create conditions for business development in sustainable sectors, such as value-added agriculture and biosecurity. In doing so, it contributes to economic resilience and diversification, particularly in rural communities.

Climate and Environmental Goals (Strategies 9–10, 31–36): By maintaining land in agricultural and resource-based uses, the Proposed Action supports smart growth and avoids new development in areas that may be vulnerable to climate-related hazards. These land use patterns align with strategies to reduce GHG emissions, preserve watersheds, and enhance natural resource resilience.

Institutionalizing Sustainability (Strategies 28–30): The Proposed Action demonstrates alignment with state goals to update land use policies and coordinate sustainable land management across jurisdictions. By supporting consistency between land use designations and on-the-ground practices, the Proposed Action enhances the transparency and effectiveness of long-term planning.

5.2.6 Historic Preservation (Chapter 6E, HRS)

Background: Chapter 6E, HRS, administered by SHPD of the DLNR, provides the legal framework for identifying, evaluating, and protecting historic properties throughout the State of Hawai'i. Historic properties are broadly defined to include archaeological sites, cultural landscapes, historic structures, and traditional cultural properties that may be significant to Hawai'i's history, architecture, archaeology, or culture. Compliance with Chapter 6E is required when any project involves the use of State or County lands, funds, or permits, and may affect historic properties.

The statutory provisions most relevant to the Proposed Action are §§6E-8 and 6E-42. Section 6E-8 requires that all State and County agencies submit their projects for SHPD review prior to any land use approvals or funding decisions if the project may affect historic properties. Section 6E-42 requires private applicants to engage in a similar consultation process when seeking permits for projects that may impact historic properties. Both provisions aim to ensure that potentially significant historic resources are identified early and that appropriate steps are taken to avoid, minimize, or mitigate any adverse effects. SHPD's review authority includes archaeological inventory surveys, preservation plans, and determinations of effect under applicable rules, including HAR §§13-275 and 13-277.

Discussion: The Proposed Action—reclassification of approximately 94.108 acres from the State Conservation District to the State Agricultural District to enable the continuation and expansion of mining and quarrying activities—triggers compliance with Chapter 6E because it involves the use of County and State permits and has the potential to affect subsurface and surface historic resources.

As detailed in **Section 3.9** and **Appendix G**, an AIS conducted by Haun & Associates identified four historic sites within the Petition Area: Site 29723 (a precontact segment of the Kauaea Trail), Site 29724 (historic roads), Site 29725 (a historic survey marker), and Site 29727 (a triangulation station at the summit of Pu'u Kali'u). These resources were evaluated for significance under Chapter 6E, HRS, and SHPD reviewed and accepted the AIS in a letter dated September 23, 2013. Following the survey, an SPP was prepared for Site 29723 and accepted by SHPD on June 24, 2014, pursuant to HAR §13-277. The SPP establishes both permanent and construction-phase buffers around Site 29723 to ensure its long-term protection.

The EIS incorporates these findings and preservation commitments. As explained in **Section 3.9**, the Proposed Action avoids direct disturbance to Site 29723, and quarrying near Site 29727 is precluded by license conditions that prohibit alteration of the summit of Pu'u Kali'u. Site boundaries and project design were shaped by the presence of these historic resources, and the Petition Area explicitly excludes areas where preservation and cultural sensitivity require avoidance. Accordingly, SHPD's review and acceptance of the AIS and SPP confirm that appropriate mitigation and preservation measures are in place.

Section 3.8 further concludes that the Proposed Action does not interfere with any known ongoing traditional or customary Native Hawaiian practices, and no TCPs were identified through the CIA (**Appendix E**). Continued consultation with cultural practitioners is a recommended mitigation measure of the CIA.

5.2.7 Significance Criteria in HAR §11-200.1-13(b)

The following provides detailed analyses and rationales regarding the 13 significance criteria outlined in HAR §11-200.1-13(b).

(1) The Proposed Action will irrevocably commit a natural and cultural resource.

The Proposed Action involves expanded mining and quarrying activities near Puʻu Kaliʻu, permanently removing the black cinder resource within the Petition Area. By their nature, mining and quarrying activities result in the irrevocable commitment of geological resources; once extracted, these resources cannot be replaced. This loss is inherently significant due to the permanent alteration of the geologic landscape and substrate conditions, as discussed in **Section 3.4**.

This geological commitment is amplified by the cultural significance of puʻu in Hawaiian traditions and practices. Puʻu Kaliʻu, specifically, retains cultural importance that extends beyond its physical characteristics, as documented through community consultation in the Cultural Impact Assessment (**Appendix E**). The extraction of cinder from the puʻu therefore carries cultural implications beyond ecological or geological considerations.

To address and partially mitigate these cultural impacts, the CIA recommends establishing a Cultural Advisory Group. To meet the intent of the CIA's recommendations, the Applicant will designate a point-person (in consultation with community) to respond to culturally related considerations or concerns on the project as warranted. This mitigation measure would ensure ongoing cultural oversight, providing stewardship informed directly by local practitioners and cultural knowledge holders. However, while this measure ensures respectful and culturally sensitive resource management, it does not alter the fundamental irreversibility of the cinder's removal.

Nevertheless, the significant and irreversible impact of resource extraction is considered acceptable within the broader context of Hawaiʻi's economic, environmental, and community policy goals. The black cinder from Leilani Quarry is a highly valued and strategic resource for the horticultural and nursery industries on Hawaiʻi Island and statewide. These industries represent critical sectors of Hawaiʻi's diversified agriculture economy, providing employment and economic stability for numerous local families and businesses. Furthermore, maintaining local availability of this resource aligns directly with State policies expressed in the Hawaiʻi State Plan and Hawaiʻi County General Plan, both of which prioritize sustainable economic development, resource stewardship, and community resilience.

In summary, while the Proposed Action does represent a significant, unavoidable, and irrevocable commitment of natural and cultural resources, it is justified through carefully considered economic, community, and policy benefits. Combined with proposed cultural and ecological mitigation strategies, including the establishment of a community cultural representative and implementation of the Landscaping and Biosecurity Plan (**Appendix D**), these actions collectively demonstrate responsible resource management in alignment with broader State and local planning objectives.

(2) The Proposed Action will not curtail the range of beneficial uses of the environment.

The Proposed Action does not significantly curtail beneficial environmental uses. Mining and quarrying activities would occur in an area historically and currently used for resource extraction, and these activities would not limit recreational, agricultural, or other beneficial environmental uses. Surrounding areas will remain buffered and vegetated, maintaining ecological function and access limitations. As

discussed in **Chapter 3**, recreational and agricultural values of the Petition Area are limited due to marginal agricultural soils and lack of recreational infrastructure.

(3) The Proposed Action will not conflict with the State's environmental policies or long-term environmental goals established by law.

The Proposed Action aligns with state environmental policies, as discussed in **Chapter 5.** It supports statewide goals articulated in the Hawai'i State Planning Act (Chapter 226, HRS) and Hawai'i County General Plan by contributing to local economic resilience, sustainability, and responsible resource management. Additionally, adherence to the Landscaping and Biosecurity Plan (**Appendix D**) ensures compliance with ecological stewardship policies, supporting conservation objectives.

(4) The Proposed Action will not have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State.

The Proposed Action will not have a substantial adverse impact on the economic, social, or cultural welfare of the community and State. Rather, the continued and expanded quarrying operations provide critical support to Hawai'i's horticultural, floricultural, and nursery industries, contributing significantly to regional economic productivity and local employment stability. This economic activity directly benefits local working families and supports the broader economic resilience of the Puna District and Hawai'i Island.

From a cultural and social perspective, respondents from the community explicitly indicated they are not inherently opposed to mining and quarrying activities at Pu'u Kali'u, provided such activities are conducted responsibly, respectfully, and in meaningful collaboration with local families and cultural practitioners. Community members acknowledged the economic importance of quarrying for local livelihoods and emphasized the importance of ongoing cultural stewardship (**Appendix E**). In response to this feedback, the Proposed Action includes the proactive establishment of a community cultural representative, ensuring culturally informed management practices and ongoing community engagement. Therefore, potential cultural impacts are adequately addressed and minimized.

(5) The Proposed Action will not have a substantial adverse effect on public health.

The Proposed Action is not anticipated to have a substantial adverse effect on public health. Potential health-related impacts such as air quality, noise, and traffic are identified as minimal and are effectively managed through strict BMPs, as detailed in **Chapter 3**. These measures include regular dust suppression, stringent noise management protocols, and careful routing and scheduling of vehicle movements to minimize disruption to the community.

Furthermore, the overall intensity of quarry operations and the associated vehicle traffic are not planned to significantly increase from current operational levels. Quarry operations have historically maintained a consistent and manageable scale, adhering to all applicable public health regulations and standards, which will continue under the Proposed Action.

(6) The Proposed Action will not involve adverse secondary impacts, such as population changes or effects on public facilities.

The Proposed Action will not significantly affect population levels or public facilities, as no residential developments or major population shifts are associated with quarry expansion. Continued mining and quarrying activities have negligible impact on local infrastructure, which is adequately maintained to accommodate existing quarry traffic and operations.

(7) The Proposed Action will not involve a substantial degradation of environmental quality.

The Proposed Action will not involve a substantial degradation of environmental quality. Although mining and quarrying activities inherently involve the permanent removal of the cinder substrate, proactive mitigation measures have been designed specifically to minimize environmental degradation to manageable and acceptable levels. Central to these efforts is the Landscaping and Biosecurity Plan (**Appendix D**), which prioritizes ecological restoration through revegetation with native plant species. This comprehensive plan also incorporates rigorous invasive species control measures, biosecurity protocols, and ongoing monitoring and adaptive management strategies to restore and sustain ecological functions in mined areas.

Through the implementation of these targeted ecological restoration practices and BMPs, significant environmental quality impacts such as habitat loss, erosion, invasive species establishment, and ecological degradation are effectively avoided or substantially minimized.

(8) The Proposed Action will not have cumulative, substantial adverse effects upon the environment or involve a commitment for larger actions.

As detailed in **Chapter 4**, cumulative impacts from mining and quarrying activities, when combined with historical land use changes and recent volcanic events, are evaluated as minor and manageable. Expanded quarrying remains geographically confined, and cumulative regional impacts are substantially mitigated through careful resource management, native revegetation, and preservation of buffer areas.

(9) The Proposed Action will not have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat.

The Proposed Action will not have a substantial adverse effect on rare, threatened, or endangered species or their habitat, provided mitigation measures are rigorously implemented. Multiple biological surveys (Terry & Hart 2013; Rathbun & Johansen 2019; LeGrande 2024) documented the federally endangered plant species *Cyrtandra nanawaleensis* within and adjacent to the Petition Area. These studies noted a declining population over time due primarily to factors external to quarry operations, including habitat degradation from ROD, volcanic events, invasive species proliferation, and disturbances from feral animals.

Specifically, biological surveys show a significant reduction in *Cyrtandra nanawaleensis* populations since the initial 2013 survey, in which more than a hundred individuals were recorded. Subsequent surveys (2019 and 2024) revealed only small, declining clusters of this species, primarily located in areas characterized by degraded forest habitats outside planned quarry expansion zones. These reductions were clearly attributed to the cumulative pressures of invasive species, ROD outbreaks, and habitat fragmentation from recent volcanic activity in the Puna region.

The existing license agreement with Kamehameha Schools explicitly mandates protective buffers of at least 70 feet around known populations of *Cyrtandra nanawaleensis*, accompanied by fencing to safeguard against operational encroachment. Moreover, quarry expansion activities have been carefully planned to avoid all currently identified populations of the endangered plant. Through this license agreement, Sanford's Service Center is obligated to disclose the presence of endangered species to the land owner and keep the land owner informed regarding governmental proceedings with reference to endangered species.

Furthermore, informal consultations with the USFWS concluded that the Proposed Action would not necessitate Section 10 incidental take permitting under the ESA. Despite the absence of this formal requirement, the Applicant has voluntarily committed to adhering to USFWS-recommended BMPs to provide additional protection for endangered species, including careful avoidance measures, fencing, and active habitat management to mitigate indirect impacts.

Critically, the Applicant's continued presence and operations within the Petition Area offer structured opportunities for active conservation management that would otherwise be unavailable. With declining habitat quality and ongoing environmental threats unrelated to quarry activities, the Applicant's commitment to proactive management (e.g., fencing, invasive species control, native plant revegetation, and ongoing population monitoring) directly contributes to stabilizing and potentially improving the condition of these endangered species populations.

Thus, although the Proposed Action intersects sensitive ecological contexts involving federally endangered species, the comprehensive mitigation strategies (required by licensing, voluntarily implemented, and reinforced through coordination with USFWS) ensure that substantial adverse effects are effectively avoided or minimized. In this sense, quarry operations at Puʻu Kaliʻu play a beneficial role by actively supporting conservation outcomes that would otherwise lack dedicated management resources, given the broader ecological challenges facing these species in the area.

(10) The Proposed Action will not have a substantial adverse effect on air or water quality or ambient noise levels.

The Proposed Action is not anticipated to have a substantial adverse effect on air quality, water quality, or ambient noise levels. Potential impacts to these environmental qualities have been identified and addressed through the consistent implementation of BMPs and Standard Operating Procedures, as detailed comprehensively in **Chapters 3** and **5**.

Regarding air quality, quarry operations primarily generate fugitive dust during excavation, handling, and transport of cinder material. However, dust emissions are effectively minimized through regular water application as needed. Water use for quarrying operations is minimal and is utilized solely for periodic dust suppression. The abundant rainfall characteristic of the Petition Area further naturally mitigates dust, significantly reducing reliance on supplemental watering.

Concerning water quality, the highly permeable volcanic soils and substrate at the quarry site effectively prevent erosion, runoff, and sedimentation issues. Additionally, no hazardous substances or chemicals are utilized in quarrying operations, apart from routine operational fluids such as fuel and lubricants required for machinery operations. These substances are carefully stored, managed, and disposed of in compliance with state and federal regulations, thereby minimizing risks to water quality.

Ambient noise impacts are managed effectively through operational BMPs, such as strictly limited operational hours and controlled use of heavy machinery. As documented in **Section 3.6**, operational noise levels are consistently within acceptable regulatory thresholds. Furthermore, the surrounding geography, dense vegetation, and designated buffer zones provide significant noise attenuation, effectively limiting noise impacts to nearby residential communities, including Leilani Estates.

Consequently, given the project's proactive management practices, natural site conditions, and ongoing adherence to applicable state and federal regulations, the Proposed Action will not result in significant adverse impacts on air quality, water quality, or ambient noise levels.

(11) The Proposed Action may be likely to suffer damage by being located on geologically hazardous land; the Proposed Action will not have a substantial, adverse effect on an environmentally sensitive area, such as a floodplain, tsunami zone, erosion-prone area, estuary, freshwater, or coastal waters.

The Petition Area is located inland and outside flood zones, tsunami evacuation zones, coastal ecosystems, or areas prone to substantial erosion or sediment runoff. However, the Petition Area is squarely within Lava Flow Hazard Zone 1, signifying the highest risk classification for volcanic activity. Lava Flow Hazard Zone 1 includes areas directly situated within the East Rift Zone of Kīlauea Volcano, where historical eruptions have frequently occurred, including the major 2018 eruption event associated with nearby Fissure 8, located approximately 0.7 miles from Pu'u Kali'u.

Given the Petition Area's proximity to the active volcanic region and its classification in Lava Flow Hazard Zone 1, there is a recognized possibility that the quarry site could sustain damage from future lava flow inundations or related volcanic activities. The geological setting places the Petition Area at higher seismic risk, with historically notable earthquakes, including a magnitude 6.9 earthquake in May 2018, occurring in the vicinity.

Nevertheless, despite this heightened volcanic and seismic risk, significant adverse environmental impacts due to damage at the quarry are unlikely. Quarry operations at the Petition Area do not involve permanent structures or infrastructure. Machinery and equipment utilized on-site are mobile and designed for rapid evacuation. As demonstrated during the 2018 eruption, Sanford's Service Center successfully implemented evacuation protocols, quickly relocating personnel and equipment to safe locations. The Draft Evacuation Plan (**Appendix F**) provides explicit procedures for volcanic and seismic hazards, detailing evacuation triggers, hazard evaluations, and operational cessation to protect worker safety and property.

Importantly, in the event of future lava flow inundation, there would be no hazardous materials or permanent infrastructure remaining on-site that could pose environmental contamination risks or public safety hazards. Any volcanic impacts would primarily result in operational disruptions and quarry closure. Additionally, the Petition Area's high-permeability volcanic substrates inherently limit risks associated with erosion or runoff even after volcanic events.

(12) The Proposed Action will not have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies.

As described in **Section 3.2.3**, the Proposed Action is visually screened by existing topography and vegetation, effectively minimizing any scenic or visual impacts from public viewplanes or roadways. License conditions explicitly prohibit modification of the Pu'u Kali'u summit, preserving its scenic profile and visual integrity.

(13) The Proposed Action will not require substantial energy consumption or emit substantial greenhouse gases.

Quarry operations require minimal energy consumption, primarily for excavation equipment and transport vehicles. Greenhouse gas emissions remain negligible within regional contexts and do not approach state or federal thresholds for significant climate-related impacts, as discussed in **Section 3.10**.

5.3 County of Hawai'i Policies

5.3.1 Hawai'i County General Plan

Background: The Hawai'i County General Plan is the County's primary long-range planning document, guiding land use, economic development, infrastructure, and environmental management across the island of Hawai'i. It establishes policies and land use designations that shape growth while balancing conservation, agricultural productivity, and resource-based industries. The General Plan informs zoning regulations, capital improvement planning, and land use decisions, serving as the framework for both government agencies and private development projects.

Currently, the 2005 General Plan is the official, published version. It employs the Land Use Pattern Allocation Guide (LUPAG) to classify lands into various categories, including urban, rural, agricultural, industrial, and conservation uses. The plan emphasizes protecting natural and cultural resources while allowing for responsible economic development, particularly in agriculture, tourism, and resource-based industries. However, as economic conditions, environmental challenges, and land use needs have evolved, the County has undertaken a comprehensive update to refine its long-term planning priorities.

The Final Recommended Draft General Plan 2045 represents this proposed update, incorporating modern planning priorities such as climate resilience, sustainability, and economic diversification. A key shift in the 2045 Draft is the transition from LUPAG to a General Plan Land Use Designation system, which refines how land use categories are defined and applied. The new system introduces designations such as Productive Agriculture, reflecting a broader recognition of agriculture and resource-based industries as essential to the County's future. While the 2005 General Plan remains the governing document, decision-makers increasingly consider the 2045 Draft as an indicator of the County's evolving policy direction. This means that projects aligning with the 2045 Plan may be viewed favorably, even if amendments to the 2005 Plan are necessary for formal conformance.

Discussion - 2005 General Plan: The 2005 Hawai'i County General Plan serves as the County's legally binding planning framework, guiding land use and resource management decisions. Under this plan, the LUPAG designates the Petition Area as Conservation. However, the plan also emphasizes the importance of resource-based industries that contribute to local self-sufficiency and agricultural productivity.

While the Conservation designation is intended to protect significant environmental and cultural resources, the 2005 General Plan supports responsible economic activities that utilize Hawai'i Island's natural resources in a sustainable manner. The Proposed Action aligns with these policies by maintaining an established cinder mining operation that supplies essential materials for soil amendment and landscaping—critical inputs for Hawai'i's agriculture and nursery industries. Additionally, the 2005 General Plan promotes a balanced approach to conservation and economic development, recognizing the necessity of industries that contribute to long-term sustainability.

The 2005 General Plan also highlights the protection of cultural and environmental resources as a planning priority. Pu'u Kali'u is identified as a significant landform with cultural and historical importance. In alignment with the plan's objectives, the Applicant's License Agreement explicitly prohibits any modifications to the summit of Pu'u Kali'u, preserving its physical integrity and cultural significance. Furthermore, mining and quarrying activities are confined to designated areas, ensuring that the slopes of Pu'u Kali'u remain undisturbed and visually prominent within the landscape. These

measures comply with the General Plan's emphasis on conserving key environmental and cultural resources while allowing for responsible resource-based economic activities.

Discussion - 2045 Final Recommended Draft General Plan: The Final Recommended Draft General Plan 2045 builds upon the 2005 General Plan by incorporating modern planning priorities, including climate resilience, sustainability, and economic diversification. One of the most significant shifts in the 2045 Draft Plan is the transition from the LUPAG system to a General Plan Land Use Designation system. Under this new framework, the Petition Area is proposed for reclassification from Conservation to Productive Agriculture, reflecting a broader recognition of agriculture and resource-based industries as essential to the County's economic future.

The Proposed Action aligns with this updated planning vision, as it provides land use flexibility to support resource-based industries such as cinder extraction, which is an essential input for agricultural and horticultural operations. The 2045 Draft General Plan acknowledges that a diversified economy must include industries that sustain agricultural productivity and environmental stewardship, making the reclassification of the Petition Area consistent with evolving policy directions.

The 2045 Draft General Plan also strengthens the County's commitment to biocultural stewardship and climate resilience. This expanded focus includes enhanced protections for native species and critical habitats. The Applicant's License Agreement includes conservation measures that directly support these objectives. Specifically, a 70-foot buffer has been established around all known populations of *Cyrtandra nanawaleensis*, a federally listed endangered species within the licensed area. The buffer is reinforced with fencing to prevent disturbance, and the License Agreement mandates Sanford's Service Center is obligated to disclose the presence of endangered species to Kamehameha Schools and keep Kamehameha Schools informed regarding governmental proceedings with reference to endangered species.. These measures reflect both the 2005 and 2045 plans' emphasis on balancing resource use with environmental protection.

The Proposed Action follows a comprehensive resource management approach that preserves Pu'u Kali'u and its surrounding habitat while allowing for the continued operation of a necessary industry. By aligning with both the 2005 and 2045 General Plans' policies on resource-based industries, environmental protection, and cultural preservation, the project represents a responsible and forward-looking land use decision for Hawai'i County.

5.3.2 Hawai'i County Zoning Ordinance

Background: The Hawai'i County Zoning Code (Chapter 25, Hawai'i County Code) establishes zoning districts and regulates land use to guide development in alignment with the County's General Plan. It defines zoning classifications, permitted and conditional uses, and development standards such as lot sizes, setbacks, and height restrictions. The ordinance also provides mechanisms for land use adjustments through permits, variances, and zoning amendments.

Zoning districts under Chapter 25 include residential, agricultural, commercial, industrial, resort, and open space classifications, each with specific regulations governing land use and development. The code also establishes procedures for reviewing and permitting activities that may not be explicitly allowed within a given zoning designation. This framework ensures that land use decisions consider environmental, economic, and community factors while maintaining consistency with County planning policies.

The Petition Area is zoned Agricultural (A-20a), which designates agricultural land with a 20-acre minimum lot size. Agricultural zoning is intended to support farming, ranching, and other agricultural operations, with allowances for accessory uses that directly support agricultural production. This zoning classification prioritizes agricultural viability while allowing certain compatible land uses under specific conditions.

Discussion: The Hawai'i County Zoning Code establishes land use regulations for various zoning districts, including permitted uses, development standards, and approval processes for non-permitted uses. The Petition Area is currently zoned Agricultural (A-20a), which designates agricultural land with a 20-acre minimum lot size. Agricultural zoning is intended to support farming, ranching, and other agricultural operations, with allowances for accessory uses that directly support agricultural production.

The Proposed Action seeks a SLUDBA to place the Petition Area within the State Land Use Agricultural District. While the County's Agricultural (A-20a) zoning designation remains unchanged, mining and quarrying activities are not explicitly listed as allowable uses under Chapter 25. Instead, such activities require a Special Permit for approval within the Agricultural zoning district.

Under Section 25-2-42 of the Hawai'i County Code, Special Permits allow for "unusual and reasonable uses" within a zoning district that are not explicitly permitted but may be considered appropriate under certain conditions. Mining and quarrying activities fall within this category and therefore require a Special Permit approval from the Windward Planning Commission. Furthermore, since the Petition Area exceeds 15 acres, the Special Permit must also be reviewed and approved by the LUC per HRS §205-6.

Through this process, the Proposed Action will achieve consistency with Hawai'i County Zoning Code. The Special Permit review ensures that non-agricultural uses within the Agricultural District are carefully evaluated for their compatibility with surrounding land uses, environmental and infrastructure impacts, and alignment with County planning policies. Approval of the Special Permit by both the Windward Planning Commission and the LUC would provide conformance for expanded mining and quarrying activities within the regulatory framework established in Hawai'i County Zoning Code.

Chapter 6

Agencies and Parties Consulted

Chapter 6

Agencies and Parties Consulted

6.1 EISPN Consultation List

The EISPN was published by the Environmental Review Program in *The Environmental Notice* on January 8, 2025 to notify agencies, organizations, and individuals that a Draft EIS would be prepared. Publication of the EISPN was followed by a 30-day public comment period to solicit guidance on the scope of the studies to be prepared and to gather input on important topics to be covered in the Draft EIS. A comment extension was published by the Environmental Review Program in *The Environmental Notice* on February 23, 2025, to further solicit agency and public feedback, extending the comment period to a total of 58 days. Table 6-1 lists those agencies, organizations, and individuals that received notification of the EISPN publication. A total of 37 agencies and individuals provided responses during the EISPN public comment period.

Table 6-1 EISPN Consultation List

Respondents and Distribution	Received EISPN Notification	Submitted EISPN Comments	Received Draft EIS Notification
Federal Agencies			
Department of Agriculture, Natural Resources Conservation Service	X		X
Department of the Interior			
Fish and Wildlife Service	X	X	X
Geological Survey, Hawaii Volcano Observatory	X		X
Pacific Islands Water Center	X		X
Environmental Protection Agency, Region IX	X		X
State of Hawai‘i Agencies			
Big Island Association of Nurserymen	X		X
Department of Agriculture	X		X
Department of Accounting and General Services	X	X	X
Department of Business, Economic Development & Tourism	X		X
Land Use Commission		X	X
Department of Corrections and Rehabilitation	X	X	X
Department of Hawaiian Home Lands	X		X
Department of Health	X		X

Table 6-1 EISPN Consultation List			
Respondents and Distribution	**Received EISPN Notification**	**Submitted EISPN Comments**	**Received Draft EIS Notification**
Clean Air Branch		X	X
Department of Land and Natural Resources	X		X
Engineering Division		X	X
Land Division		X	X
Office of Conservation and Coastal Lands		X	X
Department of Transportation	X	X	X
Environmental Review Program	X		X
Office of the Governor, Hawai'i Island Liaison	X		X
Office of Hawaiian Affairs	X		X
Office of Planning and Sustainable Development	X	X	X
State Historic Preservation Division	X		X
County of Hawai'i Agencies			
Civil Defense Agency	X		X
Department of Environmental Management	X		X
Department of Finance	X		X
Department of Public Works	X		X
Department of Water Supply	X		X
Fire Department	X		X
Planning Department	X	X	X
Police Department	X	X	X
Solid Waste Division		X	X
Elected Officials			
County Councilmember Matt Kanealii-Kleinfelder, County Council District 5	X		X
Mayor Kimo Alameda	X		X
Representative Greggor Ilagan, State House District 4	X		X
Senator Joy San Buenaventura, State Senate District 2	X		X
Civic Society			
Association of Hawaiian Civic Clubs	X		X
Cave Conservancy of Hawai'i	X		X
Sierra Club	X		X
Puna Community Development Plan Committee	X		X

Table 6-1 EISPN Consultation List			
Respondents and Distribution	**Received EISPN Notification**	**Submitted EISPN Comments**	**Received Draft EIS Notification**
Hawai'i Export Nursery Association	X		X
Hawai'i Floriculture and Nursery Association	X	X	X
Hawai'i Island Chamber of Commerce	X		X
Hawai'i Tropical Flower Council		X	X
Historic Hawai'i Foundation	X		X
Hui Iwi Kuamoo	X		X
Orchid Growers of Hawai'i		X	X
Puna Aha Council Piilani Kaawaloa	X		X
Sierra Club, Moku Loa Group	X		X
University of Hawai'i, College of Tropical Agriculture and Human Resources Waiakea Research Station		X	X
Businesses and Individuals			
Big Island Screened Cinder		X	X
Brent Branley		X	X
C&S Topsoil		X	X
Chambers Landscaping		X	X
California and Hawaii Foliage Growers		X	X
East Hawaii Carpentry & Maintenance		X	X
Green Point Nurseries		X	X
Hawaiian Earth Recycling LLC		X	X
Hawaii Island Cinder LLC		X	X
Island Landscaping & Maintenance		X	X
M. Nakamura Nursery, LLC		X	X
Mountain Meadows, Inc.		X	X
Panaewa Foliage		X	X
Pineback Landscaping		X	X
Puna Certified Nursery		X	X
Puna Rock Co., LTD.		X	X
Quindembo Bamboo Nursery		X	X
SL Kuwahara Partners, LLC.		X	X
Soil Plus Kona		X	X
The Miranda Group, Inc.		X	X

Table 6-1 EISPN Consultation List			
Respondents and Distribution	**Received EISPN Notification**	**Submitted EISPN Comments**	**Received Draft EIS Notification**
Other			
Hawai'i Electric Light Company, Inc.	X		X
Hawaiian Telcom, Inc.	X		X
Hawai'i State Public Library	X		X
Hilo Public Library	X		X
Keaau Library	X		X
Pahoa Public Library	X		X
Hawai'i Tribune Herald	X		X
West Hawai'i Today	X		X

6.2 EIS Public Scoping Meeting

Publication of the EISPN in *The Environmental Notice* was followed by two public scoping meetings held on January 20, 2025 and March 3, 2025, respectively. The meetings were held virtually for the convenience of attendees and presenters. One member of the public attended the first meeting, and no members of the public attended the second meeting. No community questions or concerns were identified at the public scoping meetings. The materials from the public scoping meetings can be found in Appendix J.

6.3 EISPN Comment Responses

A total of 37 agencies, organizations, and individuals provided comments during the 58-day public comment period for the EISPN, as required under HAR §11-200.1-23. In accordance with HAR §11-200.1-24(b), this Draft EIS includes responses to all substantive comments received during the EISPN comment period. A summary of the substantive comments and corresponding responses is provided in Table 6-2. Comments are organized by major topics.

Pursuant to HAR §11-200.1-24(c), reproductions of each written comment submission received are provided in Appendix I.

Table 6-2 EISPN Summary of Comments and Responses		
Comments	**Commenter**	**Response**
General		
Comment 2. Please consult Hawai'i Administrative Rules, Title 15, Chapter 15, for information on application requirements and decision-making criteria for DBAs and special permits before the LUC. The Draft EIS should assess the environmental impacts of the project and recommend mitigation measures to address these impacts, including those cited in the LUC rules and decision-making criteria.	Office of Planning and Sustainable Development	**Chapter 3** of the Draft EIS provides an analysis of environmental impacts and provides recommended mitigation where applicable.
Comment 3. Please note that the functions of the former Office of Environmental Quality Control have been reassigned to the Environmental Review Program established in OPSD pursuant to Act 152, Session Laws of Hawai'i 2021.	Office of Planning and Sustainable Development	Your comment has been acknowledged.
Project Description		
Comment 1. Land Use Commission staff suggest including expected lifespan of mining operations within the Petition Area, as it would be beneficial during the Future District Boundary Amendments and Future Special Permit petitions. Additionally, please include any information on ancillary buildings required for mining operations.	Department of Business, Economic Development, & Tourism, Land Use Commission	There are no buildings at Leilani Quarry and no building development is planned. **Section 1.2** provides information regarding the expected lifespan of mining and quarrying activities within the Petition Area.
Comment 1. Please provide a discussion on the reasons the subject property was designated within the State Land Use Conservation District and classified under the "Limited" subzone. Specifically, explain what characteristics, natural/cultural resources, or site conditions led to its inclusion in these land use designations.	Planning Department	The Applicant does not possess direct documentation or records from the State that explain why the Petition Area was originally designated within the State Land Use Conservation District or assigned to the Limited subzone. The State Land Use Commission does not maintain parcel-specific rationales for the initial designations made following the enactment of Hawai'i's land use law in 1961. As a matter of practice during the establishment of the State Land Use District boundaries, lands that did not clearly meet the criteria for Urban, Rural, or Agricultural classification were often placed into the Conservation District. Consequently, many lands, particularly in remote or undeveloped areas, were designated Conservation by default. Nevertheless, this EIS provides extensive site-specific information on the characteristics of the Petition Area that may have informed its

Table 6-2 EISPN Summary of Comments and Responses		
Comments	**Commenter**	**Response**
		inclusion in the Conservation District and Limited subzone. For further discussion of these attributes, please refer to **Sections 3.3** (Biological Resources) and **3.9** (Cultural Resources) of this EIS, as well as **Appendices A, B, C** (biological surveys), and **Appendix G** (archaeological inventory study).
Comment 2. Please provide a copy of the existing Conservation District Use Permit (CDUP-1957) and an aerial map overlaid with the extent of the existing permit area.	Planning Department	Conservation District Use Permits and information on compliance are included in **Appendix K**. The existing permit area is shown as the Petition Area in figures in **Chapter 1**.
Comment 3. Please provide a status report on how the petitioner is currently complying with CDUP-1957 requirements & conditions.	Planning Department	**Chapter 3** and **Chapter 5** present information on the activities and operations which comply with the CDUP requirements and conditions.
Comment 4. Please provide information on the history of any complaints, violations, or enforcement actions against the petitioner for the duration of the quarry operation.	Planning Department	**Section 5.2** and **Appendix K** provide information on CDUP compliance.
Comment 5. Please provide data on the current annual extraction volume of black cinder from the CDUP-1957 permit area. Additionally, estimate the remaining black cinder reserves within the existing permit area and the projected timeframe until depletion at the current extraction rate.	Planning Department	**Section 1.2** provides information about current mining and quarrying activities at Leilani Quarry.
Comment 6. Please provide an estimate of the anticipated amount of black cinder material to be extracted annually from the proposed petition area should the SLUBA and Special Permit be granted.	Planning Department	**Sections 2.1** and **2.2** provide information about current mining and quarrying activities at Leilani Quarry.
Comment 7. Please provide detailed information on the proposed quarry expansion, including the estimated lifespan of the expanded quarry based on projected extraction rates. Specify the anticipated increase in daily truck trips, including haul routes, roadway deterioration, and traffic impact projections. Identify the number and types of new jobs expected to be created, including quarrying, trucking, and post-excavation (e.g., processing, packaging, and delivery). Additionally, provide a breakdown of estimated expansion costs, including equipment, infrastructure, and regulatory compliance expenses. Please also provide a phased timeline for the proposed expansion.	Planning Department	**Section 1.2** provides information about current mining and quarrying activities at Leilani Quarry. **Sections 3.12** and **3.13** discuss and analyze the Proposed Action's impacts to socioeconomics, the local economy, and traffic respectively.
Alternatives		

Table 6-2 EISPN Summary of Comments and Responses		
Comments	**Commenter**	**Response**
Comment 1. The Draft EIS should discuss why Alternative 2 was not selected as the Proposed Action. Alternative 2 involved submission of a Conservation District Use Application to the Board of Land and Natural Resources (BLNR) to reclassify the Conservation District subzone for the Petition Area from Limited (L) to Resource (R). The Resource subzone allows mining and extraction of materials or natural resources with a management plan approved by BLNR in conjunction with a Conservation District Use Permit.	Office of Planning and Sustainable Development	**Chapter 2** provides an alternatives analysis which evaluates each alternative's ability to: fulfill the purpose and need of the Proposed Action; provide regulatory consistency; minimize environmental impacts; and provide long-term viability. The rationale for choosing the Preferred Alternative is provided in **Section 2.1.2**.
Comment 9. Under the alternatives analysis, please provide a more detailed explanation of why the applicant is pursuing a SLUBA and the subsequent Special Permit process is the preferred approach over seeking a Conservation District Subzone reclassification to "Resource" and obtaining a Conservation District Use Permit (e.g. less stringent permitting process, fewer regulatory restrictions on quarrying operations and output, and the overarching conservation priorities that may override quarrying plans in a Conservation District, etc.)	Planning Department	**Chapter 2** provides an alternatives analysis which evaluates each alternative's ability to: fulfill the purpose and need of the Project; provide regulatory consistency; minimize environmental impacts; and provide long-term viability. The rationale for choosing the Preferred Alternative is provided in **Section 2.1.2**.
Existing Conditions and Potential Impacts		
Comment 2. In section 3.0 Existing Conditions and Potential Impacts, please include more information on the preexisting uses and structures within the Petition Area. As mentioned in section 1.0 Introduction, the Future District Boundary Amendment and Future Special Permit will provide improved land use conformance, which alludes to current use, and examining aerial imagery on figure maps it appears there is existing ground disturbance in the Petition Area. ***Additional Map*** Please provide an additional map that delineates and provides the acreage of the current area of use, and expansion area.	Department of Business, Economic Development, & Tourism, Land Use Commission	Information on ongoing activities at Leilani Quarry is provided in **Section 1.2** and throughout **Chapter 3**. As stated in the EIS, there are no structures within the Petition Area. The ground disturbance visible in aerial imagery reflects ongoing quarrying activities, which are further discussed under the relevant resource sections in **Chapter 3**. **Figure 1-3** identifies the existing License Area along with the proposed Petition Area (expansion area).
Comment 10. The preparation of an Environmental Impact Statement (EIS) assumes that certain impacts cannot be avoided, mitigated, or reversed. Please identify and provide details on these impacts.	Planning Department	**Section 4.4** discusses irreversible and irretrievable commitments of resources associated with the Proposed Action; **Section 4.5** provides an analysis of unavoidable adverse impacts. Impacts of the Proposed Action are discussed throughout **Chapter 3** and Alternatives throughout **Chapter 2**.
Hydrology and Water Resources		

Table 6-2 EISPN Summary of Comments and Responses		
Comments	**Commenter**	**Response**
Comment 3. In section 3.2 Hydrology and Water Resources, the EISPN mentions that the mining and quarry activities do not require water, however, if there are any ancillary buildings, please include the information for water requirements.	Department of Business, Economic Development, & Tourism, Land Use Commission	There are no buildings at Leilani Quarry and no building development is planned. **Section 3.5** provides the existing conditions and potential impacts associated with the Proposed Action on water resources. The EIS notes that mining and quarrying activities do not require water.
Biological Resources		
Comment 4. Section 3.2 Biological Resources and the various included studies indicate the Petition Area contains species listed as endangered, threatened, or proposed by the United States Fish and Wildlife Service and/or The Department of Land and Natural Resources. Land Use Commission Staff would like to note that in 2022, the Commission heard a Special Permit Petition for a similar land use, in an area with similar endangered/ threatened species, conditions were imposed in order to mitigate the potential impacts to the species. One of which was to protect ʻōhiʻa trees from Rapid ʻŌhiʻa Death adjacent to and on the subject property. An additional part of the condition was to make any ʻōhiʻa trees that are not infested but need to be removed, that the wood may be available for cultural use.	Department of Business, Economic Development, & Tourism, Land Use Commission	**Section 3.3** provides the existing conditions and potential impacts associated with the Proposed Action on biological resources. **Section 3.3** further provides an overview of existing management measures and license stipulations that protect endangered species, as well as provides recommended mitigation measures.
Comment 1. We support the following activities highlighted in the notice: • The applicant establishing fenced buffer zones for the federally listed plant, Cyrtrandra nanawaleensis. • The plan to survey for listed plants before any vegetation removal or expansion of quarry activities. • Landscaping plan with protocols limiting introduction of new pests and the spread of known noxious plant, invertebrate, and animal species, and light minimization efforts for night-time activities. • We recommend evaluating the structural integrity of the Pu'u in relation to quarry activities, so that quarry activities will not impact individuals of Cyrtandra nanawaleensis.	U.S. Fish and Wildlife Service	Native files for multi-modal counts and accompanying analyses will be provided to the Department of Transportation Services Regional Planning Branch upon publication of the EIS. The structural integrity of Pu'u Kaliu has not been evaluated Mining and quarrying activities reach a maximum elevation of 990 ft (**Figure 3-5**) and do not impact *Cyrtandra nanawaleensis.*

Table 6-2 EISPN Summary of Comments and Responses		
Comments	**Commenter**	**Response**
Comment 2. • Are the Cyrtandra nanawaleensis populations currently in a fenced exclosure? If so, how big is the exclosure and is the exclosure free of feral pigs and when was the exclosure built? We recommend using ungulate proof fencing for the exclosure and inspecting it regularly (at least twice a year, especially after storms and big wind events) to prevent ingress from feral pigs. Fences should be maintained so they remain in good condition and repaired immediately when signs of failure are observed. • Genetic representation of this population of Cyrtandra nanawaleensis - Have propagules been collected, propagated, and/or planted else for this population of Cyrtandra nanawaleensis? Due to the decline of this population since 2013, we are concerned that the genetic representation of this species could be lost. We recommend collecting seeds to be placed in a seed storage facility and/or propagating and outplanting the species to establish a stable or increasing population(s) off-site to secure the genetics of this species. • How will the Cyrtandra nanawaleensis populations be marked to ensure buffers are followed? We recommend using flagging (replace when needed) and/or permanent marking, so that plants are clearly marked and can be avoided. We recommend establishing a buffer distance of 250m from the populations to reduce impacts from heavy equipment. Our buffer distances by project actions are found in the attached Avoidance and Minimization Measures (AMMs) for Listed Plants. • We recommend all staff working in the vicinity of the Cyrtandra nanawaleensis populations be made aware of this endangered plant by creating a flier to educate staff and posting this flier on site. Additionally, staff working in the vicinity should be made aware of the buffer distances and markers established to protect this plant. • We recommend incorporating our AMMs for listed plant and animal species potentially occurring in the area into your project description (see attached AMMs for Plants and Animals). as Additionally, we recommend incorporating our Invasive Species Biosecurity Protocols for Hawai'i to reduce spreading or introducing invasive species, which causes negative	U.S. Fish and Wildlife Service	Existing management measures and mitigation measures for *Cyrtandra nanawaleensis* are presented in **Section 3.3.1**.

Table 6-2 EISPN Summary of Comments and Responses		
Comments	**Commenter**	**Response**
ecological consequences to new areas or islands, resulting in potential impacts to plants, wildlife, and their habitat.		
Air Quality		
Comment 1. All project activities shall comply with Hawaii Administrative Rules (HAR), Chapter 11-59 and 11-60.1. If your proposed project: Requires an Air Pollution Control Permit • You must obtain an air pollution control permit from the Clean Air Branch and comply with all applicable conditions and requirements. If you do not know if you need an air pollution control permit, please contact the Permitting Section of the Clean Air Branch. • Permit application forms can be found here: https://health.hawaii.gov/cab/permit-application-forms/	Hawai'i Department of Health, Clean Air Branch	The Applicant acknowledges the requirement to comply with HAR Chapters 11-59 and 11-60.1. The proposed project does not involve equipment or activities that meet the thresholds requiring an air pollution control permit under HAR Chapter 11-60.1. Quarry operations are limited in scale and do not include stationary sources subject to permitting. See **Section 3.10** of the EIS for a discussion of air quality impacts.
Comment 2. Has the potential to generate fugitive dust • You must reasonably control the generation of all airborne, visible fugitive dust. Note that construction 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, visible fugitive dust. The plan, which does not require Department of Health approval, should help you recognize and minimize potential airborne, visible fugitive dust problems. • Construction activities must comply with the provisions of Hawaii Administrative Rules, §11- 60.1-33 on Fugitive Dust. In addition, for cases involving mixed land use, it is strongly recommended that buffer zones be established, wherever possible, in order to alleviate potential dust concerns. • You must provide reasonable measures to control airborne, visible fugitive dust from the road areas and during the various phases of construction. These measures include, but are not limited to, the following:	Hawai'i Department of Health, Clean Air Branch	A discussion of existing conditions and potential impacts related to air quality, including fugitive dust, is provided in **Section 3.10** of the EIS. This section also describes existing dust control practices and outlines recommended mitigation measures to ensure compliance with HAR §11-60.1-33. In addition, buffer zones have been established and are shown in **Figure 1.3**. These measures collectively help minimize the generation of airborne, visible fugitive dust during all phases of activity.

Table 6-2 EISPN Summary of Comments and Responses		
Comments	**Commenter**	**Response**
• Planning the different phases of construction, focusing on minimizing the amount of airborne, visible fugitive dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact; • Providing an adequate water source at the site prior to start-up of construction activities; • Landscaping and providing rapid covering of bare areas, including slopes, starting from the initial grading phase; • Minimizing airborne, visible fugitive dust from shoulders and access roads; • Providing reasonable dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and • Controlling airborne, visible fugitive dust from debris being hauled away from the project site. • If you have questions about fugitive dust, please contact the Enforcement Section of the Clean Air Branch. Please also see fugitive dust fact sheet at: https://health.hawaii.gov/cab/files/2024/02/Hawaii-Fugitive-Dust-Fact-Sheet-February-2024.pdf.		
Comment 3. Includes construction, demolition, or renovation activities that involve potential asbestos and lead containing materials • Please contact the Indoor and Radiological Health Branch at (808) 586-4700 or visit: https://health.hawaii.gov/irhb/	Hawai'i Department of Health, Clean Air Branch	The proposed project does not involve construction, demolition, or renovation activities that would disturb asbestos- or lead-containing materials.
Comment 4. Increases the population and potential number of vehicles in an area • The creation of apartment buildings, complexes, and residential communities may increase the overall population in an area. Increasing the population in an area may inadvertently lead to more air pollution via vehicle exhaust. Vehicle exhaust releases pollutants in the air that can negatively impact human health and air quality, including lung irritants, carcinogens, and greenhouse gases. • Ensure that drivers keep vehicle idling times to three (3) minutes or less.	Hawai'i Department of Health, Clean Air Branch	Traffic-related impacts are analyzed in **Section 3.13**, and greenhouse gas emissions are discussed in **Section 3.10**. The Proposed Action does not involve construction of residential or commercial facilities and will not result in an increase in population or associated vehicle use.

Table 6-2 EISPN Summary of Comments and Responses		
Comments	**Commenter**	**Response**
• Consider and incorporate support for alternative transportation options such as bike racks and/or electric vehicle charging stations where possible.		
Noise		
I object to the operation of a quarry near my home in Lailani Estates. This will destroy the quiet enjoyment of my home. This type operation should not be allowed next to a residential area.	Brent Branley	Potential noise impacts associated with quarry operations are analyzed in **Section 3.6**. The proposed expansion will not increase the amount of noise generated at the Leilani Quarry. A 200-foot buffer separates the licensed quarry area from the nearest residences in Leilani Estates. Noise levels at this distance are expected to remain within applicable Class C noise standards, and the existing topography and vegetation further reduce potential impacts.
Economics		
This letter is to show support for the expansion of cinder mining and quarrying activities, this will help to continue providing cinder media to our nurserymen and nurserywomen. It is important for industry to have reliable access to cinder media, as it is used by a significant number of agriculture businesses and is required for the exporting of potted plants. Without access to cinder, the growth of our Ornamental/Floriculture industry will be limited. We consider access to cinder as a growing media to be essential to our industry and without it we can not flourish.	Eric Tanouye, Hawai'i Floriculture and Nursery Association	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
Thank you for allowing us to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. We support the continued use of the Leilani Quarry and its ability to responsibly expand to continue operations. We believe it is important to our industry to be able to grow and produce our products and to do so, we need the cinder that is produced at the Leilani Quarry. This cinder pit has allowed the industry to receive cinder media in a timely manner. The media has been clean of nematodes and has been a good quality to use for floriculture and ornamental use. This media is the only affordable option for media for floriculture and ornamental use locally and a lack of supply would do serious harm to our industry as there is no other equivalent option.	Thong Teng Neo, Hawai'i Tropical Flower Council	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
OGOH would like to give our support for the continued use of the Leilani Quarry. Access to this media allows our growers to have access to clean, quality cinder that can be used to grow the orchids and floriculture for our industry. This media	Jonathan Tanouye, Orchid Growers of Hawaii	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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has become prevalent throughout our industry and I could not imagine our industry without it's use. Our growers and landscapers would not have a reliable or economical alternative and many would be forced to quit.		
We would like to share our STRONG SUPPORT for the continued use of the Leilani Quarry cinder pit. It is important for floriculture growers to have access to a source of affordable and quality media to grow our plants with. The Leilani Quarry provides access to black cinder that is an economical growing media for our anthurium and tropical plants. It also serves as an economical media for island landscapers. We do not have access to other media that could serve in this role, especially when taking into account the price of other media options. This cinder allows us to grow tropical cut flowers and foliage that we export locally, nationally and internationally. As part of generation succession, I do have concerns on the future of our industry if we do not find and are provided more access to quality black cinder. This is a valuable resource that is unique to Hawaii and assists nurserymen and women to produce high quality Floriculture and ornamentals.	Chris Tanouye, Green Point Nurseries	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
Thank you for the opportunity to submit comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. I am writing to express strong support for the continued operation and responsible expansion of this quarry, which provides significant economic and agricultural benefits to our community and beyond. Sanford's Service Center is a valued local business serving the growing community and economy of Puna. By employing local residents and supporting working families, the quarry plays an important role in sustaining local livelihoods. The black, low-density cinder produced at Leilani Quarry is especially prized by the nursery industry, which depends on reliable access to this unique media for horticultural success. There are over 80 nurseries on Hawai'i Island that benefit from this product, making its continued availability crucial to the island's economy. The State of Hawai'i has previously recognized the economic importance of black cinder for the horticultural and nursery industries. Sanford's Service Center is one of the few remaining dependable suppliers of this vital resource. Allowing the continued use and measured expansion of Leilani Quarry will	Mark Jernigan, Soil Plus Kona	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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ensure the long-term sustainability of these industries, benefiting not only Hawai'i Island but the entire state. As a business serving West Hawai'i nurseries since 1989, Soil Plus understands firsthand the importance of black cinder. Our nursery customers depend exclusively on the cinder from Sanford's Leilani Quarry. Without it, the agricultural industry in Hawai'i would face serious challenges in meeting its production needs. For these reasons, I urge your favorable consideration of the Proposed Action to secure the future availability of black cinder and support the economic growth and stability of our agricultural sector.		
The black cinder that Sanford's Service Center supplies is essential to our business; there is no acceptable replacement or substitute for the black cinder they provide. We wholeheartedly support the Proposed Action for Sanford Service Center Leilani Quarry. You undoubtedly know that Sanford's Service Center Is important to the economy of Puna as they employ local people, and therefore also their families. And, in extension, their black cinder helps support countless others on this island who are engaged in horticulture for whom their black cinder is important or essential. It is apparent that the State of Hawaii is aware of the importance of black cinder for the horticultural industry as a whole, and has been supportive of that endeavor historically.	Susan Ruskin & Peter Berg, Quindembo Bamboo Nursery LLC	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
We are a landscape plant nursery in Panaewa on the big Island and we use hundreds of cubic yards of cinder from Sanford's on a weekly basis. Our market encompasses Oahu, Maui, Kauai, and the Big Island. We need Sanford's services, a critical part of our business. Sanford's is our only source of cinder. Your support will be greatly appreciated.	Raymond H. Tanouye, Mountain Meadows, Inc	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
Sanford's Service Center is a vital local business within the Puna community, providing employment to residents and supporting working families. The cinder produced at Leilani Quarry is a low-density, black cinder that is highly sought after by the nursery industry. Sanford's Service Center plays a crucial role in supplying this specialized cinder to the 8- nurseries located on Hawai'i Island as	Brandon Miranda, The Miranda Group, Inc.	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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well as landscapers and nurseries on other islands. Beyond directly employing local workers, the black cinder supports various local businesses and contributes significantly to the East Hawai'i economy. The State has recognized the economic significance of black cinder for the horticultural and nursery sectors. Sanford's Service Center is among the few dependable sources of this essential resource. Therefore, the continued use and potential expansion of Leilani Quarry is vital for the sustainability of the horticultural and nursery industries, further aiding the economic development of both Hawai'i Island and the broader State.		
I am writing to express my strong support for the proposed action to expand Sanford's Service Center Leilani Quarry to allow them to produce the quality black cinder we require to have the potting media we use to grow potted ornamental plants we export. As a resident and member of the community, I believe that the expansion of this facility will bring significant benefits to our area and contribute to its long-term growth and sustainability. Sanford's Service Center Leilani Quarry has been a cornerstone of our local economy for many years, providing essential cinder for construction, nursery operations, and infrastructure projects. The quarry's operations have consistently demonstrated a commitment to environmental stewardship, safety, and community engagement. Their adherence to stringent regulatory standards ensures that their activities have a minimal impact on the surrounding environment while delivering critical resources for our community's development. The proposed expansion of Leilani Quarry is a necessary step to meet the increasing demand for high quality cinder in our state. As our industry continues to grow, so too does the need for reliable sources of this essential material. Expanding the quarry's operations will allow Sanford's Service Center to supply cinder efficiently and cost-effectively, supporting the many nurseries on our island and state. Moreover, the expansion of Leilani Quarry will create job opportunities for local residents, contributing to economic stability and prosperity. The quarry's operations require a diverse range of skilled workers, from heavy equipment operators to truck drivers. By providing stable, well-paying jobs, the quarry helps to support families and strengthen our community's social fabric.	Kurt Fujioka, Panaewa Foliage	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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The cinder produced from Leilani Quarry is critical for our nursery operations. It's low density and high porosity is critical for the cultivation of high quality potted ornamental plants which in turn sustains our local agricultural industry. Our company employs 25 workers and generates millions of dollars annually for Hawaii's economy. Without the cinder from Leilani Quarry, we wouldn't be able to produce quality potting media to keep growing high-quality plants. In conclusion, I wholeheartedly support the proposed expansion of Sanford's Service Center Leilani Quarry and their continued use to produce to critical black cinder we need. The benefits to our community are manifold, encompassing economic growth, job creation, environmental stewardship, and regional development. I urge you to approve this proposal and allow Sanford's Service Center to continue their valuable work in our community.		
Sanford's Service Center is a small, local business within the growing community and economy of Puna, employing local people and supporting local, working families. The cinder produced at the Leilani Quarry is a low-density, black-colored cinder highly valued by the nursery industry. Sanford's Service Center provides reliable access to this specific cinder media to local nurseries, of which there are 80 on Hawai'i Island. Aside from the direct employment of Puna residents, the black cinder produced by the Leilani Quarry supports local businesses and the economy of East Hawai'i. The State has previously acknowledged the economic importance of black cinder to the horticultural and nursery industry. Sanford's Service Center remains one of the few reliable sources of this important resource. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry, further contributing to the economic progress of not only Hawai'i Island, but the entire State.	Russell Y. Kuwaye, Puna Rock Co., Ltd.	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
This letter represents our continued support for Sanford's Service Center Leilani Quarry and its production of cinder which we use for creating a lightweight media for raised planters on roof top gardens and inorganic mulch for groundcover minimizing chemical weed control. Our nursery incorporates cinder in propagation media to allow for aeration which plants require for root development and growth, especially for the expanding native plant market.	Patrick G. Kuniyoshi, Island Landscaping & Maintenance, Inc	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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Sanford's Service Center has been a reliable source for a cost-effective resource vital to sustaining and expanding plant production as well as the high-rise landscaping projects for where alternative products need to be outsourced from Hawaii which is not cost effective.		
I am writing this letter of support for the expansion of Sanford's Leilani black cinder quarry. I have a landscaping and nursery operation with over 100 employees. We have been utilizing black cinder from Leilani quarry for many years. Black cinder is a major component of the landscape architect specified soil that we use on our installation projects. For the year of 2025 we will need approximately 20,000 cu. yds. of soil for our projects so not having access to black cinder is a major concern. Our nursery operation utilizes black cinder daily as it is the preferred media to incorporate with topsoil for the planting mix that we use. As Sanford's is the only source for black cinder it is critical to expedite their request for quarry expansion so they can continue to supply the landscaping industry. Thank you for the opportunity to express support for Sanford's Cinder request.	Craig Chambers, Chambers Landscaping	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
I am writing this in support of Sanford's cinders request for their black cinder quarry expansion at their Leilani location. We have a topsoil & aggregate company in Kona (C&S Topsoil). We supply contractors, gardeners, homeowners, state and county agencies. Black cinder is a major component of our topsoil blends that we produce. We supply a large volume to landscape contractors that rely on us to provide them a specialized topsoil blend preferred by landscape architects and horticulturalists. Currently Sanford's cannot supply the black cinder that we need to service our customers. This will affect the entire landscape and nursery industry island wide as Sanford's is the only source for black cinder. It's critical that this expansion is approved.	Dody Underwood, C&S Topsoil	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
Sanford's and Hawaiian Earth (Hawaii's largest recycling & composting facility) have been working together for decades. Sanford's service and cinder material have allowed us at Hawaiian Earth to provide our customers statewide with the very best soil products to undertake many development projects both past and	Marvin Min, Hawaiian Earth	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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present. We service customers on every island. Hawaiian Earth services developers, contractors, landscapers, nurseries, and every day residents. We truly believe that our locally produced black cinders are unique to Hawaii and stand behind the quality and great service performed by Sanford's. The Hawaii Department of Agriculture also promotes "Buy Local" (see picture below from the HDOA) and it is vital that we support local businesses such as Sanford's. The only option available to us beside black cinders would be to import both foreign or mainland pumice (volcano stones) or perlite (volcanic glass)- both of which are very expensive. The high cost of shipping these products in are not in Hawaii's best interest. These are the reasons why it is important to "Buy Local" and keep monies in the state and reward our local businesses who work tirelessly to support not only the Big Island, but the entire state. The State has previously acknowledged the economic significance of black cinder to the horticultural and nursery industries. Sanford's Service Center remains the only reliable sources of this essential resource, as they have invested in equipment, trucks, loaders, screeners and more importantly, the local employees. Therefore, the continued use and expansion of Leilani Quarry is vital to ensure the viability and sustainability of the horticultural and nursery industries. This will contribute to the economic growth of both Hawai'i Island and the entire State. We, at Hawaiian Earth appreciate the opportunity to support local business in Hawaii!		
Sanford's Service Center is a small, local business within the growing community and economy of Puna, employing local people and supporting local, working families. The cinder produced at the Leilani Quarry is a low-density, black-colored cinder highly valued by the nursery industry. Sanford's Service Center provides reliable access to this specific cinder media to local nurseries, of which there are 80 on Hawai'i Island. Aside from the direct employment of Puna residents, the black cinder produced by the Leilani Quarry supports local businesses and the economy of East Hawai'i. The State has previously acknowledged the economic importance of black cinder to the horticultural and nursery industry. Sanford's Service Center remains one of the few reliable sources of this important resource. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry, further	Vance Peter, Hawaii Island Cinder LLC	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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contributing to the economic progress of not only Hawai'i Island, but the entire State.		
Thank you for the opportunity to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. This letter represents my support for the continued use of the Leilani Quarry and its ability to responsibly expand to continue operations. My name is Darsen Aoki, owner of Big Island Screened Cinder, a one-man, small business owner since 2017. My clientele is mainly marketed toward Bonsai enthusiast located throughout the state of Hawaii. I have clientele on Kauai and Oahu and ship to them several times a year. Black cinder is a critical component in the cultivation of bonsai. Without it, we would need to find another material to use, which would be most likely be imported and cost prohibitive. While plentiful on Hawaii Island, black cinder is a scarce resource on the other main Hawaiian Islands. Sanford's fills that need for black cinder, as well as other natural resources found on Hawaii island. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of, not only my business, but the horticultural and nursery industry in the State of Hawaii.	Darsen Aoki; Big Island Screened Cinder	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
Sanford's Service Center is a small, local business within the growing community and economy of Puna, employing local people and supporting local, working families. The cinder produced at the Leilani Quarry is a low-density, black-colored cinder highly valued by the nursery industry. Sanford's Service Center provides reliable access to this specific cinder media to local nurseries, of which there are 80 on Hawai'i Island. Aside from the direct employment of Puna residents, the black cinder produced by the Leilani Quarry supports local businesses and the economy of East Hawai'i. The State has previously acknowledged the economic importance of black cinder to the horticultural and nursery industry. Sanford's Service Center remains one of the few reliable sources of this important resource. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry, further contributing to the economic progress of not only Hawai'i Island, but the entire State.	Malcoln Saxby, Puna Certified Nursery	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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Sanford's Service Center has been an important contact for our station. They are a small, local business in Puna, employing local people, and contributing to the economy of Hawai'i Island. The black cinder is of great importance to our island's horticultural and nursery industry and for our station's research done with floriculture and crops. UH CTAHR's Waiakea Research Station has been utilizing black cinder ordered from Sanford's Service Center for many years. We utilize the low density, black colored cinder as a stand alone media for our current anthurium research and a media mixture for our taro, sweet potato and ginger research in the past. We also utilize it in a media mixture to germinate crops which we grow to create seed to provide UH Manoa's ADSC (Agricultural Diagnostic Service Center) Seed Catalogue for purchase by farmers and back yard growers. We need to ensure access to the black cinder at all times as we are always taking on new projects that require planting seeds, tissue culture, seedlings or grown crops into progressively larger pots with the media either being pure cinder for anthuriums or a mixture for other crops. The State has previously acknowledged the economic importance of black cinder to the various horticultural and nursery industry and Sanford's Service Center remains one of the few reliable sources of this. The continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry as well as for our research and projects done at Waiakea Research Station.	Dayle Tsuha, UH College of Tropical Agriculture and Human Resources	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
California and Hawaii Foliage Growers have been providing top quality foliage plants to the U.S. mainland for over 40 years. Hawaii provides the perfect conditions for growing certain tropical plants. These plants cannot be produced any where else in the country. One of the vital components is the black cinder. Although environmental conditions can be altered and controlled, the cinder cannot be replaced. California and Hawaii Foliage Growers employ nearly 40 employees and generate sales from the U.S. mainland totaling millions. Sanford's Service Center is one of the few sources of black cinder. Some say cinder is cinder however, each source has different characteristics and plants grow differently from each source. Presently the cinder at the Leilani Quarry provides the highest quality plants. In order to contend with high shipping costs of our goods, the	Enrique Martinez, California and Hawaii Foliage Growers	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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quality needs to be at an unmatchable level. Without this cinder the industry may not be able to survive.		
Please allow Sanford's to provide a much valuable product to our State. The black cinder is widely used in the agricultural industry as a media and amendment for our local soils. As we all strive for sustainability we must all contribute for this purpose. My name is Andrew Matsuura, president of Pineback Landscaping, Inc. I have been a local landscaper in Hilo since 1992,and in agriculture since the late 70s working on my Dad's nursery, Orchid Isle Nursery growing Orchids. I mentioned a valuable asset for our state, because the black cinder my colleagues throughout our state always reminds how fortunate I am to live on the Big Island where this is available without shipping.	Andrew Matsuura, Pineback Landscaping	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
We have been a small family-owned business in Mountain View on the Big Island of Hawaii for over 25 years. We supply high quality bagged black cinder to a majority of the hardware stores across the entire island. We source our cinder from Sanford's Service Center. We depend on Sanford's continual production of this product. Black cinder makes up a large portion of our business revenue as it does for other businesses, from farmers to landscapers, as well as the general public. It is imperative that we support our local farmers who produce our food and employ our families. As a long-time Hawaii resident and business owner, we strive to support local business and hire local people. I believe it is imperative to grow our economy on the Big Island for us and future generations. We strongly ask you to consider allowing Sanford's Service Center to expand the Leilani Quarry for its most valuable black cinder in the responsible way it has operated the existing site.	Jac Fronte, East Hawaii Carpentry & Maintenance	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
Our entire nursery industry, about 80 on the Big Island alone, relies heavily on the availability of the quality and quantity of low-density, black-colored cinders from the Leilani quarry, which Sanford's Service Center has been providing us reliably for many years. When shipping to California a nursery must meet stringent requirements to become certified to ship to California. One of the approved media we are allowed to grow our potted plants in consists of the type of black cinder Sanford's Service Center has been providing us.	Ray T. Nakamura, M. Nakamura Nursery	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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Sanford's is a small, local business that has been employing many local people and supporting local, working families. They are a business that cares about the community and the industry they serve. In the past, the nursery encountered a crisis that had the potential to shut down all potted plant export nursery shipments into California. This was due to reniform nematodes detected in several shipments of potted plants that were inspected in California. It was determined to originate from the black cinders used in the potting mix. Fortunately, along with the State of Hawaii Department of Agriculture, and working closely with Dr. Arnold Hara (University of Hawaii and State Entomologist) and his research team, Stanford's developed and implemented a steam treatment system to disinfest truckloads of cinders prior to delivery to the certified nurseries, which safeguarded the Hawai'i foliage industry, allowing shipments in to California to continue to this day. The State of Hawaii has perviously acknowledged the economic importance of black cinder to the horticultural and nursery industry. Sanford's Service Center remains one of the few reliable sources of this important resource, and the only ones I am aware of that steams its truckload of cinders for the nurseries that require it. The continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry, further contributing to the economic progress of not only Hawaii island, but the entire State as well. And for growers like myself who export our products out of state, we are able to bring in "fresh" money into Hawaii.		
99% of our planting media consists of black cinder from Sanford's Service Center, Inc. Their low-density, black cinder is extremely vital to our business. Having a reliable supply of clean, consistent black cinder is the backbone of our nursery business, and we are only a small part of the landscaping and nursery industry on Hawai'i Island. Sanford's Service Center, Inc. has been a dependable and valued supplier of this low-density black cinder to our entire industry for over 40 years. The economic importance of this black cinder to our State's horticultural and nursery industry has already been acknowledged, and Sanford's Service Center, Inc. is one of the few reliable sources of this important and vital resource. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of our horticultural and nursery industry.	Lance Kuwahara, SL Kuwahara Partners LLC	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.

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This directly contributes to the economic progress of Hawai'i Island and the entire State. In closing, with global warming and wildfires destroying thousands of acres all over the world, I feel that we all need to try to do our part to contribute to keeping our planet green. At this point, denying Sanford's Service Center's request will have a bigger negative impact on our economy as well as our environment.		
Comment 8. The EISPN emphasizes the State's recognition of black cinder as an essential resource for Hawai'i's horticulture and nursery industries, using local demand as a justification for the quarry expansion. Given this, please provide detailed data on the current volume of black cinder material exported out of the State of Hawai'i from the existing permit area and the anticipated volume of black cinder material to be exported from the proposed expansion site. Include annual export quantities, primary export destinations, and the percentage of total production allocated for out-of-state distribution.	Planning Department	Thank you for your comment. Letters in support of Sanford's Service Center have been summarized in **Section 1.3**.
Historic and Cultural Resources		
Comment 5. Land Use Commission Staff looks forward to the clearly labeled section in the Historic and Cultural Resource section that differentiates and articulates the Ka Pa'akai Analysis.	Department of Business, Economic Development, & Tourism, Land Use Commission	A Ka Pa'akai Analysis is provided in **Section 3.8**.
Public Facilities, Infrastructure, and Utilities		
Specific to solid waste disposal, pasted below are our standard comments. • Commercial operations, State and Federal agencies, religious entities and non-profit organizations may not use any of the 21 County Transfer Stations for disposal. • The East Hawaii Regional Sort Station, also known as Hilo Reload Facility, is limited in capacity - refer to our Administrative Rules 2023.04.19.pdf All large volume disposal must the taken directly to the West Hawaii Sanitary Landfill.	County of Hawai'i, Department of Environmental Management, Solid Waste Division	Existing management measures and mitigation measures for solid waste are presented in **Section 3.14.**

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• Aggregates and any other construction/demolition waste should be responsibly reused to its fullest extent. • Ample and equal room should be provided for rubbish and recycling. • Green waste may be transported to the green waste sites located at the West Hawai'i Organics Facility and East Hawai'i Organics Facility, or other suitable diversion programs. • Construction and demolition waste is prohibited at all County Transfer Stations		
Based on the information provided, the Draft EIS should provide adequate discussion to include the following: • Jurisdiction of roadways in the vicinity. • Location of existing and proposed site access points. • Daily operation and trip patterns. • Assessment of the project's potential secondary and cumulative impact to state highways.	Hawai'i Department of Transportation	**Section 3.13** provides existing conditions and the anticipated impacts associated with the Proposed Action on traffic. This includes an analysis of roadway jurisdiction, site access, daily operational trip patterns, and the project's potential secondary and cumulative impacts to area roadways, including state highways are discussed in **Sections 4.1** and **4.2** of the EIS.
State and County Land Use Plans, Policies, and Controls		
Comment 4. Section 4.2.4 Coastal Zone Management states that the Draft EIS will address the proposed action's conformance with the relevant sections of HRS Chapter 205A. Please note the Hawai'i coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" under HRS §205A-1. Pursuant to HRS §205A-4, in implementing the objectives of the CZM program, agencies shall give full consideration to ecological, cultural, historic, esthetic, recreational, scenic, open space values, coastal hazards, as well as to needs for economic development. The Draft EIS should include an assessment with necessary mitigation measures as to how the proposed project conforms to the applicable CZM objectives and supporting policies set forth in HRS §205A-2, as amended.	Office of Planning and Sustainable Development	The Proposed Action's conformance with HRS Chapter 205A is provided in **Section 5.2.1**.
Other Considerations		

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Comment 5. Advancement of Sustainability Objectives in the Hawai'i 2050 Sustainability Plan. The Draft EIS should generally discuss the technologies and best practices and other mitigation measures for the project that would advance implementation of the Recommended Actions in the 2021-2030 Focus Areas on pages 100-107 of the *Hawai'i 2050 Sustainability Plan*.	Office of Planning and Sustainable Development	A discussion on the Proposed Action's consistency with the Hawai'i 2050 Sustainability Plan can be found in **Section 5.2.5**.
Describe strategies to reduce carbon emissions from the project, if any. Suggestions include: a) Incorporate elements that encourage and enhance the use of multiple types of transportation to reduce carbon emissions; b) implement energy-efficient technologies and practices, such as light-emitting diode lighting.; c) use sustainable, recycled, or low-emission materials in construction and manufacturing.	Hawai'i Department of Health	Impacts associated with the Proposed Action on GHGs are discussed in **Section 3.10**.

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List of References

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Appendices

Appendix A

2013 Puʻu Kaliʻu Biological Survey

Biological Survey
Pu'u Kaliu Quarry Expansion, Puna, Island of Hawai'i

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Prepared for Sanford Services Inc.
May 2013

Introduction

This report describes the results of an overview biological survey of an approximately 309-acre portion of a Kamehameha Schools (KS) property identified by TMK (3rd. Div., 1-3-009:005), with intensive survey of a 34.195-acre area that was initially proposed for cinder mining, at Pu'u Kaliu, Ahupua'a of Kauaea, Puna District, of the Island of Hawai'i (Figures 1-2).

The 309-acre area contains a working cinder quarry on approximately 25 acres on the western side, and is heavily forested with no active land uses elsewhere. It is bounded by Leilani Estates Subdivision on the north, additional vacant KS property in the State Land Use Agricultural District to the west, vacant KS property in the Conservation District to the east and southeast, and private properties in the Agricultural District in the southwest.

It is understood that the applicant intends to reclassify 309 acres from the Limited to the Resource subzone of the Conservation District, which is an administrative change that, per se, does not involve any on-ground impacts. The only proposed land use change for the foreseeable future is an application to extend the cinder quarry within a roughly 35-acre portion of the 309-acre property. The impact analysis in this report focuses on this mining proposal and assumes that any further actions would be accompanied by additional surveys and analysis.

Purpose and Methods

The objectives of the biological survey and research were to 1) describe the vegetation; 2) list all plant species encountered; 3) identify rare, threatened or endangered plant species; 4) opportunistically observe for vertebrates during plant surveys; 5) record land birds using systematic bird counts during one three-hour period after sunrise or before sunset, with focus on native birds; 6) conduct one listening survey for seabirds on Pu'u Kaliu; 7) assess need for protocols to avoid impact to Hawaiian hoary bats; 8) assess the potential to impact endangered invertebrates through literature review; and 9) discuss the framework for mitigation for impact to biological resources.

Flora and Vegetation

The area was surveyed for plants and vegetation by Ron Terry, Pat Hart, Mike Long, Jen Johansen, Jaya Dupuis, Layne Yoshida, and Christina Leopold, on five days in January and February 2013.

For purposes of both survey and reporting, the area was surveyed at both high and low intensity levels. Teams walked transects in portions of the entire 309 acres in order to characterize vegetation type and sensitivity and develop a species list with the purposes of documenting both rare natives and invasives. Because of the difficult terrain and extremely tangled vegetation of some sections, these transects were opportunistic, often looping and wandering to take advantage of any natural pathways that might exist.

For the 34.195-acre area that had been preliminarily proposed for actual quarry use, we conducted more intensive survey involving systematic transects in order to determine to the greatest feasible degree whether rare, threatened or endangered plant species were present. Special attention was given to the possible presence of any federally (USFWS 2013) listed or proposed endangered plant species such as *Cyanea platyphylla* or *Cyrtandra* spp., both of which have been reported from the lower Puna district. We divided the area into parallel bands 25 meters wide and walked GPS-guided UTM eastings and northings (i.e., north-south and east-west lines, respectively) centered on these transects. A team of five walked east-west transects on one day and north-south transects on the next field day. The transects served as center-lines for extensive zigzags that closely examined rock outcrops, cliffs, earth cracks, overhangs, caves, and other areas less common plants might be found. Finally, a team of two walked and mapped the edge of the heavy cinder deposits and also searched for rare plants. Despite the complex terrain and canopy, this intensive method appeared to be adequate for rare plant detection. Species were identified in the field and, as necessary, collected and keyed out in the laboratory.

Vegetational Influences

The geologic substrate in this area is lava flows and spatter deposits from Kilauea Volcano dated between 1,000 years before the present and 1955 C.E. (Wolfe and Morris 1996). The surface consists of ʻaʻa (clinkery lava), pahoehoe (ropy lava), spatter, loose cinder and soil. The extremely complex geology of the area was mapped in Moore and Trusdell (1991) (Figure 3).

The elevation of the 309-acre property ranges from 380 to 1,075 feet above sea level. Annual rainfall in this area of Puna is high, about 120 inches (Giambelluca et al 2013). In forested micro-climates in such areas, humidity can be extremely high.

Gagne and Cuddihy (1990) classified the vegetation in areas with a similar geology, elevation and rainfall as Lowland Wet ʻŌhiʻa/Lama Forest, defining this as a very wet, closed forest dominated by ʻōhiʻa (*Metrosideros polymorpha*) and lama (*Diospyros sandwicensis*) that occurs on youthful ʻaʻa substrates on windward Hawaiʻi. The canopy

is 10 to 15 meters high and there is a well-developed shrub and fern layer of native and alien species, with ʻohe (*Tetraplasandra hawaiensis*) as a scattered emergent.

In a study of lowland wet forests of Puna, Dupuis (2012) noted that the Puna District contains some of Hawaiʻi's last remaining native lowland wet forests. Research involving three categories of substrate age (< 200 years, 200-750 years, and >750 years) determined that intermediate-age flows (which predominate on the 309 acres) had higher absolute cover of native tree species was higher compared to young flows. Compared to older flows, there was a higher relative and absolute cover of native tree species.

Anthropogenic disturbance has been a critical factor influencing the vegetation. The 309-acre property is a mosaic of patches with undisturbed surface along with areas affected by sugar cane cultivation, roads and railroad beds, papaya farming and cinder mining (Figure 4). More subtle disturbance is found in the form of faint remnants of ancient Hawaiian cultivation or wild tree crops and modern marijuana cultivation. Particularly important are the pervasive effects of invasive species that have spread throughout the property from footholds near and far.

Current Vegetation

Over the last 100 years, the conversion of land to agriculture and residential development has fragmented the landscape in Puna's lowland wet forests. This has led to invasion by alien plant species and degradation of native plant communities in Puna (Cuddihy and Stone 1990; Dupuis 2012). In Dupuis' survey of lowland wet forest reserves, she found the following proportions of absolute canopy cover: ʻōhiʻa (44%), strawberry guava (*Psidium cattleianum*) (30%), hala (*Pandanus tectorius*) (30% strictly in the lowest 100 meters elevation zone), lama (8%), kōpiko (*Psychotria hawaiiensis*) (8%), albizia (*Falcataria moluccana*) (8%), cecropia (*Cecropia obtusifolia*) (7%), *Melastoma septemnervium* (5%), and ironwood (*Casuarina equisetifolia*) (3%) (Dupuis 2012: 13).

The disturbance on or directly adjacent to the 309-acre property related to quarrying, agriculture and residential subdivisions has drastically affected the composition of the vegetation. At the broadest level, the property can be divided into ʻōhiʻa-dominated forest, open cinder quarry and alien-dominated secondary forest based on this disturbance history. The former type covers most of the property, while the quarry is limited to a portion of the northwest and the latter is found in the southeast and also on the fringes of the quarry (Figure 5).

Although no cover plots were sampled, ʻōhiʻa, strawberry guava, lama and kopiko were prominently represented in the ʻōhiʻa-dominated forest, similar to the lowland wet forest sampled by Dupuis. The understory consists of a diverse array of native and non-native ferns (including many hapuʻu tree ferns or *Cibotium* spp.), native ʻieʻie (*Freycinetia arborea*) and many non-native vines and native and particularly non-native seedlings. Strawberry guava is known for forming dense thickets that exclude other species (Uowolo and Denslow 2008), and strawberry guava has heavily infested the entire ʻōhiʻa-dominated forest here, often to the exclusion of virtually every other species. Melastomes

including *Clidemia hirta*, *Melastoma septemnervium* and *M. candidum*, and *Miconia calvescens* are also ubiquitous. Certain parts of this forest also contain individuals of rare species.

Notwithstanding the extent of only about 100 acres, the alien-dominated forest is diverse and variable, reflecting different ages of disturbance. Cecropia, *Melochia umbellata*, *Trema orientalis*, albizia and ironwood are very prominent, depending on the location. The understory was highly variable and consisted of many species of ferns, vines, and herbs. Very few natives are regenerating in the lower layers of the alien-dominated forest.

Flora

A full list of plant species found in the surveyed areas is contained in Table 1, below. Of the 130 species found on the property, 20 are indigenous (found in Hawai'i as well as elsewhere) and 20 endemic (found in Hawai'i and nowhere else).

Surprisingly, there is a relatively large number of individuals of rare species in certain parts of the 'ōhi'a-dominated forest, including *Cyrtandra* spp. and *Tetraplasandra hawaiensis*. In Dupuis' extensive study of Puna lowland wet forests involving 291 plots from five forest reserves, all 34 detected individuals from rare species were found on 200-750 year old substrates (Dupuis 2012). This was also the location for all rare species on the current property.

Those rare species detected are mapped in Figure 5 and listed in Table 5. Transects in the northeastern quadrant of the 309 acres found a number of clusters totaling more than a hundred individuals of *Cyrtandra* spp., principally *Cyrtandra nanawalensis*. Known along with other species of *Cyrtandra* as ha'iwale, *C. nanawalensis* is entirely restricted to lowland Puna (Wagner et al. 2003), and has been proposed for federal listing as endangered (Federal Register Volume 77, Number 201, Wednesday, October 17, 2012, Proposed Rules). It should be noted that two separate *Cyrtandra* individuals were detected on the western margin of the 34.195-acre area, and one cluster were noted near the extreme eastern end (east of UTM 299000), associated with the main area of *Cyrtandra* in the northeast quadrant. It is suspected that close inspection would detect others within this area, which is composed of steep, mossy 'a'a boulders vegetated with an extremely dense thicket of 'ōhi'a-'ie'ie-Clidemia-strawberry guava that even feral pigs would have difficulty navigating.

Several individuals of dead or nearly dead *Tetraplasandra hawaiensis* were found on the northern fringe of the property, but the most significant find for this species was a grove of healthy individuals that extended over several hundred meters. There was a total of well over 40 trees forming a solid canopy in some areas, with most individuals healthy. However, there has also been heavy pig activity evidenced by wallows and chewing at the base of some of the larger trees. Observations in the Halepua'a Forest Reserve over the past few years indicate that such damaged trees will be dead within one year or so (pers. comm. Jaya Dupuis).

No currently listed threatened or endangered plant species were detected on any part of the property, although, as noted above, *Cyrtandra nanawalensis* will likely soon be listed as endangered. Several individuals of *Cyanea platyphylla* are known from KS property to the east. As the current subject property has similar habitat, a special attempt was made to locate any *Cyanea*, particularly within the 34.195-acre area. None were detected. The survey on most of the remainder of the 309 acres was not intense enough to exclude the possibility that *Cyanea* is present.

Vertebrate Fauna and Listed Endangered Invertebrates

As discussed above, the faunal survey focused on native vertebrates, including birds and the Hawaiian hoary bats, because of their conservation value. It is recognized that non-native birds, mammals and reptiles have values for various purposes and may also merit attention for the negative interaction with native plants and animals.

Forest Birds

Twelve species of birds (Table 2) were detected either opportunistically during plant surveys or as part of the systematic birds counts. Three native birds, Hawai'i 'Amakihi (*Hemignathus virens*), the 'Apapane (*Himatione sanguinea*) and the Hawaiian Hawk (*Buteo solitarius)*, were detected. All other birds seen or hear were non-native introductions.

The bird counts on May 5, 2013, involved stations located within tall-statured (>15m) 'ōhi'a forest with a mid-canopy dominated by strawberry guava. Bird counts were conducted between 15:30 and 17:30 using the Variable Circular Plot (VCP) method (Reynolds et al. 1980), whereby the distance to all individuals seen or heard at each station within an eight- minute period was recorded. Weather conditions were favorable for detecting singing birds.

A total of 90 individuals from eight species were detected (Table 3). Notably, the two native Honeycreeper species comprised almost half (44/90) of the total detections, with Hawai'i 'Amakihi accounting for 31 individuals present at 6 stations, and the 'Apapane for 13 individuals at 5 stations. The most common non-native species was the Japanese White-eye, with 26 individuals at 6 stations.

Other species of native forest birds, some endangered, are known from areas *mauka*, where the vegetation is more intact and mosquitos and the diseases they cause less prevalent. It is possible that occasional sightings of such birds could be made on this property, although the lowland elevation (maximum 1,071 above sea level atop Pu'u Kaliu) precludes heavy use by those native forest bird species mostly restricted to elevations above 4,000 feet.

Hawaiian Hawks

Hawaiian Hawks (*Buteo solitarius*) were observed on several occasions during the survey, including one sighting of a pair that was repeatedly calling. Hawks undoubtedly forage and perhaps nest on the property, includes some ʻōhiʻa trees at least 40 feet tall, which could be suitable for hawk nesting.

Seabirds

Based on its prominent elevation and potentially suitable habitat (over an acre of ʻuluhe fern near the summit), it is possible that it might be suitable nesting habitat for three species of rare seabirds: the federally endangered Hawaiian Petrel (ʻUaʻu; *Pterodroma phaeopygia sandwichensis*), the federally threatened Newell's Shearwater (ʻAʻo; *Puffinus auricularis newelli*), and the Band-rumped Storm-Petrel (*Oceanodroma castro*), which is listed as endangered by the State of Hawaiʻi. Nocturnal surveys over several nights during the breeding season for Newell's Shearwater in 1993 by the U.S. Geological Survey, Biological Resources Division detected the calls of two individuals (Reynolds and Ritchotte 1997).

The detection work for this survey involved listening by three individuals (Patrick J. Hart, Cary Derringer and Ron Terry), situated at stations separated by approximately 100 meters ringing the upper slopes of Puʻu Kaliu, for a period of two hours, from 15 minutes before sunset to an hour and 45 minutes after sunset, on May 5, 2013. No seabirds were detected during this evening of auditory surveying. This does not provide evidence that the seabirds do not utilize the area, however, as several factors may have influenced detections. The month of May corresponds with the pre-laying exodus, whereby females leave the colony and remain at sea for up to 30 days, and male and sub-adult birds make occasional visits to the colony. The highest probability for detecting these species using auditory surveying methods is during spring arrival to the colony (mid-April), during incubation (late May to late June), and during chick-rearing (late August). Further, calling patterns may differ between evening flights when birds head inland and morning flights when birds head out to sea. A more comprehensive survey effort would include pre-sunrise surveys to account for calling differences in both directions of bird movement. Last, several factors can influence sound waves and hence detection rates. Extraneous noise from highway traffic, crickets, and coqui frogs may have influenced detection rates beyond 200 meters, or closer for Band-rumped Storm-Petrel. Topographical features blocked sounds and wind from the north; surveyors were situated to listen best for calls emanating from the W, S, and SE directions. Otherwise, surveying conditions were excellent; winds were light, and no moon was present (moonlight negatively affects calling by Newell's Shearwaters).

Mammals, Reptiles and Amphibians

The endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) is often found in alien as well as native vegetation in a variety of locations throughout the island of Hawaiʻi. These solitary bats are widely scattered and roost almost undetected in tall shrubs and

trees. Although no bat surveys were performed, and no bats were observed during the twilight observations from Pu'u Kaliu on May 5, 2013, they have been observed in many areas of Puna and should be presumed to be present at least occasionally and to roost perhaps somewhere in the area around Pu'u Kaliu.

There was abundant sign of wild pigs (*Sus s. scrofa*), but no other wild non-native mammals were detected during the course of this surveys. It is highly likely that mice (*Mus* spp.), rats (*Rattus* spp.), feral cats (*Felis catus*) and small Indian mongooses (*Herpestes a. auropunctatus*) are present. Domestic dogs (*Canis f. familiaris*) likely also visit the area. None of these alien mammals have conservation value and all are deleterious to native flora and fauna.

Among reptiles and amphibians, only the infamously noisy coqui frog (*Eleutherodactylos coqui*), a severe pest in all lowland areas of Puna, was directly observed. The giant toad or bufo (*Bufo marinus*) may also be present. Various reptiles including several species of skink, gecko and the green anole (*Anolis carolinensis*) are also likely present. As with the mammals listed above, none of these alien mammals have conservation value and all are deleterious to native flora and fauna.

Listed Endangered Invertebrates

Twenty-three species of invertebrate are currently listed as threatened or endangered in the State of Hawai'i (U.S. Fish and Wildlife Service, web page accessed May 2013 http://ecos.fws.gov/tess_public/pub/stateListingAndOccurrenceIndividual.jsp?state=HI&s8fid=112761032792&s8fid=112762573902). These include a spider, an amphipods, a moth, snails, picturewing flies, and damselflies. None of these species appears to have a high potential to occur in the Puna lowland forests. A number of the listed species are restricted to other islands, and others are found at substantially higher elevations, or in drier habitats, or with specific host plant species. The habitat requirements for these listed invertebrates in terms of elevation, rainfall and host plants are not met in the Pu'u Kaliu area.

Only two groups of listed invertebrates have ranges on the east side of the Big Island: three species of Hawaiian picturewing Drosophila and two species of Hawaiian damselflies. Although no listed species are present in the subject area, these groups and their Big Island ranges are briefly discussed below.

The Hawaiian picture-wing group (genus *Drosophila*, family Drosophilidae) consists of 106 known species, most of which are relatively large with elaborate markings on the otherwise clear wings of both sexes, the pattern of which varies among species. The picturewing *Drosophila* have been referred to as the "birds of paradise" of the insect world because of their relatively large size (up to a quarter inch), colorful wing patterns, and the males' elaborate courtship displays and territorial defense behaviors. Thirteen species were listed as threatened or endangered for the State of Hawai'i in May of 2006 (71 Federal Register 26835), including three species found on the Big Island: *D. heteroneura,* with primary hosts of *Cheirodendron* spp., *Clermontia* spp., *Delissea* spp.;

D. mulli, with a primary host of *Pritchardia beccariana*; and *D. ochrobasis*, with a primary hosts of *Clermontia* spp., *Marattia* spp. ,and *Myrsine* spp. (U.S. Fish and Wildlife Service. According to the *Recovery Outline for 12 Hawaiian Picturewing Flies* (USFWS: 2006, Pacific Islands Fish and Wildlife Office), both the historical and current ranges of these species are restricted to much higher elevations in Puna (see Figure 6). The host plants for these picture-wing flies are not present in the 309 acres.

The endangered flying earwig Hawaiian damselfly and the Pacific Hawaiian damselfly are insects in the order Odonata, which includes dragonflies and damselflies. Both species are endemic to the Hawaiian Islands. Males are territorial, guarding areas of habitat where females lay eggs. During copulation, and often while the female lays eggs, the male grasps the female behind the head with terminal abdominal appendages to guard the female against rival males; thus males and females are frequently seen flying in tandem. The Pacific Hawaiian damselfly requires aquatic habitat. Female damselflies lay eggs in submerged aquatic vegetation or in mats of moss or algae on submerged rocks. The immature larval stages (naiads) are aquatic, breathing through three flattened abdominal gills, and are predators, feeding on small aquatic invertebrates or fish. Naiads may take up to 4 months to mature, after which they crawl out of the water onto rocks or vegetation to molt into winged adults, typically remaining close to the aquatic habitat from which they emerged. Historically, the Pacific Hawaiian damselfly was known from lower elevations (below 2,000 feet on all of the main Hawaiian Islands except Kahoolawe and Ni'ihau. This species was known to breed primarily in standing water systems such as marshes, seepage-fed pools, large ponds at higher elevations, and small, quiet pools in gulches that have been cut off from the main stream channel. Today, this species is restricted almost exclusively to seepage-fed pools along overflow channels in the terminal reaches of perennial streams, usually in areas surrounded by thick vegetation. The biology of the flying earwig Hawaiian damselfly is not well understood, and it is unknown whether it is more likely to be associated with standing water or flowing water. The only confirmed population found in the last 6 years was on a single East Maui stream and the adjacent steep, moist, riparian talus slope, which is densely covered with *Dicranopteris linearis* (uluhe), a native fern.

The Big Island species recovery plan in preparation by the U.S. Fish and Wildlife will address recovery of Pacific Hawaiian damselfly populations, as well as restoration of extirpated populations of the flying earwig Hawaiian damselfly, on the island of Hawai'i. The Service projects that this plan will be published as a draft in 2016 and finalized in 2017 (*Recovery Outline for Two Hawaiian Damselflies*, USFWS: 2006, Pacific Islands Fish and Wildlife Office). Because of the requirement for aquatic habitat, neither of these species would be expected in the Pu'u Kaliu area, which lacks streams, ponds, springs or other aquatic environments.

Findings in Context of Hawaiian Conservation Biology

In overview, the 309-acre property consists of some areas that have been heavily disturbed by ongoing cinder quarrying or former sugar cane agriculture. The remainder is mainly native 'ōhi'a-lama-kopiko forest that varies from moderately to heavily degraded.

The most pristine areas contain several rare and one proposed endangered plant species. The entire property supports a lowland bird community that appears to have a large native component, and the tallest cinder cone on the property has a summit with some potential to contain nesting habitat for at least one endangered seabird. The area planned for additional quarrying has been designed in part to exclude rare and endangered plants and would move operations farther from the potentially sensitive summit.

The subject 309 acres has many qualities that render it highly valuable for biological conservation. Even considering the ability to locate quarrying operations within a fraction of this property that avoids direct impacts to rare or endangered species, the loss of more than 30 acres of forest here has some adverse conservation consequences.

As noted by many authors (summarized in Dupuis 2012), the remaining lowland wet forests of Puna are important reservoirs of plant biodiversity that also play key roles in protecting native birds and invertebrates. Preserving and where possible restoring representative areas of all of Hawai'i's ecosystem types is a major long-term goal of conservation, and an important aspect of this is capturing the entire range of biodiversity across elevation gradients, from montane to into coastal communities (Anderson et al., 1999).

In Puna, the State Forest Reserve system along with Wao Kele O Puna represent important (although not usually pristine) areas for conservation. However, most property in the lowlands of Puna is in private hands, including Kamehameha Schools, W.H. Shipman Ltd, several dozen medium scale landowners, and tens of thousands of small lots in subdivisions. Most of these private lands are not subject to any conservation restrictions or requirements. Land in the State Land Use Conservation District, such as the subject property, has a restricted range of permitted uses that are also often subject to conditions, which increases the land's potential utility for biological conservation.

Actions that remove forest acreage and/or and create new disturbance edges degrade, if sometimes only slightly, the integrity of the remaining lowland forests. Aside from acreage loss, adjacent disturbance may promote additional invasion by alien species.

At the same time, it is clear that simply avoiding use of these forests does not in any way guarantee the perpetuation of their habitat value. As Dupuis noted:

> "Despite native dominance of the canopy layer on intermediate substrate, *Psidium cattleianum*, *Melastoma septemnervium,* and *Clidemia hirta* are relatively successful in the lower canopy and shrub layers. These particular species were also recognized … as notable invaders in this forest type. Through direct competition for natural resources such as increased water use… invasive species such as these change the environment in Hawai'i so dramatically, that they can preempt native species entirely….These data point to a problematic future for areas now more intact, where native and rare species have the potential of being displaced by encroaching invaders. Their proximity and aggressive regeneration

patterns, aided by bird and feral pig activity.... underscore the urgency of control effort" (Dupuis 2012: 53).

She found that rare species often disappeared entirely, including the two notable ones on the 309-acre property. Of mature 'ohe mauka (*Tetraplasandra hawaiiensis*) plants mapped in Halepua'a in 1979 and then confirmed present in 2007 by biologist Ann Kobsa, 13 have since died due to bark damage at the base of trees by feral pigs. The four survivors are likely still present due to being fenced. Of five *Cyrtandra nanawalensis* clusters located in Halepua'a by Ann Kobsa in past years, only two remain. Attempts to relocate more than 150 colonies of C. *nanawalensis* observed in 1981 in lower Malama-Kī found none (Dupuis 2012:58).

Intact lowland forests are similarly valuable for native birds. A study of avian host and mosquito-borne diseases in nine study areas of East Hawai'i in 2002 found a surprising prevalence of 'Amakihi (Woodworth et al. 2005). Despite its susceptibility to malaria, this species comprised from 24.5% to 51.9% of the avian community at three low-elevation forests, including one directly adjacent and vegetationally similar to the current study site near Pu'u Kaliu. 'Amakihi were actually more abundant at low elevations than at disease-free high elevations, and were resident and breeding there. This species has increased in low elevation habitats in Puna over the past decade. The recent emergent phenomenon of recovering 'Amakihi populations at low elevations, despite extremely high prevalence of avian malaria, suggests that ecological or evolutionary processes acting on hosts or parasites have allowed this species to recolonize low-elevation habitats.

Spiegel et al (2006) examined the distribution and abundance of native and non-native forest birds using plot counts at 174 new stations along eight survey transects, and an additional 90 stations surveyed from 1994-1995 near sea level, within a large area of Puna. Overall, introduced species were found to be more abundant than natives; 11 non-native species made up 87% of the total individuals detected. The most common exotic passerines were Japanese White-eye, House Finch and Northern Cardinal. However, the 'Amakihi and 'Apapane comprised 13% of the bird community at low altitudes. 'Amakihi were the most common and widespread native species, being found at 47% of stations at a density of 4.98 birds/hectare. 'Amakihi were significantly associated with 'ōhi'a, and 'Apapane were more locally distributed, being found at only 10% of stations. Importantly, re-surveys of 1994–1995 transects demonstrated a significant increase in 'Amakihi abundance over the past decade. This work demonstrates a widespread recovery of this species at low altitudes and a changing composition of the forest bird community at low altitudes.

These studies have a number of implications for conservation of Hawaiian forest birds. Previous work, including that by Warner (1968) and van Riper et al (1986), guided later research and conservation actions based on the idea that Hawaiian forest birds in lowland areas were doomed to extinction by avian disease. Conservation focused primarily on high elevations where *Culex* mosquitoes and disease transmission are rare, and rarely concentrated on low elevation forests. Loss of potentially important native bird

populations through habitat loss and degradation ensued, with a reduced potential evolutionary change in those populations as well. The Woodworth et al paper is one of several recent studies that demonstrate that lowland forests are an area of complicated and dynamic interplay for Hawaiian birds, where coevolutionary forces is occurring and conservation is worthwhile. This matches conclusions on conservation biology elsewhere (e.g., Nielsen et al 2001, Channell et al 2000) that have challenged the assumption that peripheral populations are less viable than core populations, and demonstrated the importance of peripheral populations in population persistence across a variety of taxa.

Impacts and Mitigation Process

As discussed above, the proposed reclassification from Limited to Resource over the 309 acres is administrative in nature and would have few impacts per se, as any future mining proposals made possible by this would require rigorous, individual examination.

In general, the 34.195-acre area that was initially proposed for mining is somewhat less sensitive than the other portions of the property that contain native forest. The forest here is dominated by ʻōhiʻa, with a substantial component of lama, hapuʻu and kopiko, and it has been demonstrated to be good habitat for two Hawaiian Honeycreepers. However, it is also heavily invaded by stands of large, mature strawberry guava, and contains no rare species except at the western and eastern margins (see Figure 5), which are actually areas that appear to have no cinder resources. It is assumed that the areas containing these *Cyrtandra* plants would be removed from the area finally proposed from mining, which would eliminate the possibility of directly impacting these plants. However, any additional forest clearing in the general area would involve indirect impacts to adjacent sensitive habitats as well, through the accelerated potential for invasion by alien species, as well as cumulative impacts of forest reduction and fragmentation.

This report does not propose specific mitigation for impacts to biological resources aside from avoidance of the area containing *Cyrtandra*, but we assume that substantive measures will be formulated during discussions among the applicant, the landowner and regulatory agencies.

Limitations

No botanical survey of a large area can claim to have detected every species present. Some species are cryptic in juvenile or even mature stages of their life cycle. Dry conditions can render almost undetectable plants that extended rainfall may later invigorate and make obvious. Thick brush can obscure even large, healthy specimens. The findings of this survey must therefore be interpreted with proper caution; in particular, there is no warranty as to the absence of any particular species.

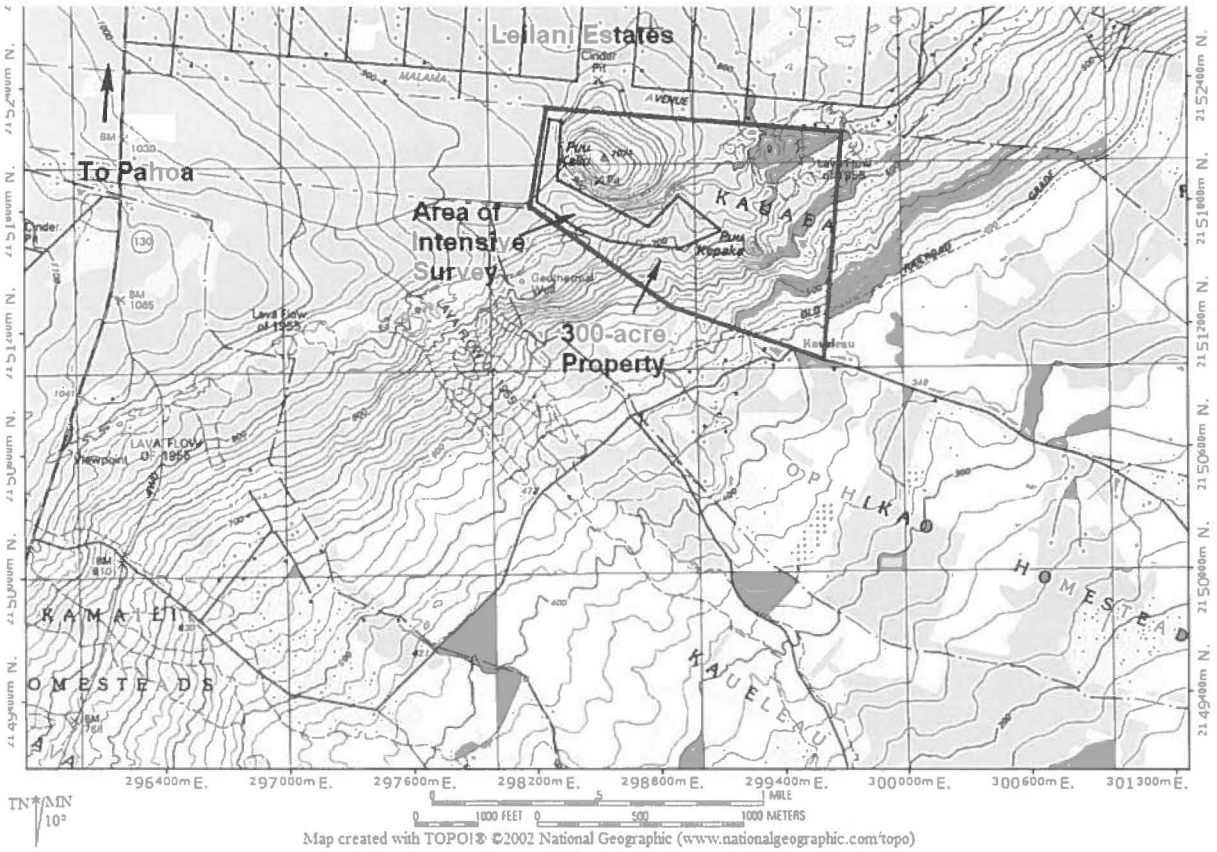


Figure 1 Property Location ▲ ▼ **Figure 2 Aerial Image**



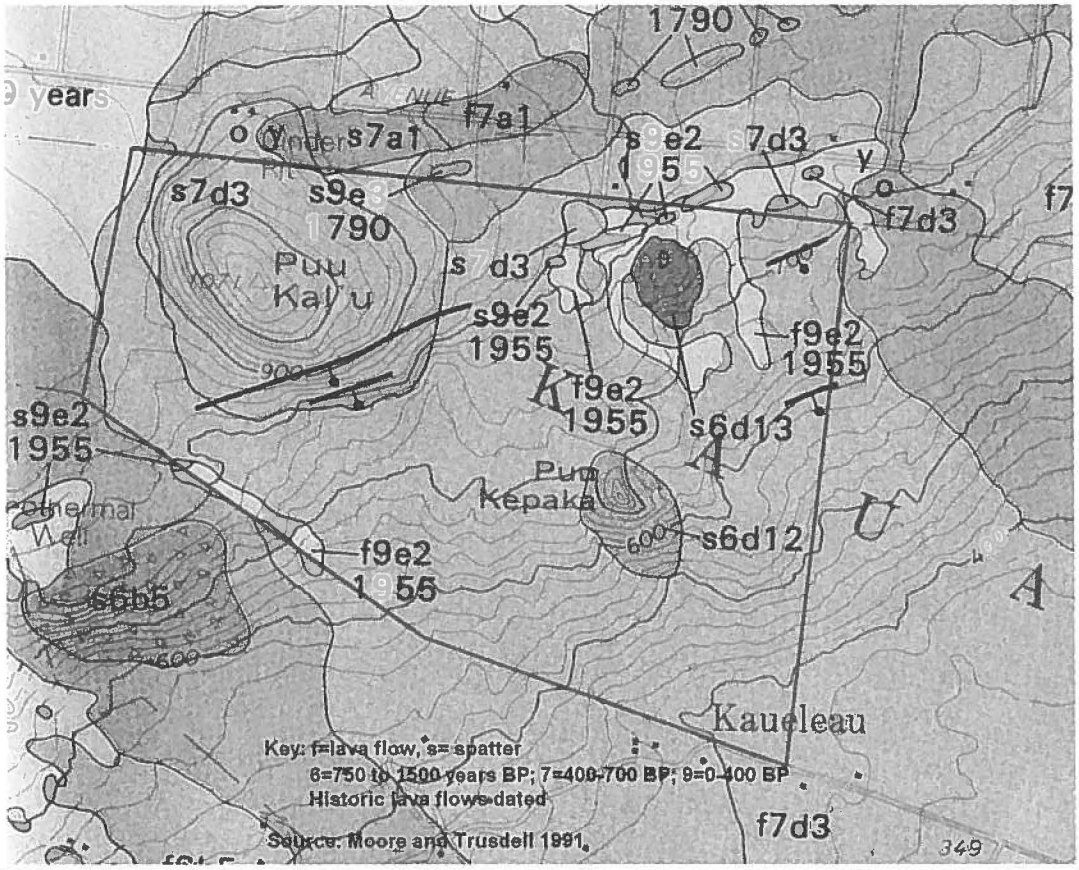


Figure 3 Geology Map ▲ **▼ Figure 4 Disturbance Zones (from Alan Haun)**

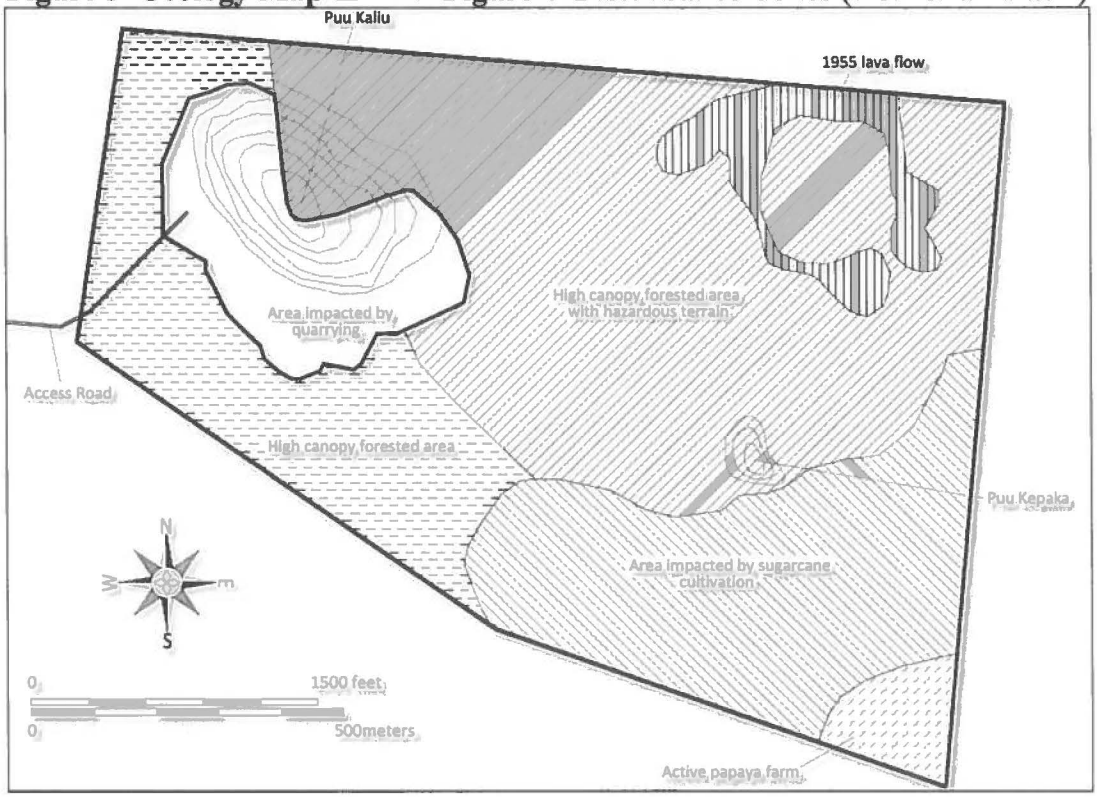


Figure 5 Vegetation Types and Detected Rare Species Locations



Figure 6
Island of Hawaii: Current and historical distribution of *Drosophila heteroneura*, *D. mulli,* and *D. ochrobasis*

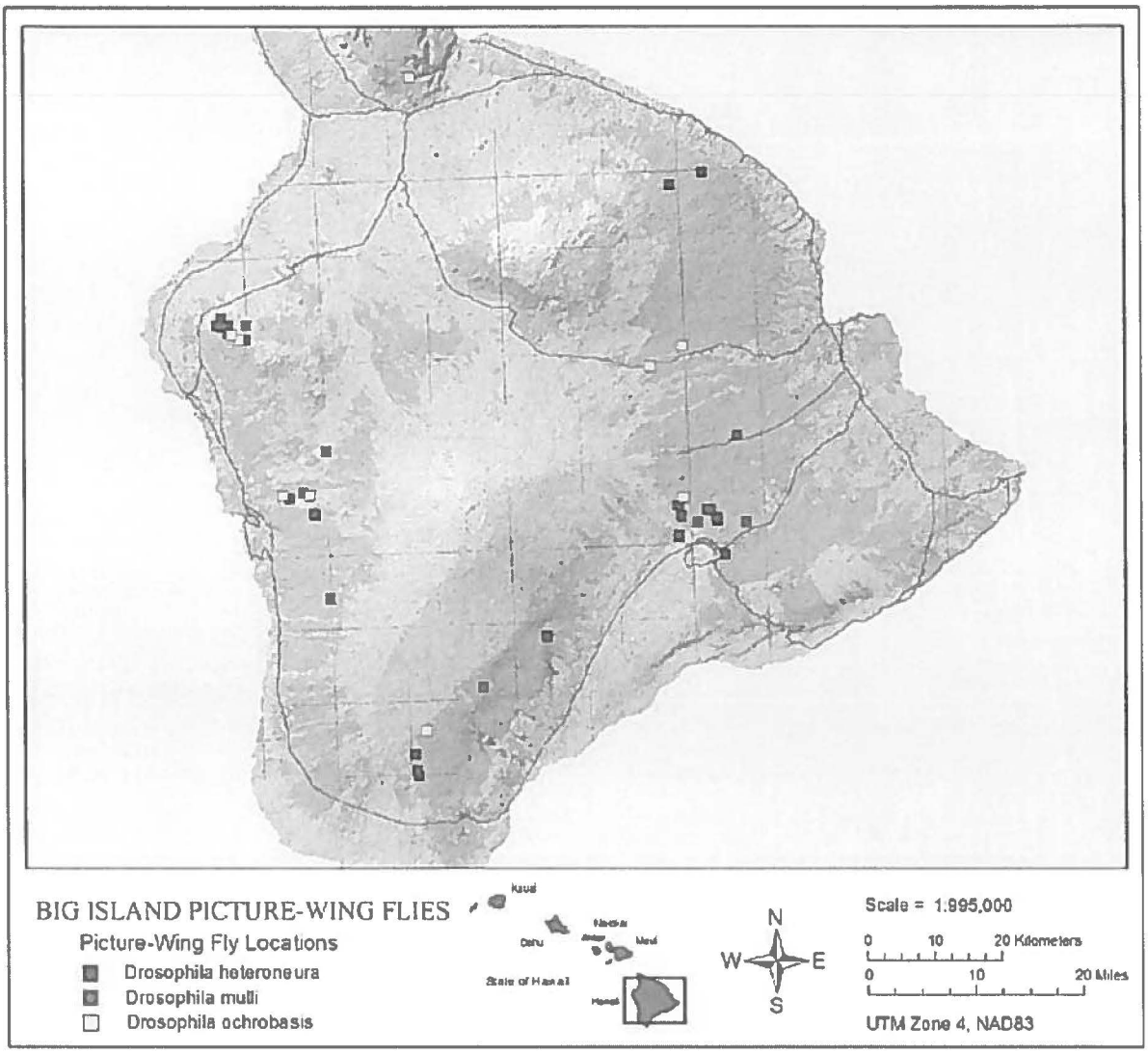


Table 1
Plant Species Detected in Botanical Survey

Scientific Name	Family	Common Name	Life Form	Status*
Adenophorus tamariscanus	Polypodiaceae	Wahine noho mauna	Fern	E
Adiantum capillus-veneris	Pteridaceae	Maidenhair fern	Fern	I
Adiantum hispidulum	Pteridaceae	Adiantum	Fern	A
Ageratina riparia	Asteraceae	Hamakua pamakani	Herb	A
Ageratum conyzoides	Asteraceae	Maile honohono	Grass	A
Ageratum houstonianum	Asteraceae	Ageratum	Herb	A
Andropogon virginicus	Poaceae	Broomsedge	Grass	A
Angiopteris evecta	Marraticeae	Angiopteris	Fern Ally	A
Anthurium sp.	Araceae	Anthurium	Shrub	A
Araucaria heterophylla	Araucariaceae	Norfolk pine	Tree	A
Archontophoenix alexandrei	Arecaceae	Alexander palm	Tree	A
Arundina graminifolia	Orchidaceae	Bamboo orchid	Herb	A
Asplenium lobulatum	Aspleniaceae	Asplenium	Fern	I
Asplenium nidus	Aspleniaceae	Ekaha	Fern	I
Athyrium microphyllum	Athyriaceae	Athyrium	Fern	E
Blechnum appendiculatum	Blechnaceae	Blechnum	Fern	A
Buddleia asiatica	Buddlejaceae	Dog tail	Shrub	A
Canavalia cathartica	Fabaceae	Maunaloa	Vine	A
Castilleja arvensis	Scrophulariaceae	Indian paintbrush	Herb	A
Casuarina equisetifolia	Casuarinaceae	Ironwood	Tree	A
Cecropia obtusifolia	Cecropiaceae	Guarumo	Tree	A
Cestrum nocturnum	Solanaceae	Night blooming jasmine	Shrub	A
Chamaecrista nictitans	Fabaceae	Partridge pea	Herb	A
Chamaesyce hirta	Euphorbiaceae	Garden spurge	Herb	A
Christella cyatheoides	Thelypteridaceae	Kikawaio	Fern	E
Christalla dentata	Thelypteridaceae	Cyclosorus	Fern	A
Cibotium chamissoi	Cibotiaceae	Hapu‘u meu	Tree	E
Cibotium glaucum	Cibotiaceae	Hapu‘u pulu	Tree	E
Cibotium menziesii	Cibotiaceae	Hapu‘u ‘i‘i	Tree	E
Clidemia hirta	Melastomataceae	Koster’s curse	Shrub	A
Coix lachryma-jobi	Poaceae	Job’s tears	Grass	A
Commelina diffusa	Commelinaceae	Honohono	Herb	A
Conyza bonariensis	Asteraceae	Hairy horseweed	Herb	A
Cordyline fruticosa	Agavaceae	Ki	Shrub	A
Crotalaria sp.	Fabaceae	Rattlepod	Herb	A
Cuphea carthaginensis	Lythraceae	Tarweed	Shrub	A
Cynodon dactylon	Poaceae	Bermuda grass	Grass	A
Cyperus halpan	Cyperaceae	Nut grass	Sedge	A
Cyrtandra nanawalensis	Gesneriaceae	Cyrtandra	Shrub	E*
Cyrtandra paludosa	Gesneriaceae	Cyrtandra	Shrub	E
*Cyrtandra sp.***	Gesneriaceae	Cyrtandra	Shrub	E
Desmodium cajanifolium	Fabaceae	Desmodium	Shrub	A
Desmodium incanum	Fabaceae	Desmodium	Herb	A
Desmodium triflorum	Fabaceae	Desmodium	Herb	A
Dicranopteris linearis	Gleicheniaceae	Uluhe	Fern	I
Dioscorea pentaphylla	Dioscoreaceae	Five leaf yam	Vine	A
Diospyros sandwicensis	Ebenaceae	Lama	Tree	E

Drymaria cordata var. *pacifica*	Caryophyllaceae	Pilipili	Herb	A
Elaphoglossum sp.	Dryopteridaceae	Stag's tongue fern	Fern	E
Emilia fosbergii	Asteraceae	Pualele	Herb	A
Epidendrum sp.	Orchidaceae	Epidendrum	Herb	A
Epipremnum pinnatum	Araceae	Pothos vine	Vine	A
Eragrostis tenella	Poaceae	Eragrostis	Herb	A
Erechtites hieracifolia	Asteraceae	Erechtites	Herb	A
Eucalyptus grandis	Myrtaceae	Red gum	Tree	A
Falcataria moluccana	Fabaceae	Albizia	Tree	A
Ficus microcarpa	Moraceae	Chinese banyan	Tree	A
Freycinetia arborea	Pandanaceae	'Ie 'Ie	Vine	I
Gonocormus minutus	Hymenophyllaceae	Gonocormus	Fern	I
Hedychium coronarium	Zingiberaceae	White ginger	Herb	A
Huperzia phyllantha	Lycopodiaceae	Club moss	Fern Ally	I
Hyptis pectinata	Lamiaceae	Comb hyptis	Shrub	A
Lantana camara	Verbenaceae	Lantana	Shrub	A
Lepisorus thunbergianus	Polypodiaceae	Pakahakaha	Fern	I
Lycopodium sp.	Lycopodiaceae	Lycopodium	Fern Ally	I
Macaranga mappa	Euphorbiaceae	Bingabing	Tree	A
Macaranga tanarius	Euphorbiaceae	Parasol leaf tree	Tree	A
Machaerina mariscoides subsp. meyenii	Cyperaceae	'Uki	Sedge	E
Mangifera indica	Anacardiaceae	Mango	Tree	A
Manihot glaziovii	Euphorbiaceae	Ceara rubber tree	Tree	A
Medinilla sp.	Melastomataceae	Medinilla	Shrub	A
Melaleuca quinquenervia	Myrtaceae	Paperbark tree	Tree	A
Melastoma candidum	Melastomataceae	Asian melastome	Shrub	A
Melinus minutiflora	Poaceae	Molasses grass	Grass	A
Melochia umbellata	Sterculeaceae	Melochia	Tree	A
Metrosideros polymorpha	Myrtaceae	'Ohi'a	Tree	E
Miconia calvescens	Melastomataceae	Miconia	Tree	A
Microlepia strigosa	Dennstaedtiaceae	Palapalai	Fern	I
Microsorum scolopendrium	Polypodiaceae	Microsorium	Fern	A
Microsorum spectrum	Polypodiaceae	Peahi	Fern	E
Mimosa pudica	Fabaceae	Sensitive plant	Herb	A
Myrsine lessertiana	Myrsinaceae	Kolea	Tree	E
Nephrolepis exaltata	Nephrolepidaceae	Sword fern	Fern	I
Nephrolepis multiflora	Nephrolepidaceae	Sword fern	Fern	A
Odontosoria chinensis	Lindsaeaceae	Pala'a	Fern	I
Ophioglossum pendulum	Ophioglossaceae	Adder's tongue fern	Fern	I
Oplismenus hirtellus	Poaceae	Basketgrass	Grass	A
Paederia foetida	Rubiaceae	Maile pilau	Vine	A
Panicum maximum	Poaceae	Panicum	Herb	A
Paspalum conjugatum	Poaceae	Hilo grass	Herb	A
Pennisetum purpureum	Poaceae	Napier's grass	Herb	A
Persea americana	Lauraceae	Avocado	Tree	A
Phaius tankervilleae	Orchidaceae	Chinese ground orchid	Herb	A
Philodendron sp.	Araceae	Philodendron	Vine	A
Phlebodium aureum	Polypodiaceae	Phlebodium	Herb	A
Phymatosorus grossus	Polypodiaceae	Maile-scented fern	Herb	A

Pipturus albidus	Urticaceae	Mamaki	Shrub	E
Pityrogramma calomelanos	Pteridaceae	Silver fern	Fern	A
Pluchea carolinensis	Asteraceae	Sourbush	Shrub	A
Pneumatopteris sandwicensis	Thelypteridaceae	Pneumatopteris	Fern	E
Polygala paniculata	Polygalaceae	Root beer plant	Herb	A
Polyscias hawaiiensis	Araliaceae	Ohe mauka	Tree	E
Psidium cattleianum	Myrtaceae	Strawberry guava	Tree	A
Psidium guajava	Myrtaceae	Guava	Tree	A
Psilotum nudum	Psilotaceae	Moa	Herb	I
Psychotria hawaiiensis	Rubiaceae	Kopiko	Tree	E
Pteris cretica	Pteridaceae	Cretan brake	Fern	I
Pterolepis sp.	Melastomataceae	Pterolepis	Herb	A
Pycreus polystachyos	Cyperaceae	Cyperus	Herb	I
Rubus rosifolius	Rosaceae	Thimbleberry	Shrub	A
Sadleria cyatheoides	Blechnaceae	Ama'u	Fern	I
Schefflera actinophylla	Araliaceae	Octopus tree	Tree	A
Schizachyrium condensatum	Poaceae	Tufted beardgrass	Grass	A
Sonchus oleraceus	Asteraceae	Sow thistle	Herb	A
Solanum americanum	Solanaceae	Popolo	Herb	I
Spathodea campanulata	Bignoniaceae	African tulip tree	Tree	A
Spathoglottis plicata	Orchidaceae	Philippine ground orchid	Herb	A
Spermacoce sp.	Rubiaceae	Button weed	Herb	A
Sphenomeris chinensis	Lindsaeaceae	Pala'a	Fern	I
Stachytarpheta jamaicensis	Verbenaceae	Jamaica vervain	Shrub	A
Syzygium cumini	Myrtaceae	Java plum	Tree	A
Syzygium jambos	Myrtaceae	Rose apple	Tree	A
Tetrazygia bicolor	Melastomataceae	Tetrazygia	Tree	A
Themeda villosa	Poaceae	Themeda	Grass	A
Trema orientalis	Ulmaceae	Gunpowder tree	Tree	A
Vandenboschia cyrtotheca	Hymenophyllacae	Vandenboschia	Fern	E
Waltheria indica	Sterculiaceae	'Uhaloa	Herb	I
Wedelia trilobata	Asteraceae	Wedelia	Herb	A
Zingiber zerumbet	Zingiberaceae	'Awapuhi ginger	Shrub	A

I = Indigenous; E = Endemic; A = Alien, End. = Listed Endangered

* Proposed for Listing October 2012, pending determination

** Apparent hybrid(s)

A=Alien E=Endemic I=Indigenous END=Federal and State Listed Endangered

Table 2
Bird Species Identified

Scientific Name	Common Name	Status
Acridotheres tristis	Common Myna	Alien Resident
Buteo solitarius	Hawaiian Hawk	Endemic Resident
Carpodacus mexicanus	House Finch	Alien Resident
Cardinalis cardinalis	Northern Cardinal	Alien Resident
Geopelia striata	Zebra Dove	Alien Resident
Hemignathus virens	ʻAmakihi	Endemic Resident
Himatione sanguinea	ʻApapane	Endemic Resident
Leucodioptron canorum	Melodious Laughing Thrush	Alien Resident
Lophura leucomelanos	Kalij Pheasant	Alien Resident
Pluvialis fulva	Pacific Golden-Plover	Indigenous Visitor
Streptopelia chinensis	Spotted Dove	Alien Resident
Zosterops japonicus	Japanese White-Eye	Alien Resident

Table 3
Bird Species Abundance During Bird Counts, May 5, 2013

Species*	Common name	BPS	Frequency
Cardinalis cardinalis	Northern Cardinal	1.0	0.50
Carpodacus mexicanus	House Finch	1.0	0.50
Hemignathus virens	ʻAmakihi	5.16	1.0
Himatione sanguinea	ʻApapane	2.16	0.83
Leucodioptron canorum	Melodious Laughing Thrush	0.33	0.16
Lophura leucomelanos	Kalij Pheasant	0.16	0.16
Streptopelia chinensis	Spotted Dove	0.33	0.33
Zosterops japonicus	Japanese White-eye	4.33	1.0

BPS (birds per station) is the mean number of detections at all stations combined. Frequency refers to the proportion of stations occupied by each species. *indicates native Hawaiian species

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Appendix B

2019 Botanical Survey of Pu‘u Kali‘u

BOTANICAL SURVEY of PU‘U KALI‘U

by Jonathan Rathbun and Jennifer Johansen

August 11, 2019

INTRODUCTION

Pu‘u Kali‘u is one of many volcanic cones strung along the East Rift Zone of Kīlauea Volcano on the Island of Hawai‘i. It is located six kilometers south-southeast of the town of Pāhoa in the district of Puna and spans the boundaries of the Opihikao and Kahuwai ahupua‘a. This survey assessed 94 acres, that included Pu‘u Kali‘u; the primary survey goals were to assess the overall status of the native forest, identify and list native and naturalized species present, and determine whether any rare species may be present and if so, to document their locations.

From the summit ridges of Pu‘u Kali‘u is a view across miles of Puna’s forests, agricultural lands and newly formed lava-scape. To the east southeast, the Kalapana-Kapoho coast can be seen; the view to the west looks up the East Rift of Kilauea to Pu‘u ‘O‘o; and to the North is an expansive view of Hilo and Mauna Kea. The forest is classified as Lowland Wet ‘Ōhi‘a Forest (Cagne and Cuddihy, 1990). Unfortunately, for many miles the tall forest is now characterized by the dead, gray skeletons of ‘ōhi‘a trees that have succumbed to Rapid ‘Ōhi‘a Death (ROD). Figure 1. provides a representative sample of the native forest canopy throughout the 94-acre study area.



Figure 1. Looking west above the forest canopy from the slope of Pu‘u Kali‘u. On the horizon the highly invasive albizia *(Falcataria [Paraserianthes] moluccana)* trees can be seen, indicating the likely future of this forest.

Visible from the Puʻu Kaliʻu summit area are the epicenters of two disasters that have recently impacted the vegetation of the area; both located in the nearby Leilani subdivision which immediately borders the study area to the north, upwind side.

In May of 2018, approximately one year before this study, a major eruption of the Kīlauea Volcano sent lava spewing from numerous fissures along the Lower East Rift Zone within and near the Leilani subdivision. This was the first eruption along this section of the Rift Zone since 1955, when a long line of fissures passing along the south edge of the study area opened up. As the 2018 eruption progressed through the summer, activity centered on a vent that volcanologists referred to as Fissure 8. This fissure is now a small puʻu (called by some ʻAi Lāʻau, 'Forest Eater'), and is located less than 1km to the north-northeast of Puʻu Kaliʻu summit. More than seven square miles, including agricultural lands, housing subdivisions, coastal recreation areas, and forests, were quickly covered with a fresh layer of ʻaʻā lava. A much larger area, (nearly the entirety of Hawaiʻi Island), was affected by massive volumes of sulfur dioxide that was released during this eruptive event. Downwind of the volcanic vents, vegetation was severely impacted toxic levels of sulfuric acid (S02). Early in the eruption, nearby residents noticed a particularly heavy S02 emission; the morning after, many plants appeared to have been sprayed with herbicide. Soon, many species of trees become defoliated, and much of the area resembled winter in a Northeastern deciduous forest. Most heavily affected were many of the weediest tree species, including waiawī (*Psidium cattleianum*), *Melochia*, *Trema*, and *Cecropia.* Several weedy herbs and shrubs temporarily disappeared. Mosses and lichens died in large numbers and fungi were noticeably set back.

However, not all plants were impacted equally. Interestingly, most native vascular plant species appeared nearly or completely unsusceptible to the S02, presumably from evolving in these volcanic Islands. Many indigenous plants may have been positively affected due to the release from competition from defoliated weedy plants. Additionally, it appeared that the sulfur helped to quell ROD symptoms. In September 2018, the eruption ceased, after a few heavy rains, all but the most severely affected weed trees began to recover. A year later, little evidence of this sulfur event is visible, except in small areas within the immediate vicinity of still-active sulfur vents where trees have completely died. So, though the impact on the human population was significant, and areas of increasingly rare coastal native forest were inundated, this disaster was relatively minor as far as native ecosystems were concerned. This affirmed that many of Hawaiʻi's natives plant species are adapted to the gasses associated with occasional volcanic eruptions.

A more serious disaster continues to unfold, albeit a little more gradually. This disaster, which is believed to have also originated in the Leilani subdivision, has the potential to cause complete collapse of native ecosystems throughout the Hawaiian Islands. Two species of fungi, *Ceratocystis huliohia* and *Ceratocystis lukuohia,* both commonly known as Rapid ʻŌhiʻa Death (ROD), are infecting ʻōhia, with the latter killing ʻōhiʻa trees with frightening efficiency. Once a stand of trees is infected with *C. lukuohia*, it is only a matter of a very few years before most or all trees in the stand are dead (Fig. 2). This disease, first detected a little more than a decade ago, has recently spread to many parts of the island, and has in the last year been found on Kaua'i and Maui. ʻŌhiʻa is by far the most common native tree in the Hawaiian Islands. ʻŌhiʻa is a crucial component of the forest canopy layer and conspicuously dominates many native forests, including the forest of the study area. Once the ʻōhiʻa dies, sunlight floods to the forest floor and

shade-loving understory native plants struggle to survive in the changed light regime. Sun-loving invasive plant species quickly move in and outcompete any remaining native species. The result is the rapid replacement of interesting native ecosystems that have evolved over millions of years with a boring, weedy, forest consisting of only alien species.

This process is all too well illustrated at Puʻu Kaliʻu. When you look across the landscape from the summit ridges, you can see that ʻōhiʻa trees that were alive as recently as five years ago, more than 90% have died. Most other native species are in retreat if they have not already disappeared entirely. Invasive tree seedlings densely dominate the forest floor. The multitudes of standing dead trees are evidence that the forest must have been vibrant and beautiful only a few years ago.



Figure 2. Standing dead ʻōhiʻa.

SCOPE AND METHODS

The area surveyed for this report comprises a 94-acre survey area which includes much of Puʻu Kaliʻu and areas to the west and south (see map). The survey focused on the composition of the vascular plant vegetation of this area. The survey was spread across eight field days in June and July of 2019. North-to-south transects were established throughout the survey area; transects were spaced at 25-meter intervals and ran north-south along UTM eastings. The UTM eastings selected were even multiples of 25, ranging from 298200 East to 298775 East. GPS units were used to guide the surveyors along these lines. The lines were used as rough guides, and some meandering occurred as obstacles such as cliffs, cracks, strawberry guava thickets, and fallen log-jams were encountered. Likely places for unusual species, such as cave mouths, cracks, rock outcroppings, and holes were inspected more carefully. Tree trunks and snags were searched for epiphytes. Species found were noted in field notebooks, or specimens were collected for later

listing. The two surveyors, Jon Rathbun and Jennifer Johansen, are both long-time students of Puna botany and were able to identify most plants on sight. References were consulted to confirm identifications. An attempt was made to provide a comprehensive list of angiosperm species present in the study area, but of course it is possible that some plants may have been unobserved, considering the dense groundcover and understory that limits visibility. However, considering the poor health and low overall diversity of the forest, we believe it is highly unlikely that rare or endangered species remain undiscovered. Plants not successfully identified to species were photographed; these are represented in the appendix.

TOPOGRAPHY AND SUBSTRATE

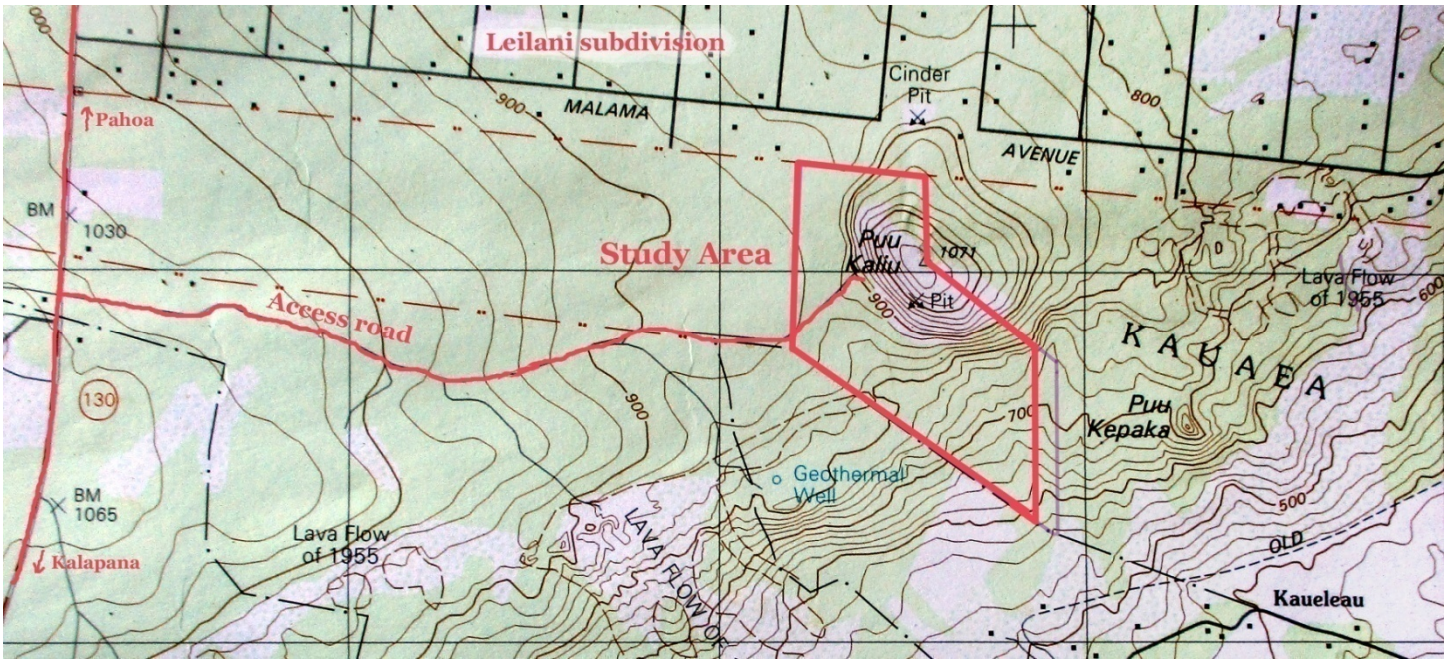


Figure 3. Topographic map showing the 94-acre study are.

Pu‘u Kali‘u is a volcanic cinder cone of the Kīlauea Volcano formed 400 – 700 years ago. It rises steeply on three sides 200' above a relatively level section of the East Rift Zone to an elevation of 1,071 feet. On the southeast side, the land drops sharply down several hundred feet further on a series of faults toward the coastal flats.

The substrate over most of the study area is volcanic cinder from the Pu'u, the surface layer partially weathered and mixed with biogenic organic matter. Rocky cracks, holes, and volcanic vents are common. A solid rocky core of the cone is exposed in the bottom of a cleft in the north slope that we call "Ha'iwale Gulch". The cinder thins, and rocky outcrops become more frequent as you move further from the cinder cone. The southwest boundary is edged by an ‘a‘ā lava flow from the 1955 eruption, while a small fissure associated with the 2018 eruption produced a small flow along the northern border.

VEGETATION

The vegetation on Pu‘u Kali‘u can readily be divided into three zones, differing in the level of disturbance related to the cinder mining operation:

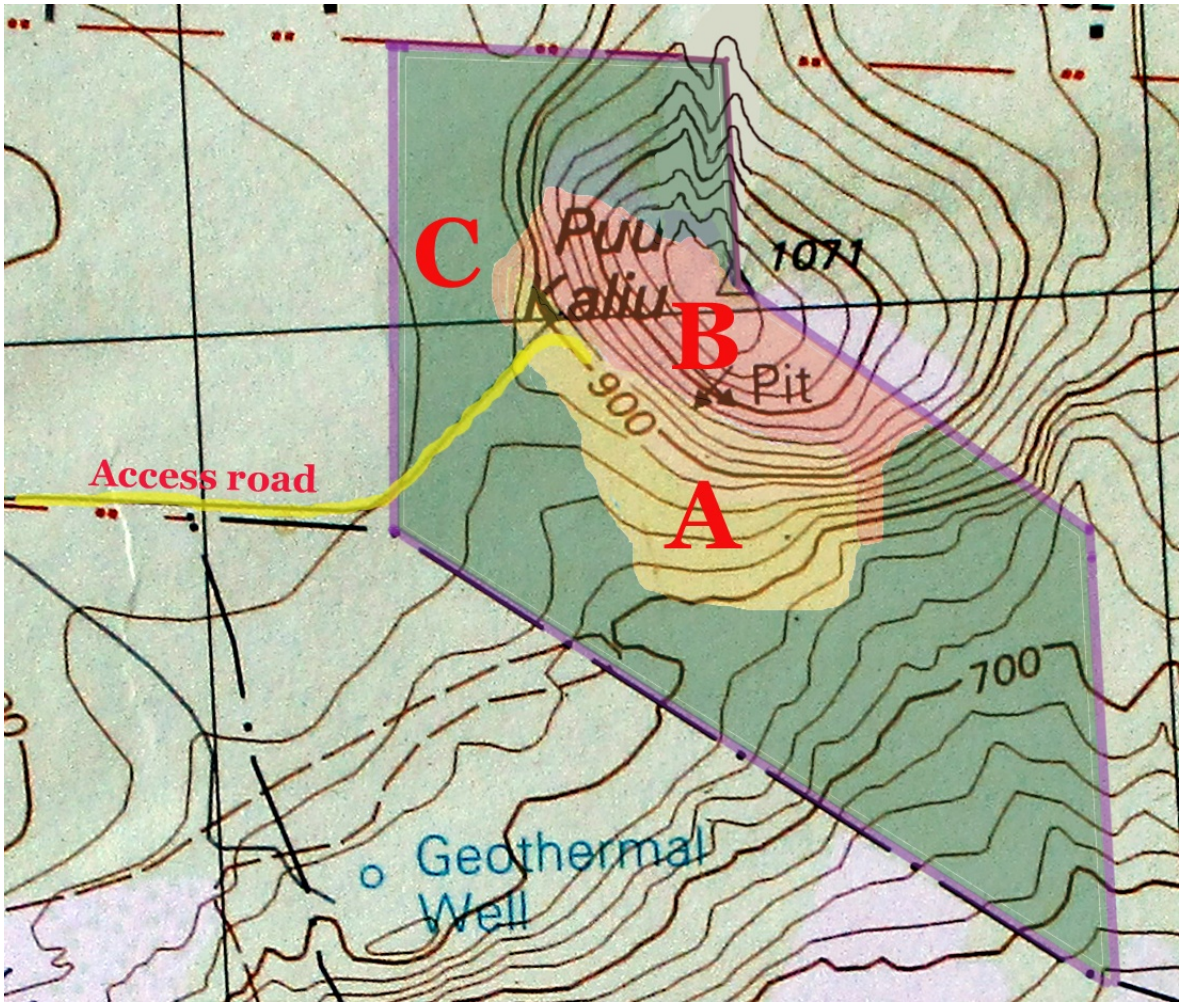


Figure 4. Three vegetation zones (A< B and C) of the 94-acre study area. See description in the text.

Zone A (yellow on the map above) indicates the approximate extent of the current mining operation. Most of this zone consists of recently dozed cinder completely devoid of vegetation. However, many species of exotic grasses and weeds find their homes along the margins of this zone. Plants found exclusively in this zone are marked with an asterisk (*) in the list below. Plants found only along access road outside the study area are marked with a pound sign (#).

Zone B (pink) delimits the area of old disturbance where vegetation is returning**.** Much of this area is covered in young ironwood trees **(***Casuarina equisetifolia***)** with a dense groundcover of yellow ginger (*Hedychium flavescens*) and Asian sword fern (*Nephrolepis multiflora*. Other areas are bare cinder with a thin covering of weedy plants or, in some places, ‘ōhi‘a seedlings a few inches to a few feet high. Melastomes such as *Arthrostemma*, *Tibouchina longifolia*, and *T. herbacea* inhabit this area. A patch of

the noxious invasive Himalayan yellow raspberry (*Rubus ellipticus*) was found in the extreme easternmost point of this area.



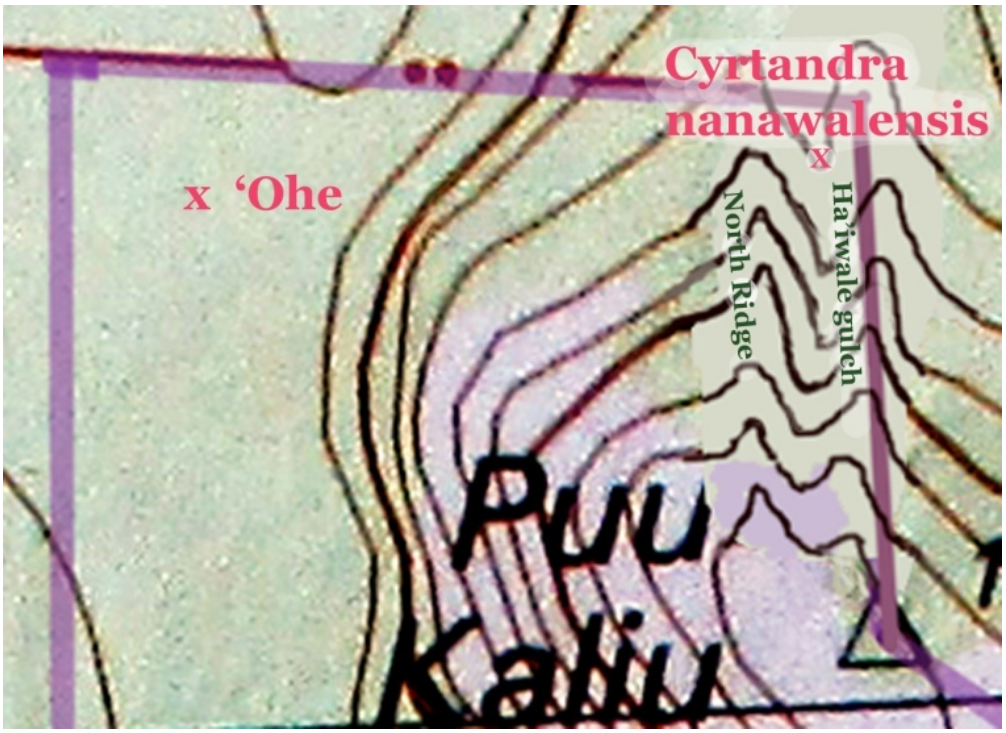
Figure 5. The eastern side of Pu'u Kaliu showing a part of zone B.

Zone C (dark green) represents the degraded native forest not disturbed by mining. Though the forest throughout this zone has been severely devastated and is now largely dead, it is still possible to discern what the forest would have been like in the recent past. Tall ʻōhiʻa snags are everywhere. Among them are the straight, pole-like skeletons of lama tree and the curvy black skeletons of kōlea trees. This forest was a wet forest dominated overwhelmingly by ʻōhiʻa. Lama and kōpiko were subdominant. Very few kōlea trees were seen, but these and possibly a few other tree species would have made up a minor part of the forest composition. Overall diversity appears to have been low. At this time (June-July 2019), we estimate the total overall number of surviving native tree cover at about 5 – 10% of what it would be if healthy. This number appears to be still declining. Waiawī (*Psidium cattleianum*) is a conspicuous part of the understory everywhere and often dominates in areas where the canopy has been lost, it often forms

dense thickets that fall over, yet continue to grow. Besides uluhe, the only native plants to be reasonably common and appear to be sustaining themselves for the time being are māmake (*Pipturus albidus*) and to a lesser degree three species of hapu'u (*Cibotium*). The māmake is in stiff competition with *Trema orientalis* as they are very often found growing in high densities together, this appears to be a recent emergence (post 2018 eruption) as they are nearly uniform in height reaching approximately 2-3meters. 'Ie'ie (*Freycinetia arborea*) can be seen clinging to dead ʻōhiʻa trees. With the loss of the tree canopy, weedy shrubs, vines and exotic tree seedlings densely tangle with the ubiquitous fallen trees, creating nearly impenetrable thickets. The most common groundcover plants include naturalized ferns (*Macrothelypteris*, *Cyclosorus*, *Nephrolepis*), honohono kukui (*Oplismenus hirtellus*), and 'awapuhi (*Zingiber zerumbet*).

The description above applies to the bulk of this zone. There are several areas with sizable pockets covered with uluhe (*Dicranopteris linearis*), which can be considered healthy subzones of Zone C. Otherwise the zone is fairly consistent, with only minor variations in vegetation composition. The lowest, southernmost areas are slightly drier and present a somewhat more mesic aspect, while the north-facing slope of the pu'u is wettest. Some areas, especially toward the southern boundary, are void of native vegetation and are dominated by exotic trees such as *Melochia*, *Trema*, and *Cecropia*. There are small nice areas where a few ʻōhiʻa trees have managed to survive.

RARE SPECIES



Of primary focus for the survey was to locate rare and endangered plant species. Plants particularly sought were *Polycias hawaiensis* ('ohe), and the federally listed endangered *Cyrtanda nanawalensis* and

Cyanea platyphylla, since these have previously been seen in the general area. Considering the highly damaged state of the forest, it is not surprising that very few rarities were found. However, we did find a lone 'ohe tree and two *Cyrtandra* species*, C. nanawalensis* and *C. paludosa var. paludosa.* The 'ohe tree was growing in the northwest corner of the study area (UTM E298299, N2152049). Both species of *Cyrtandra* were found growing together in a cleft on the north slope of Pu'u Kali'u that we call "Ha'iwale Gulch". This gulch had numerous *Cyrtandra paludosa* growing all along its bottom. Near the head of Haʻiwale Gulch, six *C. nanawalensis* (UTM E298556, N2152252) plants were growing in a clump amongst a population of *C. paludosa*. Due to *Cyrtandra's* colony-forming habit through underground stems the count of six is a best estimate. No *Cyanea* or other uncommon species were seen. The map above shows locations of the rare plants found. Contour lines were altered north of the summit to more accurately reflect topography encountered on the ground.

CYRTANDRA OF PU'U KALI'U

Following are the two species of Haʻiwale found growing together in "Haʻiwale Gulch", which runs north from the summit of Puʻu Kaliʻu (see map).



Cyrtandra nanawalensis: Leaves relatively broadly obovate, coarsely hairy on upper surface. Flowers and fruit were not present at time of our visit. (Pu'u Kali'u, "Ha'iwale Gulch" 900' 7-19). This recently described species is restricted to a few low-elevation sites in Puna and South Hilo Districts. It is federally listed as an endangered species.



Cyrtandra paludosa: Leaves narrower than *C. nanawalensis*, elliptic to narrowly obovate, acuminate, thin and smooth, often glaucous beneath. Calyx splits to base along one side and then further splits irregularly, often deciduous, while the calyx of *C. nanawalensis* is divided into 5 relatively equal lobes and is persistent on the globose to somewhat ovoid berry. (Pu'u Kali'u, "Ha'iwale Gulch" 900' 7-19).

CONSERVATION PERSPECTIVES

Sadly, the overall status of the native forest surrounding Pu'u Kali'u must be rated as poor and declining. Though the forest only a few years ago was in much better shape, it has long been under assault by invasive, exotic species, and is now severely decimated by the ROD fungal infection. This forest, if left alone, will soon be completely overtaken by exotic species and virtually no natives can be expected to survive long into the future. Naturalized trees such as Melochia, Trema, Cecropia, and albizia will dominate, with an understory of waiawī and melastomes. Given limited resources and the large amount of energy needed to restore the native forest, most of the study area is probably not worth attempting to restore. That said, the area we call Ha'iwale Gulch needs to be protected for the sake of the endangered *Cyrtandra nanawalensis*. As well, the lone 'ohe tree in the northwest corner of the study, member of a fast-disappearing species, should be preserved and seeds should be collected and propagated for genetic diversity.

NATIVE PLANTS

Trees

Diospyros sandwicensis Lama Occasional; more dead than live trees seen

Metrosideros polymorpha ʻŌhiʻa Until recently the entire study area (excluding cinder pit disturbance) was dominated by ʻōhiʻa but now 90% + of the trees are dead due to rapid ʻōhiʻa death (ROD or *Ceratocystis*) infection.

Myrsine lessertiana Kōlea Only 2 live trees seen, both in southeastern area.

Polycias (Tetraplasandra) hawaiensis ʻOhe Single tree found near northwest corner of study area. This individual is fairly large and still appears healthy. 2 additional trees are visible from the access road outside the study area.

Psychotria hawaiiensis Kōpiko Though sparse, this is the second most common native tree still surviving.

Shrubs

Cyrtandra nanawalensis Ha'iwale A small patch of about six plants found in 'Ha'iwale Gulch'.

Cyrtandra paludosa var. paludosa Ha'iwale Numerous plants grow along bottom of 'Ha'iwale Gulch'. Some plants were densely many-branched (contrary to description in WHS).

Freycinetia arborea ʻIeʻie Occasionally persisting on dead or still living ʻōhiʻa trees.

Pipturus albidus Māmake Young plants relatively common, scattered wherever any natives survive.

Solanum americanum Pōpolo Occasional.

Vines

Alyxia stellata Maile Single plant seen along ridge leading north from Pu'u Kali'u. It has rather small, crowded, ternate leaves.

Cocculus trilobus Huehue Infrequent, or at least inconspicuous.

Monocots

Cyperus (Pycreus) polystachyos Most common in disturbed areas, occasional in forest openings.

Fimbristylis dichotoma* Often grows in weedy situations but is considered indigenous.

Machaerina mariscoides ʻUki Infrequent.

Ferns

Adenophorus tamariscinus Wahine noho mauna Occasional epiphyte on kōpiko, often in dried out or dead condition as the shading canopy has died

Asplenium nidus ʻEkaha Occasional.

Cibotium chamissoi Hapuʻu Occasional.

Cibotium glaucum Hapuʻu Common.

Cibotium menziesii Hapuʻu ʻiʻi Less common.

Cyclosorus (Pneumatopteris) hudsonianus A few plants seen.

Dicranopteris linearis Uluhe Scattered patches, some large.

N**ephrolepis exaltata** Less common than *N. multiflora* and *N. exaltata X N. multiflora*, but still somewhat frequent.

Pleopeltus (Lepisorus) thunbergianus Occasional epiphyte

Psilotum nudum Scattered, usu. seen as an epiphyte on fallen ōhiʻa.

Sadleria cyatheoides Ama'u A few plants seen.

Sphenomeris chinensis Pala'a occasional.

NATURALIZED PLANTS

Trees

Archontophoenix alexandrae Alexandra palm A few mature trees scattered mostly toward Leilani side of area. Seedlings more numerous.
Carica papaya Young plants occasional in forest
Casuarina equisetifolia Grove on south slope of Pu'u up to summit. These were likely planted some years ago.
Cecropia obtusifolia Common; seedlings numerous.
Clusia rosea Autograph tree Still infrequent in the forest but more common along access road.
Eucalyptus ssp. At least 2 species planted on old disturbed cinder, most waist high, a few taller.
Falcataria (Paraserianthes) moluccana Albizia Common; seedlings numerous.
Ficus microcarpa A tree along North Ridge
Macaranga tanarius Common. Saplings and seedlings very common in forest.
Manihot glaziovii#
Melochia umbellata Common.
Persea americana Trees common, scattered on south slope.
Psidium cattleianum Ubiquitous throughout forested areas, often very dense.
Psidium guajaba Most common southwards.
Spathodea campanulata Not yet abundant, coming in along south edge of study area.
Syzygium jambos Rose apple A tree seen on North Ridge
Trema orientalis Gunpowder tree Common. Seedlings extremely numerous, forming thickets.

Shrubs

Buddleja asiatica Fairly common.
Cestrum nocturnum Plants seen in 2 places.
Hyptis pectinata Fairly common.
Lantana camara Occasional.
Ludwigia octovalvis Plants seen in 2 places.
Rubus ellipticus* A patch on west bank of old cinder pit at entrance to mining area.
Rubus rosifolius Common.
Stachytarpheta dichotoma Occasional.

Vines

Merremia tuberosa North slope of Pu'u near Leilani boundary
Momordica charantia Common

Herbs

Begonia hirtella Common – abundant.
Castilleja arvensis Scattered.
Hypericum parvulum#
Polygala paniculata*
Polygonum capitatum*
Torenia asiatica Common.

Ferns

Blechnum appendiculatum Fairly common, forms sometimes extensive patches.
Cyclosorus (Christella) dentatus Abundant.
Cyclosorus (Christella) parasiticus Very common.
Lygodium japonicum One plant seen on North Ridge of Pu'u Kali'u near USGS cameras.
Macrothelypteris torresiana Abundant.
Microsorus (Phymatosorus) grossus Common.
Nephrolepis multiflora Abundant.
Nephrolepis exaltata x multiflora Common – abundant, forms large, dense, clonal thickets to 8' tall.
Phlebodium aureum Occasional.
Pityrogramma calomelanos Common – abundant.
Pteris vittata Most common in disturbed area around cinder pit; occasional in forest.
Sphaeropteris cooperi 1 small plant seen.

Grasses

Andropogon virginicus Occasional.
Axonopus fissifolius*
Cenchrus (Pennesetum) purpureum*
Coix lachyrima-jobi Occasional in forest.
D**igitaria ciliaris***
Digitaria violascens Occasional.
Eragrostis sp.# Not in Wagner. More information below.
Melinus minutiflora*
Oplismenus hirtellus Abundant ground cover
Panicum maximum Disturbed ground along edge of old cinder pit
Panicum repens# Patch seen along road.
Paspalum conjugatum Common
Paspalum urvillei* Occasional on disturbed ground
Sacciolepis indica Occasional
Schizachyrium condensatum On old disturbed cinder near pit.
Urochloa (Brachiaria) mutica* Common along road and by old cinder pit.

Sedges

Cyperus halpan Occasional.
Kyllinga brevifolia Occasional.
Rhynchospora radicans Plants seen in 2 widely separated places in waiawī forest.

Orchids

Arundina graminifolia Scattered, common in open disturbed area
Spathoglotis plicata Scattered throughout forested areas
Phais tankarvillei Scattered in forest
Orchidaceae sp. Monopodial epiphyte, perhaps a *Vanda*. 1 plant seen on a fallen ʻōhiʻa branch south of cinder pit. More information below.

Gingers

Costus woodsonii A patch on Pu'u Kali'u North Ridge
Hedychium flavescens Abundant on Pu'u Kali'u summit area and along North Ridge
Hedychium coronarium Infrequent
Zingiber zerumbet Large and small patches scattered throughout forested areas.

Monocots

Bromeliaceae sp.# Epiphyte on albizia tree abundant near entrance to access road.
Crocosmia x crocosmiiflora#
Commelina diffusa Common
Cordyline terminalis Common
Heliconia sp. A large patch on north slope of Pu'u Kali'u near Leilani boundary. Young plants seen in 2 places in forest, may not be same.
Philodendron erubescens Vines extensively climbing and sprawling at mouth of "Ha'iwale Gulch". Perhaps on Leilani side of boundary.

Asteraceae

Ageratum conyzoides*
Ageratum houstonianum Frequent along road, less so in forest
Bidens alba*
Conyza canadensis Fairly common
Crassocephalum crepidioides Common
Emilia sonchifolia Occasional
Erechtites valerianifolia Abundant
Pluchea carolinensis Common
Sphagneticola (Wedelia) trilobata* Large patches around edge of cinder pit
Youngia japonica* Infreqent

Fabaceae

Chamaecrista nictitans*
Crotalaria lanceolata*
Crotalaria micans*
Crotalaria retusa*
Crotalaria sp.* not in Wagner
Desmodium cajanifolium*
Desmodium incanum
Desmodium intortum
Desmodium triflorum*
Mimosa pudica*
Vigna hosei(?) Spreading into the forest from the south edge of property. Identification needs confirmation.

Melastomataceae

Arthrostemma ciliatum Common, spreading.
Clidemia hirta Abundant, but not yet superdense.
Medenilla sp. Epiphyte on top of snag about 4m from ground. One plant seen north of Pu'u Kali'u near summit.
Melastoma candidum Abundant, thickets in some areas, but seems to have been set back by eruption gasses.

Miconia calvescens Scattered in forest, young plants common.
Tibouchina herbacea Occasional, mostly around edge of cinder pit.
Tibouchina longifolia Mostly scattered around edge of cinder pit.

Rubiaceae

Hedyotis corymbosa*
Paederia scandens Abundant
Spermacoce assurgens#
Spermacoce sp.* narrow leaf, not in Wagner

_____
* Roadside weeds-- seen only on roadside and recently disturbed area around cinder pit.
# Noticed along access road outside study area only. Not an exhaustive list.
( ) Genus names in parenthesis are those in Wagner, Herbst, & Sohmer 1990 or Palmer 2003 if they differ from those given here.

NON-VASCULAR PLANTS AND LICHENS

Mosses, liverworts, and lichens were noticeably scarce. Brown, dead moss was prevalent. .Similar wet forests, even degraded ones, normally host a conspicuous variety of these life-forms. The sulfur dioxide from the 2018 eruption appears to have had an adverse impact on these forms, though some now seem to be recovering to some extent.

BIRDS

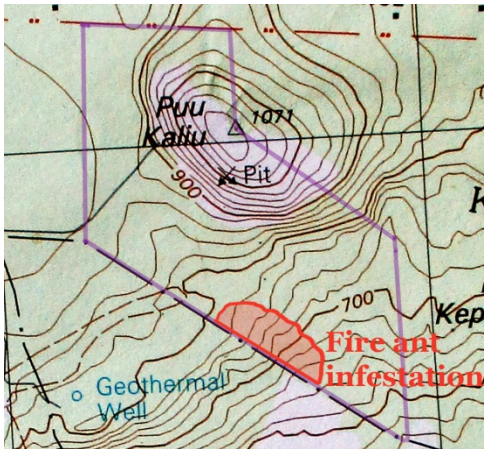
Though birds did not seem particularly abundant and were not the primary focus this survey, we incidentally noticed a few species. Though familiar with the calls of the local 'apapane (*Hematione sanguinia*) and 'amakihi (*Hemignathus virens*), we did not hear nor see these birds nor did we see many ‘ōhi‘a flowers that might attract them to the area. The only native bird seen was:

Buteo solitaris. ‘Io

Naturalized birds seen or heard include:

Cardinalis cardinalis Cardinal
Carpodacus mexicanus House finch
Garrulax canotus Melodious laughing-thrush
Lophura leucomelana Kalij pheasant
Serinus mozambicus Yellow-fronted canary
Zosterops japonicus Japanese white-eye

INSECTS



A few insects were conspicuous:

Solenopsis sp. Little fire ants infest area shown on map.
Aedes albopictus Day mosquitoes were light to moderate in deeply shaded areas.
Lepidoptera sp. Large hawk moths were quite common.

Appendix A COMPARISON WITH AN EARLIER SURVEY

A botanical survey of the same general area was made in 2013 by Ron Terry and Patrick Hart. It may be of interest to compare their findings of a few years ago to the present survey. At the time of their survey Rapid ʻŌhiʻa Death had not been formally recognized/identified and the trees in the survey area appeared disease free, however the crew did notice dying ʻōhiʻa trees along the access road. The vast area of dead ʻōhiʻa observed in this survey appeared healthy six years ago and the forest was in much better shape. Nonetheless, we counted an equal number of angiosperm species. In both surveys, the total number of native vascular plant species was rather small, indicating a low-diversity young forest. The most conspicuous difference that jumps out is in the number of native fern species found. Even discounting a probable misidentification or two, the native fern diversity was much greater in their survey. Conversely, our survey counted a greater number of naturalized fern species. We found *Cyclosorus parasiticus* and in particular *Macrothelypteris torresiana* to be extremely abundant, forming a major part of the ground cover in large areas; these were not listed by Terry and Hart. One factor may be dieback of native ferns due to the high S02 levels during the summer 2018 eruption and the subsequent replacement of non-natives. Another factor doubtless contributing to this change in species composition is the loss of shade needed by shade-loving ferns as the canopy of ʻōhiʻa dies and as weedy ferns move in.

Native Ferns & Allies

Listed by Terry & Hart but not by us	**Found by us** but not by Terry & Hart
Adiantum capillus-veneris *Asplenium lobulatum* *Athyrium microphyllum* *Elaphoglossum sp.* *Gonocormus minutus* *Huperzia phyllantha*	*Cyclosorus (Pneumatopteris)hudsonianus*

Lycopodium sp. *Microsorum spectrum* *Microlepia strigosa* *Ophioglossum pendulum* *Pneumatopteris sandwicensis* *Pteris cretica* *Vandenboschia cyrtotheca*	

Native Angiosperms

Listed by Terry & Hart but not by us	**Found by us** but not by Terry & Hart
Waltheria indica	*Alyxia stellata*
Cyrtandra sp. =*C. nanawalensis x paludosa?*	*Cocculus trilobus*
	Fimbristylis dichotoma

Naturalized Ferns

Adiantum hispidulum	*Cyclosorus (Christella) parasiticus*
Angiopteris evecta	*Lygodium japonicum*
	Macrothelypteris torresiana
	Pteris vittata
	Sphaeropteris cooperi

Asteraceae

Ageratina riparia	*Conyza canadensis*
Conyza bonariensis	*Crassocephalum crepidioides*
Emilia fosbergii	*Emilia sonchifolia*
Erechtites hieracifolia	*Erechtites valerianifolia*
Sonchus oleraceus	*Youngia japonica*

Fabaceae

Canavalia cathartica	*Crotalaria lanceolata*
Crotalaria sp.	*Crotalaria micans*
	Crotalaria retusa
	Crotalaria sp. not in Wagner
	Desmodium intortum
	Vigna hosei

Melastomataceae

Pterolepis sp.	*Arthrostemma ciliatum*
Tetrazygia bicolor	*Tibouchina herbacea*
	Tibouchina longifolia

Trees and Shrubs

Araucaria heterophylla	*Carica papaya*
Eucalyptus grandis	*Clusia rosea*
Mangifera indica	*Ludwigia octovalvis*
Shefflera actinophylla	*Rubus ellipticus*
Stachytarpheta jamaicensis	*Stachytarpheta dichotoma*
Syzygium cumini	

Herbs and Vines

Chamaesyce hirta	*Begonia hirtella*
Cuphea carthaginenesis	*Hypericum parvulum*
Drymaria cordata	*Merremia tuberosa*
	Momordica charantia
	Polygonum capitatum
	Spermacoce assurgens
	Torenia asiatica

Sedges

	Kyllinga brevifolia *Rhynchospora radicans*

Grasses

Cynodon dactylon *Eragrostis tenella* *Themeda villosa*	*Axonopus fissifolius* *Digitaria ciliaris* *Digitaria violascens* *Eragrostis* sp. (not *E. tenella*) *Panicum repens* *Paspalum urvillei* *Sacciolepis indica* *Urochloa (Brachiaria) mutica*

Other Monocots

Anthurium sp. *Dioscorea pentaphylla* *Epidendron sp.* *Philodendron sp.*	*Bromeliaceae sp.* *Costus woodsonii* *Hedychium flavescens* *Heliconia sp.* *Crocosmia x crocosmiifolia* *Orchidaceae sp. Vanda?* *Philodendron erubescens*

Appendix B UNIDENTIFIED PLANTS



Eragrostis sp. Plants glabrous throughout; culms ascending from a clump, 20 - 40cm x 0.8 - 1mm, smooth, terete. Leaves cauline; sheathes sometimes edged or tinged with pink; ligule a narrow rim; blades 4 - 8cm x 1 - 3mm. Inflorescence-branches short, scabrous, spikelets on short pedicels, 1 - 3 (or 4) per inflorescence branch, compressed, 10 - 15 x 1.5 - 2mm; 1st glume 1mm; 2nd glume 1.5mm, lemmas up to 40 -50, 2mm, sharply folded, somewhat keeled, acuminate. (Roadsides, Pāhoa 600 – 1000').





Bromeliaceae sp. Leaves about 25 – 40cm long. Numerous in albizia trees near access road entrance to Pu'u Kali'u 7-19.

Orchidaceae sp. Leaves about 25 – 30cm long. Epiphyte on fallen ʻōhiʻa branch, 1 plant seen. (Pu'u Kali'u 900' 6-19).



Heliconia sp. Isolated plants such as this were found in two widely separated places in the forest. (Pu'u Kali'u 900' 7-19). A large patch of this or another species grows along Leilani boundary.





Crotalaria sp. Shrubs to head high. Common around cinder pit. This rattlepod has become fairly common around Pāhoa since first noticed in 2013.







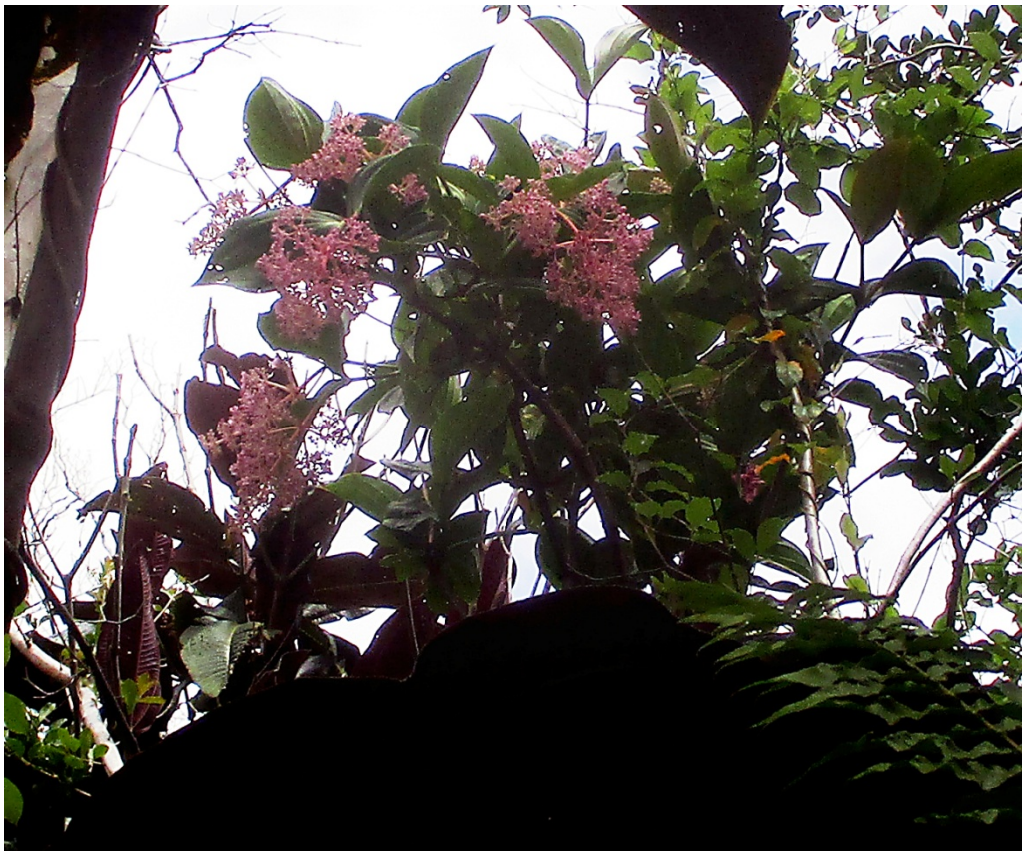


Vigna hosei? Creeping and twining vines, rooting at nodes; colonies forming extensive mats that may cover an acre or more; stems and both surfaces of leaves villous. Pseudoracemes axillary, appressed short-hairy, 2.5 - 6cm, usu. bearing 1 -

2 flowers or pods at a time. Pods papery, villous, 10 - 18 x 5mm. Seeds 5 - 6mm. Of recent introduction, rapidly increasing in abundance; abandoned fields and roadsides. First noticed about 1998.



Spermacoce sp. Stems becoming somewhat woody toward base, 15 - 40cm, sharply 4-angled, the angles winged, the wings very finely antrorsely ciliate below the nodes, faces pruinose, stems otherwise glabrous. Leaves small (10 - 25 x 3 - 6mm), upper surface papillose along margins, margins finely ciliolate, otherwise glabrous; stipules strigose, 1.5mm, tipped with several bristles 4 -5mm. Flowers in heads about 7mm in dia.; calyx-lobes usu. 4, 1 - 1.5mm; corolla-tube less than 1mm, the lobes spanning about 1.5mm; hypanthium 1 - 1.5mm. Fruit 2 - 2.5mm incl. calyx. Seeds 2, reddish-brown, compressed-ellipsoid,, papillose-reticulate, 0.7mm. A common weed of roadsides and other disturbed sites, at least in Hilo - Puna area below 4000'.



Medinilla sp. Epiphyte on a tall snag. (Pu'u Kali'u 7-19).

Appendix C SELECTED FIELD NOTES

T1 and T2N Easting 298200 & 298225 T1 is edged by a large uluhe patch. Otherwise, the area is dense with ± fallen waiawī. *Arthrostemma* forms tangles near the road. Substrate is rocky with cinder filling low spots between. A low but sharp ridge runs parallel to the road, with a lava tube on the S edge. There are a few live mature 'ōhi‘a and the usual sparse scattering of hapu'u, kōpiko, and māmake. A few dead lama, slender but tall, were noted.

T15N 298550 This transect crosses the summit of Pu'u Kali'u, where yellow ginger is dense. Uluhe patches grow on the sides. The steep south face of the Pu'u is vegetated with casuarina, yellow ginger, and naturalized ferns. North face is cut by a steep-sided cleft or gulch that runs along this transect. Here the forest was a little better than elsewhere in the study area, and not all the ‘ōhi‘a were dead . In the bottom of the gulch grow 2 kinds of ha'iwale, *Cyrtandra paludosa* and *C. nanawalensis*. *C. paludosa* is numerous along the gulch bottom. The rare species *C. nanawalensis* grows in a single small patch of about a half dozen individuals among the *C. paludosa*. This patch is located about 5 m. south of a lone tall Alexandra palm, the palm located near or at the Leilani boundary where it intersects the gulch. Other natives include uluhe, 'ie'ie, kōpiko, and māmake. Trema, melochia, waiawī several melastomes, etc. are in the early stages of invading the gulch and will soon overwhelm the area if no remedial action is taken. Several lua, or volcanic pits, were encountered a little north of summit.

T10 – 12S 298425 & 298475 This area, as elsewhere, is dominated by dead 'ōhi‘a. Moving south away from the Pu'u, the cinder covering the ground thins, leaving rocky areas exposed. A large uluhe patch lies along the south edge of the study area. An area adjoining this uluhe appears to have been dozed perhaps 10 – 20 years ago. T10 has several large ‘ōhi‘a still alive, but T12 is largely void of native vegetation. A few hapu‘u, kōpiko and māmake plants are scattered especially along T10. There are areas of *Melastoma* thicket that are partially died back, probably due to sulfur dioxide fumes from the recent eruption, or possibly as a result of biocontrol agents released against *Clidemia* also affecting *Melastoma*. Other areas were dense with *Trema* saplings 1 – 3m tall. Waiawī is ubiquitous everywhere.

T13 298500 Fire ants encountered at about 2151590 N, uluhe at 580

T15 298550 Big round hole about 15m across, no bottom visible, sides vertical, at about 21511560

T18 and T20S 298625 & 298675 South of the cinder pit the land drops off toward the coast. The area nearer the pit exhibits a 5 – 10% survival rate among the ōhi‘a and supports thinly scattered hapu'u and māmake. Down slope the native vegetations thins to 0% and there aren't even dead ōhi‘a snags. The entire area is infested with waiawī, *Trema*, albizia,, *Melochia*, *Cecropia*, young *Miconia*, etc. Fire ants infest the bottom third.

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Appendix C

2024 Natural Resources Assessment for Pu‘u Kali‘u

A Natural Resources Assessment for the Puʻu Kaliʻu Quarry Expansion Area, Puna Hawaiʻi Island



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G70

DRAFT
2024

Introduction

The Sanford Cinder Quarry is currently in operation in and around Puʻu Kaliʻu located in the District of Puna, Hawaiʻi Island. LBS Inc, was tasked with conducting a follow-up survey of the Petition Area (PA) in regards to the extant plant and animal species within the PA. Two previous surveys were conducted of the area in 2013 (Terry) and 2019 (Rathburn & Johansen). The PA totals approximately 94 acres (Fig. 2) of a larger parcel [TMK (3) 1-3-009:005 (Fig. 1). This report summarizes the findings of the recent field surveys (November 2024) as well as recommendations for any native species located within the PA as well as any that could possibly be utilizing the habitats in and around the general area that may be affected by the proposed land use change.

Site Description

Puʻu Kaliʻu is a volcanic cinder cone located along the East Rift Zone of Kilauea Volcano located in Puna on the Island of Hawaiʻi. The forest is characterized by a disturbed Lowland Wet ʻŌhia Forest. Many factors have had a hand in modifying the native landscape over the last few centuries. Most recently the 2018 Lower East Rift Zone eruption of Leilani Estates just nrrth of the PA caused initial damage to the forest including die back from sulfuric acid release and in the long term by raising ground temperatures leading to increased mortality of large trees and a landscape of deadfall and increased non-native plant regeneration in the place where the remaining native species were surviving. This along with the Rapid ʻŌhia Death (ROD), feral ungulate preSsures, and conitinued landscape modification has all aided in the continued decline of the native forest in this region.

Methods

Plant Survey

Two biologists surveyed the PA over four days, November 18-21, 2024. The entire 94 acres were included in the survey with focus on the areas with habitat that had a higher probability of harboring natives. Plant species were identified as they were encountered during meandering transects walked through the PA and along boundaries. Notes were made on plant associations and distribution, disturbances, topography, substrate type, exposure, and drainage. Species names for plants 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).

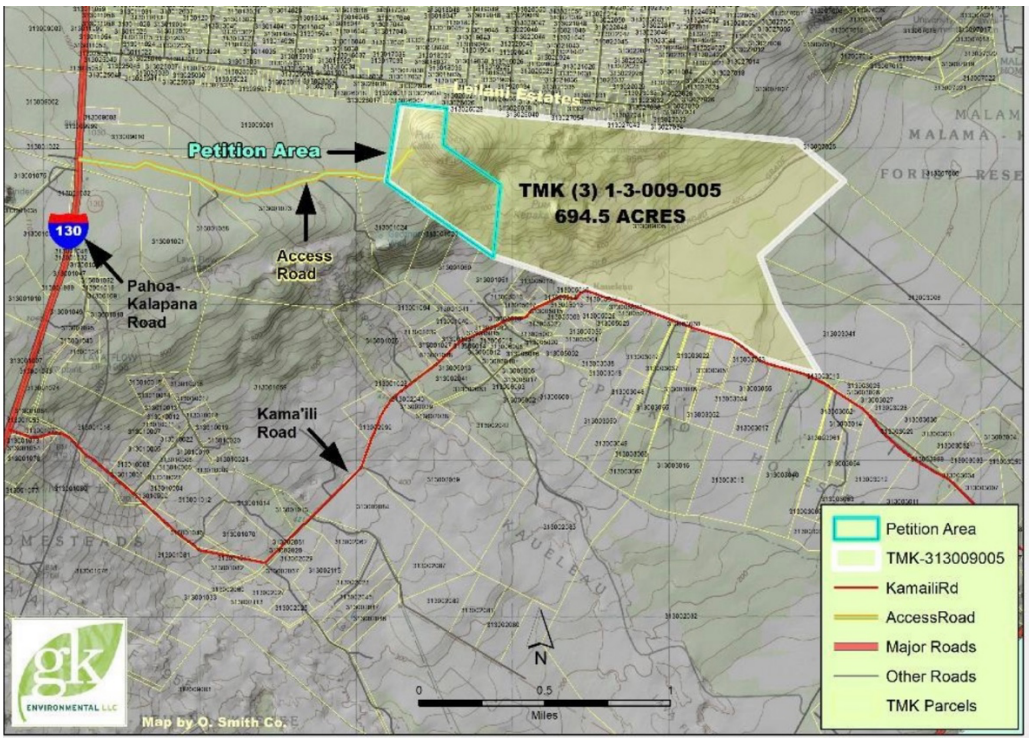


Figure 1. Petition Area Boundary is a section of overall TMK located in Puna, Hawai'i Island.

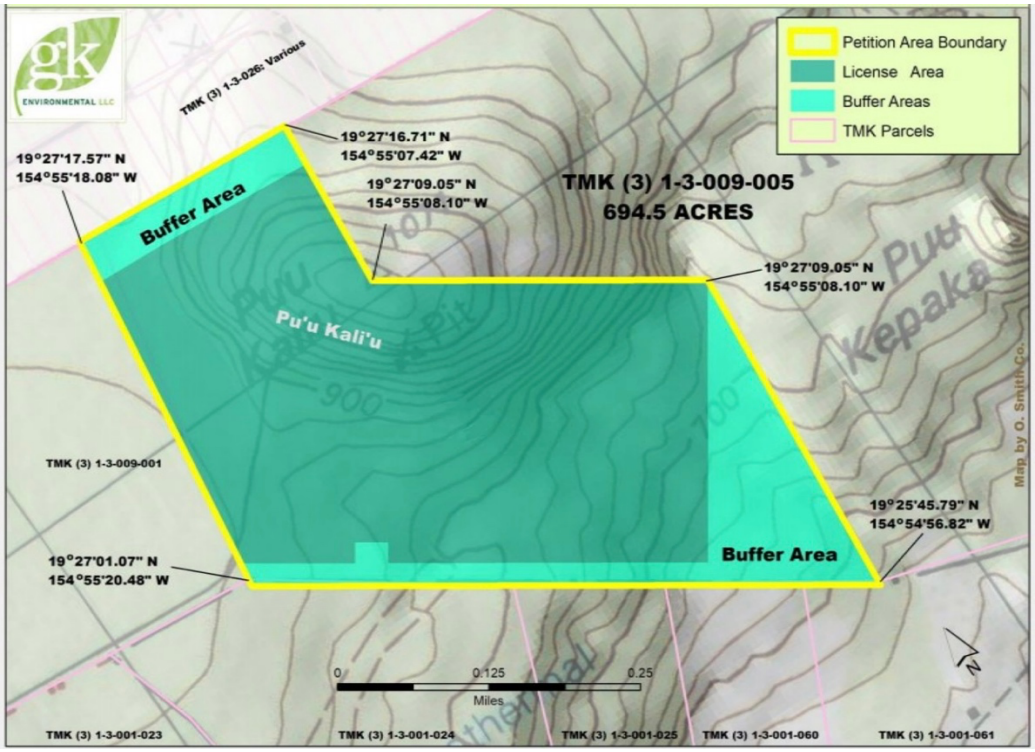


Figure 2. Topographic map showing Petition Area and current survey area outlined in yellow.

Avian Survey

Bird counts were conducted in the morning hours between 6:30 am and 8:00 am on all four days of the survey, noting species present and estimated abundance. Passive observations were also noted throughout the day. Birds were identified by visual observations aided by Leica 7 X 42 binoculars, and by listening for vocalizations. Weather conditions were relatively ideal on all four days with overcast conditions and/or light sporadic rain, and winds between 5 and 12 miles per hour. The avian phylogenetic order and nomenclature used in this report follows the AOU *Check-List of North and Middle American Birds* 2021, and the 64th supplement to the checklist (Chesser et al., 2023).

Mammalian Survey

Notes were made of any mammal sightings or indicators of mammalian presence, such as tracks, scat, or rubbings. Mammalian phylogenetic order and nomenclature follow *Mammal Species of the World* (Wilson and Reeder, 2005).



Figure 3. Vegetation at the edge of the exisiting cinder quarry with low growing disturbed weedy vegetation in foreground and secondary modified ʻōhiʻa forest in the distance.



Figure 4. Typical view of the thick non-native dominated forest on the north slope of Pu‘u Kal‘iu.

Results

Flora

The survey area is characterized by a disturbed Lowland Wet Forest typical of the Puna region. Changes is landscape and biota are due to numerous past and present factors including, geologic events such as intermittent volcanic eruptions, the most recent eruption in 2018 having significant affects on the surrounding landscape including the PA. The increased ground temperatures resulted in significant numbers of tree death and tree fall over the years since the eruption, creating a matrix of deadfall logs covered with weedy vines. Hiking though this type of landscape is gruelling and slow. Various other landscape modifiers include; ground disturbance by machinery, non-native plant introductions that impact native flora by competing for light, space, and nutrients, and feral animal effects of grazing, ground disturbance, and exacerbating the spread of non-native plants. Besides documenting the general vegetation within the PA, a concerted effort was made to locate any previously known rare native plant locations and look for any additional populations. The following describes the current dominant vegetation and the rare plants observed.

In areas that have had previous and current ground disturbance from the cinder mining, non-native vegetation dominates the landscape including tree species such as ironwood (*Casuarina equisetifolia*), guarumo (*Cecropia obtusifolia*), gunpowder tree (*Trema* orientalis), albizia (*Falcataria moluccana*), macaranga (*Macaranga tanarius*) , and shrubs including sourbush (*Pluchea carolinensis*), Koster‘s curse (*Miconia crenatum*), butterfly

bush (*Buddleja asiatica*), Partridge pea (*Chamaecrista nictitans*), comb hyptis (*Mesosphaerum pectinatum*), and rattlepod (*Crotalaria*) species. Fern and grass species include Guinea grass (*Megathyrsus maximus*), elephant grass (*Cenchrus purpureus*), molasses grass (*Melinis minutiflora*), natal redtop (*Melinis repens*), gold fern (*Pityrogramma austroamericana*), *Nephrolepis brownii*, ladder brake (*Pteris vittata*), and *Christella dentata*. A few native species were observed in or at the edges of the quarry areas including ʻōhiʻa lehua (*Metrosideros polymorpha*), ʻuki (*Machaerina mariscoides*), uluhe (*Dicranopteris linearis*), *Cyperus polystachyos*, and māmake (*Pipturus albidus*).



Figure 5. View from edge of quarry at southwestern edge looking down into an old quarry area with stands of ironwood dominating the landscape.

Vegetation outside of current and historic quarry areas (the northern and southern portions of the PA) are dominated by non-native tree species such as strawberry guava (*Psidium cattleyanum*), common guava (*Psidium guajava*), gunpowder tree, guarumo, albizia, macaranga, and *Melochia umbellata*. Native trees are scattered with the most common being ʻōhiʻa lehua and kōpiko (*Psychotria hawaiiensis*). Curiously none of the lama (*Diospyros sandwicensis*) trees noted during the previous surveys in 2013 and 2019 were observed. Understory plants include shrubs such as white and yellow ginger (*Hedychium coronarium* and *H. flavescens*), sourbush, trefoils (*Desmodium* spp.), melastomes such as *Arthrostemma ciliatum*, velvet tree (*Miconia calvescens*), Koster's curse, cane tibouchina (*Tibouchina herbacea*), glorybush (*Tibouchina longifolia*), night cestrum (*Cestrum nocturnum*), and Jamaican vervain (*Stachytarpheta jamaicensis*).

Native fern species were variable in abundance with sections with large patches of uluhe, three species of hapuʻu tree ferns (*Cibotium chamissoi, C. glaucum. C. menziesii*) scattered throughout the PA along with moa (*Psilotum nudum*), and occasionally ephiphytic species

such as ʻekaha (*Asplenium nidus*), hoe a Maui (*Elaphoglossum crassifolium*), puapua moa (*Ophioderma pendulum*), pākahakaha (*Lepisorus thunbergianus*), and wahine noho mauna (*Adenophorus tamariscinus*). We observed an association of dead hapuʻu stumps with puapua moa ferns persisting epiphytically in numerous locations especially in the western and southern portions of the PA (Fig. 6).



Figure 6. puapua moa ferns growing on dead hapuʻu log.

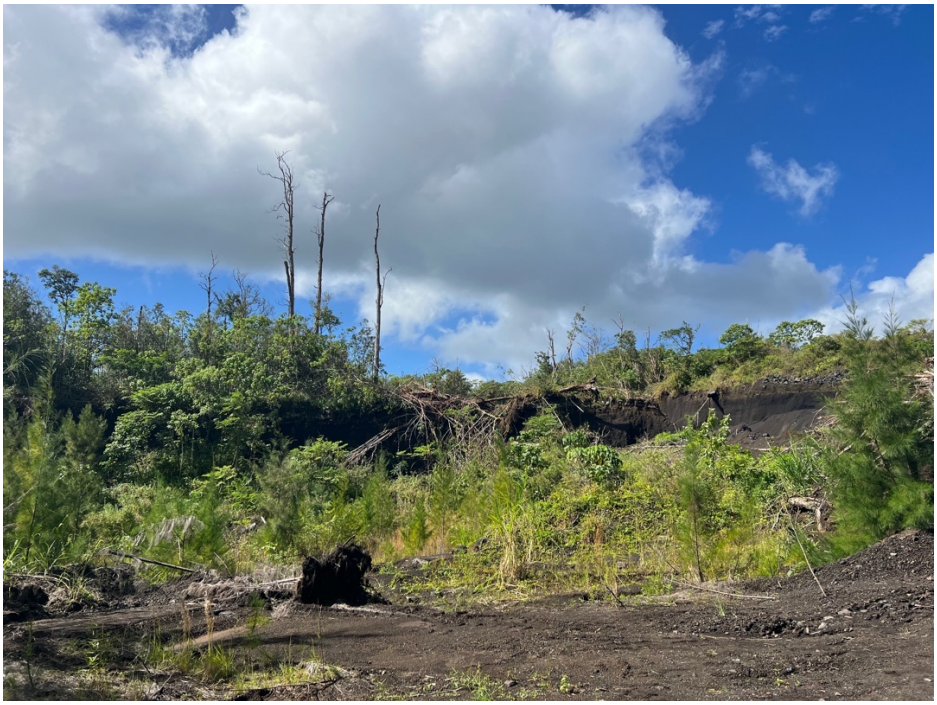


Figure 7. At a section of old quarry, non-native plant species dominate the secondary growth. Three large dead ʻōhiʻa trees can be seen standing against the skyline.

Rare Plants

During the most recent survey of the PA in 2019, two rare plant species were located and mapped; *Polyscias hawaiensis* and *Cyrtandra nanawaleensis*. We set out to relocate the mapped plants as well as attempt to locate any additional rare plant taxa.

Polyscias hawaiensis

'Ohe is an endemic tree species in the Araliaceae family that is becoming increasingly rare due to the usual threats to native Hawaiian plants and habitats as well as an unknown phenomenon that attacks the main trunks of the trees resulting in damage and eventually death of the tree. There was one individual noted in the 2019 survey and we relocated this individual in the northwestern corner of the PA. It appeared healthy and was in early flower. We did not take a new GPS point for this individual as there was one taken during the 2019 survey (UTM E298299, N2152049).

Cyrtandra nanawaleensis

This ha'iwale species is an endemic short-lived perrenial shrub or small tree in the Gesneriaceae family. *C. nanawaleensis* is listed as Endangered and restricted to the Puna region of Hawai'i Island. The species can be generally distinguised from *C. paludosa* by its hirtellus leaves but has extensive polymorphism and appears to hybridize readily. In several observations, the Pu'u Kali'u population has been noted as intermediate or more phenotypically variable than some of the other known populations. The author is aware of several restoration location for the species but it is still considered to be declining in numbers. The 2018 eruption led to the entire Malama-Ki Forest Reserve population being lost when it was covered by lava in June 2018.



Fig. 8 Yellow stars denote 2 populations of *C. nanawaleensis* in 'Ha'iwale Gulch'.

One population of *C. nanawaleensis* was located during the 2019 survey and we were able to relocate the population (pop. #1) as well as a few additional plants at another population (pop. #2) to the south (Fig. 8).

-Pop. #1 is at an elevation of 1021 feet and consists of an estimated 3 mature plants as well as a few keiki (seedlings) observed on mossy logs. Numerous *C. paludosa* individuals were observed growing with this population. (UTM E0298551, N2152221)

-Pop. #2 was located upstream at an elevation of 1045 feet. We counted 2 individual plants.

Both populations are surrounded by a non-native forest of strawberry guava, Miconia, gunpowder tree, basket grass (*Oplismenus hirtellus*), with significant signs of feral pig damage.



Figure 9. *Cyrtandra paludosa* on the left and *C. nanawaleensis* on the right located together in population #1.



Figure 10. *C. nanawaleensis* plant on the left and new keiki growing on mossy log along with Koster‘s curse at population #1.

No additional populations of individuals of ha‘iwale of either species were noted in the additional acreage of the PA during the current survey.

Fauna

Avian Fauna

A total of 9 species, representing 8 separate families (Table 1) were observed during the survey. Avian diversity and densities were in keeping with the location, disturbance, and vegetation present within the study site. Three species—Zebra Dove (*Geopelia striata*), house finch (*Haemorhous mexicanus*), and Northern Cardinal (*Cardinalis cardinalis*) were the most frequently observed and heard.

The lack of native birds in this habitat is not surprising. Although the ‘Io/Hawaiian hawk (*Buteo solitarius*) is usually observed in this area of Puna, it was not detected during the four days of survey.



Figure 11. ‘Ha‘iwale Gulch‘ (named in 2019 report) showing pig damage/disturbance to the ground and dominated by weedy vegetation.

Mammalian Fauna

Signs of introduced terrestrial mammalian species including Feral pigs (*Sus scrofa*) were detected including trails, scat, and wallows. Domestic dogs (*Canis familiaris*) were heard near the Leilani Estates at the nothern boundaries of the PA. Though not observed, it is likely that cats (*Felis catus*), Small Indian mongoose (*Urva auropunctata*), 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.

Table 1. Avian Species Detected- Pu'u Kali'u Project Area- 2024

Common Name	Species	Family	Status
		COLUMBIDAE - Pigeons & Doves	
Spotted Dove	*Streptopelia chinensis*		A
Zebra Dove	*Geopelia striata*		A
		ZOSTEROPIDAE - White-eyes	
Warbling White-eye	*Zosterops japonicus*		A
		PHASIANIDAE- Partridges, Grouse, Turkeys, and old World Quail	
Kalij pheasant	*Lophura leucomelanos*		A
		CETTIIDAE-Cettia Warblers & Allies	
Japanese Bush-Warbler	*Horomis diphone*		A
		STURNIDAE - Starlings	
Common Myna	*Acridotheres tristis*		A
		ESTRILDIDAE - Estrildid Finches	
Common Waxbill	*Estrilda astrild*		A
		FRINGILLIDAE – Fringillidae and Cardueline Finches and Allies	
House Finch	*Haemorhous mexicanus*		
		CARDINALIDAE - Cardinals & Allies	
Northern Cardinal	*Cardinalis cardinalis*		A

Legend to Table 1

Status

A Alien – introduced by humans and naturalized.

Discussion and Recommendations

The PA is located in an area that has encountered past disturbances including natural geological activity and human driven habitat alteration over the last several centuries. In general, the native habitat on and around Pu'u Kali'u is considered poor. This being said there are still native remnant plant species scattered throughout the PA. The terrain is difficult to navigate, thus we cannot be sure that we encountered every native plant species that could be extant in the PA. Recommedations for ongoing plant, animal, and habitat mitigations are discussed in the following appropriate sections. Implementation of the recommendations should minimize potential impacts to native species to the maximum extent practicable.

Floral Resources

Native plant habitat within the PA has been highly modified by recent geological events, human activities, non-native ungulates, and introduced plant and invertebrate species. There were a total of 133 plant species documented during the current survey. A full species list is provided in Appendix A. 23 species are native, 13 are endemic and 10 indigenous. Five Polynesian species were noted; niu (*Cocos nucifera*), kī (*Cordyline fruticosa*), hoi (*Dioscorea bulbifera*), ʻawapuhi (*Zingiber zerumbet*), and noni (*Morinda citrifolia*).

Native plant species in general are on the decline in comparison to the 2013 and 2019 surveys of the PA. The 2013 survey did include a much larger area but the general trend is that non-natives are continuing to replace natives species. We noted that many fern species have been extirpated in the last two decades, with a loss of at least 14 species. Some other notable species that are absent from the current survey along with the already mentioned lama, are kōlea (*Myrsine lessertiana*), maile (*Alyxia stellata*), huehue (*Cocculus trilobus*), and pōpolo (*Solanum americanum*).

Rare species

Two rare species were located including one *Polyscias hawaiensis* tree and two populations of the Endangered *Cyrtandra nanawaleensis*. A total of an estimated five mature individuals were located during this survey, down from an estimated 6 during the 2019 survey. Both of these species continue to decline in their home ranges. The USFWS 5-Year Review Summary and Evaluation for *C. nanawaleensis* (USFWS 2020) includes recommendations for future actions to stabilize the species that include: continued surveys in suitable habitat for new individuals, ungulate control and fencing, invasive plant control, rat and slug predation controls, propagation for genetic storage and outplanting, increasing numbers and locations of outplanted individuals to protect against impacts of predation, climate change, hurricanes, and lava flows. Alliance and partnership development is also a way to ensure ecosystem level restoration and management.

Intermittent Surveys

Due to the difficut terrain within the PA, it is recommended that more intensive surveys are conducted directly prior to planned vegetation removal and quarry expansion when plans of exact expansion locations are known. A smaller area survey just ahead of expansion would aid in a more finer survey and help to confirm presence or absence of sensitive native plants. The numerous gullies, sink holes, and drainages can be searched more intensely in smaller areas.

Updated Landscaping Plan

The original Landscaping Plan for the quarry was approved in 1991 and essentially consisted of planting ironwood and cypress trees when cinder removal was complete. This has directly infuenced the introduction and spread of ironwood at the site. A new Landscaping Plan is forthcoming in conjunction with this summary report. It will follow updated conservation practices and mining best management practices. Biosecurity protocols will also be included to limit introductions of new pests and the spread of known noxious plant, invertebrate, and animal species.

Rapid Ohia Death

A documented fungal disease, *Ceratocystis*, killing native ʻōhiʻa trees is prevalent on Hawaiʻi Island. The College of Tropical Agriculture and Human Resources (CTAHR) provide practices to help prevent the spread of the fungus to new trees or populations. The recommendations include; Avoiding injuring ʻōhiʻa, not moving wood or other parts of the tree locally or inter-island; cleaning gear and tools, including shoes and clothes, before and after entering work areas; and washing tires, and machinery to remove all soil and mud. For futher information visit: https://cms.ctahr.hawaii.edu/rod/

Faunal Resources

Animals and/or signs of animals documented within the survey area include feral pigs, domestic dogs, and the previously discussed bird species. The folllowing sections discuss probable species that may be utilizing the survey area or air space in the general location and recommendations if warranted.

Avian Resources

ʻIo/Hawaiian Hawk

The Hawaiian Hawk or `Io has been delisted as Endangered by Federal and State agencies but is still listed under Hawaii Revised Statutes (HRS). The ʻIo can be found from sea level to above 8,990 feet (Pyle and Pyle 2009). Hawaiian Hawks construct their nests approximately 2 months before laying eggs. Nest trees range from 32 to 79 feet in height and the nests are typically located 11 to 60 feet above the ground. Nests are constructed on stable platforms such as on the top of birds-nest ferns or crotches within the branches of the trees (Griffin 1998). Although no hawks were observed during the current site visit, they were observed during both the 2013 and 2019 surveys and there is a high probablity that ʻIo may untilize the trees within the PA for roosting or nesting.

The following measures are recommended prior to quarry expansion to avoid impacts to the Hawaiian Hawk:

- A nest survey is recommended of the immediate area to be cleared of vegetation for quarry expansion during the Hawk breeding season (March through September) at least 10 days prior to start of any clearing. The survey should be conducted by a qualified biologist using appropriate survey methods and should focus on the large trees that could provide nesting habitat (Gorressen et al 2008, USFWS 2008)
- If active nest(s) are located, no vegetation clearance should occur within 1600 feet of the nest until the chicks fledge or the nest is abandoned.
- If Hawaiian Hawk individuals are detected in the area during quarry activities, all activities within 100 feet of the bird should cease. Work may continue when the bird has left the area on its own.

Nēnē

Nēnē or Hawaiian Goose (*Branta sanvicensis*) were not observed within the survey area or in the general surrounding areas. The habitat is not conducive for foraging and/or loafing. If nēnē are observed at any time in the work areas of the quarry or access roadway, the following is recommended. Generally, human impacts to this species revolve around vehicular interactions, human feeding, and disturbance to nesting birds, eggs, chicks, and goslings. These potential threats can be minimized to the maximum extent practicable by implementing the following minimization measures:

- Don't feed birds especially if they approach for handouts.
- Secure all food rubbish in close trash receptacles.
- Establish a 15 mile an hour speed limit within the site.

Waterbirds

None of the four extant endemic endangered waterbird species or subspecies were recorded on the site. They are Hawaiian Duck or koloa (*Anas wyvilliana*), Hawaiian Coot or ʻalae keʻokeʻo (*Fulica alai*), the Hawaiian endemic sub-species of both the Common Gallinule or ʻalaeʻula (*Gallinula chloropus sandvicensis*), and the Black-necked Stilt or aeʻo (*Himantopus mexicanus knudseni*). There is no habitat that any of the four waterbird species would utilize for foraging and/or nesting in the PA.

Seabirds

It is possible that the endangered Hawaiian Petrel, Band-rumped Storm-Petrel, and the threatened Newell's Shearwater over-fly the project area between April and the middle of December each year in small numbers. The primary cause of mortality in Hawaiian Petrels, Newell's Shearwaters and Band-rumped Storm-Petrels in Hawaiʻi is thought to be predation by alien mammalian species at the nesting colonies (USFWS, 1983; Simons and Hodges, 1998). Collision with man-made structures is considered the second most significant cause of mortality of these seabird species in Hawaiʻi. 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 (Rodriguez et al., 2017) and, if not killed outright, become easy targets of opportunity for feral mammals (Ainley et al., 2001, Hue et al., 2001).

The principal potential impact that current habitat modifications or changes pose to protected seabirds is an increased threat that birds will be downed after becoming disoriented by lights. The current cinder mining practices do not use nighttime lighting but if that changes and dark hour work commences, the following is recommended:

- If night-time construction activity or equipment maintenance is proposed during any phases of the mining 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 (USFWS, 2023). 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).
- Install automatic motion sensor switches and controls on all permanent outdoor lighting and/or turn off lights when human activity is not occurring in the area.

Mammalian Resources

The findings of the mammalian survey are consistent with the location and habitats present. Although no rodents were recorded it is likely that some of the four established Muridae found on Hawai'i Island—roof rat, brown rat, Polynesian rat, and European house mouse use resources within the general area on a seasonal basis. These introduced rodents are deleterious to native ecosystems and native faunal species. As noted earlier, rodent control measures can help to aid in the preservation of native plant species within the PA.

Although 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), the 'ōpe'ape'a or Hawaiian hoary bat has the potential to occur in the PA.

Hawaiian hoary bat

The 'ōpe'ape'a – endemic Hawaiian hoary bat (*Lasiurus cinereus semotus*), currently recognized as an endemic species *Lasiurus semotus* (Pinzari et al. 2020) most likely overfly the project area on a seasonal basis. This species will forage and roost in a wide range of habitats including forest canopies, edges of forests, and open pastures (Bonaccorso et al.,

2015). The following is recommeded: 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.
- Do not use barbed wire fencing that the bats can become entangled in.

Other Resources of Potential Concern

Coconut rhinoceros beetle

The Coconut rhinoceros beetle (CRB) *Oryctes rhinoceros* is an invasive beetle species from South East Asia that has become established on O‘ahu and is now spreading to other Hawaiian Islands. The beetles feed on palm species and are a threat to our coconut trees as well as native *Pritchardia* species, hala (*Pandanus tectorius*), and other ornamental palms. The Coconut Rhinoceros Beetle Response (crbhawaii.org) recommends best management practices to discourage CRB from becoming established including limiting mulch, compost, and decaying plant material in thick piles of 2 inches or more and spreading mulch in thin layers to keep the material dry which is not favorable for the beetle larvae.

Little Fire Ant

An infestation of established little fire ants (LFA) (*Wasmannia auropunctata*) were noted in the southern section of the PA in 2019. We did not encounter any during the current survey but the populations can move around and be cryptic. This invasive ant species has been detected on Hawai‘i Island since 1999. They are extremely small but their sting can cause welts, extreme itching, and in some cases allergic reactions. Care should be taken during any future surveys, clearance, or habitation that proper protective clothing is worn and that movement of ants is limited by removing clothes and washing boots before working in other areas. Cleaning construction vehicles is also recommended when possible and/or when moving machinery between work sites.

Appendix A

Table 1. Plant Species Observed at the Puʻu Kaliʻu Project Area

PTERIDOPHYTES - FERNS & FERN ALLIES

Species listed by family	Common name	Status	Abundance
ASPLENIACEAE			
Asplenium nidus L.	*ʻēkaha*, bird's-nest fern	**Ind**	R
BLECHNACEAE			
Blechnum appendiculatum Willd.	---	Nat	O
CIBOTIACEAE			
Cibotium chamissoi Kaulf.	*hāpuʻu*	**End**	O
Cibotium glaucum (Sm.) Hook.&Arn.	*hāpuʻu pulu*	**End**	O
Cibotium menziesii Hook.	*hāpuʻu ʻiʻi*	**End**	O
CYATHEACEAE			
Sphaeopteris cooperi (Hook. Ex F.Muell.) R.M.Tryon	Australian tree fern	Nat	U
DRYOPTERIDACEAE			
Elaphoglossum crassifolium (Gaudich.) W.R. Anderson & Crosby	*hoe a Maui*	**End**	R
GLEICHENIACEAE			
Dicranopteris linearis (Burm f.) Underw.	*uluhe*	**Ind**	O
LINDSAEACEAE			
Lindsaea ensifolia Sw.	**---**	Nat	U
NEPHROLEPIDACEAE			
Nephrolepis brownii (Desv.) Hovenkamp & Miyam.	---	Nat	A
Nephrolepis cordifolia (L.) C.Presl.	*kupukupu*	**Ind**	O
Nephrolepis exaltata hawaiiensis W.H. Wagner	*niʻaniʻau, kupukupu*	**End**	U
OPHIOGLOSSACEAE			
Ophioderma pendulum subsp. *Flacatum* (C. Presl) R.T. Clausen	*puapua moa, laukahi,* adder's tongue	**Ind**	O
POLYPODIACEAE			
Adenophorus tamariscinus var. *tamariscinus* (Kaulf.) L.E.Bishop	*wahine noho mauna*	**End**	U
Lepisorus thunbergianus (Kaulf.) Ching	*pākahakaha*	**Ind**	U
Phlebodium aureum (L.) J. Sm.	*lauaʻe haole*, rabbit's-foot fern	Nat	O
Microsorum grossum (Langsd. & Fisch.) S.B. Andrews	*lauaʻe*	Nat	O

PSILOTACEAE			
Psilotum nudum (L.) P. Beauv.	*moa*	**Ind**	O
PTERIDACEAE			
Pityrogramma austroamericana Domin	gold fern	Nat	O
Pityrogramma calomelanos (L.) Link	silver fern	Nat	R
Pteris vittata L.	ladder brake	Nat	U
Pteris cretica L.	Cretan brake	**Ind**	R
THELYPTERIDACEAE			
Christella dentata (Forssk.) Brownsey & Jermy	wood fern	Nat	O
Christella parasitica (L.) H. Lév	wood fern	Nat	O
Macrothelypteris torresiana (Gaudich.) Ching	macrothelypteris	Nat	A

FLOWERING PLANTS

MONOCOTS

ARACEAE			
Epipremnum pinnatum (L.) Engl.	pothos	Nat	O
ARECACEAE			
Cocos nucifera L.	*niu*, coconut	**Pol**	R
Archontophoenix alexandrae (F.Muell.) H.Wemdl. & Drude	Alexandra palm	Nat	O
ASPARAGACEAE			
Cordyline fruticosa L.	*kī*	**Pol**	C
COMMELINACEAE			
Commelina diffusa N. L. Burm.	day flower	Nat	U
COSTACEAE			
Costus woodsonii Maas	Indian head ginger	Nat	U
CYPERACEAE			
Cyperus gracilis R.Br.	McCoy grass	Nat	C
Cyperus polystachyos Rottb.	---	**Ind**	U
Fimbristylis dichotoma (L.) Vahl	---	Nat	R
Kyllinga brevifolia Rottb.	*kili‘o‘opu*	Nat	U
Machaerina mariscoides meyenii (Kunth) T. Koyama	*‘uki*	**End**	O
DIOSCOREACEAE			
Dioscorea bulbifera L.	*hoi*, bitter yam	**Pol**	R
ORCHIDACEAE			
Arundina graminifolia (D. Don) Hochr.	bamboo orchid	Nat	O
Phaius tankervilleae (Banks ex L‘Her.) Blume	Chinese ground orchid	Nat	R
Spathoglottis plicata Blume	Malayan ground orchid	Nat	R
PANDANACEAE			
Freycinetia arborea Gaudich.	*‘ie‘ie*	**Ind**	O
Pandanus tectorius S. Parkinson	*hala*	**Ind**	O

POACEAE			
Andropogon virginicus L.	broomsedge	Nat	U
Axonopus fissifolius (Raddi) Kuhlm.	narrow-leaved carpetgrass	Nat	C
Cenchrus purpureus (Schumach.) Morrone	elephant grass	Nat	C
Chloris barbata (L.) Sw.	swollen fingergrass	Nat	C
Coix lachyrma-jobi L.	Job's-tears	Nat	U
Digitaria ciliaris (Retz) Koeler	*kūkaipua'a*, Henry's crabgrass	Nat	U
Digitaria violascens Link	violet crabgrass	Nat	U
Eragrostis amabilis (L.) Wight & Arnott	Japanese lovegrass	Nat	O
Megathyrsus maximus (Jacq.) B.K. Simon & W.L. Jacobs	Guinea grass	Nat	C
Melinus minutiflora P. Beauv.	molasses grass	Nat	U
Oplismenus hirtellus (L.) P. Beauv.	basketgrass	Nat	O
Paspalum conjugatum Bergius	Hilo grass	Nat	U
Paspalum urvillei Steud.	vasey grass	Nat	U
Sacciolepis indica (L.) Chase	Glenwood grass	Nat	U
Sporobolus indicus (L.) R. Br.	West Indian dropseed	Nat	U
Setaria palmifolia (L. König) Stapf	palmgrass	Nat	U
Themeda villosa (Poir.) A. Camus	Lyon's grass	Nat	O
Urochloa mutica (Forssk.) T.Q. Nguyen	California or Pará grass	Nat	U
ZINGIBERACEAE			
Hedychium coronarium J.Konig	white ginger	Nat	O
Hedychium flavescens Carey ex Roscoe	yellow ginger	Nat	C
Zingiber zerumbet (L.) Sm.	*'awapuhi*, shampoo ginger	**Pol**	O

FLOWERING PLANTS

DICOTS

ACANTHACEAE			
Asystasia gangetica (L.) T. Anderson	Chinese violet	Nat	C
APIACEAE			
Centella asiatica (L.) Urb.	asiatic pennywort	Nat	U
ARALIACEAE			
Polyscias hawaiensis (A.Gray) Lowry & G. M. Plunkett	*'ohe*	**End**	R
ASTERACEAE (COMPOSITAE)			
Ageratina riparia (Regel) R.M.King & H.Rob.	*Hāmākua pāmakani*	Nat	U
Ageratum conyzoides L.	*maile hohono*	Nat	O
Ageratum houstonianum Mill.	*maile honohono*	Nat	O
Calyptocarpus vialis Less.	---	Nat	O

Conyza canadensis var. *canadensis* (L.) Cronquist	horseweed		O
Crassocephalum crepidioides (Benth.) S. Moore	redflower ragweed	Nat	O
Emilia fosbergii Nicolson	*pualele*	Nat	O
Emilia sonchifolia (L.) DC. var. *sonchifolia*	Flora's paintbrush	Nat	O
Erechtites valerianifolia (Wolf) DC.	fireweed	Nat	O
Erigeron bellioides DC.	---	Nat	R
Pluchea carolinensis (Jacq.) G. Don	sourbush	Nat	C
Sphagneticola trilobata L.	wedelia	Nat	C
BEGONIACEAE			
Begonia hirtella Link	bearded begonia	Nat	U
CANNABACEAE			
Trema orientalis (L.) Blume	gunpowder tree	Nat	A
CASUARINACEAE			
Casuarina equisetifolia L.	ironwood	Nat	A
CECROPIACEAE			
Cecropia obtusifolia Bertol.	guarumo	Nat	C
CLUSIACEAE			
Clusia rosea Jacq.	autograph tree	Nat	O
CUCURBITACEAE			
Momordica charantia L.	bitter melon	Nat	U
EUPHORBIACEAE			
Euphorbia hirta L.	garden spurge	Nat	O
Macaranga tanarius (L.)Mull. Arg.	---	Nat	C
FABACEAE			
Chamaecrista nictitans (L.) Moench	partridge pea	Nat	O
Crotalaria assamica Benth.	rattlepod	Nat	O
Crotalaria lanceolata E. Mey	rattlepod	Nat	O
Crotalaria micans Link	rattlepod	Nat	O
Crotalaria retusa L.	rattlepod	Nat	O
Desmodium cajanifolium (Kunth) DC.	tick trefoil	Nat	C
Desmodium incanum DC.	Spanish clover	Nat	O
Desmodium intortum (Mill.) Urb.	tick trefoil	Nat	O
Falcataria moluccana (Miq.) Barneby & J.W.Grimes	Moluccan albizia	Nat	O
Grona triflora (L.) DC.	tick clover	Nat	C
Mimosa pudica L.	sensitive plant	Nat	O
Vigna hosei (Craib.) Backer	---	Nat	U
GESNERIACEAE			
Cyrtandra nanawaleensis H.St.John	*ha'iwale*	**End**	R
Cyrtandra paludosa var. *paludosa* Gaudich.	*moa, hahala, ha'iwale*	**End**	R
LAMIACEAE			
Mesosphaerum pectinatum (L.) Kun.	comb hyptis	Nat	O

LINDERNIACEAE			
Torenia asiatica L.	wishbone flower, *nani-o-ʻōlaʻa*	Nat	U
LYTHRACEAE			
Lythrum maritimum Kunth	loosestrife	Nat	O
MALVACEAE			
Malachra alceifolia Jacq.	---	Nat	U
Malva parviflora L.	cheeseweed	Nat	U
Melochia umbellata (Houtt.) Stapf		Nat	C
MELASTOMATACEAE			
Arthrostemma ciliatum Pav. Ex D.Don		Nat	A
Medinilla magnifica Lindl.	magnificent medinilla	Nat	R
Melastoma septemnervium Lour.		Nat	O
Miconia calvescens DC.	velvet tree	Nat	C
Miconia crenata (Vahl.) Michelang.	Koster's curse	Nat	C
Tibouchina herbacea (DC.) Cogn.	cane tibouchina	Nat	C
Tibouchina longifolia (Vahl) Baill.	glorybush	Nat	O
MORACEAE			
Ficus microcarpa L. fil.	Chinese banyan	Nat	U
MYRTACEAE			
Eucalyptus sp.	gum	Nat	R
Metrosideros polymorpha Gaud. var. *polymorpha*	*ʻōhiʻa lehua*	**End**	O
Psidium cattleyanum Sabine	strawberry guava	Nat	A
Psidium guajava L.	common guava	Nat	C
Syzygium jambos (L.) Alston	rose apple, ʻ*ohiʻa loke*	Nat	U
OROBANCHACEAE			
Castilleja arvensis Cham. & Schltdl.	Indian paintbrush	Nat	U
PLANTAGINACEAE			
Plantago lanceolata L.	nrw-lvd plantain	Nat	O
POLYGALACEAE			
Polygala paniculata L.	bubblegum plant	Nat	U
ROSACEAE			
Rubus rosifolius Sm.	thimbleberry	Nat	U
RUBIACEAE			
Morinda citrifolia L.	*noni*	**Pol**	R
Oldenlandia corymbosa L.	---	Nat	U
Paederia foetida L.	*maile pilau*	Nat	C
Psychotria hawaiiensis var. *hawaiiensis* (A.Gray) Fosberg	*kōpiko ʻula*	**End**	O
Spermacoce exilis (L.O. Williams) C.D.Adams		Nat	U
Spermacoce remota Lam.	buttonweed	Nat	U
SCROPHULARIACEAE			
Buddleja asiatica Lour.	butterfly bush	Nat	O
SOLANACEAE			
Cestrum nocturnum L.	night cestrum	Nat	O

URTICACEAE			
Pipturus albidus (Hook. & Arn.) A.Gray	māmake, māmaki	**End**	U
VERBENACEAE			
Stachytarpheta jamaicensis (L.) Vahl.	Jamaica vervain	Nat	U

Legend to Table.

STATUS = distributional status for the Hawaiian Islands:

End= endemic; native and unique to the Hawaiian Islands.

Ind = indigenous; native to Hawai‘i, 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.

Pol = Polynesian introduction before 1778.

ABUNDANCE CATEGORIES

R – Rare	seen in only one or perhaps two locations.
U - Uncommon-	seen at most in several locations.
O - Occasional	seen with some regularity, although widely scattered.
C - Common	observed numerous times during the survey.
A - Abundant	found in large numbers; may be locally dominant.

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Appendix D

Sanford Service Center Leilani Quarry Landscaping and Biosecurity Plan

Sanford Service Center Leilani Quarry Landscaping and Biosecurity Plan



Prepared by: Maya LeGrande
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January 2025

Introduction

The purpose of this Landscaping and Biosecurity Plan is to act as a tool in which to help guide management efforts in revegetating mined areas of the Sanford Service Center at Leilani Quarry, Puʻu Kaliʻu, Hawaiʻi Island. The Landscaping Plan in conjunction with biosecurity protocols will aid in the control and prevention of the establishment of noxious plant, animal, and invertebrate species that can be deleterious to the existing habitat, plant, and animal species. The focus of this Plan is to recommend a list of appropriate plant species, timing for out plantings, and best management practices to implement pre and post excavation.

Goals

Two main goals are outlined in this Plan: Updating a list of plant species appropriate for revegetation at the Leilani Quarry and to offer best management practices (BMPs) that can be put in place to minimize harmful ecological, economic, and human health impacts caused by invasive species due to their introduction or expansion and dispersal in and around the general region.

Landscaping Plan

The approved 1991 landscaping plan for the Leilani Quarry consisted of out planting ironwood (*Casuarina equisetifolia*) or cypress trees at 6ʻ x 6ʻ or 10ʻ x 10ʻ spacings when cinder removal was complete. The out planting of ironwood trees has led to a monostand of these non-native trees in abandoned areas of the quarry. Future out plantings should include native species that are appropriate for the location and readily available from nurseries on island.

Pre-quarry surveys should be carried out when the location of new excavations are known. An inventory of native and invasive plant species should be documented of the immediate area that will be cleared of vegetation prior to the cinder mining. Any native plants that can be salvaged prior to clearing should be removed and held in containers or out planted directly into appropriate areas designated as current out planting sites. These sites can include historically cleared areas or recently abandoned sections of the quarry that are determined to be closed to future mining. In addition to relocation and potting up wild plants, collecting seeds and or cuttings of plants to put into propagation for later out planting.

Outplanting of native plants should be conducted as soon as possible after a quarry area is deemed to be closed to excavation. The sooner the plants are out planted the less they will have to compete with invasive weedy species that will invade the abandoned quarry areas more readily than the native plants.

Maintenance will be an integral part of a landscaping plan incorporating native plants. Consistent visits to monitor the out planted trees will be necessary in order to confirm survival, clear the out-planting areas and trees themselves of weedy shrubs and vines, and to possibly outplant groundcover if possible.

List of plant species appropriate for landscaping at Leilani Quarry

Scientific Name	common name	Methods for propagation
Cibotium chamissoi	hāpuʻu	Relocation or dig and pot up
Cibotium glaucum	hāpuʻu	Relocation or dig and pot up
Cibotium menziesii	hāpuʻu	Relocation or dig and pot up
# *Nephrolepis exaltata* subsp. *hawaiiensis*	ʻōkupukupu	Spore collection, dig and pot up
# *Microlepia strigosa* var. *strigosa*	palapalai	Spore collection, dig and pot up
# *Machaerina mariscoides* subsp. *meyenii*	ʻuki	Seed collection, dig and pot up
Freycinetia arborea	ʻieʻie	Seed collection, cuttings, dig and pot up
***** *Pandanus tectorius*	hala	Seed collection, cuttings, dig and pot up
# *Zingiber zerumbet*	ʻawapuhi	Collect if available
Diospyros sandwicensis	lama	Seed collection to propagate
***** *Metrosideros polymorpha*	ʻōhiʻa lehua	Cuttings, seed collection to propagate
Psychotria hawaiiensis var. *hawaiiensis*	kōpiko ʻula	Seed collection
***** *Psydrax odorata*	alaheʻe	Seed collection and dig up and pot up
Morinda citrifolia	noni	Seed or dig and relocate
Wikstroemia sandwicensis	ʻākia	Seed collection
Pipturus albidus	māmake, māmaki	Seed collection

*** Primary recommendation**

 # Groundcover

Invasive species BMPs

Invasive species include species whose introductions are capable of causing harm to environmental, economic, or human health. Invasive species are a serious threat to Hawai'i and may pose a significant threat to Hawai'i's native ecosystems and the biota that they encompass.

Steps for preventing invasive species introduction and spread:

- Prevention: Minimize the introduction and spread of invasive species at the project site.
- Monitoring: Build a program that allows for early detection of new invasive species and the spread of established invasive species.
- Response & Control: Establish a system for rapid response and notification of appropriate agencies for eradication & control.
- Education & Outreach: Create and put into practice an appropriate training procedure for both employees and visitors to create awareness regarding invasive species.

Prevention

The Quarry will utilize existing plant species to the best of their ability for landscaping efforts. When additional species are introduced, they will be reviewed to determine if any of the species are listed as invasive or potentially invasive in Hawai'i before being brought in for outplanting. Native plant species brought from off site, will be screened for possible pest species before outplanting. These include; Rapid 'Ōhi'a Death [ROD] fungus (*Ceratocystis* spp.), little fire ants [LFA] (*Wasmannia auropunctata*), and Coconut Rhinocerus beetle [CRB] (*Oryctes rhinoceros*). A quarantine area at the nursery of origin or at the project site receiving area will be established to hold plants for 10 days prior to out planting in order for them to be monitored for pathogens.

The movement of plant or soil material between worksites has the potential to spread invasive fungal pathogens and invertebrate pests. Limiting the movement of soil from off-site locations is a priority. All construction equipment and personal gear will be cleaned to the best ability before being brought in to the work site. Personal gear, such as shoes and clothes, will be cleaned daily. Boots will be decontaminated with 70% alcohol solution.

Mitigating measures can be implemented to limit the establishment or spread of incipient species. Employees and visitors should be educated about the problems that invasive species can cause and learn how to implement simple procedures and put them into practice. At the minimum the following practices should be implemented for quarry employees and landscaping crews:

- Cleaning all footwear of dirt and mud and decontaminating with 70% alcohol solution when footwear cannot be totally cleaned for both employees as well as customers.
- Cleaning all tires of trucks or wheeled vehicles entering the off-road paths on a daily basis with detergent.
- Reviewing this Plan with new employees as well as on an annual basis to refresh knowledge and incorporate any updated information.

- Signage and summary review to educate and remind visitors of the importance of these measures for keeping invasive species to a minimum.
- Using covered trash receptacles along with trapping or baiting for feral cats, rats, and mongoose.

For Customers entering and exiting the Quarry access road and loading area:

- Clear signage near the entrance to the Access Road that requires vehicles to be aware of spreading noxious species.
- No dumping of yard waste or fill along the access roadways or near the quarry.

Feral cats pose a risk to birds, marine animals, and human health. They are top predators of nesting seabirds and can spread the parasite *Toxoplasma gondii* that can negatively impact the health of native birds and Hawaiian monk seals as well as humans by causing miscarriage and severe ocular and neurological lesions in new-borns (Torgerson & Mastroiacovo 2013, Maenz et al 2014, Ngo et al 2017). It is recommended that humane traps be used to capture cats and have them sterilized so that their numbers do not increase. Both cats, rats, and mongoose pose threats to native sea birds in Hawai‘i.

Monitoring

Ongoing monitoring efforts will include:

- Employees and visitors reporting any observed plants or animals of concern to the designated point person and following up with a report to submit to Big Island Invasive Species Committee (BIISC).
- Allowing BIISC to monitor the area for any of their target species on an appropriate schedule.

Response & Control

Informing BIISC of any observed target species at biisc@hawaii.edu or (808) 933-3340

Further Information on Target Species on Hawai‘i Island.
BIISC
https://www.biisc.org/plant-control/

Rapid Ohia Death
https://cms.ctahr.hawaii.edu/rod/

Coconut Rhinoceros Beetle
https://dlnr.hawaii.gov/hisc/info/invasive-species-profiles/coconut-rhinoceros-beetle/

Little Fire Ant
https://dlnr.hawaii.gov/hisc/little-fire-ant-lfa/
https://littlefireants.com/

Appendix E

Cultural Impact Assessment for Sanford Service Center, Inc. Expansion

Cultural Impact Assessment for Sanford's Service Center Leilani Quarry Ahupua'a of Kauaea, Moku of Puna Hawai'i Island

Prepared for

Sanford's Service Center, Inc.
15-2628 Keaau-Pahoa Rd
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By
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Kaimipono Consulting Services LLC

Contributor
Alan Haun, PhD
Haun & Associates

Updated 2019

EXHIBIT 12

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EXECUTIVE SUMMARY

This Cultural Impact Assessment (CIA) was prepared (2015) at the request of Sanford's Service Center, Inc. in conjunction with a proposal to expand cinder mining operations at Sanford's Service Center, Inc. Leilani Quarry in the vicinity of Pu'u Kali'u, on lands leased from Bishop Estate-Kamehameha Schools. The CIA was originally drafted for a 309 acre portion of TMK (3) 1-3-009:005. Currently Sanford's Service Center has a license from KS to perform mining activities in a 73.075-acre portion of the property, termed the "Licensed Area." In 2018 Sanford's Service Center, Inc. amended their original expansion footprint and reduced their petition area. They are seeking to amend the Land Use District boundaries of certain lands consisting of approximately 94.107 acres of TMK (3) 1-3-009:005 situated at Kauaea, Puna, Island and County of Hawai'i, State of Hawai'i ("Petition Area") from the State Land Use Conservation District (Limited Subzone) to the State Land Use Agricultural District. Therefore, this CIA has been updated to reflect this change. The purpose of a CIA is to gather information about traditional cultural practices, ethnic cultural practices, and pre-historic and historic cultural resources that may be affected by the implementation of this project or undertaking in accordance with the State of Hawaii Environmental Council *Guidelines for Assessing Cultural Impacts* (Adopted on November 19, 1997). The original (2015) *level of effort* for this CIA included ethnographic research (oral histories) of people who are connected to these lands in various ways and an archival cultural/historical background review of the literature (including internet research). An archaeological inventory survey (AIS) of the project area was conducted by Haun & Associates (Haun and Henry) in 2013. The archival data (maps and background information) of the AIS is included in this report (maps were updated illustrating the new petition area). The revision phase included a limited site visit (December 5, 2018) where current photos were taken and the CIA report updated and revised (February-March 2019).

Nineteen people were called and thirteen potential ethnographic consultants were identified and contacted; most felt that they did not know anything about the project area which is currently undeveloped, but being mined for cinder in selected areas. However, according to archival research the project area was well utilized in the early historic era. Two people who were familiar with the project area were interviewed. Much of the lands in the vicinity of the project location have been a cultural resource area where hula and medicine plants were gathered. East of the access road is The Pu'u Kali'u Lowland Wet Forest where native species are being protected. The lands in the vicinity were also known hunting grounds for some Puna families. In 1993 a study was conducted (Reynolds and Ritchotte 1995:29) of Puna nesting areas for the endangered Newell shearwater birds; they recorded that these endangered birds were seasonally nesting on Pu'u Kali'u, on the northeastern border of the Petition Area.

The ethnographic consultants would like to be informed and be considered cultural advisors for the mining expansion. They would like to continue cultural gathering practices and ask that something be done about the 'ohi'a fungus situation. It is recommended that the Newell shearwater researchers be contacted to help determine where exactly the birds are nesting so that a protection plan can be developed. An email was sent (2019) to Pacific Fish & Wildlife Service in hopes of contacting either Reynolds or Ritchotte regarding any follow-up surveys. There has been no response likely due to federal furloughs.

The License between Sanford's Service Center, Inc. and Bishop Estate specifically prohibits further mining of the portion of Pu`u Kaliu which includes the summit outside of the "OVERALL AREA" as shown on the map. Sanford's Service Center, Inc. has not mined the summit of the Pu'u and is currently mining in a direction away from the Pu'u. The proposed buffer areas totaling 21.033-acres would minimize impacts to forested areas. Cultural impact will be a non-issue for this project since the expansion will not jeopardize the summit of Pu'u Kali'u - the Newell's Shearwater nesting grounds and a USGS triangulation station or access to cultural resource areas.

ACKNOWLEDGEMENTS

Without the ethnographic consultants this Cultural Impact Assessment (CIA) report could not have been done. Therefore, **Mahalo Nui Loa** goes out to ethnographic consultants Emily Kealoha Naeole and Piilani Kaawaloa. Aunty Emily drove me to the project site, the neighboring Leilani Estates, and her neighborhood Maku‘u. And Piilani agreed be interviewed even though she just got out of the hospital. Mahalo also to Aunty Elaine Hauanio and Aunty Felisa Hanohano for taking the time to talk with me, although they deferred to their deceased husbands who were the cultural experts of the project area.

A big mahalo also goes to transcriber Seana Piilani Ah Kee, to Jamie Sing Kawauchi for her contact leads, to Daniel Orr for driving me to the 2018 site visit, and to Kim Iwata for making arrangements.

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INTRODUCTION

At the request of *Sanford's Service Center, Inc.* a Cultural Impact Assessment (CIA) (2015) was conducted in two phases: the archival and ethnographic research and analysis from August through October 2015 and the report write-up in October-December 2015. In a new petition (2018-19), Sanford's Service Center, Inc. ("Petitioner") is seeking to amend the Land Use District boundaries of certain lands [Sanford's Service Center, Inc. Leilani Quarry] consisting of approximately 94.107 acres of Tax Map Key No. (3) 1-3-009:005 situated at Kauaea, Puna, Island and County of Hawai'i, State of Hawai'i ("Petition Area") from the State Land Use Conservation District (Limited Subzone) to the State Land Use Agricultural District.

This CIA is in compliance with state requirements to identify and evaluate possible cultural impacts associated with the expansion of the Sanford's Service Center Leilani Quarry. Act 50 SLH 2000 (HB 28 H.D.1) [Appendix A] as it amends the State of Hawai'i Environmental Impact Statement law [Chapter 343, HRS] includes "effects on the cultural practices of the community and State. [It] also amends the definition of 'significant effect' to include adverse effects on cultural practices."

The purpose of a CIA is to gather information about traditional cultural practices, ethnic cultural practices and pre-historic and historic cultural resources that may be affected by the expansion of the quarry, in accordance with the State of Hawaii Environmental Council *Guidelines for Assessing Cultural Impacts* (Adopted on November 19, 1997) [Appendix B]. The *level of effort* for the 2015 CIA included ethnographic research (two oral histories) of people who are connected to these lands in various ways and an archival cultural/historical background review of the literature (including internet research). The *level of effort* for this phase of the CIA (2018-19) included a very limited ground-truthing survey, and updating the original 2015 CIA report.

This report is organized into five chapters. Chapter 1 describes the revised project area in terms of location, in the context of *ahupua'a* (land division), *moku'āina* (district) and *mokupuni* (island), as well as a generalized description of the natural environment (e.g. geology, flora and fauna) and built environment (e.g. any current features). Figures and photos in this chapter have been updated (2019). Chapter 2 explains the methods and constraints of this study. Chapter 3 summarizes a review of the historical and traditional (cultural) literature in the context of the general history of Hawai'i, the island of Hawai'i, the traditional districts or *moku* of Puna and local histories of the *ahupua'a* of Kauaea. Chapter 4 presents the ethnographic analysis based on the supporting raw ethnographic data (oral history transcripts) as it pertains to land, water and cultural resources and use in the project area and vicinity. It also includes background data about the ethnographic consultants. Chapter 5 summarizes the findings of this study based on supporting data from Chapters 1 through 4 and presents a cultural impact assessment and recommendations.

SCOPE OF WORK

The CIA scope-of-work (SOW) is based on the Environmental Council *Guidelines for Assessing Cultural Impacts* (1997) and focuses on three cultural resource areas (traditional, historical and ethnographic), conducted on two levels: archival research (literature/document review) and ethnographic data (oral history). The specific tasks include:

1. Conduct historical and other culturally related documentary research;
2. Identify individuals with knowledge of the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or *ahupua'a*; or with knowledge of the area potentially affected by the proposed action e.g. past/current oral histories;

3. Identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
4. Assess the impact of the proposed action on the cultural resources, practices and beliefs identified.

Traditional resources research entailed a review of Hawaiian *moʻolelo* (stories, legends or oral histories) of late 19th and early 20th century ethnographic works. Historic research focused on the literature compiled. Ethnographic research focused on current interviews with knowledgeable individuals.

Project Area Description and Physical Environment

According to Haun & Associates (2013), the survey area is a parcel located in the inland portion of Kauaea Ahupuaʻa (Figure 1) between approximately 380 ft and 1,070 ft elevation. The lands are owned by Bishop Estate and leased by Sanford's Service Center, Inc. who is petitioning to expand their current cinder mining operation. The survey area is bordered to the north by the Leilani Estates subdivision and Keahialaka Ahupuaʻa; by Opihikaō Homestead and Kaueleau Ahupuaʻa to the south; by undeveloped land to the west; and by undeveloped land and a papaya farm to the east. The existing Leilani Quarry is located in the southwestern portion of the petition parcel (Photos 1-18) and the remaining portion is undeveloped. A prominent feature is Puʻu Kaliʻu a 1,071 ft high hill located in the northeastern portion of the Petition parcel (Figure 2). Leilani Quarry is located on the southwest flank of Puʻu Kaliʻu and includes 30 permitted acres within the 73.075 acres of the new petition area. Puʻu Kepaka, is approximately 760 ft high and is located south east of the new petition area.

> The Project Summary drafted by GK Environmental LLC provides: Petitioner is presently conducting mining and quarrying operations on a 30-acre portion of the Petition Area pursuant to non-conforming Conservation District Use Permits issued by the Board of Land and Natural Resources on April 7, 2008. In 2011, Conservation District Rules were amended such that mining and quarry operations are no longer identified land uses in the Conservation District Limited Subzone. The existing quarry produces a low-density type of black-colored cinder that is highly valued by the nursery industry. If the Land Use District Boundary Amendment is granted the Petitioner's intent is to apply for a Special Permit with the Land Use Commission to expand their quarry operations over a 73.075-acre portion of the Petition Area. The remaining 21.033-acre portion of the Petition Area will be buffer areas." [Figure 3]

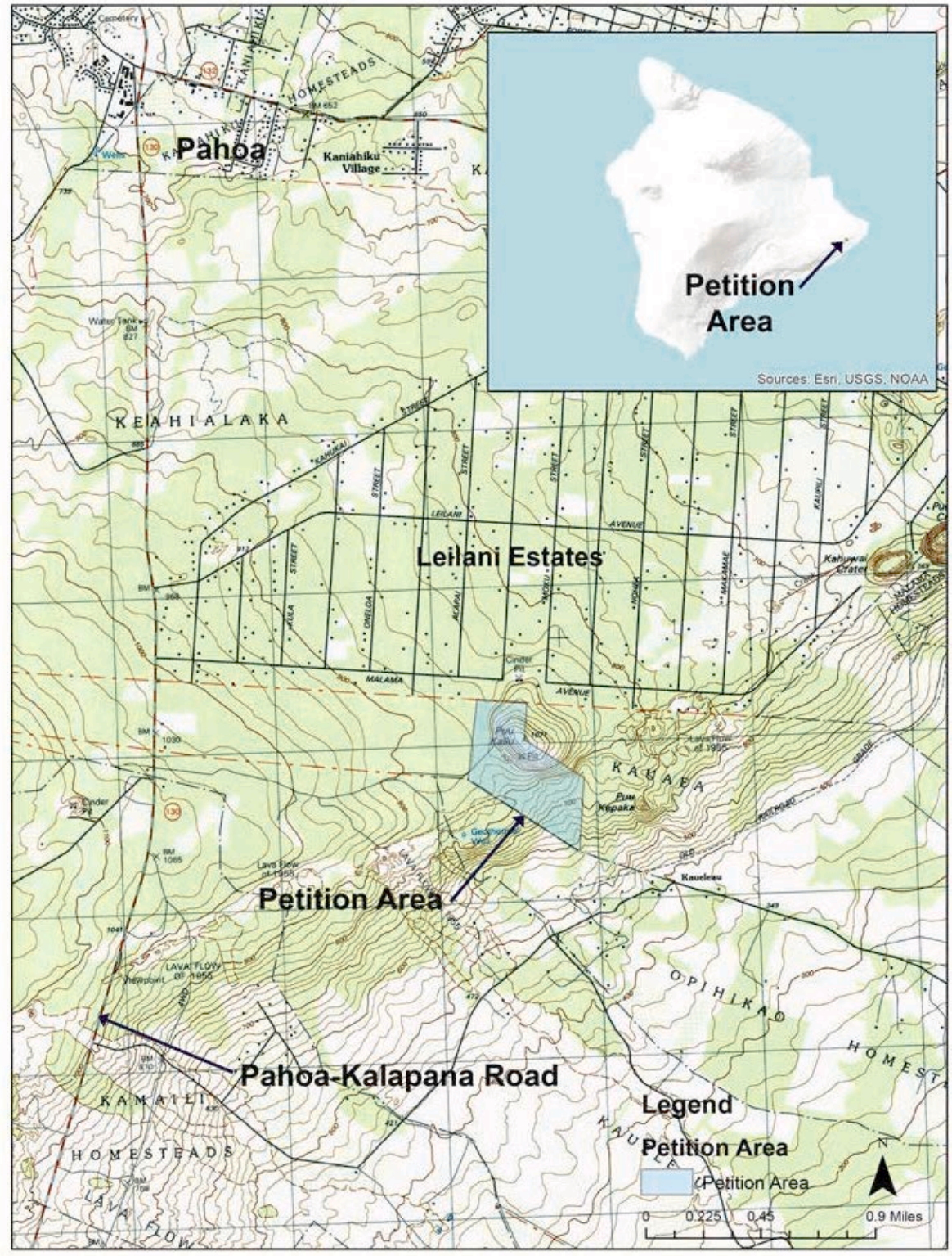


Figure 1. Petition Area Location Map (By GK Environmental LLC 2019)

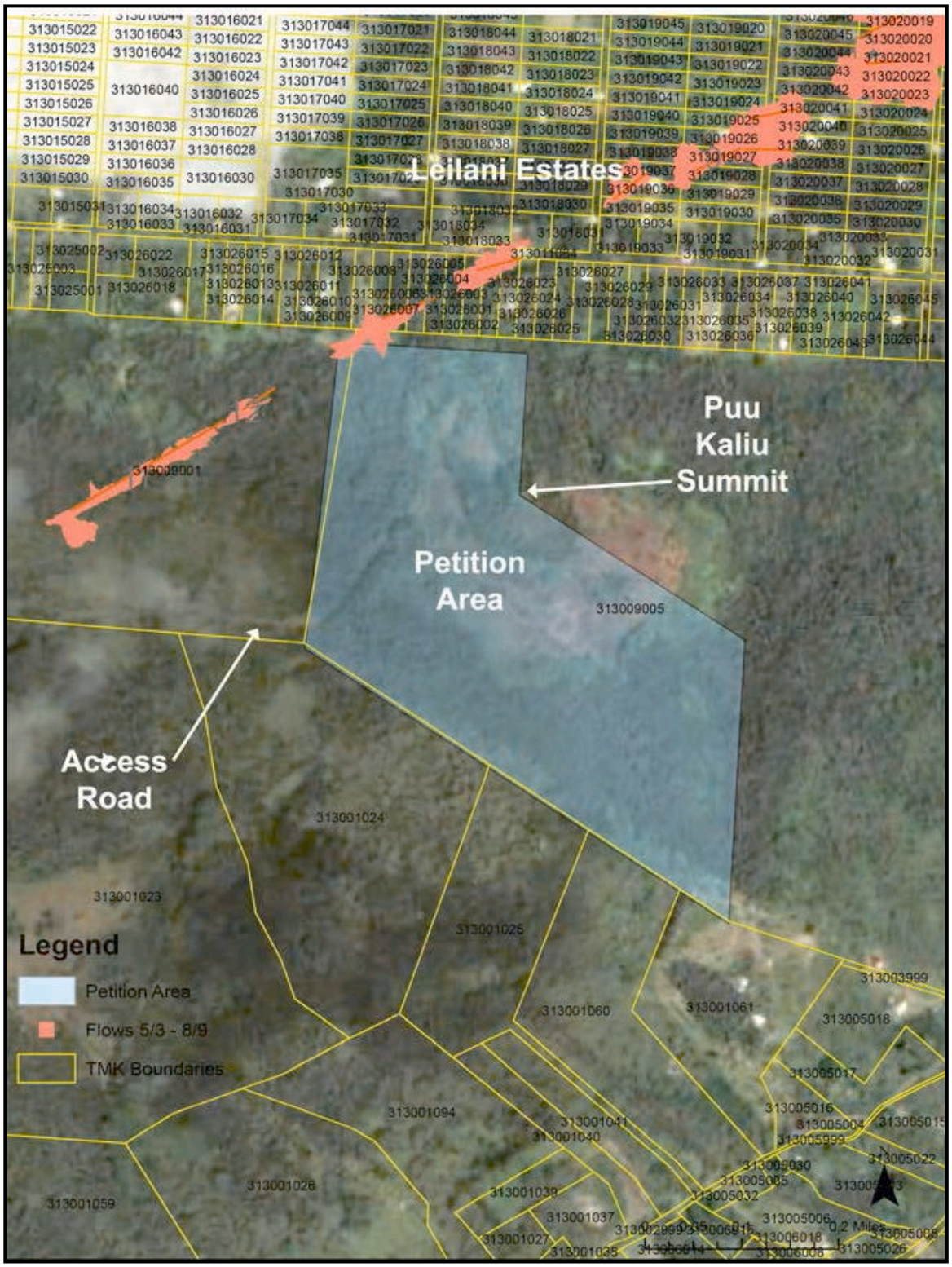
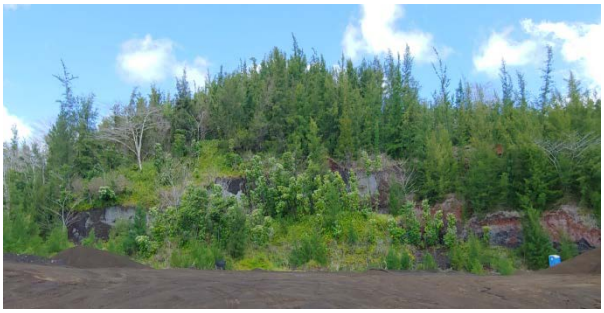


Figure 2. Petition Area Vicinity and TMK Map (by GK Environmental LLC 2019).




Photos 1-2 Cinder access road to quarry area.

Photos 3-4. Cinder mining area looking towards Puʻu Kaliʻu.




Photos 5-8. Leilani Quarry cinder mining south of Leilani Estates.



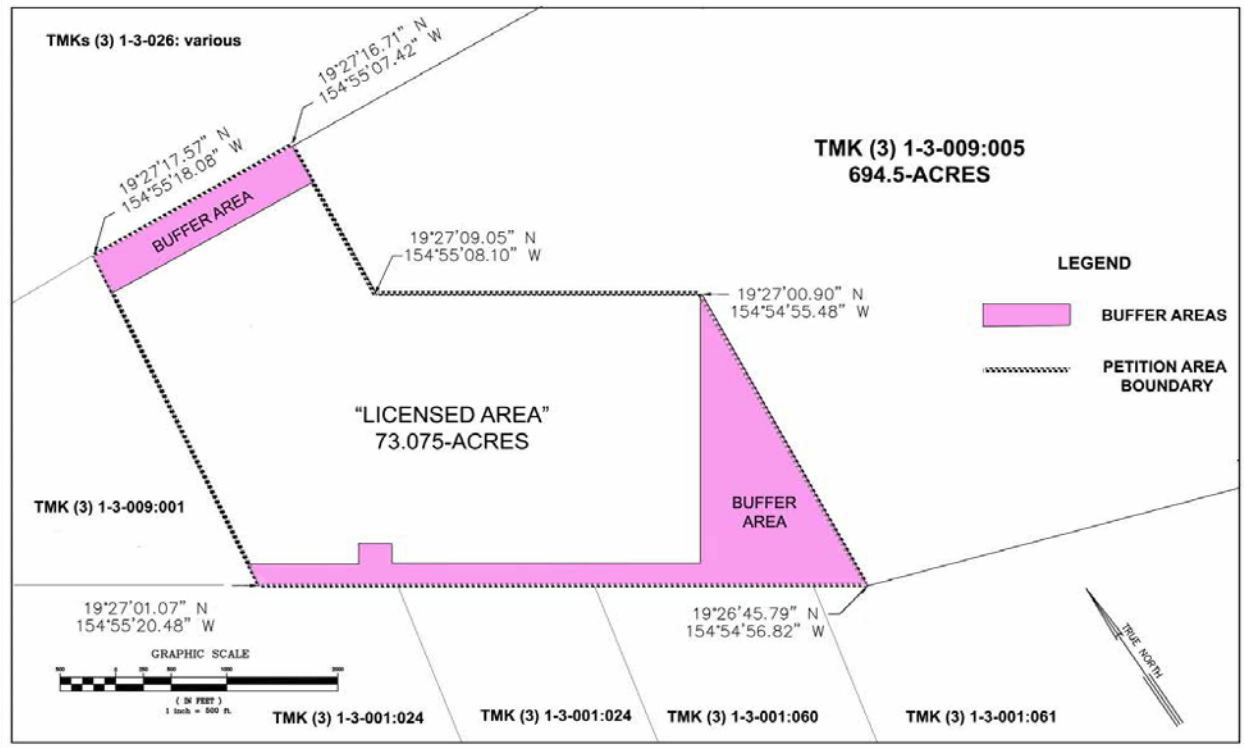



Figure 3. Petition Area Buffer Map (by GK Environmental LLC 2019).

Currently Sanford's Service Center, Inc. has a license from KS to perform mining activities in a 73.075-acre portion of the property, termed the "Licensed Area". This 73.075 acre area also includes the already permitted 30 acre CDUP area. Buffer areas totaling 21.033-acres would minimize impacts to forested areas. Together the 73.075-acre Licensed Area and 21.033-acre buffer areas comprise the 94.107-acre Petition Area. The License specifically prohibits further mining of the portion of Pu'u Kaliu which includes the summit outside of the "OVERALL AREA" as shown on the map attached as Exhibit C to the License (Figure 4). Sanford's Service Center, Inc. has not mined the summit of the Pu'u and is currently mining in a direction away from the Pu'u. If this SLU District Boundary Amendment is granted, Sanford's Service Center, Inc. will be applying for a Special Permit to mine within the 73.075 acre licensed area, but the mining activities will be focused on the area outside of the 30 acre CDUP area, within the remaining 43.075 acres, and will not impact Pu'u Kaliu.

The petition area is within the Lower East Rift Zone of the Kilauea Volcano. Large portions of the area have been disturbed by cinder mining and agricultural activities. This area includes an active cinder quarry and areas that were previously disturbed by cinder mining. Those areas were excavated below the original ground surface and are vegetated with sparse grass, weeds, shrubs and trees. The area (Leilani Quarry or Leilani Pit) is accessed by a dirt/cinder road along the southwestern side off of Hwy 130 (Figure 5).

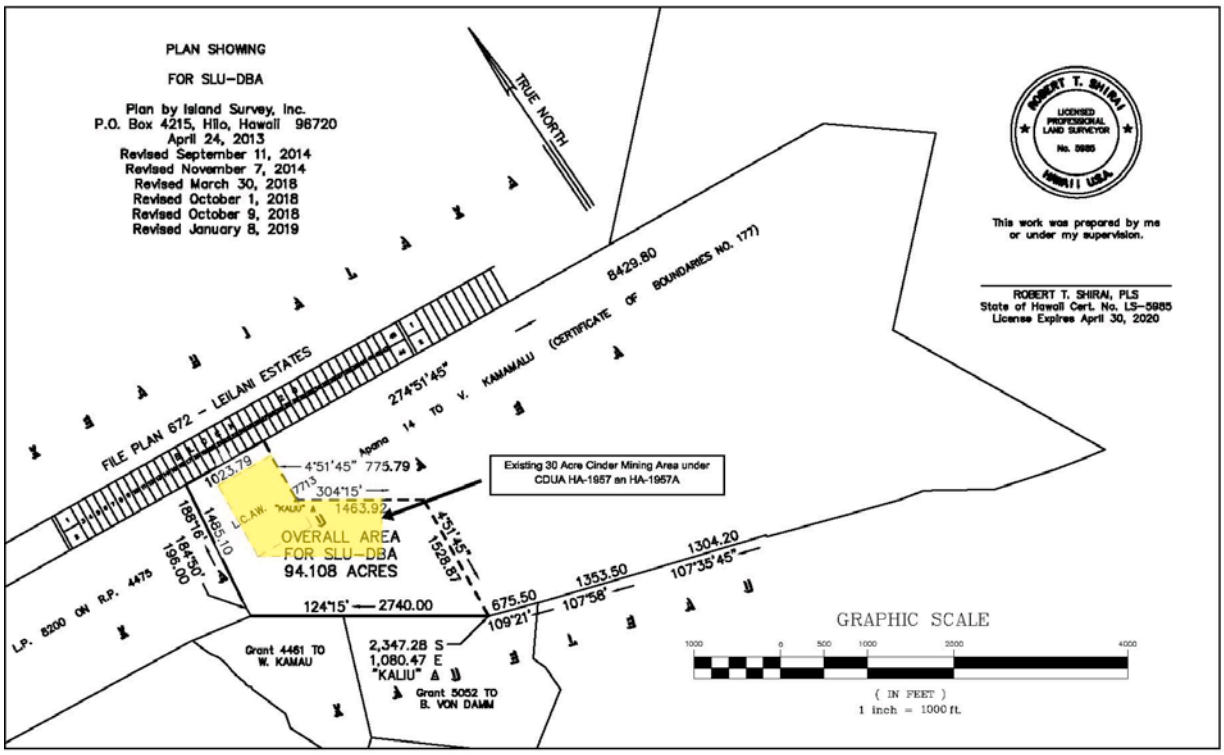


Figure 4. Map by Island Survey, Inc. with Permit Area.

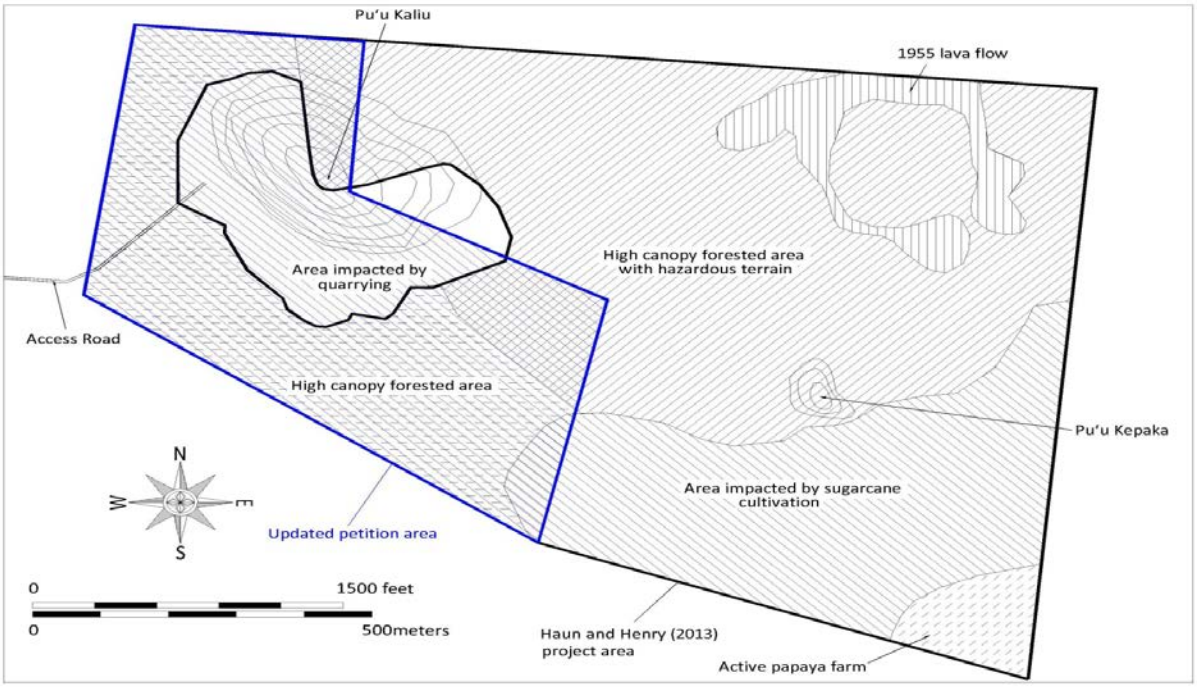


Figure 5. Areas of use and terrain types in petition area and vicinity (Haun & Henry 2013:11; updated 2019).

On May 3, 2018 a volcanic event occurred in the Leilani Estates, a neighborhood developed in the 1960s and located within the Lower East Rift Zone. Leilani Estates is north of the Pu‘u Kali‘u summit (elevation 1073’) and the Leilani Quarry where Sanford’s Services Center, Inc. has their mining operation. By May 6, 2018 lava was flowing across Makamae Street (Figure 6) in Leilani Estates (NYT 2018). Of the 24 fissures that erupted throughout Leilani Estates (Figure 7, see also Figure 2) Fissure 8 was the most monumental (108 feet) and the most active because of its volume and longevity. Hundreds of homes and thousands of acres of lands ultimately perished from the lava flows that finally ended on September 6, 2018. Pu‘u Kali‘u and the current mining area did not appear to be affected by the 2018 lava flows around the area. Pu‘u Kali‘u has a good vantage point from the Leilani Estates off of Malama Avenue. However, entrance to Leilani Estates was off limits until December 6, 2018, the day after the site visit.

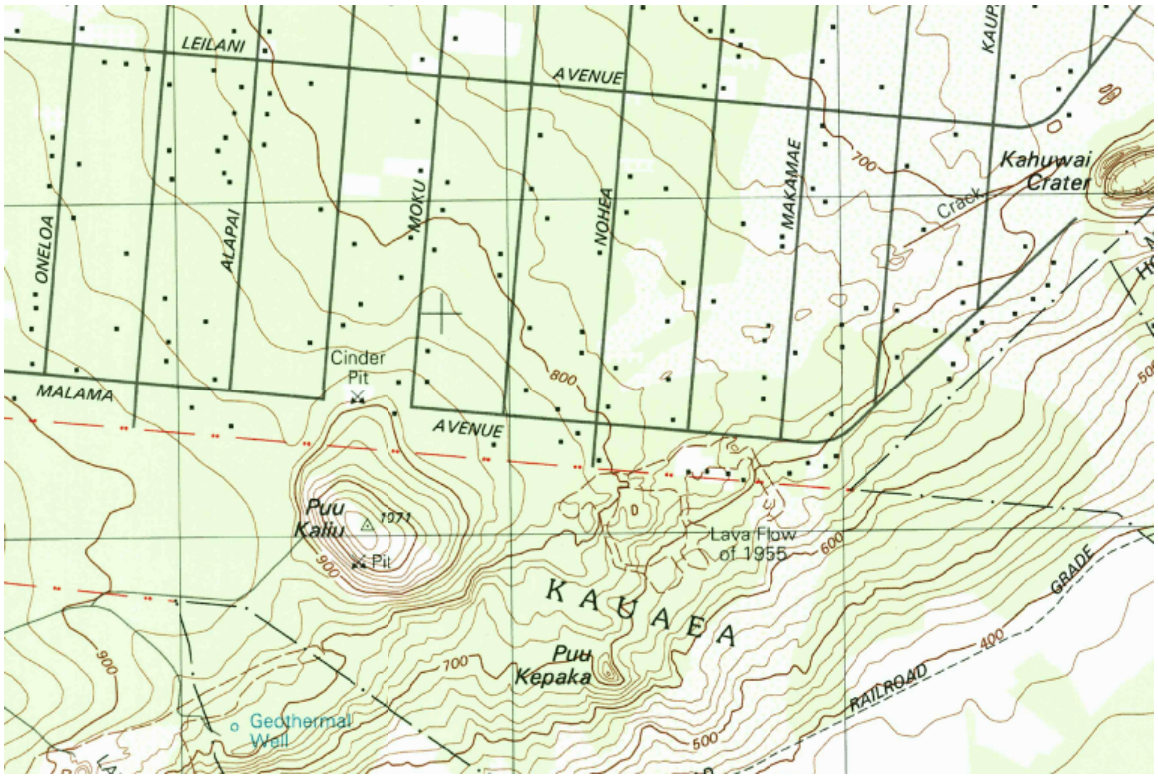


Figure 6. Portion of USGS TOPO Map (2019) of Leilani Estates in relation to Pu’u Kaliu.



Photo 9. Makamae St Lava Flow (USGS/AP 2018)

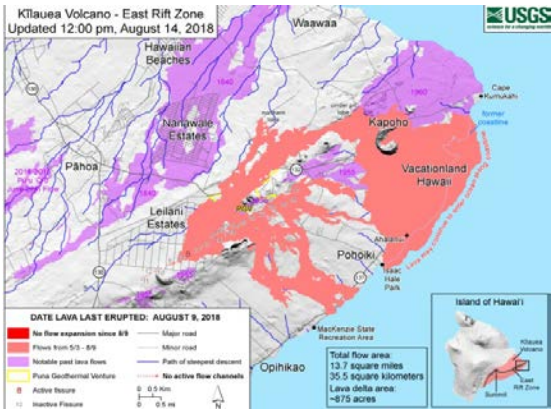


Figure 7. Fissure 8 Lava Flow USGS (2018).



Photo 10. View inside of the cone of Fissure 8 on Aug. 5, 2018 (USGS-HVO)



Photo 11. Fissure 8 flowing towards Kapoho June 9, 2018 (USGS-HVO)



A short distance away from Leilani Quarry, parallel to the access road is a cordoned off area where huge crevices are visible caused by a volcanic event. However it's not clear if this was caused by a pre-2018 or recent event. Part of the crevice was within the fenced area of the nearby Pu‘u Kali‘u Lowland Wet Forest where ‘ohia lehua and other native plants are being identified and protected.

Photos 12 and 13. Crevices parallel to project access road.







Photos 14-15 Sections of the Pu‘u Kali‘u Lowland Wet Forest

Natural Environment

Table 1. Terrain types in the original survey area (From Haun & Henry 2013:10).

Area	Acres within	% of project area	Ground surface visibility
Cinder quarry	31	10.0	Excellent
Impacted by sugarcane cultivation	66	21.0	Fair to good
Papaya farm	7	2.0	Excellent
1955 lava flow	13	4.0	Fair to good
High canopy forest	53	17.0	Fair to good
High canopy forest - Hazardous terrain	139	45.0	Fair
	309	**100.0**	

The following descriptions are from Haun & Henry (2013:13) and includes the original Petition area which has since (2018-19) been revised and downsized:

> There are two small lava flows associated with a 1790 eruption, located along the northern boundary in the central portion of the parcel, and along the south boundary in the southwestern portion. The 1790 flow occupies 3 acres or 1% of the project area. The flow along the north boundary corresponds to an area of pahoehoe lava and the flow along the south boundary corresponds to an area of a‘a lava.
>
> The majority of the [survey] area is characterized by lava flows that date from 450-750 years ago comprising 272 acres (88%). The Pu‘u Kali‘u area is designated as “pc4-0” by Wolfe and Morris (2001) and encompasses 62 acres (20%). This flow roughly corresponds to the Papai extremely stony muck soil area…. The remaining 210 acres (68%) are designated as “p40” and correspond to the Malama extremely stony muck soil area.
>
> The oldest flows in the parcel date from 750 to 1,500 years ago (pc3) and are located in two areas. A 12-acre (4%) area corresponds to the Pu‘u Kepaka area (see Figure 6) indicating that this smaller hill pre-dates Pu‘u Kali‘u. The second area is situated in the northeastern corner of the [survey] parcel and is surrounded by the 1955 flow. It is 6 acres in area and comprises 2% of the project area.
>
> In addition to the sites documented during the [2013] survey, 20 caves and three overhangs were identified. These features were carefully examined and no evidence of cultural use or modification was evident resulting in their designation as non-cultural features.

Table 2. Lava flows in the original survey area (Haun & Henry 2013:13). Lava flows of 2018 are not included.

Lava flow designation*	Lava flow age	Acres within	% project area	Location with project area
p5	AD 1955	15	5	Northeast corner of parcel
p5	AD 1790	3	1	North-central area and along south boundary
pc40	450-750 years old	62	20	Pu‘u Kali‘u
p40	450-750 years old	210	68	Majority of parcel
pc3	750-1500 years old	12	4	Pu‘u Kepaka
pc3	750-1500 years old	6	2	Northeast corner of parcel
Total		**309**	**100**	

** - from Wolfe and Morris 2001*

The following vegetation descriptions are from Haun and Henry (2013:5) includes the original Petition area. The revised Petition area is illustrated in Figure 5.

> The southeastern portion of the [survey] area was disturbed by historic and modern sugarcane cultivation. This area comprises 66-acres or 21% of the total parcel and is characterized by relatively flat, gently sloping terrain with introduced plant species including strawberry guava (*Psidium cattleianum*), Coster's curse (*Clidemia hirta*), lantana (*Lantana camara*), Miconia (*Miconia calvescens*), Hawaiian raspberry (*Rubus hawaiensis),* avocado (*Persea americana*), coconut (*Cocos nucifera*), mango (*Mangifera indica*), red ginger (*Alpinia purpurata*), grasses and vines. The dense vegetation in this area resulted in fair to good ground surface visibility. An active papaya (*Carica papaya*) farm is located in the southeast corner of the parcel, occupying 7-acres or 2% of the parcel. The ground surface visibility in the papaya farm is excellent. This area also was formerly used for sugarcane cultivation.
>
> There is a U-shaped area in the northeastern portion of the [survey] area that was covered by a 1955 lava flow from Kiluaea Volcano (13-acres, 4%). This area is vegetated with young *ohia* (*Metrosideros polymorpha*) trees, ferns and grasses with fair to good ground surface visibility.
>
> The southwestern portion of the [survey] area consists of a high canopy forest comprising 53-acres or 17% of the total [area]. The terrain in this area is relatively level with moderately thick vegetation dominated by strawberry guava and large ohia trees. Occasional fissures associated with the East Rift Zone are present in this area (see Figure 4). Ground surface visibility in this area is fair to good.
>
> The remaining 139-acres (45%) are comprised of a high canopy forest with hazardous terrain. This area is characterized by an extremely uneven ground surface that is bisected by narrow ridges and deep fissures and channels. The vegetation in this area consists of strawberry guava, African tulip (*Spathodea campanulata*), albizia (*Falcataria moluccana*), avocado, autograph tree (*Clusia rosea*), bamboo (*Bambusa spp.*), bamboo orchid (*Arundina graminifolia*), Coster's curse, gunpowder tree (*Trema orientalis*, Hawaiian raspberry, *kukui* (*Aleurites moluccana*), *ohia*, paper mulberry (*Broussonetia papyrifera*), staghorn fern, (*Dicranopteris linearis*), *ti* (*Cordyline fruticosa*), *uluhe* (Dicranopteris linearis), grasses and vines. Ground surface visibility in this area is fair.

Table 3. Vegetation in the survey area based on data from Haun & Henry (2013:5) above.

Area	Common Name	Binomial Nomenclature	Historic
Southeastern portion	Strawberry guava	*Psidium catteianum*	Sugarcane
	Coster's curse	*Clidemia hirta*	
	lantana	*Lantana camara*	
	Miconia	*Miconia calvescens*	
	Hawaiian raspberry	*Rubus hawaiensis*	
	avocado	*Persea americana*	
	coconut	*Cocos nucifera*	
	mango	*Mangifera indica*	
	red ginger	*Alpinia purpurata*	
	grasses		
	vines		
Southeastern corner	Papaya farm	*Carica papaya*	Sugar cane
Northeastern portion	Ohia	*Metrosideros* Sp	1955 lava flow
	ferns		
	grasses		
Southwestern portion	Ohia	*Metrosideros* Sp	High Canopy forest &
	Strawberry guava	*Psidium catteianum*	East Rift Zone
Remaining 139 acres	Strawberry guava	*Psidium catteianum*	High Canopy forest &
	avocado	*Persea americana*	Hazardous terrain -
	Coster's curse	*Clidemia hirta*	Deep fissures &
	African tulip	*Spathodea campanulata*	Channels
	albizia	*Falcataria moluccana*	
	gunpowder tree	*Trema orientalis*	
	Hawaiian raspberry	*Rubus hawaiensis*	
	kukui	*Aleurites moluccana*	
	Ohia	*Metrosideros* Sp	
	paper mulberry	*Broussonetia papyrifera*	
	staghorn fern	*Dicranopteris linearis*	
	ti	*Cordyline fruticosa*	
	uluhe	*Dicranopteris linearis*	
	grasses		
	vines		

Revised Petition Area Fauna

In 1993 nocturnal surveys were conducted by Michelle Reynolds and George Ritchotte (1995:26, 29) using auditory cues and night vision equipment during the seabird breeding season to determine the use of the inland areas of the Puna district. The following table lists the detections of the Newell's Shearwater (*Puffinus auricularis newelli*) in three locations in Puna; including Pu'u Kali'u in the petition area.

> The Newell's Shearwater, or 'A'o, *Puffinus auricularis newelli,* is a threatened *procellariid* (US Fish and Wildlife Service 1992) known to breed on the Islands of Kauai and Hawaii, and suspected to breed on the other main Hawaiian Islands (Pratt et al. 1987). Newell's Shearwater was thought to be extinct after 1894, but in 1954 a specimen was collected on Oahu (King and Gould 1967) and a breeding colony was found on Kauai in 1967 (Sincock and Swedberg 1969) [Reynolds and Ritchotte 1995:26].

Table 4. Newell's Shearwater detections in the Puna district in 1993 (Reynolds and Ritchotte 1995:29).

Location	Survey Dates	No. Detections	Detections/h
Heiheiahulu	August 19	32	11.64
	August 23	20	6.15
	August 26	2 visual	0.67
	August 31	15 (1 visual)	4.29
	September 1	3	1.53
	September 2	1	0.29
	September 8	2	0.34
	September 9	2	1.00
	September 10	3	0.95
	September 16	4	1.18
	September 20	6 (1 visual)	1.69
		Total = 99	Mean = 1.05
Puulena Crater	July 23	13	14.18
	July 28	7	3.23
	July 29	2	1.00
	August 9	5	3.16
	August 10	7	1.00
	August 25	2	0.35
	August 26	19	71.25
	September 9	89	23.52
	September 10	16	14.77
		Total = 160	Mean = 1.26
Pu'u Kaliu	September 1	2	0.67
			Mean = 0.04

Pu'u Kali'u (elevation 305 m). The low numbers detected at Pu'u Kali'u may be due to surveys conducted late in the breeding season starting on 31 Aug. 1993. Follow-up surveys conducted on 1 and 3 Jun. 1994 discovered additional Newell's Shearwaters at Pu'u Kali'u and south of Pu'u Kali'u (M. Reynolds, unpubl. data) (Reynolds and Ritchotte 1995:29).

METHODS

The Cultural Impact Assessment (CIA) consisted of three phases: (1) cultural and historical archival literature review; (2) ethnographic survey (oral history interview), analysis of ethnographic data (past and current oral histories) and (3) report writing. The research was conducted June – September 2015; analysis and report writing was done in July to November 2015; with revisions in December 2015.

Personnel. The personnel consisted of the author (ethnographer) who has a master's degree in Anthropology, with a graduate curriculum background in the archaeology track as well as anthropology theory, cultural resource management, ethnographic research methods, and public archaeology; an undergraduate curriculum background that included Hawaiian History, Hawaiian Language, Hawaiian Archaeology, Pacific Islands Religion, Pacific Islands Archaeology, Cultural Anthropology, as well as a core archaeology track, Geology, and Tropical Plant Botany; and ethnographic field experience that includes over 400 interviews to date.

Level of Effort. The level of effort for this study included a broad archival research literature review and an ethnographic review and analysis [two oral histories].

Theoretical Approach. This CIA is loosely based on *Grounded Theory*, a qualitative research approach in which "raw data" [transcripts and literature] are analyzed for concepts, categories and propositions. Categories were pre-selected as part of the overall research design. However, it is not always the case that these research categories are supported in the data. Categories were generated by forming general groupings such as "Land Resources and Use," "Water Resources and Use," and "Cultural Resources and Use." Conceptual labels or codes are generated by topic indicators [i.e., flora, fauna]. In the *Grounded Theory* approach, theories about the social process are developed from the data analysis and interpretation process (Haig 1995; Pandit 1996). This step was not part of this cultural impact assessment as the research sample was too small.

Archival Research. The majority of the archival research was based on a report by Haun & Associates (2013) and research by the principal investigator that included a broad but limited background literature review. Secondary source material included translations of 19th century ethnographic works, Hawaiian language resources (i.e., proverbs, place names and dictionary) and internet research. [NOTE: *Alan Haun is listed as co-author]

Consultant Selection (Oral Histories). The selection of the ethnographic consultant was based on the following criteria:

- Had/has Ties to Project Location(s)
- Known Hawaiian Cultural Resource Person
- Known Hawaiian Traditional Practitioner
- Referred By Another Cultural Practitioner

Interview Processes. The formal interview process included a brief verbal overview of the study. Then the ethnographic consultant was provided with a consent or 'agreement to participate' form to review and sign [Appendix C]. An ethnographic research instrument [Appendix D] was designed to facilitate the interview; a semi-structured and open-ended method of questioning based on the person's response ('talk-story' style). Each interview was conducted at the convenience (date, place and time) of each consultant. The interview was conducted using a cassette tape recorder or a digital recorder. The interviewees were allowed to choose where they wanted to have their interview conducted. A *makana* or gift was given to the consultant in keeping with traditional reciprocal protocol.

Transcribing-Editing Process. The taped interview was transcribed by a hired transcriber. After the interviews were transcribed, each transcript was edited and corrected by the principal investigator before mailing. Each ethnographic consultant was sent a *mahalo* letter that explained the transcript review process, along with two hard copies of the interview transcripts, two *Release of Information* forms, and a self-addressed, stamped envelope for return of a signed release form and a copy of the revised transcripts. This process allows each consultant to make corrections (i.e., spelling of names, places), as well as have a chance to delete any part of the information if so desired or to make any stipulations if desired. The consultants were also informed of the two-week time limit for their review and return revised transcripts and signed release forms after which it will be assumed that the raw data can be selectively used.

Ethnographic Analysis Process. The analysis process followed a more traditional method, as a qualitative analysis software program (i.e., TALLY) was not necessary. Each interview was considered a separate file, and the first name was used to identify the consultant (s). Each transcript was electronically coded for research thematic indicators or categories (e. g., personal information; land, water resources and use; site information-traditional and/or historical; and anecdotal stories). For the purpose of this CIA, it was also not necessary to go beyond the first level of content and thematic analysis, as this was a more focused study. However, sub-themes or sub-categories were developed from the content or threads of each interview [e. g., cinder mining or Puʻu Kaliʻu].

Summary of Findings and Cultural Impact Assessment. The Summary of Findings section is based on both archival and ethnographic data: Summary of Significant People and Events (e.g. Legendary Entities, *Ali'i Nui*), Summary of Historic People and Events, and Significant Practices Pre-Contact and Post-Contact. This section also includes 'Environmental Council Guidelines Criteria in Relation to Project Lands' and the Cultural Impact Assessment and recommendations or mitigation if any are made.

Report. The report includes the description of the project area; the explanation of methods; a review of the historical and traditional (cultural) literature; the ethnographic analysis; summary of findings and cultural impact assessment.

Site Visits. One site visit was made by the principal investigator with an ethnographic consultant on July 10, 2015. Another site visit was made on December 5, 2018.

Ethnographic Research Constraints:

- It was difficult making initial contact with people; several methods were utilized (e.g. telephone, email; Facebook message; in person). Several messages were left explaining the project before finally making contact with eleven people. Four people asked for a preview of questions and project maps-only one agreed to an interview;
- Two people immediately declined during the initial telephone conversation;
- Two people declined after several telephone conversations – they decided they did not know the Puʻu Kaliʻu area at all;
- One consultant had to be re-interviewed because of cassette tape recorder issues while on site visit;
- Two potential consultants were visited and after talking story for a while decided their husbands who are deceased were the real cultural experts not them, and declined. Their husbands hunted and gathered in the Puʻu Kaliʻu area and were very culturally involved in the Pahoa community;
- One consultant who agreed to be interviewed wanted to postpone the interview for a later date;
- One potential consultant conducted cultural projects in the project area was very interested in doing a site visit and interview but needed to get employer permission and asked me to "stand by" but it never came to pass.

CULTURAL AND HISTORICAL BACKGROUND REVIEW

The Cultural and Historical Background Review of selected archival material that includes translations of 19th and 20th century ethnographic works, historical texts, indexes, archaeological reports, internet research and Hawaiian language resources (i.e., proverbs, place names and Hawaiian language dictionary). Several sections are extracted with permission from Haun & Henry (2013).

Chronology of Human Impact, Settlement and Development in Greater Hawai‘i – an overview.

Colonization Period. First voyager dating is scanty at best, however, based on early site dates from Bellows, O‘ahu and Ka Lae/South Point, Hawaii, Kirch (1985) estimated that the Colonization Period of the Hawaiian Islands by Polynesians from the south, was somewhere between AD 300-600 [this has been recently refuted with a new estimated settlement period beginning ca 1100AD (SAA 2013)]. A couple of *mo‘ōlelo* about Hawai‘i Loa the navigator, have the islands being settled much earlier than this. It is believed that the first Polynesian voyagers to Hawaii followed the flight paths of migratory birds, and navigated by the stars. A voyage of migration would have included sixty to a hundred persons who could exist for weeks on a large canoe, which may have been a hundred feet in length (Day 1992:3). This feat was remarkable in that it was done in canoes carved with tools of stone, bone, and coral; lashed with handmade fiber; and navigated without instruments.

Reconstructing the cultural sequence for the Puna district and other places in Hawai‘i during the colonization period would involve the ‘founder effect’ and time necessary to adjust and adapt to a new environment. The colonizers were not able to bring all of the gene pool or crop plants from their homeland, so their new culture consisted of what survived the journey, what was remembered and what could be applied to the new environment (Kirch 1985:285-6). Although early Hawaiians were farmers and felt spiritually tied to the ‘*āina* (land) in many ways (Waters, n.d.), when they first arrived they had to modify both their subsistence practices and the land. Faunal remains analyses indicate that early Hawaiian subsistence depended on fishing, gathering, bird hunting [extinct fossil remains, see Olson and James, 1982], as it took time to clear the forests, plant their crop cultigens, breed their animals, and construct suitable living quarters. Creation chants such as the *Kumulipo* depict a very deep philosophical bond with the land and nature and “the respectable person was bound affectionately to the land by which he was sustained” (Charlot 1983: 45, 55). Ancient sites of various *ko‘a* (fishing and bird shrines) also imply a spiritual respect for their sustenance.

As the founding groups grew, they fissioned into subgroups anthropologists refer to as *ramages*, with the senior male of the original ramage as chief of the conical clan, although hierarchical ranking was not just relegated through the patrilineal line of descent (Kirch 1985:31). Bellwood refers to these groups as tribal and related by blood (Bellwood 1978:31). Chiefly ranking probably did not occur until late in the Developmental Period.

Developmental Period**.** According to Fornander (1969) certain practices were universal Polynesian customs which the Polynesian-Hawaiians brought from their homeland; such as the major gods *Kāne, Ku, Kanaloa* and *Lono*; the *kapu* system of law and order; *pu‘uhonua* (place of refuge); ‘*aumakua* (ancestral guardian) concept; and the concept of *mana* (supernatural or divine power) (Fornander 1969:61, 113,118,127-8). The early culture evolved as the population grew, and many of the changes were related to significant socio-economic changes. The evidence indicates that the “ancestral pattern of corporate descent groups” were still in place (Kirch 1985:302-3). However, this was changing as well.

During the Developmental Period, changes occurred bringing about a uniquely Hawaiian culture, documented by the material culture found in archaeological sites. The adze (*ko‘i*) evolved from the typical Polynesian variations of plano-convex, trapezoidal and reverse-triangular cross section to a very standard

Hawaiian quadrangular-tanged adze. A few areas in Hawaii produced high quality basalt for adze production. Mauna Kea on the island of Hawai‘i was a well-known adze quarry of very high quality basalt. Other areas included Maunaloa, west Molokai, Kapa‘a in windward O‘ahu, Kaho‘olawe and Honolua-Honokohau and Haleakalā on Maui. The two-piece fish hook and the octopus lure breadloaf sinker are also Hawaiian inventions of this period, as are the ‘*ulu maika* stones and the *lei niho palaoa* (whale-tooth adornment). The latter was a status item worn by those of high rank, indicating a trend toward greater stratification (Kirch 1985:184,204,306).

Expansion Period**.** The Expansion Period is significant in that most of the "ecologically favorable zones," the windward and coastal areas of all major islands were now settled and the more marginal leeward areas were being developed. This was also the period of the greatest population growth, the development of large irrigation field system projects, and dryland farming. The uniquely Hawaiian invention, the *loko* or fishpond aquaculture, was developed in the fifteenth century or the later half of this period (Kirch 1985: 303).

This was a period of great long voyages from Hawaii and new migrations from Kahiki (F=foreigner) [1. ‘Olopana, his wife Lu‘ukia and his brother Mo‘ikeha; 2. Kaumaili‘ula, Kaupe‘a; 3. Ho‘okamali‘i, Haulaninui-ai-ākea, Kila (sons of Mo‘ikeha); 4. La‘amaikahiki (F), friend of Mo‘ikeha - he brought the *kā‘eke* hula drum, a new god and the outrigger; 5. Kaha‘i-a-Ho‘okamali‘i – brought back breadfruit; 6. Pa‘ao (F) – brought new religion and priesthood, Pili (F) – new ruling system; 7. Kaulu-a-Kalana – brought back edible mud to Kawainui; 8. Paumakua (he brought white men); 9. ‘Olopana II, Kahiki‘ula; 10. Keānini (F), Ha‘inakolo; 11. Kamaunu-a-Niho (F), Humu (F), Kalana-nu‘u-nui-kuamaomao (F); 12. Kamapi‘ikai who made four voyages, three were 2-way] (Cordy 2000:149-150).

There appears to be some controversy as to the arrival of the priest Pa‘ao and Pili who displaced the Hawaii chiefly line of this period. Fornander (1880) states that due to the bad government of Kapawa he was deposed by Pa‘ao who went back to Kahiki and brought Pili Ka‘aiea to rule. However, others state that Pa‘ao (a white man) arrived much later in the reign of Kahoukapu (Ellis 1823 Byron 1826); up to sixteen rulers after Kapawa in the reign of Lonokawai (Malo 1840; Pogue 1858; *Hoku Pakipika* 1862; Kepelino 1868 (Cordy 2000:151-153). Pa‘ao was the keeper of the god Kū‘ka‘ilimoku who had fought bitterly with his older brother the high priest Lonopele. After much tragedy on both sides, Pa‘ao escaped Lonopele's wrath by fleeing in a canoe from Kahiki. Kamakau (1991) told the following story in 1866:

> Puna on Hawai‘i Island was the first land reached by Pa‘ao, and here in Puna he built his first *heiau* for his god Aha‘ula and named it Aha‘ula [Waha‘ula]. It was a *luakini*. From Puna, Pa‘ao went on to land in Kohala, at Pu‘uepa. He built a *heiau* there called Mo‘okini, a *luakin*i. It is thought that Pa‘ao came to Hawaii in the time of the *ali‘i* La‘au because Pili ruled as *mo‘i* after La‘au. Pili was in the line of succession in the *mo‘o kū‘auhau* or genealogy of Hanala‘anui. It was said that Hawaii Island was without a chief, and so a chief was brought from Kahiki; this is according to chiefly genealogies. Hawai‘i Island had been without a ruling chief for a long time, and the chiefs of Hawai‘i were *ali‘i maka‘āinana* or just commoners (Kamakau 1991:100). There were seventeen generations during which Hawai‘i Island was without chiefs--some eight hundred years (Kamakau 1991:101, 102).

Pa‘ao brought with him the Kū practice which incorporated human sacrifice [which may not have been a new practice (Cordy 2000:160-163)], used in monumental *luakini heiau* or war temples. Pili started a line of *ali‘i nui* that would continue to the Kamehameha "dynasty." The evolution of the *luakini heiau* is difficult to place archaeologically, and although the arrival of Pa‘ao may have been a real event; the uniqueness and complexity of *heiau* were most likely a local (Hawaiian) development (Kolb 1989:3). The bones of *kahuna* Pa‘ao are said to be deposited in a burial cave in Kohala in Pu‘uwepa [possibly Pu‘uepa] (Kamakau 1987:41).

It was during the A.D. 1400s-1500s of this period that descendants of the Pili line consolidated the Hawaii Island polities and unified the island under one kingdom: Pili began (ca. A.D. 1320); Koa (ca A.D. 1340-1360), ʻOle (ca A.D. 1360-1380), Kūkohau (ca A.D. 1380-1400) [the last three may have been siblings or sons of Pili]; Kaniuhi (ca A.D. 1400-1420); Kanipahu (A.D. 1420-1420) who was usurped by Kamaʻiole; Kalapana (A.D. 1440-1460) who brought down Kamaʻiole was the son of Kanipahu; Kahaʻimoeleʻa (A.D. 1460-1480) son of Kalapana; and Kalaunuiohua (A.D. 1480-1500) grandson of Kalapana. Both Kalapana and his son Kahaʻimoeleʻa had their royal residence in Waipiʻo. The following were ruling chiefs ca A.D. 1500-1600: Kūāiwa who appointed his junior son Ehu as chief of Kona and another junior son Hukulani as chief of Kohala and was succeeded by his oldest son Kahoukapu as ruling chief of Hawaii Island (A.D. 1520-1540); his son Kauholanuimahu (A.D. 1540-1560) was the next ruler who sometimes resided on Maui on his wife's lands; his son Kihanuilūlūmoku (A.D. 1560-1580) followed - he lived and reigned in Waipiʻo as did his son Lïloa (A.D. 1580-1600) who ruled next; his junior son ʻUmi (A.D. 1600s) usurped Līloa's oldest son Hākau (A.D. 1600-16??) (Cordy 2000:185-192).

During the last 200 years of the Expansion Period, the concept of *ahupuaʻa* was established, as well as class stratification, territorial groupings, powerful chiefs and *"moʻi"* or king (Kirch 1985:303-6). The *aliʻi* and the *makaʻāinana* (those who looked after the land) were not confined to the boundaries of the *ahupuaʻa*. Not only did the *ma kai* (ocean direction) and *ma uka* (mountain direction) people share seafood and produce by lighting a fire when there was a need, they also shared with their neighbor *ahupuaʻa ohana* (Hono-ko-hou 1974:14, 15). The *ahupuaʻa* was further divided into smaller sections such as the *ʻili, moʻo ʻāina, paukū ʻāina, kihapai, kōʻele, haku one* and *kuakua* (Hommon 1976:15; Pogue 1978:10). The chiefs of these land units gave their allegiance to a territorial chief (*aliʻi nui* or *moʻi* - king). One of Hawaiʻi island's most famous *aliʻi nui* during this period was Liloa and his son ʻUmi-a-Liloa (ca. Late 1500s to Early 1600s).

Moʻolelo about events that took place in the early to mid 1600s revealed that many of the battles of this period were relatively quickly contained by the opposing *aliʻi.* These stories also illustrate the on-going inter-relationships between the people of the various islands. In the *History of Kūaliʻi,* the exploits of Kūaliʻi (great-great grandson of Kākūhihewa, *aliʻi nui* of Oʻahu) take him to every island and he eventually unites all the islands "from Hawaiʻi to Niʻihau" (Fornander 1917: IV: II: 406).

Proto-Historic Period**.** The Proto-Historic Period, A. D. 1650-1795, appears to be marked with both intensification and stress. Lonoikamakahiki was still the ruling chief of Hawaiʻi Island. And many wars took place during this time between intra-island chiefdoms and inter-island kingdoms. During the early part of this period Maui *aliʻi nui* Kama-lala-walu ignored the advice of his counsel and sent his half-brother Ka-uhi-o-ka-lani (both sons of Kiha-a-Piʻilani) to spy on Hawaiʻi Island, to see how large the population was. They landed in Kawaihae. The next morning the spies began a circuit of Hawaii; they then returned to Maui and reported to Kama-lala-walu that they saw many houses, but few men (Kamakau 1992:56-57). While most of the prophets and seers supported Kama-lala-walu's war on his cousins of Hawaii Island, children of his father's sister Piʻikea and ʻUmi-a-Līloa, some warned that if he did go, he would die and not return to Maui alive. They landed at Kohala and began the destruction of the people of Kohala. Kanaloa-kuaʻana, son of Keawe-nui-aʻUmi was captured and treated cruelly. Kama-lala-walu was advised not to battle in Waimea, to go to Kona instead, but he did not listen (Kamakau 1992:58).

The battle of Puʻuʻoaʻoaka commenced just outside the Waimea plains. The light-weighted lava rocks here contributed to the defeat of the Maui warriors who were used to heavier water-worn rocks. The Maui warriors retreated; some to Kawaihae, others to Kohala. And because of the lack of canoes, very few escaped alive. Ka-uhi-a-Kama, son of Kama-lala-walu who was killed on the plain of Puako, escaped to Kekaha, found a canoe and fled to Maui. He was saved by Hinau, the foster son of Lono-i-ka-makahiki. Many of the chiefs of Kona were relatives of Ka-uhi-a-Kama through his mother Kapu-kini-akua

(Kamakau 1992:59-60). Kapukini was the daughter of Līloa and Maui chiefess Haua and a half-sister and wife of ʻUmi (Cordy 2000:206).

After the death of Hawaiʻi Island *aliʻi nui* Lono-i-ka-makahiki, his children did not succeed him. Instead Hawaiʻi Island was divided into smaller divisions. The descendants of Kanaloa-kuaʻana [Keakealanikane (ca A.D. 1660-1680), Keawekuikekaʻai, Keʻeaumoku, Kalaniʻopuʻu and Keōua] later ruled Kohala, Kona and Kaʻu. The descendants of Keawe-nui-a-ʻUmi ruled Hilo and Hāmākua. This was not a peaceful period. The chiefs of Kona and Hilo fought each other for the various resources each area had [Hilo's bird feathers, war canoes, fine tapa; Kona's food, drinking water and fish]. These wars lasted for several decades with the Hilo chiefs usually defeating the Kona-Kohala chiefs, especially during the reigns of Kuaʻana, Kuahuʻia, Ka-lani-ku-kau-laʻalaʻa and Moku. Ke-aka-mahana (w) [daughter of Keakealanikane who was raised on Kauai and brought back to reign] was the ruler of Kona (ca A.D. 1680-1700) during the wars with Hilo; her primary residence was Hōlualoa, Kona. The rulers of Kona and Kohala who succeeded Ke-aka-mahana were her daughter Keakealaniwahine (ca A.D. 1700-1720) [it was during her reign that Oʻahu's famous ruling chief Kualiʻi raided the coast of Hilo and Puna districts (Wikipedia/Kualii 2010)] and her son, Keawe [Ke-awe-i-kekahi-aliʻi-o-ka-moku]. The Mahi clan were the war leaders, but the chiefs of Hilo were always victorious over those of Kona and after they won the battle of Huʻehuʻe the secret places and burial caves in Kona were broken open. In the battle of Mahiki, Ka-lani-ku-kau-laʻalaʻa and Moku were the chief war leaders of Hilo. After Moku, the Hilo chiefs ceased to reign (Kamakau 1992:61-63; Cordy 2000:239-245).

During Keawe's reign (ca A.D. 1720-1740), unlike his mother Keakealani, his royal court was in Hōnaunau and his district chiefs were Mokulani of the ʻĪ family -- son of Kuahuʻia and cousin of Keawe's son's wife (Hilo, Hāmākua except for Waipiʻo, and eastern Puna); the Mahi family, Mahiʻololi, then his son Kauaua-a-Mahi (Kohala); Kalaninuiʻiamamao, eldest son of Keawe (Kaʻu and western Puna); and Kalanainuikeʻeaumoku, another son of Keawe (Kona) (Cordy 2000:260). The battles between the Hawaii Island families, factions and district chiefs continued during the later part of the Proto-Historic period. Keawe's oldest son Kalaninuiʻiamamao also of the ʻĪ family was slain supposedly by his half-brother Kalanainuikeʻeaumoku (his mother was Keawe's half-sister Kalani-kau-lele-ia-iwi) and when Keawe died he tried to claim island control, but was thwarted by Mokulani (Cordy 2000:243-245; 260-267).

Kohala's Ka-lani-kau-lele-ia-iwi (half-sister of Keawe) was also the mother of Alapaʻi-nui-a-Ka-uaua, who went to live on Maui with his half sister, Ke-kuʻi-apo-iwa-nui (wife of Ke-kau-like, Maui *aliʻi nui*) after his father's (Ka-uaua-nui-a-Mahi) death at the hands of the Hilo chiefs in the battle of Mahiki. When Alapaʻi heard of (his uncle) Keawe's death and the unrest between the district chiefs, he went back to Hawaiʻi Island with plans to make war on all the chiefs. He captured the chiefs of Kohala and Kona, and became ruler of those districts. However, when his brother-in-law Ke-kau-like (Maui Moʻi) heard about Alapaʻi's victory, Ke-kau-like made war on Alapaʻi in order to return Kohala and Kona to their chiefs. He wasn't successful, however Ke-kau-like's warriors prevented Alapaʻi from conquering the Hilo and Kaʻu chiefs (Kamakau 1992:64-65). During these battles a lot of damage was done on the landscape.

In retribution, Alapaʻi decided to carry the battle to Maui. While Alapaʻi and his warriors were encamped in Kohala, Kamehameha was born to Ke-kuʻi-apo-iwa (II) in Kapakai (ʻIʻi, John Papa 1983:3), in the *ahupuaʻa* of Kokoiki, in the *moku* of North Kohala [Kamakau (1992:67) says it was AD 1756; however others say it was between AD 1753 and 1758 with more leaning towards AD 1753 (Cahill 1999:56-57)] near the Moʻokini *heiau*. He was quickly taken by Kohala chief Nae-ʻole and hidden in Halawa (Kamakau 1992:67-69), his ancestral homeland. Ke-kuʻi-apo-iwa (II) was the daughter of Kekela and Haʻae (both grandchildren of Keawe); because of her weakened condition, Ke-kuʻi-apo-iwa II did not accompany the Alapaʻi expedition to Maui. Kamehameha's father was Keōua, younger brother of Ka-lani-ʻopuʻu. The infant Kamehameha was placed in the charge of Nae-ʻole and his younger sister Ke-ku-nui-a-lei-moku until he was five. He was then returned to Alapaʻi who placed the child in the care of his

wife, Ke-aka (Kamakau 1992:68-69). [NOTE: Ethnographic consultant Emily Kealoha Naeole does not know if her husband Harold Yet Naeole was related to that Naeʻole.]

However, before Alapaʻi reached Maui, a dying Ke-kau-like [Ka-lani-kuʻi-hono-i-ka-moku] made his son Kamehameha-nui his successor. Kekaulike died enroute to Kula (Kamakau 1992:69). When Alapaʻi heard of his death, he decided not to make war on his sister's son. While visiting them on Maui, Alapaʻi heard that the Oʻahu chiefs attacked his relatives on Molokai, so he went there to help (Kamakau 1992:70). Alapaʻi (ca A.D. 1740-1760) was said to have been a good ruler and loved by the common people, but his rule had come about by the slaying of Keawe's sons, Ka-lani-nui-ʻi-a-mamao [father of Kalaniʻopuʻu and Keōua] and his brother Ka-lani-nui-keʻe-au-moku, rightful *aliʻi nui* of Hawaii island and Mokulani, chief of Hilo, Hāmākua, and Puna. This would later be the cause of several battles between Alapaʻi and his nephew, Kalaniʻopuʻu (Kamakau 1992:75-78; Cordy 2000:279).

Alapaʻi resided in several places; Kailua (Kona), Kokoiki (Kohala), Waiolama (Hilo), Waipiʻo, Waimea and Kawaihae where he died (Cordy 2000:278). In 1754 Alapaʻi became ill and moved to Kikiakoʻi in Kawaihae. As his illness progressed while at Kikiakoʻi at the *heiau* of Mailekini, Kawaihae, Alapaʻi appointed his son Keawe-ʻopala to be ruler over the island (Kamakau 1992:77). However, this was short-lived due in part to shifting allegiances of Keawe-ʻopala's chiefs (e.g., his relative Keʻeaumoku) and *kahuna,* siding with Kalaniʻopuʻu. "A canoe arrived from Kekaha and brought word to Keʻeaumoku that Ka-lani-ʻopuʻu was at Kapalilua (in south Kona) and was coming to make war against Keawe-ʻopala. Keʻeaumoku therefore made up his mind to join forces with Ka-lani-ʻopuʻu" (Kamakau 1992:78). It was that same year that Kalaniʻopuʻu, a lover of war, became *aliʻi nui* of Hawaiʻi Island (Kamakau 1992: 78-79).

In January 1778 Cook landed in Waimea, Kauaʻi and the culture of old Hawaiʻi began its spiraling change (see Day 1992). Cook left Hawaiʻi for several months, but returned later in the year. Kalaniʻopuʻu was fighting Kahekili's forces in Wailua, Maui on November 19, 1778 when Cook's ship was sighted on his return trip to the islands. Kalaniʻopuʻu visited Cook on the *Resolution,* while Kahekili visited Clerke on the *Discovery* (Kuykendall and Day 1976:16). When Cook sailed into Kealakekua Bay on January 17, 1779, Kalaniʻopuʻu was still fighting Kahekili on Maui. At this time Kaeo, younger brother of Kahekili was the ruling chief of Kauaʻi; Ka-hahana, nephew of Kahekili was the ruling chief of Oʻahu and Molokai; Kahekili of western Maui, Lānaʻi and Kahoʻolawe; and Kalaniʻopuʻu of Hawaiʻi Island and Hāna, Maui (Kamakau, 1992:84-86, 92, 97-98).

Demographic trends during the Proto-Historic Period indicate a population reduction in some areas, yet show increases in others, with relatively little change in material culture. However, there was a continued trend in craft and status material, intensification of agriculture, *aliʻi* (chief/land managers) controlled aquaculture, upland residential sites, and oral records that were rich in information. The Kū cult, *luakini heiau,* and the *kapu* (restriction or regulation) system were at their peak, although western influence was already altering the cultural fabric of the islands (Kirch 1985:308, Kent 1983:13). By 1794 at least eleven foreigners were living on the island of Hawaiʻi, including American, English, Irish, Portuguese, Genoese, and Chinese (Day 1992:23-25) [may have been connected to the sandalwood trade]. When Kamehameha I conquered Oʻahu and Maui in 1795 (with western advice and technology), subsequently unifying the Island Kingdom (Kent 1983:16), it marked the end of the Proto-Historic Period.

Early Historic Period**.** The Early Historic Period (AD 1795-1899) is marked by very significant events. After Kamehameha I conquered Maui in 1795, he went to Molokaʻi where the sacred women of Maui (Kalola Pupuka and her daughters Kalanikauiōkikilokalaniakua and Kekuʻiapoiwa Liliha and her daughter Kalanikauiakaʻalaneo), were in hiding. Kamehameha took Kekuʻiapoiwa Liliha and Kalanikauiakaʻalaneo to Oʻahu to witness the Battle of Nuʻuanu Pali and the defeat of Oʻahu. It was during this trip that Kalanikauiakaʻalaneo was given the name Keʻōpūolani (Kleiger 1998:21).

Hawai‘i’s culture and economy continued to change radically as capitalism and industry established a firm foothold. In 1810, Kaua‘i *ali‘i nui* Kaumuali‘i ceded under duress, his kingdom of Kaua‘i, Ni‘ihau, Lehua and Ka‘ula to Kamehameha I. At this time the sandalwood trade in Hawai‘i was still flourishing; the Fijian and Marquesan supply of sandalwood was exhausted, so Hawai‘i became known as the “sandalwood mountains” to entrepreneurs of Southern China. Sandalwood came under the personal control of Kamehameha I, who had become “a fervent consumer of high-priced western goods.” The sandalwood industry was thriving to the point where the subsistence levels declined, as farmers and fishermen spent most of their time logging, causing famine to set in (Kent 1983:17-20).

On October 1819, Protestant missionaries set sail from Boston to Hawai‘i. Earlier that year, on May 8, 1819, Kamehameha I died. Following his death, his son and heir Liholiho banished the *kapu* system at the advice of his queen mother Ke‘ōpūolani and queen regent Ka‘ahumanu [the queens were second cousins] (Kamakau, 1992:210, 222). The missionaries arrived in Kailua-Kona on March 30, 1820, to a markedly changed culture; one with a “religious” void, and a growing appetite for western products. They quickly started missions on all of the islands (Day 1992:25).

During this period, “between one hundred and two hundred foreigners lived among the Islands… (Day 1992:25). Hardly a ship touched without leaving a deserter or two behind…. A white man automatically ranked as a chief, although he could not own land in fee simple or build a permanent house…[and] they took Hawaiian wives” (Day 1992:25).

In the 1830’s other industries such as whaling, and merchandising crept into Hawai‘i. In 1836 the first sugar plantation was established on Kaua‘i (Kent 1983:23, 29). According to early historic accounts Puna was well populated and intensively cultivated. Reverend William Ellis (1963) traveled through Puna in 1823 and noted several plantations of various crops including banana and sugar. One of the largest sugar plantations in Hawaii was the Ola‘a Sugar Company was founded in 1899 by B.F. Dillingham, Lorrin A. Thurston, Alfred W. Carter, Samuel M. Damon, and Wm. H. Shipman. The cane was transported to the mill primarily by railroad (Haun and Henry 2013:23).

In the 1840s a political act of the Hawaiian Kingdom government would change forever, the land tenure system in Hawai‘i and have far-reaching effects. The historic land transformation process was an evolution of concepts brought about by fear, growing concerns of takeovers, and western influence regarding land possession. King Kamehameha III, in his mid-thirties, was persuaded by his *kuhina nui* and other advisors to take a course that would assure personal rights to land. One-third of all lands in the kingdom would be retained by the king; another one-third would go to *ali‘i* (chiefs/*konohiki*) as designated by the king; and the last one-third would be set aside for the *maka‘āinana* or the people who looked after the land. In 1846 Kamehameha III appointed a Board of Commissioners, commonly known as the Land Commissioners, to “confirm or reject all claims to land arising previously to the 10th day of December, AD 1845.” Notices were frequently posted in *The Polynesian* (Moffat and Fitzpatrick, 1995). However, the Legislature did not acknowledge this act until June 7, 1848 (Chinen 1958:16; Moffat and Fitzpatrick 1995:48-49), known today as *The Great Mahele*.

The 1840s also heralded other changes as well. The Hawaiian government, with the aid of the missionaries, encouraged the sugar industry as well as other enterprises such coffee, cotton, rice, potatoes, and silk worms (Speakman 2001: 93), *pulu*, goat skins, fungus, wheat, other vegetables, sugar syrup and molasses (Maclennan 1995:35). The constitutional monarchy was established during this period and in a speech to the legislature in 1847 Kamehameha III promoted the agricultural industry:

> I recommend to your most serious consideration, to devise means to promote the agriculture of the islands, and profitable industry…. What my native subjects are greatly in want of, to become

> farmers, is capital, with which to buy cattle, fence in the land and cultivate it properly (In Maclennan 1995:34).

Disease had a devastating affect on the population and the landscape, killing *ali‘i* and *maka‘āinana* alike; measles epidemics in 1848 and 1849, were followed by the horrendous smallpox epidemic in 1853. “Ten thousand [all toll] of the population are said to have died of this disease in Hawaii” (Kamakau, 1992:411, 418). John Papa ‘I‘i in *Fragments of Hawaiian* History (1984) talks about the impact of this disease and as *kahu* or guardian of several young *ali‘i*, he had to take several of them off of O‘ahu island. They just kept sailing from island to island and usually were not allowed to land as O‘ahu was thought to be the source of the smallpox (‘I‘i 1984:171).

By 1858 at least 2,119 foreigners now lived in Hawaii. Many were merchants who traded and provided provisions, ranchers and missionaries who lived in various locations throughout the islands. In the 1860s the U. S. Civil War brought about a boost for the sugar industry in Hawai‘i as sugar plantations in the South were boycotted or destroyed. The industry brought in tens of thousands of laborers from Asia, Europe, the Americas, Oceania, and Africa to work on the many plantations and mills that were being established on all major islands, which had a profound effect on life in Hawaii (Oliver 1961:123). This influx not only radically changed the culture, but also drastically altered ethnobotanical agricultural lands, destroying traditional architectural features in the process as lands were cleared for mono-crops, domestic settlements and large-scale ranching.

Territorial History (AD 1900-1949)**.** Several events, which took place in the early 1900’s eventually created a downward spiral effect on the sugar industry. Mainland labor union leaders went into the fields organizing union membership drives. The military began a major drive to install airfields and encampments. And the Federal government imposed quota restrictions on sugar exports (Oliver 1961:147, 148). This period saw much of the lands being sold in fee simple and Native Hawaiians (*kanaka maoli*) running for Congress (Daws 1974 297). In 1920 Hawaii delegate to Congress, Prince Joanah Kuhio Kalanaianaole authored the Hawaiian Homes Act. Lands were set aside on all islands for homesteading by Hawaiians with 50% or more native blood.

Modern History (Post AD 1950)**.** Post World War II brought about an influx of people and industries to Hawai‘i, allowing the tourism, offshoot enterprises and military to flourish. Along with the rise of the tourism industry, and competing sugar markets abroad, the sugar companies saw a sharpening decline in business (the Sugar Acts of 1934 and 1937, and ILWU Strike of 1946 didn’t help). The 1950s and 1960s were the bleakest years for the sugar industry and it was becoming apparent that the sugar industry was beyond salvage (Kent 1983:107-108). More changes were soon to take place on the landscapes of Hawaii as former sugar lands became subdivisions and new jobs were being created in the tourist industry. Technology and mechanization initiated in the 1950s to 1970s helped to bring about the decline of plantation camps and lifestyles, yet in 1959 “one out of twelve people employed in Hawaii was in the sugar industry” (Vorfeld 2001:1). However, technology could not save the sugar industry, which could not compete with unfavorable sugar markets and higher costs. By the 1990s most of the sugar plantations reluctantly closed down operations. The vacant lands soon gave way to various development projects and the need for more Environmental Impact Studies (EIS).

1950 also marked the introduction of radiocarbon analysis which shifted the focus of study in archaeology from relative dating excavated material or cultural remains to carbon dating; this was followed by a focus on settlement and subsistence patterns, land and marine use. However, the recent Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) and its implementing regulations (43 CFR Part 10), and Hawai‘i’s Act 50 (2000) has shifted the focus of study to include a greater interaction with indigenous people, and a lesser focus on invasive methods of study.

Historical Documentary Research (Extracted from Haun & Henry 2013:17-28).

The project area is situated in the *ahupua'a* of Kauaea in Puna District. There is little mention of Kauaea in Hawaiian traditional and legendary accounts. Crozier and Barrere (1971) note that in Puna few pre-missionary traditions and legends survived because of intensive mission work by Reverend Titus Coan between 1835 and the 1870s. Emory *et al*. (1959) suggest that Puna's traditional history is difficult to follow because of the dominating influence of the ruling families in the neighboring districts of Hilo and Kaʻu. Handy and Handy (1972:542) state that Hawaiian traditions suggest that Puna "was once Hawaii's richest agricultural region and that it is only in relatively recent time that volcanic eruption has destroyed much of its best land".

According to Kamakau (1961), Huaʻa was the chief of Puna when it was seized by ʻUmi-a-Liloa, unifying his control over the Island of Hawaiʻi. Huaʻa was killed during a battle with one of ʻUmi's warrior sons, Piʻi-mai-waʻa, at Kuolo in Keaʻau. Kalaniʻopuʻu unified his control over Hawaii Island when he gained control of Kaʻu and Puna following Alapaʻi's defeat in a battle at Mahinaakaka. During Kalaniʻopuʻu's rule, the Puna chief, I-maka-koloa, attempted a rebellion and seized the valuable products of the district including *ʻoʻo* and *mamo* bird features, hogs, fine mats made from pandanus blossoms and from young pandanus leaves, gray tapa cloth, and tapa cloth made from *mamaki* bark.

Following the death of Kalaniʻopuʻu, in 1782, a dispute over ascendancy ensued culminating in the battle of Mokuʻohai (Kamakau 1961, Kuykendall 1938). Following the battle, control over the island was divided between Keoua Kuʻahuluʻula, who held Kaʻu and a portion of Puna; Keawemaʻuhili, who controlled the remainder of Puna, Hilo, and southern Hamakua; and Kamehameha, who controlled northern Hamakua, Kohala, and Kona. A feud between Keoua and Keawemaʻuhili in 1785 resulted in Keawemaʻuhili's death and the expansion of Keoua's territory, including the unification of Puna. The island was finally re-unified in 1791 when Kamehameha killed Keoua at Kawaihae. In 1790, a lava flow extended diagonally across Kaueleau from the northeast above Opihikaō to the coast at Kamaili (Wolfe and Morris 2001).

Early historic accounts document that Puna was well populated and intensively cultivated. In 1823, Ellis (1963) traveled along the coast to Kaimu, where he reported a sandy beach and village with an estimated 725 occupants. At Kaimu, there were plantations and groves of coconuts and *kou*. Ellis estimated that the population of Kaimu and nearby villages was approximately 2,000. Ellis described a village at Kamaili surrounded by plantations where they were given taro and potatoes. Other crops noted by Ellis in Puna included bananas and sugar cane.

The following summarizes Burtchard (1994) discussion of Puna's later history. Prior to the 1870s, foreign influence in Puna primarily was limited to missionaries. In the late 1870s, Robert Rycroft moved to Pohoiki and built a home, wharf, sawmill, jail and courthouse. He later began growing coffee in the area and built a coffee mill. In the mid-1880s, the government began selling land in Puna for homesteads. Most of the homestead land was acquired for coffee cultivation in the 1890s.

The Waihona 'Aina (2000) Mahele Database; which is a compilation of data from the Indices of Awards (Indices 1929), Native Register (NR n.d.), Native Testimony (NT n.d.), Foreign Register (FR n.d.) and Foreign Testimony (FT n.d.); indicates that only one Land Commission Award (LCA) was awarded in Kauaea. LCA 7713*H was awarded to Victoria Kamamalu, Kuhina Nui of the Hawaiian Islands between 1855 and 1863. This LCA is depicted on a map of Kauaea Ahupuaʻa by D.B Lyman…. The original Lyman map, which belonged to Princess Ruth Keelikolani, [was] made by E. Baldwin in February 1882. According to the map, Kauaea encompassed 2,449 and ¾ acres.

The Loebenstein's 1895 Hawaii Government Survey map of Puna (Figure 8)…depicts a network of transportation routes that extended through this portion of Puna. Three of the routes were labeled as roads by Loebenstein and the remainder depicted as trails.

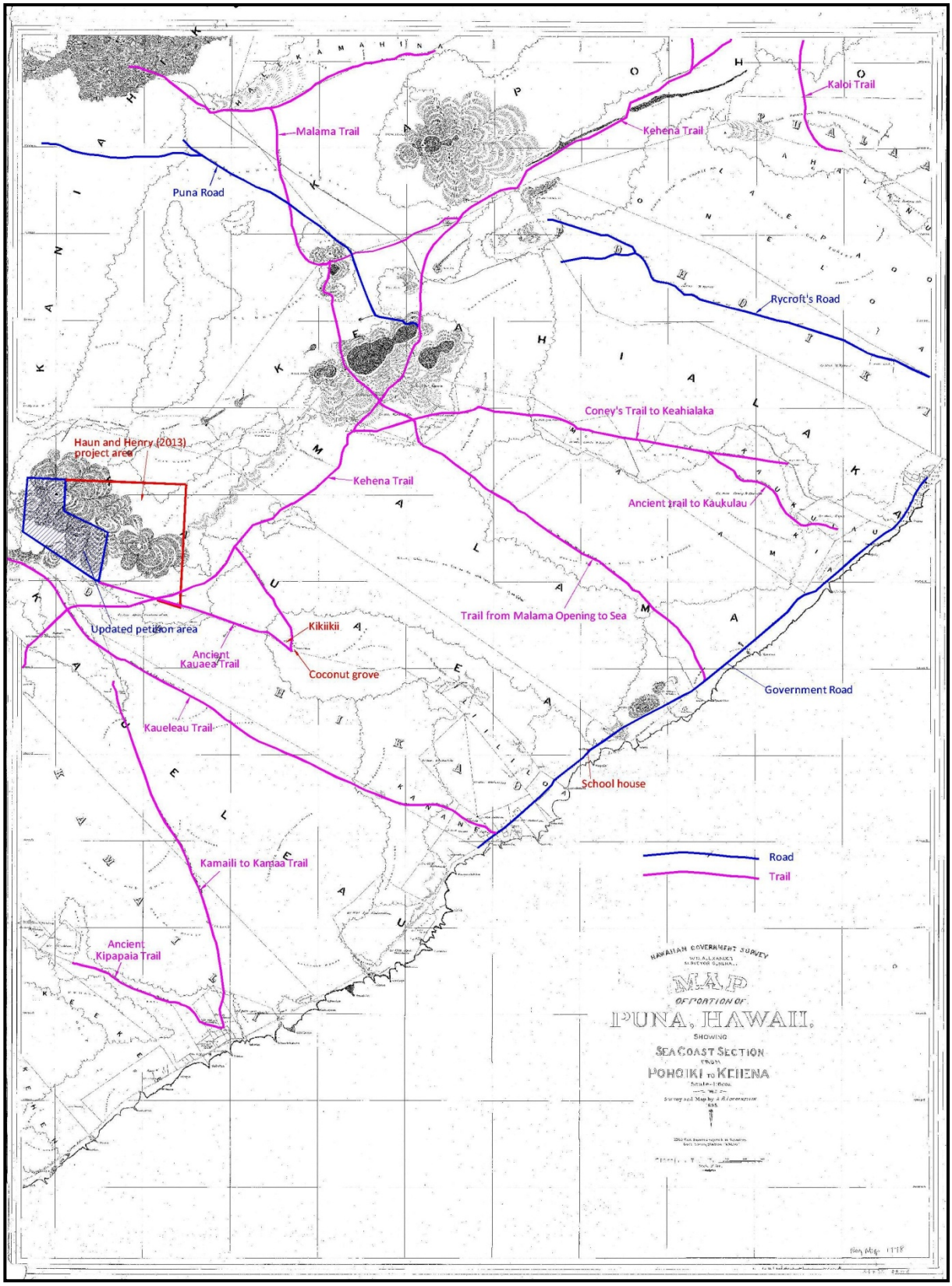


Figure 8. Loebenstein's 1895 Hawaii Government Survey Map of Puna (Haun and Henry 2013:21; updated 2019).

> The three roads consist of the Government Road that parallels the shoreline, Puna Road located in Kaiahiku and Keahialaka Ahupua‘a, and Rycroft’s Road in Pohoiki. The main transportation routes were the Government Road following the coast and the Kehena Trail, located further inland paralleling the shoreline. A series of inland-seaward trails and roads connect the main transportation routes, providing access from mountain communities to the sea. Several of the trails are listed as ancient in origin including the Kipapaia Trail in Kamaili, and the Kauaea Trail located in Kauaea Ahupua‘a.
>
> The 1895 Loebenstein map shows the [original] project area vicinity. The Kehena Trail extends through the southwestern corner of the parcel in an east-west direction. A house belonging to “Kaaukai” is located on the north side of the trail and a coconut tree is located to the east of the house.
>
> The ancient Kauaea Trail originates at a coconut grove and community named Kikiikii seaward of the project area. The trail enters the [original] project area at the southeast corner and extends inland, roughly paralleling the southern side of project area on the boundary between Kauaea and Opihikaō. It appears to terminate in the forest at the base of Pu‘u Kali‘u. Houses owned by “Elia” and “Maluo” are located to the southwest of the Kauaea Trail, just outside the project area.
>
> It also indicates that in 1895, most of the northeastern portion of the project area, on the “Slope of Kaliu” was “Good coffee land”. An area listed as “Thin woods on clinkers” is surrounded by the “Good coffee land” along the northern project area boundary (Figure 9). Pu‘u Kali‘u has been in use as a triangulation station to map the displacement of Kilauea Volcano’s south flank from as early as 1896 (Swanson *et al.* 1976). A series of triangulation surveys used Pu‘u Kali‘u, among other volcanic summits to track the horizontal ground displacement over time, within the Kilauea Rift Zones. These surveys were conducted in 1896 and 1949 by the U.S Coast and Geodetic Survey, in 1958 and 1961 by the U.S. Geological Survey, and in 1970 and 1971 by personnel from the Hawaiian Volcano Observatory. The data from the earliest study was obtained in 1896, but was not triangulated until 1914. A sign marking the data point is present on the summit of Pu‘u Kali‘u. The sign was found to be in good condition in 1967 (pers. comm., Robert Shrai, Island Survey). The sign was located during the project and has been designated as Site 29727 (Haun and Henry 2013:47).

A September 30, 1908 article in the Hilo Tribune described the effects of a violent earthquake in the Puna District.

> Geritt P. Wider and I (A. Gartley) just came through Puna from the Volcano on horseback, and saw many evidences of the earthquake which were of interest. We left the Volcano on Keauhou trail, passing the line of small craters Panau, Panau-iki, Kapaahu, Kalapana, Pahoa, Kapoho and to Hilo. At the crater of Makaopuhi tons of material have been shaken down from the vertical banks into the mauka pit below. Some smoke was issuing from the bottom of the mauka pali and quite large deposits of sulphur have formed. The shake must have been very heavy in Puna. At Kapaahu a crack about a foot wide opened for about 500 feet, extending mauka from the sea. At Kalapana the old '68 crack, which opened when the Puna coast sunk, opened about twelve inches more, and about a quarter mile back of this crack toward Kau a new crack has opened, extending from pali to pali and several hundred feet long. Some say there was a small crack before one or two inches wide, but it is now twelve to eighteen inches wide. At Kahena it is reported that a strip of the pali (about 100 feet high) along the coast, some 50 feet wide and half a mile long, split off and dropped into the sea, and a new crack has opened parallel with the front of the pali 50 feet back and over two miles long. Three houses and many water tanks were overturned in Kalapana and nearly every stone wall was thrown down. On the trail from Kalapana to Kahena the walls on the mauka side of the road suffered, those on the makai side being left intact. The schoolhouse at Kauaea was either overturned or badly set off its foundation (USGS.gov website).

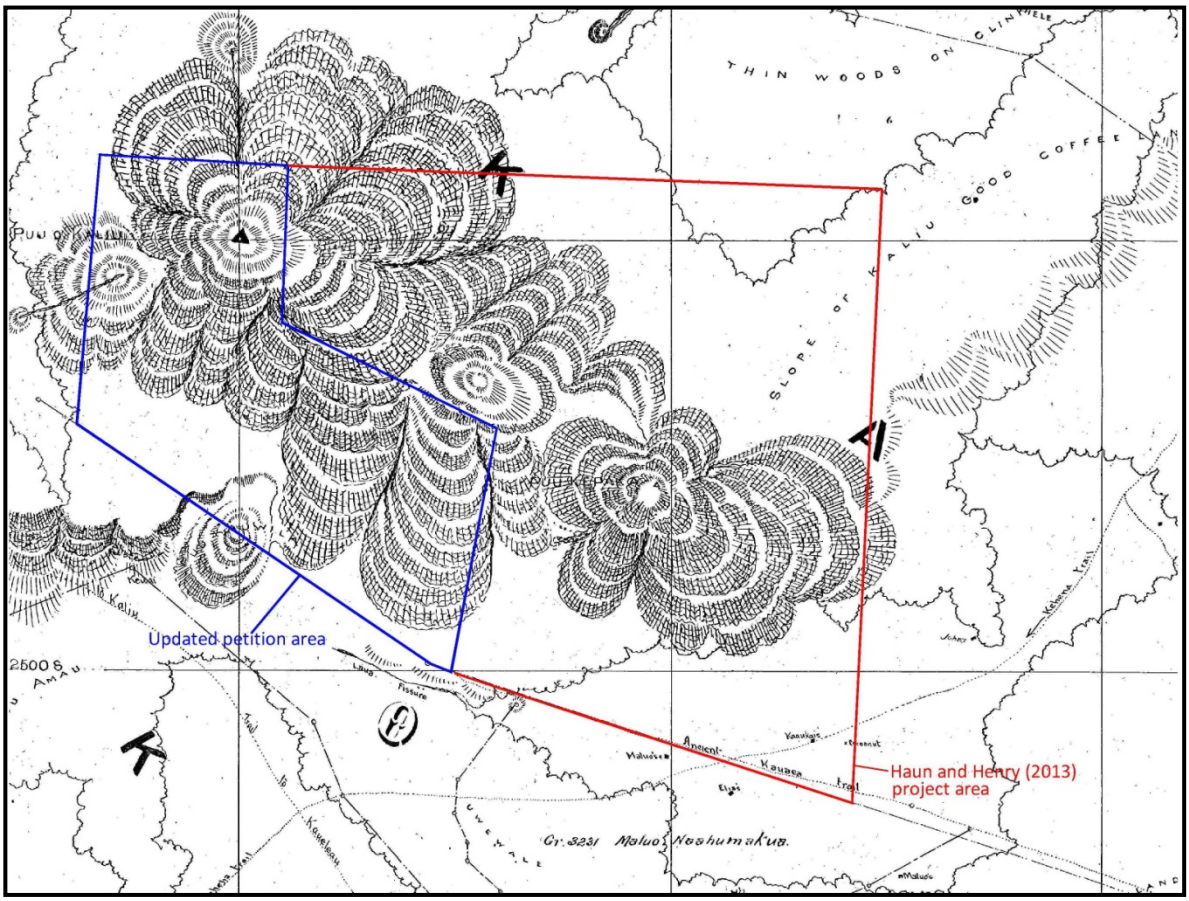


Figure 9. Portion of Loebenstein's 1895 map showing revised project area vicinity; coffee lands (Haun and Henry 2013:22; updated 2019)

The Ola‘a Sugar Company was founded in 1899 by B.F. Dillingham, Lorrin A. Thurston, Alfred W. Carter, Samuel M. Damon, and Wm. H. Shipman. The plantation was to become one of the largest in the state. According to the Hawaii Sugarcane Plantation Archives:

> With a $5,000,000 investment, the promoters purchased 16,000 acres in fee simple land and nearly 7,000 acres in long leasehold from W.H. Shipman. They also purchased 90% of the stock in the adjacent Puna Plantation, adding another 11,000 acres to the holdings. Ola‘a Sugar Company began as one of Hawaii's largest sugar plantations with much of its acreage covered in trees.
>
> The task of setting up the plantation was enormous. Before 1900, coffee was the chief agricultural crop in the area. Over 6,000 acres of coffee trees were owned by approximately 200 independent coffee planters and 6 incorporated companies. The coffee trees were uprooted to make way for cane. Ohia forests had to be cleared, field rock piled, land plowed by mules or dug up by hand with a pick, quarters for laborers and staff had to be built, the mill constructed, and the first cane planted.
>
> The cane was transported to the mill by fluming and by railroad. Although Ola‘a Sugar Company had 72 miles of flumes, it had no dependable water source for their operation. The railroad was relied upon for delivery of 60% of the cane. In addition to its own standard gauge 35 miles of railway track, the company ran cars over the Consolidated Railway tracks to bring its cane in from more distant fields. The history of Ola‘a Sugar Company is closely

connected with the southern branches of the Hawaii Consolidated Railway Co. because they were interdependent from the start. The cane fields were in four widely separated areas cut off from each other by stretches of barren lava. The railroad was therefore vital to the plantation, which in turn helped support the railroad. When a tidal wave on April 1, 1946 destroyed much of the Hawaii Consolidated Railway Company's tracks, it ceased operations. The plantation was then forced to convert to trucks in order to transport sugar and molasses to the Hilo wharf.

Fortunately, under the management of Wm. L.S. Williams, a major road-building program had been started in 1939 for the purpose of eliminating the portable track. He started the plantation on its way to modernization by laying a network of 500 miles of roads for hauling cane. Since 1948, all the cane hauling has been by truck (Hawaii Sugarcane Plantation Archives).

By the end of the 1940s, Ola'a Sugar Company was deeply in debt, owing American Factors, Ltd (AMFAC) $2,000,000. The debt was the result of insect epidemics, volcanic eruptions and drop in sugar prices. By 1953, the company was $4,100,000 in debt and in 1959 it was decided that the plantation would sell some of its 35,700-acres to offset the debt. In 1960, the company changed its name to the Puna Sugar Company, primarily because it was thought a name change would give the company a new start. Apparently this strategy worked because in 1963 the company had its best year ever with a 36% increase in profits. The company was debt free for the first time in its history by 1966, and in 1969 the Puna Sugar Company was purchased outright by AMFAC. The company closed in 1982 following cancelation of government subsidies and tax breaks and the introduction of high fructose corn syrup, a cheap low-cost substitute for sugar.

The Walter E. Wall's 1915 Hawaii Territory Survey Map of Puna Homestead Subdivisions and Government Tracts (Figure 10)… indicates that formal roads in the area had been expanded since 1895, connecting the town of Pahoa with coastal communities. Despite this expansion, many of the trails depicted on the 1895 map appear to have still been in use in 1915. This map also depicts the Hilo Railroad lines to the east of Pahoa with a line extending as far south as Kapoho Ahupua'a.

By the late 1920s, concern over forest depletion and watershed maintenance lead to the creation of forest reserves in the Puna District. The Wall's 1927 Hawaii Territory Survey Map of Puna, Keauohana and Malama-Iki Forest Reserves (Figure 11) … indicates that few new roads had been built since the 1915 map. It also shows that fewer trails were being utilized in 1927.

The railroad lines, used to transport sugar cane were expanded since 1915. One line extended from Pahoa town into the *ahupua'a* of Waiakahiula and Keahialaka. The rail line that formerly terminated in Kapoho was expanded to the east as far as Kaueleau Ahupua'a. This section of track passed through the southeastern corner of the present project area.

A close-up of Wall's 1927 (Figure 12) map shows the project area vicinity. As discussed above, a portion of the railroad line extended into the [original] project area. This rail line roughly follows the path of the Kehena Trail, suggesting that railroad utilized the pre-existing transportation route. The rail line was identified during the present project and was documented as Site 29728 that is discussed the Findings section. A trail enters the project area along its southern side, roughly paralleling the inland portion of this boundary. This trail may represent an inland extension of the Kaueleau Trail. The Kauaea School discussed above is also depicted on Wall's 1915 and 1927 maps of the area. This indicates that the school was re-built following the 1908 earthquake and used until at least 1927.

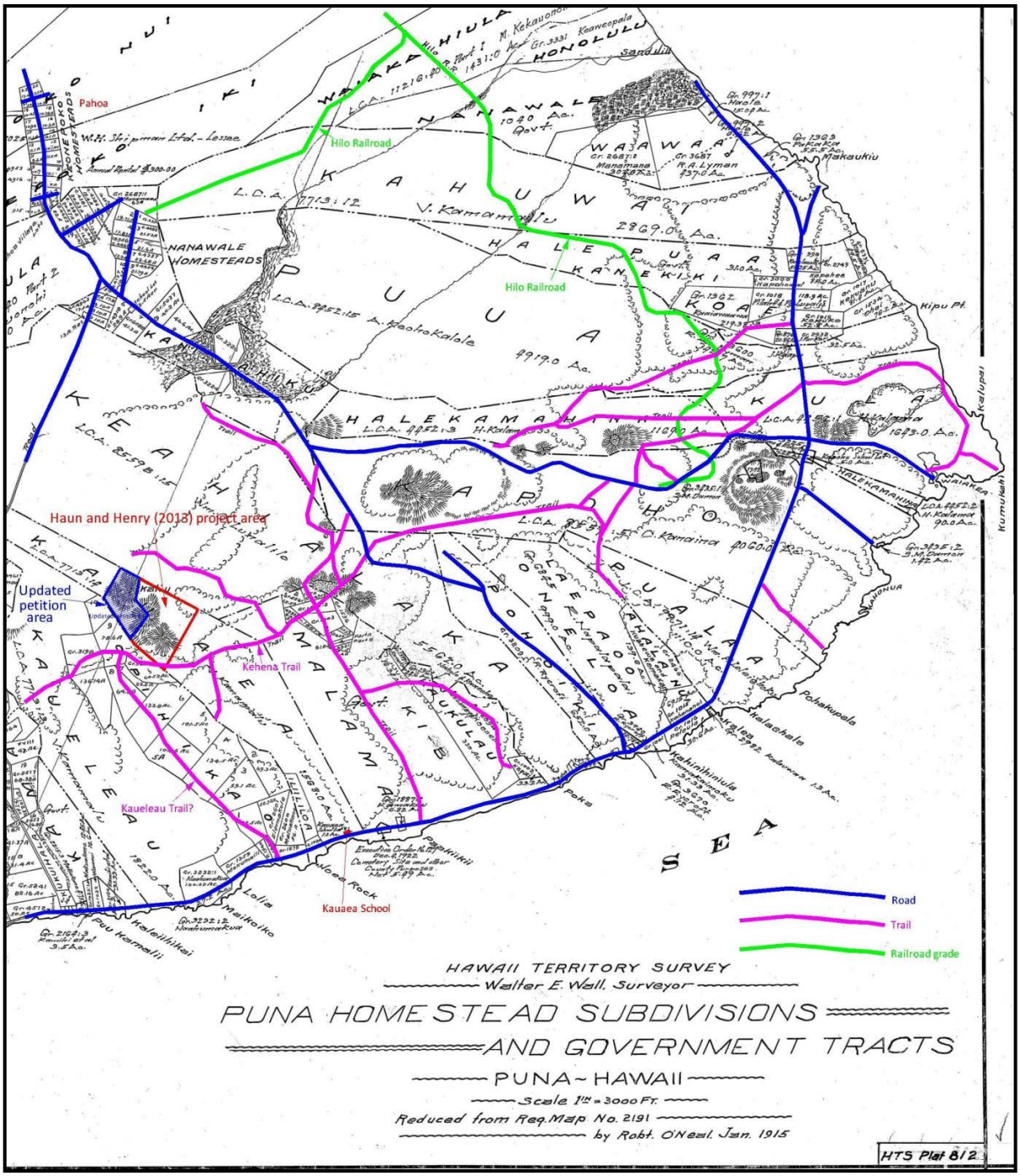


Figure 10. Portion of Wall's 1915 Hawaii Government Survey Map of Puna (Haun and Henry 2013:25; updated 2019)

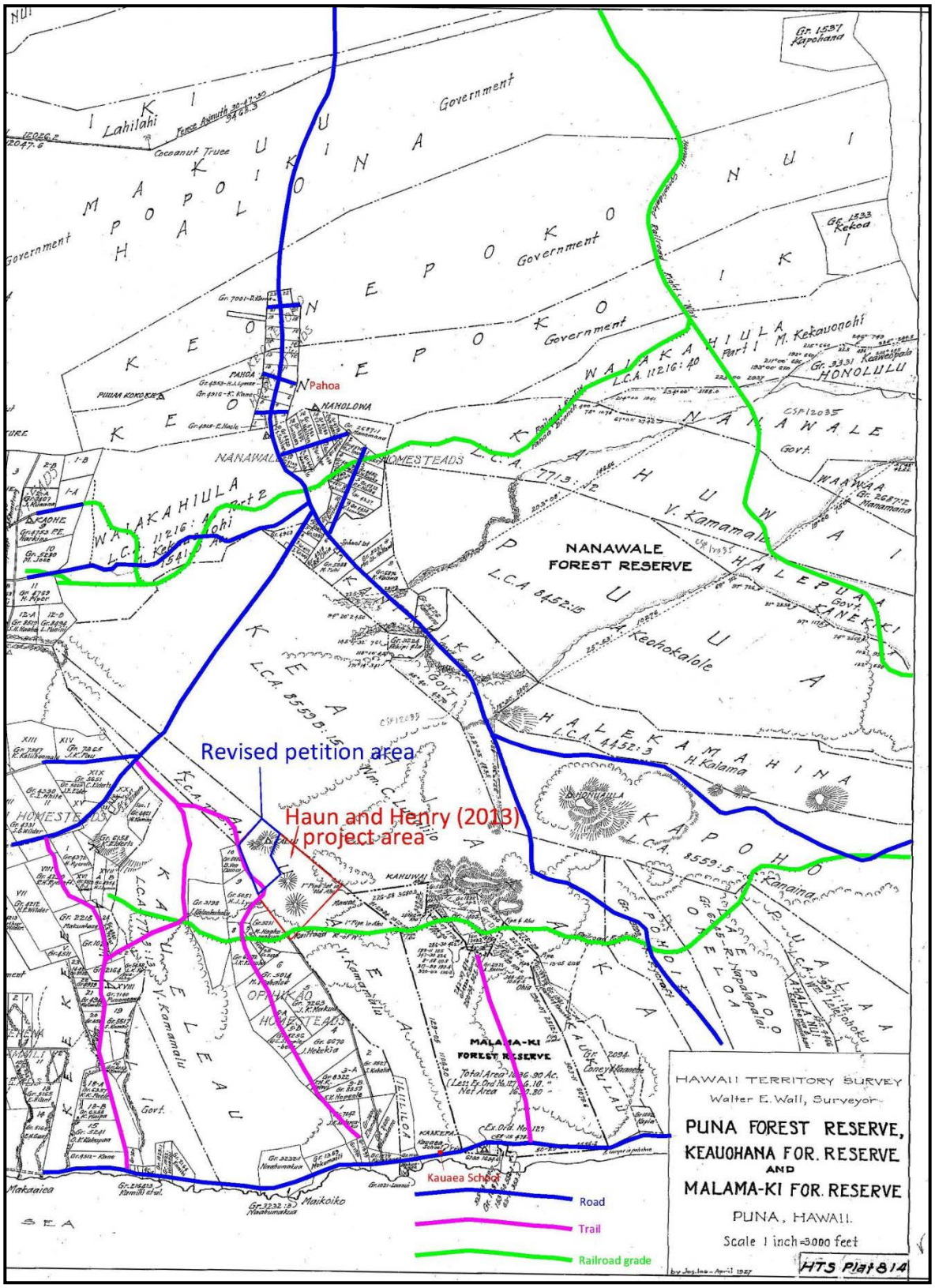


Figure 11. Portion of Wall's 1927 Map of Puna (Haun and Henry 2013:26; updated 2019).

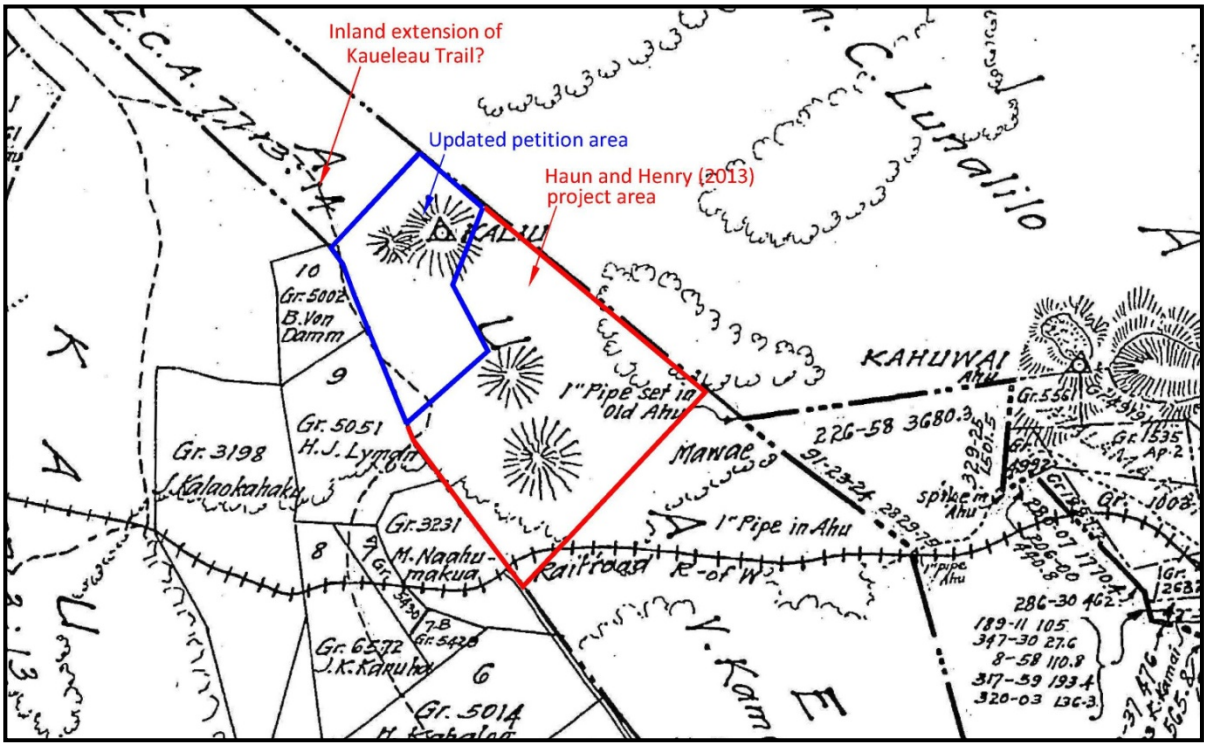


Figure 12. Close-up of Wall's 1927 map showing project area vicinity (Haun and Henry 2013:27; updated 2019).

Handy and Handy (1972) citing oral historical sources, indicate that in the 1930s there were homesteading areas in the *ahupua‘a* of ‘Opihikaō, Kaueleau, Kamaili, Ke‘eke‘e, Kehena, and Keauohana, in the general vicinity of the project area. Dry land taro was grown throughout the inland portions of these *ahupua‘a*. A particular taro cultivation method, *pa-hala*, is described for the area from Kalapana to Kamaili.

The method involved excavating a hole in a‘a lava in a pandanus grove. The hole was then filled with weeds, which were allowed to rot for six weeks or more. A taro cutting (*huli*) was wrapped in pandanus leaves and planted in the hole. After the cutting produced three or four leaves, the pandanus branches were cut to provide sunlight and the taro plant was covered with pandanus leaves. After the pandanus leaves were sufficiently dry, the leaves were burned reducing them to ash that provided nourishment for the taro plant, which grew tall enough to hide a man beneath the leaves.

A 1965 aerial photograph of the project area vicinity depicts the Site 29728 railroad grade that extends through the southeastern corner of the parcel. The area to the south of the railroad line appears to be cultivated in formal fields, and the area to the north has been cleared of trees. A linear cleared swath extends through the central portion of the parcel in a northeast by southwest direction.

Portions of the present project area have been used as a cinder mine. The cinder mining activity has been in operation by Sanford’s Service Center since 1987. Cinder mining was also undertaken along the northern slopes of Pu‘u Kali‘u, outside the project area to the north. Cinders mined from this area were used to create the Leilani Estates subdivision, founded in 1964 (lelaniestates.org).

An interview with a local resident of the project area vicinity was conducted by Haun & Associates Project Supervisor Shawn Fackler during the project. Mr. Kahaloa was born in 1959 and raised near the project area. During the interview he stated, "I used all that area [from his house up to Pu'u Kali'u and Kepaka] as my playground as a kid". He explained that the vegetation used to be mainly guava and it was easy to venture all the way up to either *pu'u*. The only cultural resource in the project area that he could remember is the Site 29726, Feature A enclosure. He originally thought the structure might have been a World War II era feature, but now thinks it is related to sugarcane cultivation in the area.

Mr. Kahaloa began leasing land and running his papaya farm in the southeastern portion of the project area approximately 25 years ago. He explained that a cherry orchid previously grew on the land where his papaya farm is now, but that he could not remember who ran it. He did indicate that a ranch [name unknown] grazed cattle in the area *mauka* of his farm up to the Leilani Estates area for at least 30 years before he began growing papaya. He also indicated that the ranch routinely used tractors in its later years to clear vegetation for grazing cattle and also confirmed that the wooden posts observed during the survey along the old sugar cane railroad grade were part of a cattle chute built within the past 50 years.

Mr. Kahaloa recalled that, "the land *mauka* of the road used to be sugarcane fields all the way up to the tops of the *pu'us*. They [field workers] used donkeys and carts to harvest the cane but then stopped all together when the railroad stopped running." Kahaloa also mentioned that his grandmother told him that taro used to grow in the fields before the introduction of sugar cane.

Another informant interview was conducted with Emily Naeole-Beason by telephone on February 4, 2013. She is 56 years old and has lived in Opihikaō her entire life. Her parents and grandparents also lived in Opihikaō. She is very familiar with the project area. Her granddaughter is named after the cinder cone Pu'u Kali'u that dominates the western half of the area and is referenced in a *hula* performed by her daughter. She was not aware of any traditional activities or resources in the area. She recalled that sugar cane was once grown in the vicinity.

Previous Archaeological Surveys (Haun and Henry 2013:30)

A search of the DLNR-SHPD archaeological report database and other sources identified 16 archaeological projects between Kauaea and Kehena (Figure 13). Not included in [this report] are the studies by Stokes (Stokes and Dye 1991), which focused on major sites, primarily *heiau* throughout Hawaii Island and a survey of east Hawaii by Hudson (1932). Stokes (Stokes and Dye 1991), relying in part on the earlier observations of Thrum, reported fourteen *heiau* in Puna of which three were destroyed at the time of Stokes fieldwork in 1906. Several of the *heiau* were reported to be agricultural temples. Hudson (1932) reported 32 sites along the coast between Kapoho and Kaimu including the Hilo-Puna Trail, habitation platforms and enclosures, water sources (cave and well), windbreak shelters, and four *heiau*: Mahina'akaka Heiau at Keahialaka, Kalepa at Kalepa Point, "Old" Wahaula Heiau at Kamaili, and Kumakaula at Ke'eke'e.

The surveys in Table 5 cover more than 650 acres of Puna between sea level and 1,540 ft elevation. Cultural remains identified by the surveys consist of 113 sites with nearly 940 features. To aid in reconstructing settlement patterns, features were quantified by probable age and function, and the studies are ordered by elevation. Traditional Hawaiian features were categorized as habitation, agricultural, burial (including possible burials), ritual, and trail. Features not assignable to these categories were categorized as miscellaneous. Traditional sites in this category include petroglyphs, *holua* slides, water sources, and *ahu*. Density values are given for sites, features, and habitation and agricultural features. Overall, the studies have identified more than 76 habitation features, 314 agricultural features, 269 burials, 7 ritual features, and 18 trails. The large number of burials includes several historic cemeteries. Other historic features were not segregated by function. The majority of the historic features are walls and roads. None of the studies processed radiocarbon dates.

A 15-acre portion of the present 309-acre project area was previously examined by Haun and Henry (2006). The majority of the Haun and Henry (2006) study area (c. 95%) was comprised of the cinder quarry area, with a narrow (10-30 m wide) disturbed vegetated band present around the southwest and west sides. No sites or features were present.

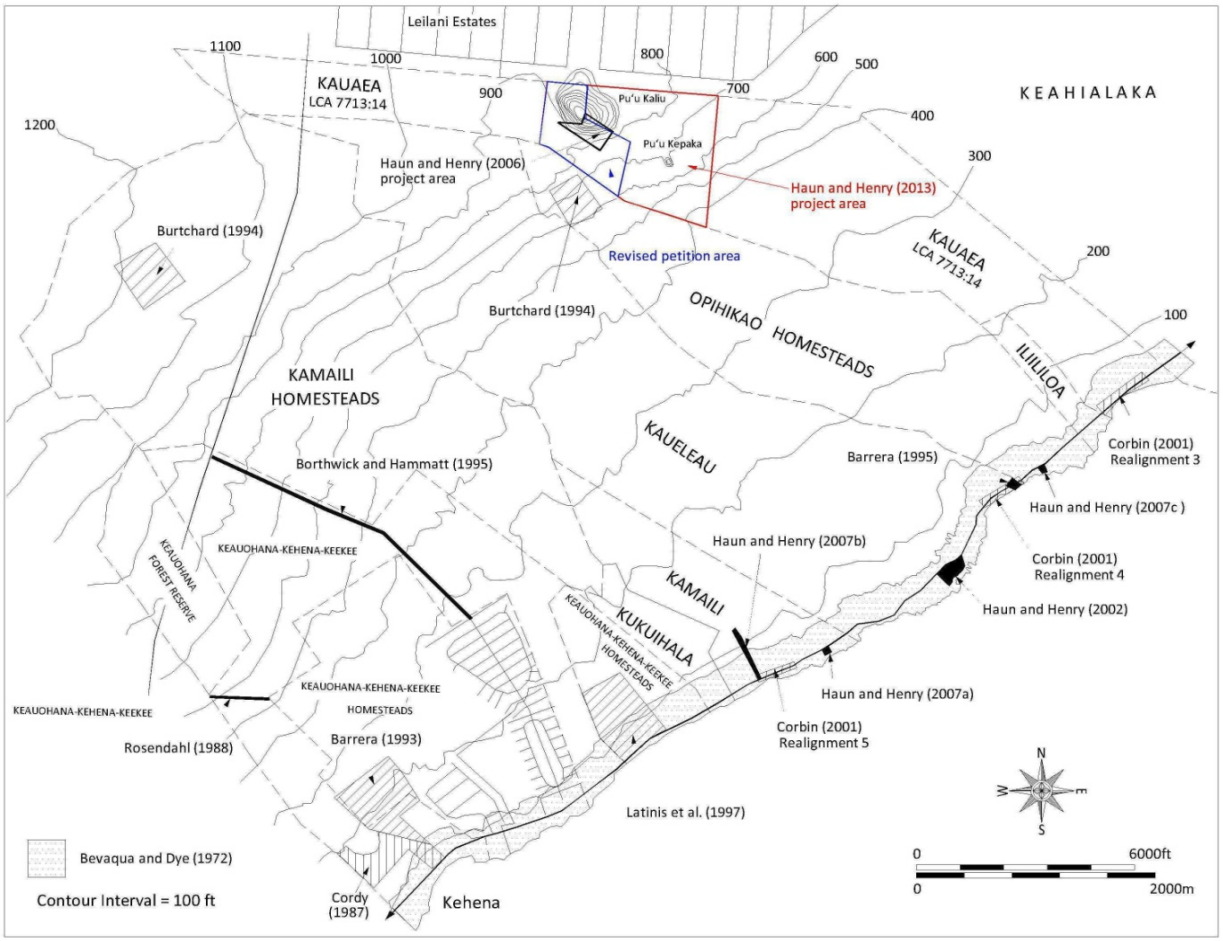


Figure 13. Ahupua‘a boundaries and previous archaeological work (Haun and Henry 2013:18; updated 2019).

Table 5. Previous Archaeological Work from Haun and Henry 2013:31).

Author	Land	Study Type*	Elev	Sites	Feas.	Hab Feas	Ag Feas	Burial Feas	Trail	Misc	Historic Feas
Haun and Henry	Opihikaō	IN	10-25	2	2						2
Corbin (2001)	Kamaili, Kaua Kaueleau	IN	20-40	1	40		40	1			
Bevaqua and Dye (1972)	Kapoho-Kalapana	RN	20-40	48	426	61	many	156	5	188	7
Haun and Henry (2007a)	Kamaili	IN	20-38	*	*						
Haun and Henry (2007b)	Kamaili	IN	30-115	5	10						10
Barrera (1995)	Kaueleau	DR	35-40	3	9	2					7
Haun and Henry (2002)	Kaueleau	IN	80-100	0							
Cordy (1987)	Keauohana	RN	80-250	15	92		20	63	4		5
Latinis, Moore and Kennedy (1997)	Keekee	IN	100-300	6	128	3	88	24	4	2	4
Barrera (1993)	Keauohana	RN	120-300	1	167	5	150	3			9
Borthwick and Hammatt (1995)	Kamaili, Keekee, Kehena,	AS	280-860	0							
MLK Rosendahl (1988)	Keauohana Kehena	FI	540-620	0							
Burtchard (1994)	various	RN	650-1200	34	65	5	16	22	5	8	11
Haun and Henry (2006)	Kauaea	AS	780-1050	0							
Bonk (1989, 1990)	Kaimu, Makuu, Kaohe, Kehena,	RN/ MON	1480-1540	0							
	Total/Average			**113**	**939**	**76**	**314**	**269**	**18**	**198**	**55**

IN = Inventory Survey, RN = Reconnaissance Survey, DR = Data Recovery, AS = Archaeological Assessment

Traditional Literature

The ethnographic works of the late 19th and early 20th century contribute a wealth of information that comprise the traditional literature - the *moʻolelo, oli,* and *mele* - as well as glimpses into snippets of time, and a part of the Hawaiian culture relatively forgotten. The genealogies handed down by oral tradition and later recorded for posterity, not only give a glimpse into the depth of the Hawaiian culture of old, they provide a permanent record of the links of notable Hawaiian family lines. The *moʻolelo* or legends allow *ka poʻe kahiko,* the people of old, the *kupuna* or ancestor, to come alive, as their personalities, loves, and struggles are revealed. The *oli* (chants) and the *mele* (songs) not only give clues about the past, special people, and *wahi pana* or legendary places, they substantiate the magnitude of the language skills of *na kupuna kahiko* (the people of old). Several excerpts of the *moʻolelo* and *mele* have already been used as references or chronology markers in the 'Overview of Human Impact, Settlement and Socio-economic Development…' above. The following sections give a little more detail and explanation of the traditional literature.

Genealogies

Poʻe kūʻauhau or genealogy *kahuna* were very important people in the days of old. They not only kept the genealogical histories of chiefs "but of *kahunas*, seers, land experts, diviners, and the ancestry of commoners and slaves…an expert genealogists was a favorite with a chief" (Kamakau 1992:242). During the time of 'Umi genealogies became *kapu* to commoners, which is why there "were few who understood the art; but some genealogists survived to the time of Kamehameha I and even down to the arrival of the missionaries" (ibid).

Surviving genealogies illustrate that the ruling families of each island were interrelated quite extensively. The chiefs of Oʻahu, Kauaʻi, Hawaiʻi, Maui and Molokaʻi had one common ancestry. Families branched out, but conjoined several times in succeeding generations. Oʻahu and Hawaiʻi's chiefs were linked as are Hawaiʻi and Maui chiefs, and Hawaiʻi's chiefs were linked to Kauaʻi chiefs (Kamakau, 1991:101; McKenzie, 1983: xxv). Not only were the chiefs or *aliʻi* related to each other, they were also related to the commoners. In *Ruling Chiefs,* Kamakau states that "there is no country person who did not have a chiefly ancestor" Kamakau (1992:4).

Malo (1971) wrote about the connection between the *makaʻāinana* and the chiefs; "Commoners and *alii* were all descended from the same ancestor, Wākea and Papa" (Malo, 1971:52). This is evident in the genealogies. Genealogies were very important to the chiefs, because ranking was very important. The genealogies not only indicated rank, they ascertained a link to the gods. The following excerpt explains the idea and importance of rank and the role of genealogies:

> Position in old Hawaii, both social and political, depended in the first instance upon rank, and rank upon blood descent—hence the importance of genealogy as proof of high ancestry. Grades of rank were distinguished and divine honors paid to those chiefs alone who could show such an accumulation of inherited sacredness as to class with the gods among men…a child inherited from both parents…. The stories of usurping chiefs show how a successful inferior might seek inter-marriage with a chiefess of rank in order that his heir might be in a better position to succeed his parent as ruling chief…a virgin wife must be taken in order to be sure of child's paternity—hence the careful guarding of a highborn girl's virginity (Beckwith1990: 11).

One could defend and/or prove their rank by knowing or having one's genealogist recite one's genealogy. "To the Hawaiians, genealogies were the indispensable proof of personal status. Chiefs traced their genealogies through the main lines of 'Ulu, Nanaʻulu, and Pili, which all converged at Wākea and Papa (Barrere, 1969:24). Two well-known genealogy chants are the *Kumuhonua* and the *Kumulipo.*

Kumuhonua**.** The *Kumuhonua*, first published by Fornander in 1878, in *The Polynesian Race* Vol. I was based on information from Kamakau and Kepelino. Kumuhonua, the man, was of the Nanaulu line, and the older brother of Olopana and Moikeha (McKenzie 1986:14-15). However, the birth chant *Kumuhonua* has been a subject of controversy as noted in following *Preface* by Kenneth P. Emory:

> We have become painfully aware that the Kumuhonua 'legends' are not ancient Hawaiian legends, nor is the genealogy which accompanies them a totally authentic genealogy…. In his second volume (1880) when he relates events from the period of the arrival in Hawaii of migrant chiefs from Tahiti to the time of Kamehameha, in these writings he is dealing with relatively untampered, authentic Hawaiian traditions and genealogies…. We must ever be on guard against the effects of this impact in what was recorded subsequently about the pre-contact period….. The world of the Polynesian began to be transformed overnight by Western influence." (Barrere, 1969: i)

Barrere (1969) explains that some of the *Kumuhonua* legends were recorded by Kamakau and Kepelino between the years 1865 and 1869, however, the 'genealogy' of the *Kumuhonua*, published by Fornander, was given to him "to provide credibility to the legends…this 'genealogy' [was] constructed from previously existing genealogies--the *Ololo* (*Kumuhonua*) and the *Paliku* (*Hulihonua*) which are found in the *Kumulipo* chant (see Beckwith 1951:230-234) and interpolations of their own invention" (Barrere, 1969:1).

Kumulipo**.** A better example is the famous Creation Chant *The Kumulipo.* Feher (1969) had several notable Hawaiian scholars write passages in his *Kumulipo: Hawaiian Hymn of Creation-Visual Perspectives by Joseph Feher.* In the *Introduction* Momi Naughton states "The Kumulipo belongs to a category of sacred chants known as *pule ho'ola'a ali'i,* 'prayer to sanctify the chief,' which was recited to honor a new-born chief (Feher, 1969:1). In her passage, Edith McKenzie states:

> "The *Kumulipo* is a historical genealogical chant that was composed by the court historians of King Keaweikekahiali'iokamoku of the island of Hawai'i about 1700 AD in honor of his first born son Ka-lani-nui-'I-a-mamao. This important chant honors his birth and shows the genealogical descent of both the *ali'i* (chiefs) and the *maka'ainana* (commoners) from the gods, in particular Wākea…" (Feher, 1969:1).

The Kumulipo was an *inoa* or name chant for Ka-lani-nui-'I-a-mamao, first born son of Keawe, who later became the father of Kalaiopu'u [Kalani'opu'u], ruling chief of Hawai'i (Beckwith, 1990:9). However, Johnson comments that "Malo remarks that the *Kumulipo* is important to both *ali'i* (chiefly) and *maka'āinana* (commoner) groups. It is also a means by which Polynesians as a whole may corroborate lineal ties to the Hawaiian people" (Feher, 1969:2).

In a passage by Roger T. Ames, he corroborates this idea and states, "what is of particular humanistic interest is the way in which the *Kumulipo* as a repository of cultural authority served Hawaiian society in transmitting its cultural legacy and organizing its community. In doing so it combines both a linear sense of temporal development and the richness of one particular moment in time" (Feher, 1969:3).

Youngblood (1992) found that he could draw on both Fornander and Beckwith's translations of *The Kumulipo* to sketch a socio-political history of Hawai'I (Youngblood, 1992:34). In his re-creation he found that stemming from Wākea and Papa are two major Hawaiian genealogies: the *Nana'ulu* and the *'Ulu* [brothers]. The *Nana'ulu* was the wellspring for the *ali'i* of O'ahu and Kaua'i, while the *'Ulu* line supplied the chiefs of Maui and Hawai'i Island.

*Hawaiian Genealogies***.** In 1983 Edith McKenzie completed the first volume of *Hawaiian Genealogies,* translated from genealogy articles in 19th Century Hawaiian newspapers; these articles were in response to

a call to preserve the Hawaiian heritage. The descent of Hāna's *ali'i nui* and their connection to other ruling families can be illustrated by piecing these genealogies together. Some of McKenzie's genealogies were from feature articles published in Hawaiian newspapers such as *Ka Nonanona* and *Ka Nupepe Kuokoa* in the late 19th century and early 20th century. Some of the information was also in Malo's (1838) *Hawaiian History*, and in Fornander's (1880), *The Polynesian Race* (Book I) (McKenzie, 1983:1).

The following excerpt is from Kamakau's article in *Ka Nupepa Kuokoa* October 7, 1865, and was translated by McKenzie (1986). It illustrates some of the mid-19th century sentiment regarding genealogies:

> *I na makaainana, he mea waiwai ole, no ka mea ua papa ko lakou mau makua o hoohalikelike, a hoohanau keiki o ke kuaaina a pii aku i na li'i. Nolaila ia ao ole ia ai na keili a na makaainana, ma kahi makuakane a makuahine, a kupuna aku no…. Ia kakou i ka poe o keia wa, aole waiwai o keia mea he mooalii aole a kakou mau kuleana nui iloko. Aka, ma ko kakou noonoo iho he waiwai nui. Ua komo kakaou iloko, ua waiwai na'lii i na kupuna; a ua waiwai pu kakou i koo kakou ike ana. No ka mea, ua kapu i ka makaainana aole e ike i keai mea. Aka, no ka pii ana i ka naauao a me ke akamai o na keiki a na makaainana; nolali, ua noa na wahi kapu, ua pii waleia. O ke koeana mai o na kupuna oia kahi waiwai.*
>
> To the commoners, a genealogy was of no value because their parents forbad (sic) it lest comparisons should occur and country children be born and rise up as chiefs. Therefore, the children of the commoners were not taught beyond father, mother, and perhaps grandparents…. To us, the people of this time, there is no value of this thing of a chiefly lineage; we have no great interest in it. But in our thoughts it is of great value. We have entered into discussion of it; the chiefs valued the chiefs and ancestors; and we also value our knowledge of it. Because it was forbidden to the commoners, they were not to know this. However, due to the rise of wisdom and skill of the children of the commoners, therefore, all of the ranking privileges were no longer restricted; it was only lifted. What remains of the ancestors is something of value (McKenzie 1986:18-19).

Using thirty years to account for one generation, McKenzie determined that Wākea was born in AD 190; Umi-a-Liloa in 1450; Keawekehahialiiokamoku in 1650, Kalanihuiikupuapaikalanui Keoua in 1710; and Kamehameha I in 1740" (McKenzie, 1983:12). Volume Two of *Hawaiian Genealogies* was published in 1986 and consists of information extracted from genealogical lists published in thirteen newspapers from 1858 to 1920. It compliments genealogies found in other works, such as Fornander's (1880) *An Account of the Polynesian Race…* and David Malo's *Hawaiian Antiquities* (McKenzie, 1986: v).

Hawai'i Island Royal Line. In the following list of Hawai'i Island *ali'i* or chiefs (Table 6) most of the people are in a loose chronological order with multiple unions and is not inclusive as many lesser unions were not listed or recorded in official genealogies. This annotated list illustrates how interconnected the chiefly lines were with unions between island polities and families. [Macrons are not inserted because there were not in the records.]

Table 6. Hawai'i Island Royal Line [based on McKenzie (1983, 1986), Kamakau (1992) and 'I'i (1959).]

Kane	**Wahine**	**Keiki**
*Hanala'anui	Mahuia	Lanakawai [14 generations before the following]
[*twin of Hanala'aiki progenitor of the Maui Pi'ilani Lines – both born at Mokae, Hana, Maui]		
Kauholanuimahu	Neula	**Kiha**nuilulumoku [Kiha 1]
Kiha 1	Waoilea [Ewa, Oahu Chfs]	**Līloa**-a-Kiha
Līloa	Pinea 1 [younger sib of Waoilea]	Hakau [later killed by Umi]
"	Haua [Maui Chfs]	Kapukini″
"	Akahiakuleana [←Hana]	Umi-a-Līloa I
Hakau	KukukalaniaPae	Pinea 2

Umi	Ohenahena/Hehena	Kamolanuiaumi
"	"	Kahekilinuialokapu
"	Kulamea	Kapunahahuanuiaumi
"	Makaalua	Nohowaaumi
"	**Kapukini**/Kapulani	Kealiiokaloa→Kalaniopuʻu/Kamehameha I
"	"	Kapulani
"	"	**Keawenuiaumi**
"	Piikea-a-Piʻilani	Aihakoko
"	"	Kumalae→ Aikanaka/Liliʻu
"	Kuihewamakawalu	Papaikaneau
"	"	Kuimeheua (k)
"	"	Uluehu
"	Mokuahualeiakea	Akahiilikapu→ Liholiho/Kamamalu
Keawenuiaumi	Koihalawai [Kauai Chfs]	Kanaloakuaʻana
"	Hoopiliahae	Umiokalani
"	"	Keawepaikana
"	Hoopilihae	Lililoa 2
"	"	Hoolaaikaiwi
Keawe [Hawaii king]	Kalanikauleleaiwi [sib of Keawe]	Kalani-Keeaumoku
"	"	**Kekela**kekeaokalani
Kauaunuimahioloii	"	**Alapainui** [Hawaii king]
Lonoikahaupu [Kauai king]	"	Keawepoepoe [Chief-Hawaii/Maui/Oahu/Kauai]
Kaulahea [Maui king]	"	**Kekuiapoiwa Nui**
Kaulaheanuiokamoku	Papaikaniau	Kalaninuikuihonoikamoku **Kekaulike**
Haae	Kalelemauli	Kamakaeheikuli
"	"	Haalou
Haae	**Kekela**okalani [dau/Keawenuiaumi]	**Kekuiapoiwa** 2 [Oahu/Maui Chiefess]
Kekaulike [Maui Rul chf]	Kahawalu	Kauhiaimokuakama
"	Holau	Manuhaaipo
"	"	Kekauhiwamoku
"	"	**Kaeo**kulani [Kauai Rul Ch/father of Kaumualii]
"	**Kekuiapoiwa Nui** [half-sister]	**Kamehameha Nui** [Maui Ruling Chf]
"	"	**Kalola**
"	"	**Kahekili**nuihumanu 2 [Iron king of Maui]
"	"	Kuhooheiheipahu (w)
"	"	Naaiakalani
"	"	Manuailehua
"	Haʻaloʻu [chiefess of Waiheʻe]	**Namahana**ikaleleokalani [→ Kaʻahumau]
"	"	Kekuamanoha (k) [father of Kalanimoku, Boki, Manono]
"	Kaneʻalae (Molokai-also wife of Keawe)	?
Kalaninui-i-mamao [Kaʻu]	Kamakaimoku [Oahu, Waianae cfs]	**Kalaniopuʻu** *[Hawaii king]
"	"	**Keōua**kalanikupuapaikalaninui→K-I

***[Two fathers: also Begotten by Pele-io-holani, ruling chief of Oahu and Kamakaimoku]**

Kalaniopuʻu	**Kalola** [Maui High Chfs]	**Kiwalao**
"	Kaneikapolei [Kaupo, Maui line]	Keōua Kuahuʻula [Kaʻu]
"	"	Keōua Peʻeale
"	Muʻolehu	Manoua→ Peter Kaeo of Kauai
"	Halau	Kawelaokalani
Kalaniopuʻu	Manoua [daughter/Kaʻu]	Manono [Died in battle/placed on Mookini altar]
"	Kamakolunuikalani	Pualinui [→a Lahaina line]
"	"	Kukanaloa [moʻopuna of 3 kings]
Keōua	Kahikikalaokalani	Kalokuokamalie
"	Kekuiapoiwa 2 [cousin]	**Kamehameha I**
"	"	Keliimaikai [Kalanimalokuloku-Kepookalani]
"	Kamakaehikuli	Kalaimamahu [grandfather of Lunalilo]
"	**Kalola** [→Keopuolani]	Kekuiapoiwa Liliha II [wife of Kiwalao]
"	Manononui [daughter of Alapaʻinui]	Kiilaweau [wife of Keliimaikai/mother of Kekuaokalani cousin of Liholiho]

"	Akahinui	Kaleiwohi
Keawemauhili [Hilo cf]	Kekikipaʻa [dau of Kameʻeikamoku]	Kapiolani [cfs of Kaʻawaloa/Kealakekua]
[half brother of Kalaniopuʻu;	m Ululani; killed by nephew Keōua Kuahuʻula]	[cousin of Kiwalaʻo and Kamehameha I]
Kiwalao [Hawaii Chf] [Sibs]	**Kekuiapoiwa** Liliha	Kalanikauikaʻalaneo **Keopuolani** [Wailuku]
"	Manoua	Kaaimalolo→ Kaeo of Kauai
Kauhiʻaimoku-a-Kama	Kahoʻomaʻeha	Koliʻi [Kailua-Kona cf]
"	"	Kaʻiwi [Hilo/Waipiʻo cf]
"	"	Kaleohano [Kona cf/Navigator for Boki]
"	"	Keahemakani (w)
"	Luʻukia	Kalolowahilani (w) m Keʻeaumoku
Kamehameha Nui [sibs]	**Kalola** [Maui]	Kalaniakuaiokikilo/Kalaniwaiakua [Kapu]
" [half sibs]	**Namahana**ikaleleonalani	Pele-io-holani 2
"	"	**Kuakini**okalani
Keʻeaumoku	Kalolowahilani	Ke-aka-kilohi (k)
Keeaumoku Papaiahiahi	**Namahana**	**Kaʻahumanu** (w)
"	"	Kaheiheimalie/Hoapiliwahine (w)
"	"	Kahekili III/Keʻeaumoku 2 (k)
"	"	Kekuaipiia/Namahana II (w)
"	"	Kaluaikonahale/Kuakini (k)
Kekumanoha	Kamakahukilani	Kalanimoku (k)
"	"	Wahinepiʻo (w)
"	"	Boki (k)
Kalaimamahu [K1 sib]	Kalakua Kaheiheimalie	Kahahaikaʻaoʻaokapuoka/Kekauluohi
Kamehameha I	**Kalola**-a-Kumukoʻa	?
"	Kanekapolei	Pauli Kaoleioku
"	Kekikipaʻa [dau of Kameʻeikamoku/mother of Chiefess Kapiolani]	?
"	Peleuli Kekela m Kawelolani [K-I brother]	Maheha Kapulikoliko (w)
"	"	Kahoanoku Kinau (k)
"	"	Kaikoʻolani (k)
"	"	Kiliwehi (w)
"	Kauhilanimaka	Kahiwa Kanekapolei [mother of Kepelino]
" [niece]	Kaʻahumanu	NI
Kamehameha I	Kaheiheimalie Kanui	Kamehameha Iwi
"	"	Kamehamalu (w)
"	"	Kahoʻanoku Kinau (w)
"	Kalanikauikaʻalaneo **Keopuolani** [Kapu chiefess]	Kalani Kua-**Liholiho** [b Hilo]
"	"	Kalani **Kauikeaouli** Kiwalaʻo [b Keauhou]
"	"	Harriet Nahiʻenaʻena
" [niece]	Kekauluohi [m Kanaina→ Lunalilo]	NI
"	Manono	? Kapauaʻai (w)
Liholiho [cousins]	Kekāuluohi [m Kanaʻina → Lunalilo]	NI
"	**Kamāmalu** [half sister]	NI
"	Kekāuluohi [mom of Lunalilo]	NI
"	Kalanipauahi	NI
"	Kekauʻonohi	NI
"	Kīnaʻu	NI
Kalani**Kauikeaouli** Kiwalaʻo	Kapakuhaili	Keaweʻaʻula II
"	Hakalelponi Kalama [b Kailua-Kona	NI.
Leleiohoku [Wm Pitt I]	Nahiʻenaʻena	(k) stillborn

[son of Kalanimoku, great-grandson of Kekaulike, hanai of Kuakini-son of Keʻeaumoku, husband of Princess Ruth Keʻelikolani]

M. Kekuanaoa	Kinau	Lot Kamehameha [Kamehameha V]
"	"	Alexander Liholiho [Kamehameha IV]
"	"	Victoria Kamamalu
Charles Kanaʻina	Kekāuluohi	Wm Charles **Lunalilo**
Lunalilo	**N**	
Kepoʻokalani [s/Kameʻeiamoku]	Keohohiwa	ʻAikanaka

ʻAikanaka	Kamaeokalan	Analea/Ane Keohokalole
John Adams Kuakini	Analea/Ane Keohokalole	NI
Cesear Kapaʻakea [cousins]	Analea Keohokalole	Moses
“	“	James
“	“	David **Kalākaua**
“	“	Lydia/**Liliʻuokalani**
“	“	Anna
“	“	Kaiminaʻauao
“	“	Kinini
“	“	Miriam Likelike [mother of Princess Kaʻiulani]
“	“	Leleiohoku
Alexander **Liholiho**	**Emma** Kaleleonalani	Albert Edward Kauikeaouli
Charles Kanaina	Kekāuluohi	William Charles Lunalilo
Kalākaua	Kapiolani [grd dau of Kaumualii]	NI
Kaeokalani	Kamakahelei [queen of Kauai]	**Kaumuʻaliʻi**
John Owen Dominus	**Liliuokalani**	NI
Archibald Cleghorn	Miriam Likelike	Victoria Kawekiu Kaʻiulani Lunalilo….

Puna Chiefs

The following are excerpts from *Nā Kuaʻāina: Living Hawaiian Culture* by Daviana McGregor (2007) about the ruling chiefs of Puna and the first missionary in Puna (Chapter 4; 152-154).

> *“Hilinaʻi Puna, kālele iā Kaʻū*” (Puna leans and reclines on Kaʻū) refers to the common origin of the people of Puna and Kaʻū. The ancestors of these two districts were originally of one extended family….those in Kaʻū referred to themselves as the Mākaha, meaning fierce, savage, ferocious. Those in Puna called themselves Kūmākaha, or standing fierce, savage, ferocious.
>
> There were two notable Puna chiefs…Huaʻa and ʻImaikalani (primarily Kaʻū) who were identified as enemies of High Chief ʻUmialīloa and were killed by he and his warriors. During the time of High Chief Līloa, approximately 1475 CE, the chiefs of the six districts of Hawaiʻi, including Puna, were autonomous within their own districts, but they acknowledged Līloa as their paramount chief…. Huaʻa was killed on the battlefield in Kuolo, Keaʻau…. From the time of Keawenuiaumi Kaʻu was ruled by the Kona chiefs (his descendants)…Puna is linked with Kaʻu until the time of Keaweikekāhialiʻiokamoku, when ʻI family of Hilo controlled parts of Puna (152-153).
>
> In the time of Kalaniopuu, the chief ʻImakakoloa of Puna became powerful…was probably a descendant of ʻImaikalani through the ʻI family…. He seized the valuable products of his district which consisted of hogs, gray tapa cloth (*ʻeleuli*), tapas made of *mamaki* bark, fine mats made of young pandanus blossoms (*ʻahu hinano*), mats made of young pandanus leaves (*ʻahuau*), and feathers of the ʻoʻo and mamo birds of Puna (154).
>
> The first missionary to journey through Puna was William Ellis in 1823. In his published journal he described the natural resources available to the residents of the district and some of their living conditions and subsistence and exchange practices. He estimated that there were approximately 725 inhabitants at Kaimu and another 2,000 Hawaiians in the immediate vicinity along the coast. At Kauaea, about three and a half miles from Kaimu, he reported, 300 people gathered to hear him preach (155-156).

Mo‘olelo

Legends or *mo‘olelo* are a great resource as well as entertaining. Leib and Day (1979) state in their annotated bibliography of Hawaiian legends, that legends “are a kind of rough history.” They noted “Luomala’s idea of the value of myth and legend in the serious study of a culture” and her following quote. “To a specialist in mythology, a myth incident or episode is as objective a unit as an axe, and the differences and similarities of these units can be observed equally clearly and scientifically.” They also expressed concern about authenticity, and sometimes found it difficult to determine if a legend was a primary or secondary source. The following definitions of terminology, including the Hawaiian classification of prose tales--*mo‘olelo* or *ka‘ao*, come from their work (Leib and Day 1979: xii, 1):

Tradition	used to refer to that which is handed down orally in the way of folklore
Folklore	a rather inclusive term, covering the beliefs, proverbs, customs, and literature (both prose and poetry) of a people
Myth	a story of the doings of godlike beings
Legend	deals with human beings and used interchangeably with ‘myth’ … because the collectors and translators of the tales often failed to make the strict distinction themselves
Ka‘ao	“pure fiction”
Mo‘olelo	deals with historical matters and somewhat didactic in purpose… included tales of the gods, as well as tales of historical personages… many have recurring patterns, plots, and types of characters

History of *Mo‘olelo* Collecting**.** According to Leib and Day (1979) a substantial number of legends were collected and written in Hawaiian during the century following Cook’s arrival in Hawai‘i. A few accounts of the mythology were printed in the journals of missionaries and travelers, and a few of the Hawaiian lore were printed in languages other than English. The following synopses are excerpts from the works of Leib and Day’s (1979) and give an overview of the first collectors and compilers of Hawaiian myths and legends.

> About 1836 a movement was started under the influence of Reverend Sheldon Dibble, to write down in Hawaiian some of the material dealing with the native legendary history, customs, and other lore. Results of the research were published at the Lahainaluna press in 1838. A partial translation made by Rev. Reuben Tinker was issued serially in 1839 and 1840---the first four installments appearing in *The Hawaiian Spectator* and the last four in *The Polynesian.* In 1841 the Royal Hawaiian Historical Society was formed at Lahainaluna. Some of their research and the earlier *Ka Moolelo Hawaii* were incorporated into Dibble’s *History of the Sandwich Islands* (1843). After his death in 1843 his work was carried on principally by two of his outstanding native pupils, David Malo and Samuel M. Kamakau. Malo wrote his own *Moolelo Hawaii* about 1840 at the request of Rev. Lorrin Andrews, which was later translated by Emerson as *Hawaiian Antiquities.* In 1858 the Rev. John F. Pogue of Lahainaluna printed a third *Moolelo Hawaii,* based on the 1838 history, but including additional material. Kamakau did not print any of his material for thirty years (Leib and Day 1979:7, 8, 9).
>
> The increase in the amount of Hawaiian lore appearing in the native press in the 1860’s and thereafter was at least in part the result of an organized effort to collect and preserve such material. At Kamakau’s instigation a Hawaiian society was formed in 1863 to collect material for publication in the native press at the time, and also to aid Fornander’s research. Fornander was the greatest collector of Hawaiian lore. He credits as sources, several natives whom he sent on tours of the Hawaiian Islands to collect all available Hawaiian lore, as well as Kalakaua, Lorrin Andrews, Malo, Dibble, Dr. John Rae, Kamakau, Naihe, S.N. Hakuole [Haleole], Kepelino, and Remy. The culmination of this effort was Fornander’s (1880) *An Account of the Polynesian Race: Its Origin and Migrations and the Ancient History of the Hawaiian People to the Times of*

Kamehameha I. Fornander's collection remains the most important single source of Hawaiian legends (Leib and Day 1979:9-13).

In June 1865 Kamakau began publishing in *Ka Nupepa Kuokoa*, articles on traditions and legends. His series of articles dealing with Hawaiian history, particularly from the late eighteenth century on, and especially of Kamehameha, appeared weekly in the same publication in October 1866. When the newspaper ceased in 1869, this series continued in *Ke Au Okoa* for nine months. Kamakau then wrote a series on ancient Hawaiian religion, customs, and legendary history in *Ke Au Okoa* until February 1871. All of his writings were in Hawaiian (Leib and Day 1979:8, 9).

Very little work was done in translating Hawaiian mythology into English until late in the nineteenth century. It wasn't until 1888, over a hundred years after the discovery of the Hawaiian Islands, that the first book in English dealing exclusively with Hawaiian mythology was printed; *The Legends and Myths of Hawaii* by King Kalākaua. However, it was more likely authored by former United States Minister to the Hawaiian Islands, R.M. Daggett (Leib and Day 1979:5, 7).

Thrum is one of the most frequently cited authorities on Hawaiian lore. He was born in Australia in 1842 and arrived in Honolulu in 1853. In 1875 he began publication of the *Hawaiian Almanac and Annual*, later known as *The Hawaiian Annual* or *Thrum's Annual*, which appeared yearly under his editorship until his death in 1932. Thrum's contribution is as editor, compiler, and publisher of translations, not translator. By providing in his *Annual* a place for the publication of such material, and perhaps by persuading authors to provide him with translations, he was instrumental in much legendary matter appearing in printed form. Thrum wrote or rewrote a large portion of his own material (Leib and Day 1979: 17).

Thrum's first book *Hawaiian Folk Tales* was published in 1907 and consisted largely of tales that had previously been published in *Thrum's Annual*. Only 35 of the 260 pages were translated by Thrum, the rest were credited to Rev. A.O. Forbes, Rev. C.M. Hyde, William Ellis, J.S. Emerson, Mrs. E.N. Haley, N.B. Emerson, Mrs. E.M. Nakuina, Walter M. Gibson, Joseph M. Poepoe, and M.K. Nakuina. His second book *More Hawaiian Folk Tales*, published in 1923 was similar. A number were translations from Hawaiian language newspapers of half a century earlier, often with no translator cited. Translators credited were A. F. Knudsen, Henry M. Lyman, W. D. Westervelt, J. H. Boyd, and Lahilahi Webb. Some of the chapters were reprinted or abridged from the Bishop Museum translations of the *Fornander Collection*, of which Thrum was editor. His greatest work, *Fornander's Collection of Hawaiian Antiquities and Folklore*, was published by Bishop Museum in 1916 and 1920 in three volumes. The original editor was W. D. Alexander and most of the work completed under his supervision. However, he died in 1913 and Thrum was appointed to complete the production. Beckwith credits John Wise with the original translation of that work. In 1920 or 1921 Thrum completed another work "Ancient Hawaiian Mythology" which was never published (Leib and Day 1979: 18-19).

A great resurgence of interest in Hawaiian folklore began in the early twentieth century, in part caused by the annexation to the United States. People on the mainland wanted to know more about 'their new island possessions.' The funds of the Bureau of American Ethnology were made available for Hawaiian studies i.e., Emerson's *Unwritten Literature* and Beckwith's *Laieikawai*. The most important twentieth-century translators of Hawaiian legends have been N. B. Emerson, Thomas G. Thrum, William D. Westervelt, William Hyde Rice, Laura C. S. Green, Martha Warren Beckwith, and Mary Kawena Wiggins Pukui. Emerson's extensive notes were a major contribution to Hawaiian scholarship. Most of them explain the meanings of Hawaiian words. In many, Emerson alludes to legends, giving a number of them briefly and relating a few in some detail. Some of these probably do not exist anywhere else in print (Leib and Day 1979:14).

Mo'olelo of Pele and Puna Chiefs**.** From the legends or *mo'olelo* collected by Fornander, Kamakau, Westervelt and others, we can get a glimpse into the lives of some of these people listed in the genealogies. To reproduce any legend completely would take too long, therefore only excerpts are

generally used. The following legends are from Westervelt's *Hawaiian Legends of Volcanoes* Chapter V, 'Pele and the Chiefs of Puna,' and Chapter VI 'Pele's Tree.'

Pele and the Chiefs of Puna

Kumu-Kahi. According to the legends, Pele was very quickly angered. Her passions were as turbulent as the lake of fire in her crater home. Her love burned, but her anger devoured. She was not safe. Kumu-kahi was a chief who pleased Pele. According to the legends he was tall, well built, and handsome, and a great lover of the ancient games. Apparently he had known Pele only as a beautiful young chiefess; for one day, when he was playing with the people, an old woman with fiery eyes came to him demanding a share in the sports. He ridiculed her. She was very persistent. He treated her with contempt. In a moment her anger flashed out in a great fountain (p. 28) of volcanic fire. She chased the chief to the sea, caught him on the beach, heaped up a great mound of broken lava over him, and poured her lava flood around him and beyond him far out into the ocean.

Thus the traditions say Cape Kumu-kahi, the southeast point of the island Hawaii, was formed. Here kings, chiefs, and priests have come for ages to build great piles of lava rock with many ceremonies. The natives call these "funeral mounds" and name them after the builders, although the persons themselves were seldom placed underneath in burial.

When Hawaiians, who had been ill, recovered, they frequently vowed to make a "journey of health." This meant that they came to the place now known as Hilo Bay. There they bathed by the beautiful little Coconut Island, fished up by the demi-god Maui. There they swam around a stone known as Moku-ola (The-island-of-life). Then they walked along the seashore day after day until they were below the volcano of Kilauea. They went up to the pit of Pele, offered sacrifices, and then followed an overland path back to Hilo. It was an ill omen if for any reason they went back by the same path. They must make the "journey of health" with the face forward. Hopoe (The dancing stone), Kapoho (The green lake), and Kumu-kahi were among the places which must be visited. They all have their Pele legends.

On the shortest path from Kumu-kahi to Kilauea is a great field of many acres of lava stumps. These, according to the best theories, were made by immense floods of lava pouring down upon large forests of living trees. Lava always cools rapidly on the surface therefore, as the lava spread out through the forest, very soon there was a great floor of hot black stone pierced by a multitude of trees. Some of these burned very slowly. The flowing lava would easily push itself up through the small opening around a burning tree and would keep on pushing and building up a higher and higher cone of lava as the tree burned away, until the tree was destroyed. These cones rise sometimes ten to fifteen feet above the lava floor. They frequently have well-preserved masses of charcoal as their core. This is nature's method of making lava stumps. This field of hundreds of lava stumps has a different origin according to the legends.

Papa-lau-ahi (The-fire-leaf-smothered-out) was a chief who at one time ruled the district of Puna. He excelled in the sports of the people. It was his great delight to gather all the families together and have feasts and games. He challenged the neighboring chiefs to personal contests of many kinds and almost always was the victor. One day the chiefs were sporting on the hillsides around a plain where a multitude of people could see and applaud. Pele heard a great noise of shouting and clapping hands and desired to see the sport. In the form of a beautiful woman she suddenly appeared on the crest of one of the hills down which Papa-lau-ahi had been coasting. Borrowing a sled from one of the chiefs she prepared to race with him. He was the more skilful and soon proved to her that she was beaten. Then followed taunts and angry words and the sudden absolute loss of all self-control on the part of Pele. She stamped on the ground and floods of lava broke out, destroying many of the chiefs as they fled in every direction.

The watching people, overcome with wonder and fear, were turned into a multitude of pillars of lava, never changing, never moving through all the ages. Papa-lau-ahi fled from his antagonist, but she rode on her fiery surf waves, urging them on faster and faster until she swept him up in the

flames of fire, destroying him and all his possessions. (1. These are the lava stumps easily visited by any lover of the curious who journeys to Kilauea.)





Photos 16-21. Various lava tree stumps in Lava Tree State Park in Pahoa, Puna.





Ke-Lii-Kuku. Another chief who was called in Hawaiian legends, Ke-lii-kuku (The-Puna-chief-who-boasted). He was proud of Puna, celebrated as it was in song and legend.

"Beautiful Puna!
Clear and beautiful,
Like a mat spread out.
Shining like sunshine
Edged by the forest of Malio."
--Ancient Chant.

Ke-lii-kuku visited the island Oahu. He always boasted that nothing could be compared with Puna and its sweet-scented trees and vines. He met a prophet of Pele, Kane-a-ka-lau, whose home was on the island Kauai. The prophet asked Ke-lii-kuku about his home land. The chief was glad of an opportunity to boast. According to the "Tales of a Venerable Savage" the chief said: "I am Ke-lii-kuku of Puna. My country is charming. Abundance is found there. Rich sandy plains are there, where everything grows wonderfully." The prophet ridiculed him, saying: "Return to your beautiful country. You will find it desolate. Pele has made it a heap of ruins. The trees have descended from the mountains to the sea. The *ohia* and *puhala* are on the shore. The houses of your people are burned. Your land is unproductive. You have no people. You cannot live in your country anymore."

The chief was angry and yet was frightened, so he told the prophet that he would go back to his own land and see if that word were true or false. If false, he would return and kill the prophet for speaking in contempt of his beautiful land. Swiftly the oarsmen and the mat sails took the chief back to his island. As he came around the eastern side of Hawaii he landed and climbed to the highest point from which he could have a glimpse of his loved Puna. There in the distance it lay under heavy clouds of smoke covering all the land. When the winds lifted the clouds, rolling them away, he saw that all his fertile plain was black with lava, still burning and pouring out constantly volumes of dense smoke. The remnants of forests were also covered with clouds of smoke through which darted the flashing flames which climbed to the tops of the tallest trees.

Pele had heard the boasting chief and had shown that no land around her pit of fire was secure against her will. Ke-lii-kuku caught a long vine, hurled it over a tree, and hung himself. [1. Ohia ha or Paihi = Syzygium. Ohia-lehua = Metrosideros polymorpha sandwicense. 2. Hala or Lahala = Pandanus adoratissimus.]

Ka-Pa-Pala. Another chief by the name of Ka-pa-pala heard of Pele. He went to the edge of the crater and there found a group of beautiful women. He was welcomed by Pele. They delighted in each other. Many were the games and contests. The chief was so frequently the victor that at last he boasted that he could ride his surfboard on the waves of her lake of fire. She was angry at the thought that he dared to desecrate her sacred home. He defied her, caught his surf-board, threw it on a wave as it struck the encircling wall, then leaped on his board and launched out on the fire-waves. It is said that, to show his contempt for the power of Pele, he even stood on his head and was carried safely for a time on the crest of the red rolling surf.

Pele became very angry as she saw him fleeing from her over the lake of fire, so she called to her fire-servants, the aumakuas, or ghost-gods, of the crater, and they hurled other fire-waves across the lake against the one the chief was riding. They twisted and turned that wave. They broke its crest. The chief and his surf-board were tossed up in a whirlpool of fire. Then he dropped into the heart of the flame and was lost.

Pele's Tree

Ohia Lehua is the native name for a tree which abounds in Puna, the region of the volcanic home of the goddess Pele. It has a continual growth of delicately shaded leaves. The young leaf, pink tinted, comes as the old leaf shading into gray falls from the tree. Flowers which are like beautiful red fringed balls are always found glorifying the varicolored foliage. Here honey-loving birds and bees find their best feeding-places. The ohia forests grow abundantly and rapidly on lava even recently thrown out by the eruptions from Pele's lake of fire. The ohia roots seem [1. Metrosideros polymorpha.] to find food and drink, where the numerous cracks of a lava field open in every direction, and vie with the tree ferns in making life take the place of the desolation caused by the volcanic floods.

About half way between the city of Hilo and the volcano Kilauea, there stood for many, many years an old ohia tree. It was so old that it had become legendary and was known as "Ka laau o Pele" (The tree of Pele). Whenever a native came near this tree, he began to search for certain leaves or fruits which he could lay beneath the tree as an offering before he dared to try to pass beyond. These sacrifices were supposed to appease the wrath of the goddess and assure the traveler safe passage through Pele's dominions.

Three *mo‘olelo* were cited in *Hawaiian Legends Index* (Vol II – K) that mention ‘Kali‘u’ and are listed in the following:

Colum, Padric	‘The fire-goddess’ In *Legends of Hawaii*	pp 25-37
Emerson, Nathaniel	*Pele and Hiiaka*	
Westervelt, William D.	‘Hopoe, the dancing stone’ In *Hawaiian Legends of Volcanoes*	pp 87-95

“Kaliu” is mentioned several times in chants in the story ‘Hopoe, the dancing stone’ (Westervelt 1916: 91 and 93) where Pele ordered her sister Hiiaka to go to Kauai to fetch her lover Lohiau. Hiiaka had her conditions - that Pele not damage her beautiful ‘*ohia lehua* forests of Kaliu and her friend Hopoe. As

Hiiaka prepared to leave she climbed up the walls of the Kilauea crater where Pele resided. She looked down on her sisters and chanted:

> "The traveler is ready to go for the loved one.
> The husband of the dream.
> I stand, I journey while you remain,
> O women with bowed heads.
> Oh my lehua forest – inland at Kaliu,
> The longing traveler journeys many days
> For the lover of the sweet dreams.
> For Lohiau ipo." - Ancient Hiiaka Chant

Hiiaka found Lohiau but had visions of Puna and the unfaithfulness of Pele; the impatient Pele was throwing lava from the pit crater to the forests which she had promised to protect. Hiiaka chanted:

> "The smoke bends over Kaliu.
> I thought my lehuas were tabu.
> The birds of fire are eating them up.
> They are picking my lehuas
> Until they are gone."
>
> "O my friend of the steep ridges above Keaau,
> My friend who made garlands
> Of the lehua blossoms of Kaliu,
> Hopoe is driven away to the sea –
> The sea of Lanahiku."

Mele and Oli

Aside from the *mo'olelo*, legends or stories of these famous and infamous *ali'i*, the songs and chants also give glimpses into the lives of the ancient people and places as depicted above. Research revealed that there are literally thousands of *mele* and *oli* that have been recorded and/or written over the last 170 years or more. There are several indexes of songs and chants in the Hawaiian Collections at the University of Hawai'i Hamilton Library (i.e., Horie 1990; Stillman 1988; 1990; 1993; 1995; 1996). Pukui explained that it was common, for chants not to have a title, as it was the composer's role to create the *mele*, which was then given away. When formal titles were not specified, the first line of verse served as the title (Pukui, 1995:xvii). There are texts of songs and chants compiled and translated by Roberts (1967), Pukui (1995), and Emerson (1997), as well as chants in legends compiled by Fornander (1969).

The Hawaiian word *mele* included all forms of poetical composition and sometimes overlap *oli* or chant, the lyric utterance (Emerson, 1997: 254). In regards to Hawaiian poetry or *mele*, "they had no exact word for so abstract a term as our 'poetry.'" The English equivalent to the Hawaiian *mele* means a song. All *meles* were "sung, or rather chanted, or cantillated…. The *mele* is interwoven in Hawaiian culture with the *hula* and the *kaao*--that is, poetry is interwoven with the dance and with mythology…. *Haku mele*, is one who arranges words into song (Plews, 1981:176).

Pukui (1995) classifies chants into three groups: (1) chants for the gods (pule); (2) chants for the *ali'i*, descendants of the gods; and (3) chants of activities that involved secular things. In Pukui's (1995) *Na Mele 'Welo* she points out that some *oli* are non-dance chants, but many of the *mele* and *oli* were expressed in dance or *hula* (Pukui, 1995:xvii). Emmerson explains that the hula was a religious service, in which poetry, music, pantomime, and the dance lent themselves, under the forms of dramatic art, to the refreshment of men's minds. Its view of life was idyllic and it gave itself to the celebration of those

mythical times when gods and goddesses moved on the earth as men and women and when men and women were as gods (Emerson, 1997:11, 12). Helen Cadwell quotes Alexander, but does not name the publication, as classifying *mele* into 4 divisions: (1) religious chants, prayers, and prophesies; (2) *inoa*, or name songs, composed at the birth of a chief in his honor, recounting the heroic deeds of his ancestors; (3) *kani kau*, the dirges or lamentations for the dead; and (4) *ipo*, or love songs which includes topical *mele* of a more secular character, now surpassing the others in number, and have survived in better condition "on the lips of the country folk (Roberts, 1967:67, 72).

ʻŌlelo Noʻeau

ʻŌlelo Noʻeau. *ʻŌlelo noʻeau* or proverbial/traditional sayings usually had several layers of meanings. They reflected the wisdom, observations, poetry and humor of old Hawaiʻi. Some of them referenced people, events or places. The following *ʻŌlelo noʻeau* were compiled by Pukui between 1910 and 1960 with both translations and an explanation of their meaning (Williamson, et al. in Pukui, 1983:vii), which are often more *kaona* (hidden or double meaning) than obvious. The following selected proverbs reference place names of the project area: Kaliʻu, Pāhoa and Puna [Kauaea was not mentioned].

ʻŌlelo noʻeau:	*Kaʻawa lena o Kaliʻu*
Translation:	The yellowed *ʻawa* of Kaliʻu.
Meaning:	Refers to Kaliʻu, Kilohana, Kauaʻi. People noticed drunken rats in the forest and discovered some very potent *ʻawa* there. There is a Kaliʻu in Puna, Hawaiʻi, where good *ʻawa* is also grown (Pukui 1983:140, #1281).
ʻŌlelo noʻeau:	*ʻĀina i ka houpo o Kāne.*
Translation:	Land on the bosom of Kāne.
Meaning:	Puna, Hawaiʻi. It is said that before Pele migrated there from Kahiki, no place in the islands was more beautiful than Puna (Pukui 1983:11 #79).
ʻOlelo noʻeau	*ʻApiki Puna i Leleʻapiki, ke nānā la i Nānāwale.*
Translation:	Puna is concerned at Leleʻapiki and looks about at Nānāwale.
Meaning:	The people are but followers and obedient to their rulers. The people of Puna were not anxious to g o to war when a battle was declared between Kiwalaʻo and Kamehameha; it was the will of their chief. Leleʻapiki (Tricky-leap) and Nānāwale (Just-looking) are places in Puna (Pukui 1983:27 #233).
ʻŌlelo noʻeau:	*E ala e Kaʻū, kahiko o Mākaha; e ala e Puna, Puna Kumākaha; e ala e Hilo naʻau kele!.*
Translation:	Arise o Kaʻū of ancient descent; arise O Puna of the Kumākaha group; arise O Hilo of the water-soaked foundation.
Meaning:	A rallying call. The names are found in Kaʻū and Puna chants of the chiefs. The Mākaha and Ku-mākaha were originally one [group]. Some moved to Puna and took the name Kumākaha (Pukui 1983:32, #260).
ʻŌlelo noʻeau:	*Ka makani hali ʻala o Puna.*
Translation:	The fragrance-bearing wind of Puna.
Meaning:	Puna, Hawaiʻi, 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, #1458).

‘Ōlelo no‘eau:	*Pō‘ele ka ‘āina o Puna.*
Translation:	The land of Puna is blackened [by lava flows].
Meaning:	(Pukui 1983:292, #2665).
‘Ōlelo no‘eau:	*Puna, mai ‘Oki‘okiaho a Mawae.*
Translation:	Puna, from Ko‘olau to Kaupō.
Meaning:	The extent of Puna is from ‘Oki‘okiaho on the Ka‘ū side to Mawae on the Hilo side (Pukui 1983:301, #2747).
‘Ōlelo no‘eau:	*Ka us Līhau o Pāhoa*
Translation:	The Līhau rain of Pāhoa.
Meaning:	The icy cold rain of Pāhoa, Puna, Hawai‘i (Pukui 1983:170, #1582).





Photos 22-24. The favorite trees of Puna; *‘ohia lehua, mamaki and hala*.

Place Names

Hawaiians of old generally named everything; from winds and mountains, to rocks, canoes, taro *lo‘i*, fishing stations, and “the tiniest spots where miraculous or interesting events are believed to have taken place” (Elbert in Pukui et al., 1974:x). They all represented a story, some known only locally, while others became legendary.

Place names in project area and vicinity

Kali‘u	Hill, Kalapana qd. Hawaii (*Pele and Hiiaka* Emerson 22), *Lit.* ‘the well salted’ (Pukui et al., 1974:77).
Kauaea	Ahupua‘a in Puna. Not listed in Pukui et al 1974; Found on maps.
Kauaea Trail	Named after the ahupua‘a, in sections of the Kauaea Ahupua‘a; on maps.
Kea‘au	Land sections, Hilo Maku‘u and Puna qds., Hawai‘i; village, (Pukui et al., 1974:100).
Kepaka	Cinder cone in project area; not listed in Pukui et al 1974.
Kilauea	Active volcano on the flank of Mauna Loa; Kilauea and Puna qds. (Pukui et al., 1974:111).
Kuolo	Area near Keaau, Puna, Hawai‘i where Puna chief Hua‘ā was defeated, thus giving control of Puna to ‘Umi; *Lit.* ‘to rub’ (Pukui et al., 1974:125).

Malama-ki Forest area, Kalapana qd., Hawai‘i. *Lit.* ‘bright *ti* plant’ (It is said that the game *ho‘olele ki* was played here. A leaf was held in the hand while the player chanted ‘*O kelā kī, ‘o kela kī, na Ka-moho-ali‘i ka‘u kī, lele!* that ti, this ti, my ti is for Ka-moho-ali‘i, fly! Then the leaf was hurled, and if the chant had been said correctly and the wind was right, it returned to the sender. This game was played only here. Ka-moho-ali‘i, a celebrated shark entity, was Pele’s older and favorite brother.) (Pukui et al., 1974:143).

‘Opihikaō Village, Kalapana qd. Puna, Hawai‘i. Formerly ‘Opihi-kāō. *Lit.* ‘crowd (gathering) limpets’ – because of robbers, people were afraid to gather ‘opihi alone (Pukui et al., 1974:171).

Pāhoa Village. Kalapana and Maku‘u qds. Hawaii (Pukui et al., 1974:174).

Pohoiki Coastal land section Kalapana qd. Hawai‘i. *Lit.* ‘small depression’ – Pele is said to have dug a crater here (Pukui et al., 1974:187).

Puna Quadrangle and district, southeast Hawai‘i land section and sugar mill, Kalapana qd.; forest reserves, Kalapana and Puna qds.; road, Hilo qd., Hawai‘i. Poetic (Hawai‘i): *paia ‘ala i ka hala,* bowers fragrant with pandanus; *ka ‘āina i ka houpo o Kāne* (*Pele and Hiiaka*, Emerson 218), the land in the heart of Kāne (Pukui et al., 1974:193-194).

ETHNOGRAPHIC DATA AND ANALYSIS

The Ethnographic Survey (oral history interview) is an essential part of the Cultural Impact Assessment (CIA) because the ethnographic data helps in the process of determining if an undertaking or development project will have an adverse impact on cultural properties and practices or access to cultural properties and practices. The following are initial selection criteria:

- Had/has Ties to Project Location(s)
- Known Hawaiian Cultural Resource Person
- Known Hawaiian Traditional Practitioner
- Referred By Other People

The consultants for this Cultural Impact Assessment were selected because they met the following criteria: (1) grew up, lives or lived in Pāhoa and/or Puna; (2) consultant is familiar with the history and *mo'olelo* of Kauaea, Pāhoa and/or Puna and vicinity; (3) consultant is a cultural practitioner of the area; (4) consultant was referred by other people. Copies of signed "Consent/Release" forms are provided [Appendix E and F].

In order to comply with the scope of work for this cultural impact assessment (CIA), the ethnographic survey was designed so that information from the ethnographic consultants would facilitate in determining if any cultural resources or practices or access to them would be impacted by the implementation of the Sanford's Services Center, Inc. mining expansion activities. To this end the following basic research categories or themes were incorporated into the ethnographic instrument: Consultant Background, Land Resources and Use, Water Resources and Use, Cultural Resources and Use; Anecdotal Stories and Project Concerns. Except for the 'Consultant Background' category, all the other research categories have sub-categories or sub-themes that were developed based on the ethnographic raw data (oral histories) or responses of the ethnographic consultants. These responses or clusters of information then become supporting evidence for any determinations made regarding impacts on cultural resources and/or practices including access.

Each person interviewed is asked to talk about their background; where they were born and raised, where they went to school and worked, and a little about their parents and grandparents. This category helps to establish their connection to the project area, their area and extent of expertise, and how they acquired their proficiency. In other words, how they meet the selection criteria. Ethnographic consultants either have family or personal ties to the project area/vicinity and/or are familiar with the history of the area.

There is always a danger of not allowing the consultant's "voice" to be heard; of making interpretations that are not theirs; and of asking leading questions. To remedy this, the "talk story" method is used and allows for a dialogue to take place, thereby allowing the consultant to talk about a general topic in their own specific way, with their own specific words. All of the excerpts used are in the exact words of each consultant or paraphrased to insert words that are "understood" or to link sentences that were brought up as connected afterthoughts or related additions spoken elsewhere in the interview.

There were extenuating circumstances regarding this project. The period between June and September 2015 was a particularly wary time with at least nine named hurricanes/tropical storms. The previous year one of the strongest tropical cyclones, Hurricane Iselle made landfall on August 7, 2014. "Public damage and the cost to remove debris was estimated at $13.2 million" (Stewart 2014). Pahoa was one of the Hawaii Island communities to have suffered the most with huge Albizia trees blocking main roadways. Stacks of tree trunks are still visible today.



Photo 25. Albizia tree limbs.

Many crops were damaged as well as private properties. So it was understandable that many Pahoa residents had much on their minds with the media and civil defense asking people to be prepared for this hurricane season. Agreeing to be interviewed for a CIA project was farthest from their thoughts.

Attempts were made to contact sixteen people. Three people were contacts from a previous (2013) archaeology survey. Two had telephone numbers that were no longer working and no new listings were available. One was interested and asked for maps and survey questions which were emailed to him. He later declined to be interviewed because he was from a neighboring ahupua‘a and felt he did not know the project area.

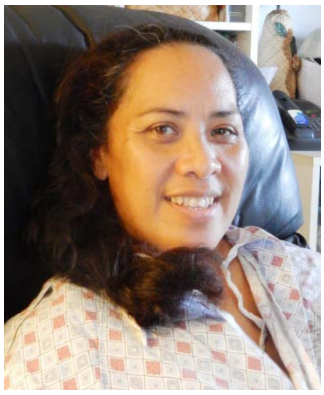
Thirteen “new” potential ethnographic consultants were contacted; two did not respond to phone calls, but later were visited in person. After talking with them for a while they both declined saying their deceased husbands were the cultural experts, not them. Two people did not respond to Facebook messaging. Six people declined to be interviewed saying they did not really know the project area specifically. Three people agreed to be interview, but one had to “get permission” and one could not be interviewed until September 13. The one person who needed permission never got back to me. One person was interviewed twice because of recorder issues while we were driving around the project area.

The following Table (7) is designed to provide a demographic view of the ethnographic consultants and how they met the selection criteria.

Table 7. Ethnographic Consultant Demographics.

Interviewee	YoB	Ethnicity	Connection to Project Area	Birthplace	Reside	Cultural Expertise
Piilani Kaawaloa	1965?	Hawaiian	Cultural Practitioner	Lower Puna	Pahoa	Hula/Lei/ Gatherer/Historian
Emily Naeole	1956	Hawaiian	Cultural Practitioner	Pahoa/Opihikaō	Maku‘u	Lei/Gatherer
YoB=year of birth						

Consultant Background. The following “Consultant Background” section provides an overview of the ethnographic consultant, as well as information about their families and their connection to the project area Kauaea/Kali‘u or Pāhoa/Puna. These vignettes are presented in alphabetical order of interviewee last names.



Piilani Kaawaloa. My name is Piilani Kaawaloa, I was born and raised in lower Puna, my parents are William and Minnie Ka‘awaloa. My parents have several properties throughout the lower Puna area that was given to them by Ali‘i. My grandmother’s side, Minnie Ka‘awaloa, her family has property within the Kilohana area, so that would be the Pe‘a, Elderts, the Kaheiki, Lonokapu, and so we have a house in Pahoa, in Nanawale, a house down at Kalapana, my grandmother has property down Koae, near Kapoho. We have property where people call Royal Gardens, we call it Pulama, and we also have property in Kalapana Gardens. My grandfather was an all-around kind of person, he loved to fish, he loved to hunt, and he would go to all these areas for specific items not just to go. My grandfather was also a bulldozer operator and he would help people clear their property and that’s how he knew about all these different places in the area because people would ask him to clear the land.

His name was William Kaawaloa. I was very fortunate to have been able to go with him during that time, watch how he bulldozed, the type of tree that he tried to preserve even when the landowner would tell him

to bulldoze the whole property. He would look at specific trees and bulldoze around specific trees and later on tell them how and why he saved those trees and how important. The landowner would not argue with him and later on they'd say, "I remember your grandfather, he came and he bulldozed our property and told us this and this and he was right". When I hear people come and share stories, not knowing that he had passed, is really moving and touching because you can see the wealth and knowledge of trying to save these plants.

I was raised by my grandparents. So they were my parents, they raised me like my parents and legally adopted me when I was a baby. Mary Jane Kamoku is my birth mother. Kaawaloa, everybody gets it mixed up, it comes from the bay, "the longest harbor" that's what our name means. A lot of people think because it's pronounced with the 'okina that it's "the longest awa drink" but it's the harbor. My grandmother was Minnie Elderts (Nahakuelua Elderts) Kaawaloa.

I went to Pahoa High and Intermediate and then I went the University of Hawaii at Hilo. My major was Hawaiian Studies and Education. I teach in Keaau, I use to teach at Honoka'a High School, the Hawaiian Emersion schools, Pahoa High and Intermediate. I did some classes at the University, and now I'm currently employed by Kamehameha Schools at Ke'eau, their campus. I took hula from my grandmother [Minnie Kaawaloa], I danced for George Na'ope when I was little and as I grew up, I also danced *hula* with Aunty Edith Kanaka'ole when she used to come down to Kalapana for Summer Fun, I took a lot from Aunty Pua Kanaka'ole Kanahele's classes at the University when she was teaching and I also danced for Uncle Johnny Lum Ho. I was little at that time but I used to see her [Aunty Iolani Luahine] when she used to come to the Puna area. I saw her dance, my favorite song was *'O Kona Kai 'Ōpua I ka La'i*, with the *kala au*. She was always smiling; she looked like she was always in another world. I never felt, like some *kupuna* you have that sense of fear, not her, she was soft spoken, very aloha.

I used to [have my own *halau*], when I taught at Pahoa High and Intermediate we had a group called *Napua Mai Ole* and it was a Hawaiian ensemble, I took them all over to various parts of the mainland, we toured in Tahiti. I had several different school groups and took them to several different places, when I was teaching out of the University with Napua Noeau we took them to Samoa and New Zealand. We went to the North Island, it's so beautiful. I went when we had to do research on the Puna Geothermal Adventure in 1980s, and I was sixteen at the time, I was one of those who were chosen to go down and study the effects of the geothermal on the native community and bring back information for our Puna community.

We went all over, Rotorua, Wellington, Taupo, everywhere place that had geothermal, we saw various sites where the different *marae* was displaced, we saw where the community just thrived from having the geothermal within their community. These were places where the steam, you are just driving and the steam is all over, not where they had to drill. So where the communities were thriving and the places where they had to drill, that were displaced. It was really interesting, and we went down to exchange cultures at the same time. My fondest memory was Papa John Rangihau, he was an elder at that time, and Tīmoti Kāritu, and he was a well-known professor for bringing back the language and the establishment of the Te Kohanga Reo. They came here to Hawai'i and that's how they met with Pila Wilson and started the Punanaleo, was through that.

It was quite an adventure, amazing experience, life changing experiences and it's not until you travel and you see how other people are steadfast, *pa'a*, in their culture. You know I thought I knew a lot about my culture and I better get to know more about my culture and that was one of those things that really taught me to appreciate about my grandparents and the knowledge that they had and to really pay attention. I was very fortunate to have learned from them and to be raised by them.

My grandmother would always say, "Don't fight for the land because the land will consume you". I used to wonder about that and I saw firsthand, my aunty went and fought for the land and a year later she died. You can pursue and once you come to a block, it's like they telling you don't go any further, enough. You said your piece, people know what and don't push it because then the land is going to consume you and that means you going be underneath.

Don't fight it because the land is going to eat you. To me the beauty of that ʻŌlelo Noʻeau, He aliʻi ka ʻāina, he kauʻa ke kanaka, the land is the chief, the people are its servants. They're going be here long after we die and all we can do is maintain - take care of the land, use it for our needs and then the land going take care of us. If we take care of the land, the land is going to take care of us; if all us humans leave the land alone, it's going to revitalize itself but every time we try to tamper, we do this we do that, we the losers because now look we don't have food to eat, the rain is not coming back. You hear all the complaints but whose fault, we are not being responsible to the chief.

# # #



Emily Kealoha Naeole. Aloha! My name is Emily Naeole, I'm going to be fifty-nine years old on September 23rd; I was born here in Pahoa, raised in Opihikaō. My parents were Gabriel and Mary (Makuakane) Kealoha. My father was from Kalapana, born and raised. My mom is Mary Makuakane and she was born and raised in Opihikaō, where we were brought up.

I went Pahoa School from Kindergarten to Twelfth Grade, I was eighteen when I got married and moved back to Pahoa and lived in the Pahoa area since I was nineteen years old. I have seven siblings, lost two brothers; I have five other siblings, six of us left. I live in Maku'u Hawaiian Homes, I have three daughters and one son and my late husband is Harold Yet Naeole.

Since I was ten years old I was a *maile* gatherer, I picked *maile* because was plentiful down in Opihikaō, and when I was in my later twenties I learned how to *haku* and made *lei poʻo*. So that's two of the ways I was connected to our culture, making *lei poʻo* and making *maile lei*s and that's why I went to the forest a lot, to gather my materials and the *maile* vines. That's why I know about the Puʻu Kaliʻu, I think the area is Kilohana, according to what I know of the olden names of Puna, I think that areas was called Kilohana.

I have a granddaughter that is named Kaliʻu, she just made eleven years old, my daughter Heidi Batalo, as a young person dancing *hula* she learned a *hula* called Puʻu Kaliʻu and that's why she named her daughter that. My daughter danced for the Kanakaole's, that's where she learned that dance about Puʻu Kaliʻu. That's why when I heard Sanford acquired that place, I told him that I have a granddaughter named after that Puʻu, so I wanted him to make sure to take care of that place because Hawaiian style, when get names it's very, very important when you name after something. So that was my *manaʻo* to Sanford.

The reason why I know Sanford is because I attended Pahoa School from Kindergarten to Twelfth Grade. I graduated from Pahoa High School in 1974, Sanford was my classmate, and we were classmates from Kindergarten to Twelfth Grade, for thirteen years and that's how I know Sanford. Throughout my adult life, because Sanford owns – he sells cinder and dirt; I've acquired those things from him to take care of my homestead land in Maku'u.

If Sanford never give me those breaks, where he would bulldozer and then I was able to pay so much until I paid my bill. When I buy cinder, I could make a loan of $1,000 to $2,000, and I would pay so much every month until I could finish paying. I'm glad that I have these kind of connections that I've known

since I was a kid, because I wouldn't be able to *malama* my homestead if I didn't get such breaks from certain people in my community and that's how I know Sanford from Kindergarten.

We didn't have much. We are in the middle of all these houses but didn't have jobs, the farmers, tourist and a lot of Filipinos on the Papaya Farm. I remember my Dad they were also papaya farmers, a lot of times in the early days the children was the work force, we were out in the fields picking papaya and weeds and doing all kinds of that stuff. I grew up as a farmer's daughter; actually our father was a fisherman. He went out fishing, that was another thing my dad did, and he used to work at the Maxwell Park picking up stuff, and I remember him on the side of the road, he used to work at a construction company, I think they were putting in water lines but I remember him with a jack-hammer. Raising eight children is a lot of work and you had a lot to do, so my dad - we used to gather a lot of stuff, guava, *lilikoi* - my parents actually gathered *opihi* as a means of survival, go down the beach. That was life in Puna.

In 2006 I ran for City Council, District 5 that was lower Puna consisting of ʻĀinaloa, the old Paradise Park, from Shower Drive all the way down to Kalapana. From 2007 and 2010, I was the City Council for this area and I really love my District.

# # #

Land Resources and Use. Land resources and use changes over time. Evidence of these changes is often documented in archival records. Cultural remains are also often evident on the landscape and/or beneath the surface and provide information regarding land resources and use. However, oral histories can give personal glimpses of how the land was utilized over time and where the resources are or may have been. The sub-categories below are developed based on the responses of people interviewed.

Project Vicinity and Resources

> Leilani Estates is before Kilohana. Leilani Estates is in a part of Malama, it goes like this, Malama, Keahialaka [Piilani].
>
> Puʻu Pilau, some people call it Honuʻula [Piilani].
>
> All up in this area is all Ohiʻa forest, before the reason why they called this place Kilohana, the people that lived in this area made the best *kapa*. So Kilohana means 'the choicest', 'the most beautiful.' When they made *kapa*, and the *wauke* grew up in there, grew so tall the nodes were so far apart that when you made *kapa* you wouldn't have to join, or cut off by the node and still be able to mesh together and continue making *kapa*. As a little girl I use to drive up with my grandfather and you could see *wauke*, today there are several houses up in that area - going Kilohana - going Mauka and Makai side…I don't know if they still have *wauke*, I never been there in a long time [Piilani].
>
> The other thing that is prominent in this area is the *ʻieʻie*, and right now because of the *ʻieʻie* really needs the *ohiʻa lehua* to climb, the part that is used, all of the plant is used but the part that is familiar to people is the root of the *ʻieʻie*, that is used to make the helmet for the *aliʻi*. They would gather that to make baskets for fishing. Very seldom you hear people weaving the leaves, but some people would use it in their *lei* for adornment. The flower is a beautiful orange. Lei makers will gather the flowers but it doesn't last as long; similar to *lehua*, it's very fragile but very beautiful. Right now the *ohiʻa* trees in the Puna area are suffering from that fungus disease, so it would be nice if they could be sprayed or some way to save the *Ohiʻa* forest [Piilani].



Photo 28. *ʻIeʻie* growing up *ʻohia* tree.

Even though, like the property now, they have that gate, and when I go to gather *ʻieʻie* I got to park my car right by the gate and walk all the way in to the *ʻieʻie*. But the gate that they have right now. Right by the steam vent there is a big black double gate [Piilani].

If you look, when you come down Opihikaō, heading to Kaimu towards Kikala, those areas, Keokea, you'll notice that the *ʻohiʻa* trees are being overgrown by the false *kamani*, *albizia*, the albizia is just growing rampant and the *ʻohiʻa* forest is dying. It's really sad to see this particular area [Piilani].



Photo 29. Non-natives encroaching on *ʻohia*.



Photo 30. Native *ʻohia lehua* forest dying.

Puʻu Kaliʻu Resources and Cinder Mining

Puʻu Kaliʻu, if you live in Opihikaō, you could look up the hill and see Puʻu Kaliʻu, because it was a pretty tall mountain, so the mountain has subsided during the years Bryson had the place and now over to Sanford Iwata, and Bryson's last name was Kuwahara and Bryson had that for ten years and it was turned over to Sanford. Bryson was mining the Puʻu Kaliʻu; he was taking out and selling it to people throughout the community and island. So Bryson was already mining Puʻu Kaliʻu before Sanford came and Bryson had some *pilikia*, and that's why his contract stopped and that's why Sanford took over from the Bishop Estates [Kamehameha Schools Estate] [Emily].

You got to go by Pahoa intersection by Pahoa High School, take a right, you got to go pass the site where Puʻu Kaliʻu is at, go to the Opihikaō Junction and go down the hill. As you are going down to the middle of or the bottom part of Opihikaō Junction then that's where you can look up and see the area of Puʻu Kaliʻu. The difference from when I was a child to now is that the hill has shrunk because they've been mining the cinders of the Puʻu for many years. I don't think there is a mountain anymore because it dissolved [Emily].

I know that they've been mining a lot of cinder and gravel, if they are planning on expanding towards Kilohana, then they'd be expanding into some beautiful forest…. They are getting really close to Kaliʻu, and Kaliʻu is a little up [Piilani].

[Puʻu Kaliʻu] Lots of forest, you got to be real careful when you are going into that area, and like I said I would only go with my grandfather and he was the navigator into those kinds of places, and what we would go for was to look for *ohiʻa* logs to make *ulua* poles, so certain types of *ohiʻa* logs would be gathered but not a lot [Piilani].

Lots of uneven ground, plenty of *uluhe*, false staghorn ferns, so you cannot see underneath and you could fall, there's plenty area that is unsafe and unpredictable, you would think the *ohiʻa* tree is short but it's in a crevice or *mā wae*. You have a lot of native plants in that area, like

everywhere there is invasive species. Certain *laʻau lapaʻau* was gathered in that area, the medicinal plants [Piilani].

Because when you go up the road, the road turns this way and you can get red cinder or red rock and then you go up, if you go straight, you can go to the quarry area to get your different size gravel. Then you can go further up and go left or continue to go straight and that where they were grading and opening up for new cinder, like black cinder, gravel, sort of like sand but more fine grade to make cement. If you are talking about that area, on weekends they are closed and there is a big black gate, right over there is a nice spot to gather *ʻie'ie*. When you go there, get *hāpuʻu*, beautiful, beautiful *hāpuʻu* all inside there, and on the backside of Kaliʻu, families were living up inside, they planted anthurium, get *ʻawa* plants [Piilani].

There are a lot of native plants in that area, plenty *ohiʻa, ʻieʻie, uluhe, maile*. I never saw māmane but *māmaki*, yes. *Maile hohono. Maile hohono* was use for chicken pox and rash, you would think that's rubbish plant, you'd go poison but. A lot of times we'd go and gather medicinal plants we go up and stay off the highway because that's where nobody touched, nobody poisoned, nobody do nothing [Piilani].

When I went with my grandfather, we went looking for *ohiʻa* so I really cannot say if I noticed any native birds up in that area. I was told to watch out for wild pig and watch out where I'm stepping. *Maile*, I definitely know, *ohiʻa lehua, waiwaiʻole*, those underbrush plants, plenty *aʻa*.

We are coming to the forest…there's a lot of ohia trees - something is killing our *ʻohia* trees. I see some kukui nut, a lot of these trees look like they are dying…when we were coming in I saw *mamaki*, right there, see that bush right up there near that other plant. So there's a lot of vibrant bush up here, a lot of the *ʻohia* seems like its dying, all the leaves are falling off [Emily].





Photos 31 and 32. Cinder mining operation

I know a few hunters that would go up there, I don't know if my cousin Rocko and his kids still go…mainly [for] pigs. Who else do I know that would go *holo holo* in that area? I'm not sure if the Aiona family or the Kuhiwinui's, my cousin Alan Kahoʻokaulana, he presently lives in Kikala and that's right above, in the Black Sands Subdivision area [Piilani].

I know there are a few legends that talk about Kaliʻu, Puʻu Kaliʻu but I can't recall some of these legends. There are some reference in the old newspaper, I think there is mention in David Malo, I'm not sure if Fornander in his collection has Puʻu Kaliʻu, it just stands out in my head, Fornander [Piilani].

About a month ago we took a drive up to the site where Puʻu Kaliʻu exists and then we went down the road down into a ditch [pit area] where they are mining cinders and there was a guy with a truck, I think he's a grader and he loads up the people that goes down there to get cinder. I think some of the things that we've seen was a *lama* tree, *mamaki* tea plant, *ʻohiʻa* trees, a lot of those *ʻohiʻa* looks like it's a kind of sickness where it kind of drying up and dying. I think it's a

problem with the *'ohi'a* in the State of Hawaii, right now are having an issue with some kind of bug. We saw *'ie'ie* climbing up the *'ohi'a* trees, what else did we see? We took a drive in [the area] and were looking at the various plants and things that existed throughout the area [Emily].

Ohana Lands.

I'm not really sure on the acreage but it's a huge amount of land and it's all subdivided by the family, you have the Kaheiki, the Pe'a, the Elderts, all those are family names that are on the property. Young is another name, because I remember the family still is in the house that's there, like some of the other family like my cousin Rocko Kaheiki still farms on some of the property. There's a side road from Kilohana that goes down into that area but it doesn't meet another street it just goes down to a dead end, and there's the steam vents [Piilani.

Lava Tubes

There are just craters that go underneath, lava tubes that go underground to this area over here. A lot of places in Leilani Estates have lava tubes, because I've been to many properties that the property sink, like a few of my Tahitian friends. One of them lives on Pomaika'i Street, in Leilani Estate, after she bulldozed and put cinder, certain areas sank because of the underground lava tubes [Piilani].

Water Resources and Use. The Hawaiian word for fresh water is *wai;* the Hawaiian word for wealth is *wai wai.* This is because of the value the ancient Hawaiians placed on fresh water, which was crucial for growing taro, the staple of the Hawaiian people using the *'auwai* or irrigation system. 'Steam' has been included in this category because there are steam vents in the vicinity.

Steam Vents

You wouldn't know that it's steam vents anymore because of the bushes, but right on the main highway when you get to that place, right before you go down to Opihikaō, that use to be in the area that families would go if you were sick. You'd sit in the cave and inhale the steam, so if you had asthma or caught a cold. You wouldn't just go, just to go, it's a place of healing, a lot of outsiders found out about the place and go do all kinds of stuff and it became desecrated. There's not as much steam as before and of course the activity of them wanting to build the geothermal plant, so you lose the steam somewhere along the line [Piilani].

So Leilani Estates starts from the top and it goes all the way by Pu'ulena and you come out by the bottom right where the geothermal plant is [Piilani] (see Figure 2).

Consultant Concerns/Recommendations. This special section is included when ethnographic consultants share their concerns and/or recommendations about the project in general. The interviewees shared many concerns. The sub-categories were developed based on responses of the interviewees.

Cultural Sites

I think what we would really appreciate is, if they came across an area and immediately stopped and called somebody who lived within the area and not just people that would side with them but get everybody's input and make a determination and say, okay we are going to save this as historical value. What happens a lot of the times they think it is not important anymore, they don't practice it, but even though you don't practice it in your everyday life it could be an educational component to the next generation. They can make it accessible and safe and these different educational groups can come and relate stories and the history and practice so these area but if they are going to continue to bulldoze it, eliminate it, you can never rebuild it again, you can never study it and look back to what our *kupuna* did, you can never value it anymore, it's gone forever.

That's the sad part of development and progress, a site is different from bones to me, bones you can relocate, you can still go to a place and visit them, re-bury them, reinter them but once you bulldoze a *heiau*, once you bulldoze the *pu'u*, you can never rebuild that *pu'u*. When you tell the *mo'opuna*, before it used to be Pu'u Kali'u over here, and they look at you like and what did they *pu'u* look like and what about this *pu'u* and that it was so significant to this community. It's like the lava flow, the lava flow makes a crater and it is given a name, it's like birth, you give a child that name and that name has a relationship to that activity or event and at a particular time and so it reference what the people went through at that particular time [Piilani].

I'm not against development if it's done in a respectful way that includes the entire community, the input from the different families in the community and certain things can be incorporated within the development. If there can be a collaboration in utilizing the place for the people trying to make money, by all means, but if the corporation or the developer is just there to develop and never mind about the purpose or the community then no [Piilani].

Community Needs

The land here in Hawaii has a lot of *pohaku*, you need to get cinder, you need to get dirt and without that you can't grow. I have an example; I have a five acre lot in Maku'u and I had it in July 2015, for thirty years, and planting all those things on my land, I have acquired thirty plus semi-trucks of cinder and dirt, I think more, between thirty and fifty semi-trucks of dirt and cinder because I wouldn't be able to cultivate what I'm growing on my land. So a lot of people in this community, Puna area, even Volcano and Hilo, people get cinder and dirt to plant on their land. We are not like Hāmākua where they get a lot of dirt; over here in Puna we have a lot of rocks. A lot of our land requires a lot of cinder and a lot of dirt; I'm just talking about experience of what kinds of things we need on our *'āina* to just try to grow something. There is not a lot of companies now in the Puna area that do sell cinder and stuff, because what is happening is that the resources are thinning out, they've been mining different Pu'u's for quite a while and I don't think the resources is that much plentiful anymore, but we still need to plant and if we are going to plant we still need the cinder and dirt [Emily].

To me, if we were mining it for ten years, I don't see it as being a problem. It's something that we do need here in our Puna area. I just want to say that for whoever makes the final decision is that just to survive here is kind of rough and I'm just speaking through experience of my life living in Puna. My planting is now a really big thing for me, it's kind of like my therapy for recovery [Emily].

CIA SUMMARRIES

This cultural impact assessment (CIA) is based on two guiding documents: Act 50 and Environmental Council Guidelines (1997) [see Appendices A & C]. H.B. NO. 2895 H.D.1 was passed by the 20th Legislature and approved by the Governor on April 26, 2000 as *Act 50*. The following excerpts illustrate the intent and mandates of this Act:

> The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit' in Hawai'i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.
>
> Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.
>
> The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.

Summary of Findings

The following summaries are based on the information presented in the previous sections: the traditional (cultural) and historical literature background review and the ethnographic data and analyses. References are not cited unless it is new information and not already cited in the text above. These summaries condense the information above, but also serve to focus on a few significant individuals and events in history in relation to the project lands in the *ahupua'a* of Kauaea, Pāhoa, Puna District, Hawaii Island. It will give a broad overview of land, water and cultural resources and uses in the general area, as they reflect cultural resources (properties) and practices and access to them, as well as share the concerns and recommendations of the interviewees.

Summary of Significant People and Events. According to traditional and historical material, most of the land in Hawai'i has gone through land modifications over time, including the lands of Kauaea Ahupua'a, and have witnessed the comings and goings of many significant people. Some of these people may have contributed substantially not only to the history of this area, but of the Puna District and the rest of the Hawaii Island as well. There were several people and events noted in the oral histories. Some of these significant entities traversed these lands or vicinity.

Legendary Entities. The mythical residents of Puna were:

- Kane. Before Pele arrived in Puna, it was known as the 'Land in the bosom of Kane' as there was no place in the islands more beautiful than Puna.
- Pele. Volcano or fire goddess Pele left evidence of her visits in the form of *pu'u* which dot the landscape, as well as legends connected to these *pu'u* or volcanic cinder cone vents.
- Hi'iaka. Sister of Pele; Puna was her beloved forest lands where forests of *'ohia lehua, maile, 'ie'ie and hala* thrived. Hi'iaka specifically mentioned her *lehua* forest of Kali'u.
- Hopoe. The beloved friend of Hi'iaka who made garlands of the lehua blossoms of Kaliu, whom Pele in a fit of anger changed into a 'dancing stone' in the sea of Lanahiku.

Legendary Aliʻi Nui. The following were ancient Puna chiefs in legends. Ancient ruling Puna families (Kūmākaha and later I) were connected or related to ancient Kaʻū families (Mākaha).

- Kumu-Kahi a chief who competed with Pele in ancient games but one day when she appeared as an old woman he insulted her. In her anger she transformed into a fountain of lava and chased him to the sea where she covered him and beyond with lava.
- Papa-lau-ahi was a chief who at one time ruled the district of Puna. He excelled in the sports of the people. He challenged the neighboring chiefs to personal contests of many kinds and almost always was the victor. Pele appeared one day and challenged him in a sled race. He beat her then taunted her. She became angry and stamped on the ground and floods of lava broke out, destroying many of the chiefs as they fled in every direction. She swept Papa-lau-ahi up in the flames of fire, destroying him and all his possessions.
- Ke-lii-kuku of Puna visited Oahu and bragged to Kane-a-ka-lau of Kauai, who was a prophet of Pele, that his country is charming, abundant with rich sandy plains, where everything grows wonderfully. The prophet ridiculed him, saying: "Return to your beautiful country. You will find it desolate. Pele has made it a heap of ruins. The trees have descended from the mountains to the sea. The *ohia* and *puhala* are on the shore. The houses of your people are burned. Your land is unproductive. You have no people. You cannot live in your country anymore." He hurried back home. There in the distance it lay under heavy clouds of smoke covering all the land. When the winds lifted the clouds, rolling them away, he saw that all his fertile plain was black with lava, still burning and pouring out constantly volumes of dense smoke. The remnants of forests were also covered with clouds of smoke through which darted the flashing flames which climbed to the tops of the tallest trees. He hung himself in despair.
- Ka-Pa-Pala was another chief who heard of Pele. He went to the edge of the crater and there found a group of beautiful women. He was welcomed by Pele and played many games and contests. The chief was so frequently the victor that at last he boasted that he could ride his surfboard on the waves of her lake of fire. She was angry at the thought that he dared to desecrate her sacred home. Pele became very angry as she saw him fleeing from her over the lake of fire, so she called to her fire-servants, the au-makuas, or ghost-gods, of the crater, and they hurled other fire-waves across the lake against the one the chief was riding. The chief and his surf-board were tossed up in a whirlpool of fire. Then he dropped into the heart of the flame and was lost.
- Huaʻa and ʻImaikalani – were noted chiefs of Puna who were killed by ʻUmi-a-Līloa
- ʻImakakoloa was a Puna chief who became powerful during the time of Kalaniopuʻu; was a descendant of ʻImaikalani through the I family of Hilo who controlled parts of Puna

Legendary Ohana and Aliʻi Nui. One of the first legendary people or families who impacted the history of Hawaiʻi was the Nanaula family who settled the southern Hawaiʻi islands around the 6th century along with other families from Tahiti and/or Samoa and brought their Polynesian traditions. They peopled all the islands for thirteen or fourteen generations, but acknowledged that another group had come before them. During the 10th century the Paumakua family arrived from Tahiti; they are tied to the Hua family from Lāhainā, Honokahua and Hāna, who were on Maui at least a century before. These people are the ancestors of many of the families of all the islands. During the 11th century the Nanamaoa family from the Society Islands established families on the islands of Hawaiʻi, Maui and Oʻahu. During this period the descendants of Paumakua were Haho (who started the *Aha-ali`i*), Palena, Hua, Hanalaʻanui, Hanalaʻaiki (twins and progenitors of Maui and Hawaiʻi Island *aliʻi nui*), and Mauiloa, were well established on Maui and Hawaiʻi Island. The Nanamaoa families were shortly followed by Paʻao and Pili who came (some say from Society Islands, othesr say Samoa) after Kapawa, grandson of Nanamaoa, and appear to have changed the religious and social structures of the island chiefdoms, bringing with them the concept of *aliʻi nui,* and the Kū cult which included human sacrifice. Around the beginning of the 12th century great voyages took place to and from the southern islands, but stopped abruptly around the end of that century, during the time of Wakalana around AD 1175, right after the arrival of white foreigners, possibly from Japan. Most of the islands were ruled by the southern families who were descendants of the ancient Nanaʻulu - Ulu lines, with the exception of Molokai (Kamauaua family) and parts of Oʻahu (Maweke family).

The Hāmākua polity was dominated by Waipiʻo until about early to mid-A.D. 1300s and held the political power on Hawaiʻi Island. The Waipiʻo rulers of that period include ʻOlopana, son of Maweke (Oʻahu ruling chief) – ʻOlopana left Waipiʻo after a severe flood and went to Kahiki; Kunaka (he adopted Kila, son of Moʻikeha, ruling chief of Kauai and younger brother of ʻOlopana); and Kapawa who was the first to be born at Kūkaniloko, royal birthplace on Oʻahu. Kapawa was the grandson of Nanamaoa [line] who's son Nanakaoko and his wife Kahihiokalani built Kūkaniloko; chiefs born there were considered to be "born in the purple" and entitled to all the distinction, privileges and *kapu* it conferred. However, the oral histories also illustrate a continued interaction and relationships between the island polities: the granddaughter of Kohala's *aliʻi nui* married the son of Oʻahu's *aliʻi nui*; Kunaka of Waipiʻo adopted Kila, the son of Mo'ikeha *aliʻi nui* of Kauai. It is in the Kila *moʻolelo* that the Waipiʻo heiau Pāka`alana is first mentioned – it is claimed to be both a *puʻuhonua* (place of refuge) and a *luakini* (human sacrifice) *heiau*; Kila is also credited with establishing the *koʻele* tax (working in the taro fields for the *aliʻi* one day a week) for his father *aliʻi nui* Kunaka.

Famous chiefs and long voyagers were (1) ʻOlopana, his wife Luʻukia and his brother Moʻikeha; (2) Kaumailiʻula, Kaupeʻa; (3) Hoʻokamali`i, Haulaninui-ai-ākea, Kila (sons of Moʻikeha); (4) Laʻamaikahiki, friend of Moʻikeha - he brought the *kāʻeke hula* drum, a new god and the outrigger; (5) Kahaʻi-a-Hoʻokamaliʻi – brought back breadfruit; (6) Paʻao – who brought new religion and priesthood and became the keeper of Kūkaʻilimoku. Paʻao first landed in Puna and here in Puna he built his first *heiau* for his god Ahaʻula and named it Ahaʻula [Wahaʻula]. It was a *luakini*. Pili – was the first *aliʻi* of the new ruling system; (7) Kaulu-a-Kalana – brought back edible mud to Kawainui; (8) Paumakua (he brought white men); (9) ʻOlopana II, Kahikiʻula; (10) Keānini, Haʻinakolo; (11) Kamaunu-a-Niho, Humu, Kalana-nuʻu-nui-kuamaomao; and (12) Kamapiʻikai who made four voyages, three were two-way.

It was during the A.D. 1400s-1500s of this period that descendants of the Pili line consolidated the Hawaii Island polities and unified the island under one kingdom. Pili (ca. A.D. 1320); Koa (ca A.D. 1340-1360), ʻOle (ca A.D. 1360-1380), Kūkohau (ca A.D. 1380-1400) [the last three may have been siblings or sons of Pili]; Kaniuhi (ca A.D. 1400-1420); Kanipahu (A.D. 1420-1420) who was usurped by Kamaʻiole; Kalapana (A.D. 1440-1460) who brought down Kamaʻiole the son of Kanipahu; Kahaʻimoeleʻa (A.D. 1460-1480) son of Kalapana; and Kalaunuiohua (A.D. 1480-1500) grandson of Kalapana. Both Kalapana and his son Kahaʻimoeleʻa had their royal residence in Waipiʻo.

The following were ruling chiefs ca A.D. 1500-1600: Kūāiwa who appointed his junior son Ehu as chief of Kona and another junior son Hukulani as chief of Kohala and was succeeded by his oldest son Kahoukapu as ruling chief of Hawaii Island (A.D. 1520-1540); his son Kauholanuimahu (A.D. 1540-1560) was the next ruler who sometimes resided on Maui on his wife's lands; his son Kihanuilūlūmoku (A.D. 1560-1580) followed [The *moʻolelo* 'Kiha Pu' is about this Kiha, not Kiha-a-Piʻilani of Maui who may have been related through Kihanui's wife] - he lived and reigned in Waipiʻo as did his son Līloa (A.D. 1580-1600) who ruled next; his junior son ʻUmi (A.D. 1600s) usurped Līloa's oldest son Hākau (A.D. 1600-16??).

During the reign of Hawaii Island ruling chief Līloa, high chiefs were appointed by him to the districts of Hilo, Puna, Kaʻu, and Kona. Līloa also made regular journeys around the island checking on his people, farmlands and *heiau* - rededicating many of them (e.g. Kūkuihaele, Waikoekoe, Kapulena, Kawela and Pāʻauhau in the Hāmākua District; Pakaʻalana in Waipiʻo was the main *heiau*, ancient even in his time, and under the care of the Paʻao line of *kahuna pule* who looked after Līloa's major god Kūkaʻilimoku and Lono during Makahiki. His royal residence was called Kahaunokamaʻahala, located just behind the sand dunes along Wailoa Stream and adjacent to his heiau Pākaʻalana. Līloa's highest ranking wife Pinea was his mother's youngest sister from the Oʻahu line with whom he had Hākau his successor; another wife Haua was a Maui chiefess; and from his union with Akahiakuleana of Hāmākua, he had ʻUmi-a-Līloa, who inherited Kūkaʻilimoku upon Līloa's death. Hākau's reign was short-lived due to his supposed abuse

of his priests; ʻUmi and others plotted and executed his death.

ʻUmi had several wives including Piʻikea, daughter of Maui ruling chief Piʻilani. The end of this period ends in the death of ʻUmi followed by the death of his successor son Kealiʻiokāloa. Warfare broke out between the chiefs because one group of chiefs favored ʻUmi's younger son Keawenui-a-ʻUmi and another group of chiefs favored Kūkaʻilani, the son of Kealiʻiokāloa, who was still a child. Keawenui-a-ʻUmi defeated the opposing chiefs who either died in battle or where later executed. Keawenui-a-ʻUmi had many residences; his primary court was in Hilo, but he had a major residence in Nāpoʻopoʻo at Kealakekua Bay where his son Lonoikamakahiki was born to Haokalani (Oʻahu chiefess – Kalona-iki or Ehu line); another residence was in Waipiʻo, Hāmākua District. Upon the death of Keawenui, his eldest son Kanaloakuaʻana became regent/king until his younger brother and Keawenui's heir, Lonoikamakahiki had passed certain tests. Lono and his wife Kaikilani-Aliʻi-Wahine-o-Puna (daughter of Kealiʻiokāloa, oldest son of Keawenui) traveled throughout the islands and were subjects of epic *moʻolelo*. After the death of Hawaiʻi Island *aliʻi nui* Lono-i-ka-makahiki, his children did not succeed him. Instead Hawaiʻi Island was divided into smaller divisions. This was not a peaceful period. The battles between the Hawaii Island families, factions and district chiefs continued during the later part of the Proto-Historic/Historic Period (A. D. 1650-1795) up to the time of Keawe, Alapaʻinui, Kalaniopuʻu and Kamehameha I.

Aliʻi nui of Hawaiʻi Island (Wiki Aliʻi 2015)

- Kapawa
- Pilikaʻaeia, 1125-1155
- Kukohou, 1155-1185
- Kaniuhu, 1185-1215
- Kanipahu, 1215-1245
- Kamaʻiole, usurper of Kanipahu, deposed by Kalapana, 1245-1255
- Kalapana, 1255-1285
- Kahaʻimaoeleʻa, 1285-1315
- Kalaunuiohua, 1315-1345
- Kūʻaiwa, 1345-1375
- Kahoukapu, 1375-1405
- Kauholanuimahu, 1405-1435
- Kihanuilulumoku, 1435-1465
- Līloa, 1465-1495
- Hākau, 1495-1510

Unbroken line of rule to this point. Hakau, Liloa's first born and named heir was overthrown by Liloa's second son Umi-a-Liloa, however, the hereditary line of Liloa is unbroken and continues.

- ʻUmi-a-Līloa, 1510-1525
- Kealiʻiokaloa, 1525-1545
- Keawenuiaʻumi, 1545-1575
- Kaikilani (female), 1575-1605
- Keakealanikāne, 1605-1635
- Keakamāhana (female), 1635-1665
- Keakealaniwahine (female), 1665-1695
- Keaweʻīkekahialiʻiokamoku, 1695-1725, co-ruler with his half-sister wife Kalanikauleleiaiwi

Hereditary line of Liloa is broken by the usurping rule of Alapainui.

- Alapaʻinui, nephew of Keaweʻīkekahialiʻiokamoku and usurper of his son; 1725-1754.
- Keaweʻopala

The usurping line of rule ends with Keaweʻopala who is killed in battle while his son and heir, Kalaimanokahoʻowaha did survive to greet Captain James Cook. The hereditary line of Liloa resumes through the grandson of Keaweʻīkekahialiʻiokamoku, Kalaniʻōpuʻu.

- Kalaniʻōpuʻu [Kalaniʻopuʻu unified his control over Hawaii Island when he gained control of Kaʻu and Puna following Alapaʻi's defeat in a battle at Mahinaakaka. During Kalaniʻopuʻu's rule, the Puna chief, I-maka-koloa, attempted a rebellion and seized the valuable products of the district including *ʻoʻo* and *mamo* bird features, hogs, fine mats made from pandanus blossoms and from young pandanus leaves, gray tapa cloth, and tapa cloth made from *mamaki* bark.]
- Kīwalaʻō, April 1782-July 1782, *Aliʻi* of Kaʻū

Kalaniʻōpuʻu's line ends with the death of Kīwalaʻō by Kamehameha's forces.

- Kamehameha I

Noted Puna Chiefs:

- Huaʻa
- ʻImaikalani
- ʻImakakoloa

Significant Ancient Events and Practices. Hawaiʻi Island and then Maui Island were the first two Hawaiian islands born to Papa, the earth mother, and Wākea, the great sky god. The first human settlement (ca AD 300-600) [this date has been challenged] on Hawaiʻi Island occurred on the windward side - Hāmākua District (Waipiʻo, Waimanu). For over 500 years after the initial settlement, permanent settlement spread out from Waipiʻo and Waimanu into the wet areas of Kohala, eastern Hāmākua to Hilo Bay and into the wet areas of Puna with Waipiʻo and Hilo becoming the dominant polities during this early phase.

Certain practices were universal Polynesian customs which the 'Hawaiians' brought from their homeland; such as the major gods *Kane, Ku* and *Lono*; the *kapu* system of law and order; *puʻuhonua* (place of refuge); ʻ*aumakua* (ancestral guardian) concept; and the concept of *mana* (supernatural or divine power). The distinct natural phenomenon of Hawaiʻi Island were most likely obvious to early settlers – the snows of Mauna Kea and Mauna Loa, the lava flows of Mauna Loa, Kīlauea and Hualālai and the probable earthquakes and tsunami. Ceremonies were likely developed to appease the deities connected to these places and events; oral traditions mention volcano gods prior to the arrival of Pele and her family. Other than ceremonials sites (for bird-snarers, adze-making, *heiau* and smaller *ahu* or small shrines; often cairns or single or multiple uprights, sometimes platforms or pavings), burials were a very significant practice in ancient times.

During the Developmental Period (AD 600-1100), changes occurred bringing about a uniquely Hawaiian culture, documented by the material culture found in archaeological sites. The adze (*koʻi*) evolved from the typical Polynesian variations of plano-convex, trapezoidal and reverse-triangular cross section to a very standard Hawaiian quadrangular-tanged adze. A few areas in Hawaii produced quality basalt for adz production. Mauna Kea on the island of Hawaii was a well-known adze quarry. The two-piece fish hook and the octopus lure bread-loaf sinker are Hawaiian inventions of this period, as are the ʻ*ulu maika* stones and the *lei niho palaoa*. The later was a status item worn by those of high rank, indicating a trend toward greater stratification, although evidence also indicates that the "ancestral pattern of corporate descent groups" were still in place.

Contact/Historic People of Puna/Pāhoa. The first missionary to journey through Puna was William Ellis in 1823. In his published journal he described the natural resources available to the residents of the district and some of their living conditions and subsistence and exchange practices. He estimated that there were approximately 725 inhabitants at Kaimu and another 2,000 Hawaiians in the immediate vicinity along the coast. At Kauaea, about three and a half miles from Kaimu, he reported, 300 people gathered to hear him preach.

Only one Land Commission Award (LCA) was awarded in Kauaea. LCA 7713*H was awarded to Victoria Kamamalu, Kuhina Nui of the Hawaiian Islands between 1855 and 1863. This LCA is depicted on a map of Kauaea Ahupua‘a by D.B Lyman…. The original Lyman map, which belonged to Princess Ruth Keelikolani, [was] made by E. Baldwin in February 1882. According to the map, Kauaea encompassed 2,449 and ¾ acres.

Summary of Land, Water and Cultural Resources and Use of Project Area

Various resource use patterns are physically evident as well as recounted in the literature. The physical evidence remains in the form of landmarks, stone ruins that are fortunate to have been preserved relatively intact and cultural material remains (surface and sub-surface). Clues regarding function and use can sometimes be extrapolated from the stories, songs, chants and ethno-historical observations that were also fortunately recorded or passed on; and the continuing cultural practices of today’s people of Pāhoa/Puna.

Gathering Practice. Based on the archival literature and ethnographic data the project area (Table 8) has an abundance of flora that has been and is considered cultural resources and gathered and used in cultural practices, both traditionally and currently.

Table 8. Cultural Resources and Gathering Practices in Project Area

Common Name	Hawaiian Name	Binomial Nomenclature	Cultural Uses
candlenut	*kukui*	*Aleurites moluccana*	food, oil, lei, tattoo ink, kapa dye, canoe parts
coconut	*niu*	*Cocos nucifera*	food, drink, container, oil, fiber, drums, thatch
fern-bird nest	*‘ākaha/‘ēkaha*	*Asplenium nidus*	medicine, used in hala mats, ceremony
fern	*hāpu‘u*	*Cibotium Sp.*	food, pillow stuffing, gardens
fern	*laua‘e*	*Microsorum grossum*	hula altars, adornment, scenting kapa, lei
fern	*palapalai*	*Microlepia strigosa*	lei, hula altars
fern-false staghorn	*uluhe*	*Dicranopteris linearis*	medicine
Hawaiian raspberry	*‘ākala*	*Rubus hawaiensis*	food
Hawaiian raspberry	---	*Rubus macraei*	food
maile	*maile*	*Alyxia oliviformis*	medicine, lei, fragrance
māmaki	*māmaki/māmake*	*Pipturus albidus*	medicine, tea
‘ōhi‘a lehua	*‘ōhi‘a lehua*	*Metrosideros polymorpha*	house & *heiau*, fishing pole, canoe parts, lei
screw pine	*hala*	*Pandanus tectorius*	medicine, mats, hats, cordage, brush, lei, scent
screw pine vine	*‘ie‘ie*	*Freycinetia arborea*	lei, fish traps, basket, cordage, medicine
ti	*ti*	*Cordyline sp*	medicine, liquor, hula, ceremony, cooking

Two other practices in the project area include pig hunting and getting cinder for gardens. While there are remnants of traditional trails within the project area they are not in the impact area.

General Concerns and Recommendations of Interviewees Regarding the Proposed Project:

- Cultural Sites Protocol: if previously unidentified sites are discovered, stop, call someone from the area for input and determination (record info or preserve site);
- Make sites and/or gathering resource areas accessible and safe for educational/cultural groups or individuals [The summit of Pu‘u Kali‘u is culturally sensitive];
- Be aware and avoid the Newell’s Shearwater birds nesting grounds;
- I’m not against development if it’s done in a respectful way that includes the entire community, the input from the different families in the community and certain things can be incorporated within the development. If there can be a collaboration in utilizing the place for the people trying to make money, by all means, but if the corporation or the developer is just there to develop and never mind about the purpose or the community then no;
- There is not a lot of companies now in the Puna area that do sell cinder and stuff, because what is happening is that the resources are thinning out, they’ve been mining different Pu’u’s for quite a while and I don’t think the resources is that much plentiful anymore;
- To me, if we were mining it for ten years, I don’t see it as being a problem. It’s something that we do need here in our Puna area.

Environmental Council Guidelines Criteria in Relation to Project Lands:

According to the Environmental Council Guidelines, the types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, religious and spiritual customs. The following actions were taken to meet the EC Guidelines Criteria for conducting this cultural impact assessment based on the SOW:

1) *conduct historical and other culturally related documentary research*;

Documentary research, particularly on identifying traditional and cultural uses of the area, was completed. Much of what is known about the traditional and cultural uses of the area comes from written records that tell of its prehistory (e.g. *mo‘olelo*; 19th century ethnographic works; and missionary journals); the stories associated with area uses by early Hawaiians; and scientific studies (i.e., archaeological, botanical, geological, biological).

2) *identify individuals with knowledge of the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua‘a; or with knowledge of the area potentially affected by the proposed action* [*e.g. past/current oral histories*];

The project lands have been in continual use since ancient times, however, not in exclusive *kanaka maoli* use since Contact. The interviewees were selected because of their use and knowledge of the project area.

3) identify and describe the cultural resources, practices and beliefs located within the potentially affected area;

Archival research in Cultural and Historical Background Review and ethnographic research (Ethnographic Data Review and Analysis) produced the data utilized to identify and describe the cultural resources, practices and beliefs located within the potentially affected area in the *Summary of Findings* above. The cultural resources, practices and beliefs were also illustrated in Table 8 above.

4) and assess the impact of the proposed action on the cultural resources, practices and beliefs identified.

Cultural Impact Assessment

The undertaking or proposed action - the expansion of the Sanford's Service Center, Inc. cinder mining operation, includes the western and southern flank of Puʻu Kaliʻu. The ethnographic consultants would like to see that the cultural resources of this area are protected and that access will be allowed for gathering practices and pig hunting; project concerns are listed above. The License between Sanford's Service Center, Inc. and Bishop Estate specifically prohibits further mining of the portion of Puʻu Kaliu which includes the summit outside of the "OVERALL AREA" as shown on the map. Sanford's Service Center, Inc. has not mined the summit of the Puʻu and is currently mining in a direction away from the Puʻu. The proposed buffer areas totaling 21.033-acres would minimize impacts to forested areas. Cultural impact will be a non-issue for this project since the expansion will not jeopardize the summit of Puʻu Kaliʻu - the Newell's Shearwater nesting grounds and a USGS triangulation station or access to cultural resource areas.

It is recommended that Sanford's Service Center Inc. develop a Cultural Advisory Group to include the Puna Aha Council representative, a member of the Kaawaloa Ohana who borders the project area and a member of the pig hunting association or group if one is available. It is also recommended that Pono Pacific and/or Fish & Wildlife Service be contacted to help determine where the Newell's Shearwater birds are nesting on Puʻu Kaliʻu; as well as follow up with the managers of the Lowland Wet Forest.

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APPENDIX A
Act 50 SLH 2000
A BILL FOR AN ACT RELATING TO
ENVIRONMENTAL IMPACT STATEMENTS
[UNOFFICIAL VERSION]
HOUSE OF REPRESENTATIVES H.B. NO, 2895 H.D.1
TWENTIETH LEGISLATURE, 2000
STATE OF HAWAII
A BILL FOR AN ACT
RELATING TO ENVIRONMENTAL IMPACT STATEMENTS.
BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. The legislature finds that there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawai‘i's culture, and traditional and customary rights.

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit' in Hawaii. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.

SECTION 2. Section 343-2, Hawai‘i Revised Statutes, is amended by amending the definitions of "environmental impact statement' or "statement" and "significant effect", to read as follows:

"'Environmental impact statement" or "statement" means an informational document prepared in compliance with the rules adopted under section 343-6 and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic [and] welfare, social welfare, and cultural practices of the community and State, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects, and alternatives to the action and their environmental effects.

The initial statement filed for public review shall be referred to as the draft statement and shall be distinguished from the final statement which is the document that has incorporated the public's comments and the responses to those comments. The final statement is the document that shall be evaluated for acceptability by the respective accepting authority.

"Significant effect" means the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State's environmental policies or long-term environmental goals as established by law, or adversely affect the economic [or] welfare, social welfare[.], or cultural practices of the community and State."

SECTION 3. Statutory material to be repealed is bracketed. New statutory material is underscored.
SECTION 4. This Act shall take effect upon its approval.

Approved by the Governor as Act 50 on April 26, 2000

APPENDIX B

Guidelines for Assessing Cultural Impacts

Adopted by the Environmental Council, State of Hawaii
November 19, 1997

I. INTRODUCTION

It is the policy of the State of Hawaii under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

The Environmental Council encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area. The Council provides the following methodology and content protocol as guidance for any assessment of a project that may significantly affect cultural resources.

II. CULTURAL IMPACT ASSESSMENT METHODOLOGY

Cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements. A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups.

Such information may be obtained through scoping, community meetings, ethnographic interviews and oral histories. Information provided by knowledgeable informants, including traditional cultural practitioners, can be applied to the analysis of cultural impacts in conjunction with information concerning cultural practices and features obtained through consultation and from documentary research.

In scoping the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. Thus, for example, a proposed action that may not physically alter gathering practices, but may affect access to gathering areas would be included in the assessment. An ahupua'a is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua'a and the geographical extent of the study area should take into account those cultural practices.

The historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, including submerged cultural resources, which support such cultural practices and beliefs.

The Environmental Council recommends that preparers of assessments analyzing cultural impacts adopt the following protocol:

1.identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or *ahupua‘a*;

2.identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;

3.receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;

4.conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;

5.identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and

6.assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Interviews and oral histories with knowledgeable individuals may be recorded, if consent is given, and field visits by preparers accompanied by informants are encouraged. Persons interviewed should be afforded an opportunity to review the record of the interview, and consent to publish the record should be obtained whenever possible. For example, the precise location of human burials are likely to be withheld from a cultural impact assessment, but it is important that the document identify the impact a project would have on the burials. At times an informant may provide information only on the condition that it remain in confidence. The wishes of the informant should be respected.

Primary source materials reviewed and analyzed may include, as appropriate: Mahele, land court, census and tax records, including testimonies; vital statistics records; family histories and genealogies; previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs; and other archival documents, including correspondence, newspaper or almanac articles, and visitor journals. Secondary source materials such as historical, sociological, and anthropological texts, manuscripts, and similar materials, published and unpublished, should also be consulted. Other materials which should be examined include prior land use proposals, decisions, and rulings which pertain to the study area.

III.CULTURAL IMPACT ASSESSMENT CONTENTS

In addition to the content requirements for environmental assessments and environmental impact statements, which are set out in HAR §§ 11-200-10 and 16 through 18, the portion of the assessment concerning cultural impacts should address, but not necessarily be limited to, the following matters:

1.A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and

features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.

2.A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.

3.Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

4.Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.

5.A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant
constraints, limitations or biases.

6.A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.

7.A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project.

8.An explanation of confidential information that has been withheld from public disclosure in the assessment.

9.A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

10.An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

11.A bibliography of references, and attached records of interviews which were allowed to be disclosed.

The inclusion of this information will help make environmental assessments and environmental impact statements complete and meet the requirements of Chapter 343, HRS. If you have any questions, please call 586-4185.

APPENDIX C
Agreement to Participate in this Ethnographic Survey

Project Title: Sanford's Service Center, Inc. - Expansion Project
Pahoa

Investigator: Maria Orr, M.A.
Kaimipono Consulting Services LLC

You are being asked to participate in an ethnographic survey conducted by *Kaimipono Consulting Services LLC* (KCS) contracted by *Haun & Associates* to prepare a Cultural Impact Assessment (CIA) as part of an environmental compliance document prepared by GK Environmental LLC for the Sanford Service Center, Inc. expansion project. This Ethnographic Survey is part of the Cultural Impact Assessment, which is mandated by an amendment (Yr 2000) to the Environmental Impact Statement law. The investigator will explain the purpose of the study, the procedures to be used, the potential benefits and possible risks of participating. You may ask the investigator any question(s) in order to help you to understand the study or procedures. A basic explanation of the study is written below. If you then decide to participate in the study, please sign on the second page of this form. You will be given a copy of this form to keep.

I. Nature and Purpose of the Study

The purpose of this ethnographic survey is to gather information about the project lands and vicinity through interviews with individuals who are knowledgeable about these areas, and/or about traditional and historic information such as cultural practices, legends, songs, chants or other information. The objective of this study is to facilitate in the identification and location of any possible pre-historic and/or historic cultural resources, or traditional cultural practices in the area mentioned above, in accordance with the definitions and guidelines in National Register (NR) Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (U.S. Department of Interior, National Park Service; Parker and King 1990).

II. Explanation of Procedures

After you have voluntarily agreed to participate and have signed the consent page, the investigator will tape record your interview and have it transcribed later. Data from the interview [ethnographic research/oral history] will be used as part of the background historical summary for this project report. The investigator may also need to take notes and/or ask you to spell or clarify terms or names that are unclear.

III. Discomforts and Risks

Foreseeable discomforts and/or risks may include, but are not limited to the following: having to talk loudly for the recorder; being recorded and/or interviewed; providing information that may be used in reports which may be used in the future as a public reference; knowing that the information you give may conflict with information from others; your uncompensated dedication of time; possible miscommunication or misunderstanding in the transcribing of information; loss of privacy; and worry that your comment(s) may not be understood in the same way you understand them. It is not possible to identify all potential risks, however reasonable safeguards have been taken to minimize risks.

IV. Benefits

This study will give you the opportunity to express your thoughts (mana‘o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected **if you so desire**. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record" **and not be recorded in any way**. In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, _____, understand that Maria Orr, an independent investigator contracted by Haun & Associates will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources associated with these lands, as well as traditional cultural practices and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. **I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.**

_____ I am willing to participate.
_____ I am willing to participate, under the following conditions:

Consultant Signature	**Date**
Print Name	**Phone**
Address	**Zipcode**

MAHALO NUI LOA

Part II: Personal Release of Interview Records

I, _____, have been interviewed by Maria Orr of Kaimipono Consulting Services LLC, an independent investigator contracted by Haun & Associates. I have reviewed the written transcripts of tape recordings of the interview, and agree that said documentation is complete and accurate except for those matters specifically set forth below the heading "CLARIFICATION OR CORRECTIONS."

I further agree that Ms. Orr, Haun & Associates *and* GK Environmental LLC *may use and release my identity and other interview information, both oral and written, for the purpose of using such information in a report, subject to my specific objections, to release as set forth below under the heading "SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS."*

CLARIFICATION OR CORRECTIONS:

SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS:

_____

Consultant Signature **Date**

_____

Print Name **Phone**

_____

Address **Zipcode**

_____

Email

MAHALO NUI LOA

APPENDIX D
Ethnographic Basic Research Instrument for Oral History Interviews

This research instrument includes basic information as well as research categories which will be asked in the form of open primary questions which allow the individual interviewed (Consultant) to answer in the manner he/she is most comfortable. Secondary or follow-up questions are asked based on what the Consultant has said and/or to clarify what was said. The idea is to have an interview based on a "talk-story" form of sharing information. Questions will NOT be asked in an interrogation style/method, NOR will they necessarily be asked in the order presented below. This research instrument is merely a *guide* for the investigator and simply reflects general categories of information sought in a semi-structured format. Questions will be asked more directly when necessary.

The Consultants were selected because they met one or more of the following criteria:

- ❖ Referred By Other Cultural Resource People
- ❖ Had/has Ties to Project Area/Vicinity
- ❖ Known Hawaiian Cultural Resource Person
- ❖ Known Hawaiian Traditional Practitioner
- ❖ Referred By Other Cultural Resource People

[NOTE: This part of the interview, #1-4 is mutual sharing and rapport building. Most of the information for research categories "Consultant Background" and "Consultant Demographics" come from this section, but not exclusively.]

1. *To start please tell me about yourself…Name? Where/When you were born?*

   [This information can be addressed in a couple of ways. After the investigator first turns on the tape recorder, the following information will be recorded: Day/Date/Time/Place of Interview/Name of Consultant (if authorized by Consultant)/Name of Investigator/Questions: Have you read the Agreement To Participate?/Do you have any questions before we begin?/Will you please sign the Consent page. The investigator will explain again the purpose of the interview.

   The investigator will then ask the Consultant to "Please tell me about yourself--when/where were you born? where did you grow up? where did you go to school?" This general compound question allows the Consultant to share as much or as little as he/she wants without any pressure. Most of the information for #1 may already be known to the investigator.]

2. *History: Your 'ohana/family background; Hawaiian connection (if any)?*

   [Much of the information for questions #2, 3, and 4 usually comes from the "monologue" answer to Question #1. If it does not, then these questions will be asked. The answers in this section usually establish how the Consultant meets the criteria; how the Consultant developed his/her information base, etc.]

3. *Youth: Where lived? Grew up?* [This may have been answered in #1]

4. *Schooling*? *Where? When?* [This may have been answered in #1]

[NOTE: The next part of the interview, #5-7 reflects information sought for the following research categories: Land, Water, Marine, Cultural Resources and Use as well as Significant People, and Events. The questions are open-ended so as NOT to "put words in the mouths" of the Consultants. The answers will help in assessing if any cultural properties or practices will be impacted by the proposed project.]

5. *Can you tell me what you know about the lands of Kauaea? Pu'u Kali'u?*

   [NOTE: Generally when people share information about a specific topic/place, they usually state where their information came from. If it isn't volunteered, it is asked as a follow-up question(s). A map of the project area should be available to confirm that investigator and consultant are talking about the same place. Photos would also help if a field trip is not possible. The best scenario would be to be "on-site" at some part of the interview…although this is not always practical.]

6. *What are your recollections and/or personal experiences of this area?*

7. *Do you know any stories/legends/songs/chants associated with these areas?*

[NOTE: Possible follow-up questions:

- How are you or your family connected to the project area?
- What year(s) were you and/or your family associated with these lands?
- What was this place/area called when you were growing up? When you were working here?
- Can you describe what the area looked like--what kinds of natural and/or man made things?
- To your knowledge what kind of activities took place in this location?
- Do you know of any traditional gathering of plants, etc in the area?
- Please describe any other land/water use? Resources?
- What was the historic land use? Agriculture? Habitation? Dwellings? Ranching?
- [Have map ready for marking.]
- Do you know about any burials in the project area?
- Do you know of any cultural sites in the project area or vicinity?

8 *Is there anyone you know who can also tell me about the project area?*

[NOTE: Usually in the course of the interview, Consultants suggest other people to interview.]

9. *As soon as the tape of this interview is transcribed I will send you two sets. Please review your transcripts and make any corrections and/or additions, then sign both copies of the Release Forms thereby allowing the information to be used by the investigator and Haun & Associates. Then mail one set back in the enclosed stamped-addressed envelope.*

10. *If your revised transcript is not returned within two weeks of date of receipt, it will be assumed that you are in concurrence with the transcript material and your information will then be incorporated into any draft reports. However, you can still make changes during the draft review process.*

MAHALO NUI LOA

APPENDIX E

SIGNED CONSENT FORMS

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected **if you so desire**. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record" **and not be recorded in any way**. In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Piilani Kaawaloa understand that Maria Orr, an independent investigator contracted by Haun & Associates will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources associated with these lands, as well as traditional cultural practices and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. **I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.**

✓ I am willing to participate.
_____ I am willing to participate, under the following conditions:

[signature]	9/13/2015
Consultant Signature	**Date**
Piilani Kaawaloa	808-896-4172
Print Name	**Phone**
P.O. Box 688 Pahoa Hi	96778
Address	**Zipcode**

MAHALO NUI LOA

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected **if you so desire**. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record" **and not be recorded in any way**. In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Emily I. Naeole understand that Maria Orr, an independent investigator contracted by Haun & Associates will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources associated with these lands, as well as traditional cultural practices and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. **I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.**

_____ I am willing to participate.
_____ I am willing to participate, under the following conditions:

Emily I. Naeole 7/10/15
Consultant Signature **Date**

Emily I. Naeole 808 965-5650
Print Name **Phone**

15-2231 Kaohuwalu St, Pahoa, HI 96778
Address **Zipcode**

MAHALO NUI LOA

APPENDIX F

SIGNED RELEASE FORMS

[NOTE: ‘J Carlsmith Ball LLP’ should be GK Environmental LLC]

Part II: Personal Release of Interview Records

I, _____, have been interviewed by Maria Orr of Kaimipono Consulting Services LLC, an independent investigator contracted by Haun & Associates. I have reviewed the written transcripts of tape recordings of the interview, and agree that said documentation is complete and accurate except for those matters specifically set forth below the heading "CLARIFICATION OR CORRECTIONS."

I further agree that Ms. Orr, Haun & Associates *and* J Carlsmith Ball LLP *may use and release my identity and other interview information, both oral and written, for the purpose of using such information in a report, subject to my specific objections, to release as set forth below under the heading "SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS."*

CLARIFICATION OR CORRECTIONS:

SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS:

Emily D. Naeole 10-13-2015

Consultant Signature **Date**

Emily I. Naeole 965-5650

Print Name **Phone**

15-2237 Kaohuwalu St. Pahoa, HI 96778

Address **Zipcode**

_____

Email

MAHALO NUI LOA

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Appendix F

Sanford's Service Center Draft Evacuation Plan

Sanford's Service Center

Leilani Quarry

DRAFT - Evacuation Plan

Statement of Purpose

This evacuation plan is to specify protocols and procedures for evacuation of the Leilani Quarry, operated by Sanford's Service Center, Inc. This Plan is used for volcanic and seismic hazards that may directly or indirectly affect the Leilani Quarry ("Quarry"), and access to it. The Quarry presently has no secondary vehicular access, and secondary access by foot has not been established.

In general this plan involves the following action items:

1. Identification of hazards.

2. Evaluation of hazards by consultation with the appropriate authorities.

3. Response, which may include re-evaluation.

4. Re-evaluation, and a return to Step 1.

Potential Hazards

The volcanic, seismic, and fire hazards that may affect the quarry and necessitate evacuation are as follows:

1. Lava inundation of the Quarry and/or access road
2. Earthquake damage to the access road and Quarry
3. Other volcanic phenomena that render the Quarry and/or access road hazardous, including, but not limited to, ash falls, pyroclastic eruptions, and volcanic gasses.
4. Wildfires, possibly caused by lava.

Evacuation Triggers and Protocols

Evacuation will be triggered by immediate hazards, imminent hazards and anticipated hazards.

Immediate hazards are those that may be immediately threatening to persons at the Quarry , may cause destruction of the access road, or be threatening to truck drivers driving to or from the Quarry. An immediate hazard should be regarded as an emergency situation requiring all persons to immediately leave the Quarry and drive to a safe location.

Generally speaking, imminent hazards are those that may create an immediate hazard situation within 12 to 24 hours. Any hazard that is presented that presents a hazard within this window triggers immediate evacuation. The hazard should be evaluated to determine if equipment may be safely evacuated.

Anticipated hazards are those hazards that should be continuously monitored to determine if the threat to persons on the Quarry and Quarry access may become more imminent. An example of this is an ongoing non-explosive eruption on another part of Kilauea Volcano that does not threaten the Quarry .

Specific Hazards and Protocols

Earthquakes: After a major earthquake that causes strong shaking at the Quarry, the access road will be inspected for hazards including cracks, tree falls, and other things that may prevent vehicular access. If hazards are identified, evacuation of all persons on the premises should be considered due to the potential for aftershocks.

Lava Flows: In the case that a Kilauea East Rift Zone eruption may inundate the Quarry site or the access road within 72 hours, all equipment and persons at the Quarry will be removed from the Quarry and relocated to a safe location. Quarry operations should cease and mobile equipment should be driven out of the Quarry to a safe location if feasible. Additional equipment should be removed from the Quarry only when this may be done safely.

Volcanic Gases and Vog: In the event of a volcanic eruption, and during an ongoing eruption, Sanford's Service Center will monitor site conditions and evaluate site safety due to volcanic gasses. It is recommended that a poisonous gas monitor that detects sulfur dioxide (SO_2) and hydrogen sulfide (H_2S) be used by personnel while working at the Quarry. Other resources that may indicate the potential for hazardous gases at the site include the website: https://vog.ivhhn.org/current-air-quality

Ash falls and pyroclastic eruptions: While very rare, ash and pyroclastic eruptions from Kilauea Volcano may now be of higher than usual probability because of the growth of a pond and the intrusion of ground water into Halemaumau Crater in 2019. Volcanic ash can be hazardous to human life and equipment. In the unlikely event that such an eruption occurs, the potential for the eruption to affect the Quarry should be immediately evaluated.

High Wind Events, Tropical Storms and Hurricanes: If a tropical storm, hurricane warning, or other high wind event, is issued for the Puna District all equipment will be stowed in the center of the site away from tall trees and personnel evacuated before winds are tropical storm strength (approx. 40 mph). The site should not be re-entered before winds abate, as the trees along the access road are particular hazards.

Wildfires: In the event of a wildfire that threatens the area, Hawai‘i Fire Department shall be consulted and the site evacuated promptly, with equipment stowed in the center of the quarry .

Appendix G

Final Archaeological Inventory Study

Haun & Associates Report 901-100113

FINAL

ARCHAEOLOGICAL INVENTORY SURVEY

TMK: (3) 1-3-09:POR. 005



KAUAEA AHUPUA‘A, PUNA DISTRICT

ISLAND OF HAWAI‘I

Haun & Associates

Archaeological, Cultural, and Historical Resources Management Services

73-1168 Kahuna A‘o Road, Kailua-Kona HI 96740 Phone: (808) 325-2402 Fax: (808)325-1520

FINAL

ARCHAEOLOGICAL INVENTORY SURVEY

TMK: (3) 1-3-09: POR. 005

KAUAEA AHUPUA‘A

PUNA DISTRICT

ISLAND OF HAWAI‘I

By:

Alan E. Haun, Ph.D.

and

Dave Henry, B.S.

Prepared for:
Sanford Service Center
15-2628 Keaau-Pahoa Road
Pahoa, HI
96778

August 2013

Haun & Associates
Archaeological, Cultural, and Historical Resources Management Services
73-1168 Kahuna A‘o Road, Kailua-Kona HI 96740 Phone: (808) 325-2402 Fax: (808) 325-1520

SUMMARY

Haun & Associates conducted an archaeological inventory survey of a 309-acre portion of the 694.5-acre TMK: (3) 1-3-09:005 located in Kauaea Ahupua'a, Puna District, Island of Hawai'i. The objective of the survey was to comply with historic preservation regulatory review requirements of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD).

The survey identified six sites with ten features. The sites are comprised of four single feature sites and two feature complexes. The features consist of five roads, an enclosure, an enclosure with a ramp, a slab with a vertical metal post supporting a sign, a trail and a railroad grade. Feature function includes transportation (7), survey marker (1), triangulation station (1) and loading ramp (1). One site is probably prehistoric in age and 5 are historic.

In addition to the six sites, 20 caves and three overhangs were identified during the project. The caves consist of 8 vertical holes with chambers at the base, 8 caves in the bottoms of deep depressions, and 4 caves at the base of fissures. These natural features were carefully inspected during the project and no evidence of use or modification was found and they are designated as non-cultural features.

All six sites within the project area are assessed as significant for their information content. A trail was additionally assessed as culturally significant as a main, probably named transportation route. The mapping, written descriptions and photography at five of the six sites adequately documents them and no further work or preservation is recommended. The trail is recommended for preservation. Measures to protect this site would be detailed in a Site Preservation Plan prepared for DLNR-SHPD review and approval. Consultation with the Na Ala Hele is also recommended.

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INTRODUCTION

At the request of Sanford Service Center, Haun & Associates conducted an archaeological inventory Survey (AIS) of a 309 acre portion of the 694.5-acre TMK: (3) 1-3-09:005 located in Kauaea Ahupuaʻa, Puna District, Island of Hawai'i (*Figures 1* and *2*). The project area consists of Bishop Estate lands that are leased by Sanford Service Center. The objective of the project is to comply with historic preservation regulatory review requirements of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD), Hawaiʻi Administrative Rules, Title 13, DLNR, Subtitle 13, State Historic Preservation Rules, Chapters 276 and 284 (DLNR 2003). Sanford Service Center intends to expand the cinder mining operation within the parcel.

Haun & Associates conducted the survey fieldwork between November 26 and December 21, 2012 under the direction of Dr. Alan Haun. The field work portion of the project required 65 person days to complete. This final report presents the project scope of work, field methods, background information, survey findings, and site significance assessments with treatment recommendations.

Scope of Work

Based on DLNR-SHPD rules for inventory surveys the following specific tasks were determined to constitute an appropriate scope of work for the project:

1. Conduct background review and research of existing archaeological and historical documentary literature relating to the project area and its immediate vicinity--including examination of Land Commission Awards, *ahupua'a* records, historic maps, archival materials, archaeological reports, and other historical sources;

2. Conduct 100% pedestrian survey coverage of the project area;

3. Conduct detailed recording of all potentially significant sites including scale plan drawings, written descriptions, and photographs, as appropriate;

4. Conduct limited subsurface testing (manual excavation) at selected sites to determine feature function;

5. Analyze background research and field data; and

6. Prepare and submit Final Report.

Project Area Description

The project area consists of a 309-acre parcel located in the inland portion of Kauaea Ahupuaʻa between approximately 380 ft and 1,070 ft elevation. The project area is bordered to the north by the Leilani Estates subdivision and Keahialaka Ahupuaʻa, by Opihikao and Kaueleau Ahupuaʻa to the south, by undeveloped land to the west and by undeveloped land and a papaya farm to the east. An existing cinder quarry is located in the western portion of the parcel and the remaining portion is undeveloped. A dirt access road enters the project area along the southwestern side. An aerial view of the project area is presented in *Figure 3.*

There are two hills (*puʻu*) in the project area. Puʻu Kaliu is a 1,071 ft high hill located in the northwestern portion of the parcel. The cinder quarry is located on the slope flank of Puʻu Kaliu. The second *puʻu,* Puʻu Kepaka, is approximately 760 ft high and is located in the eastern portion of the parcel.

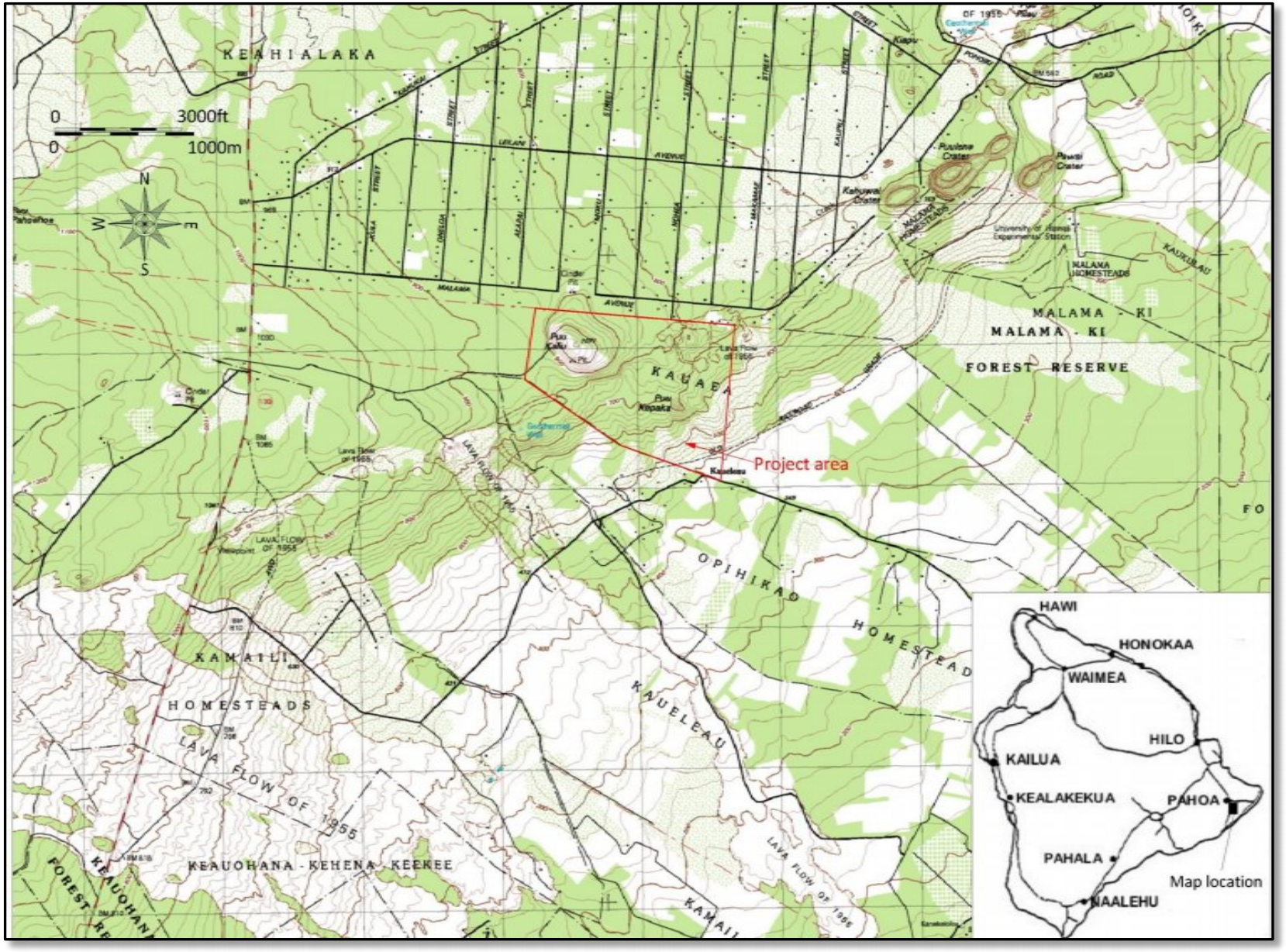


Figure 1. Portion of 1994 USGS Pahoa South Quadrangle showing project area

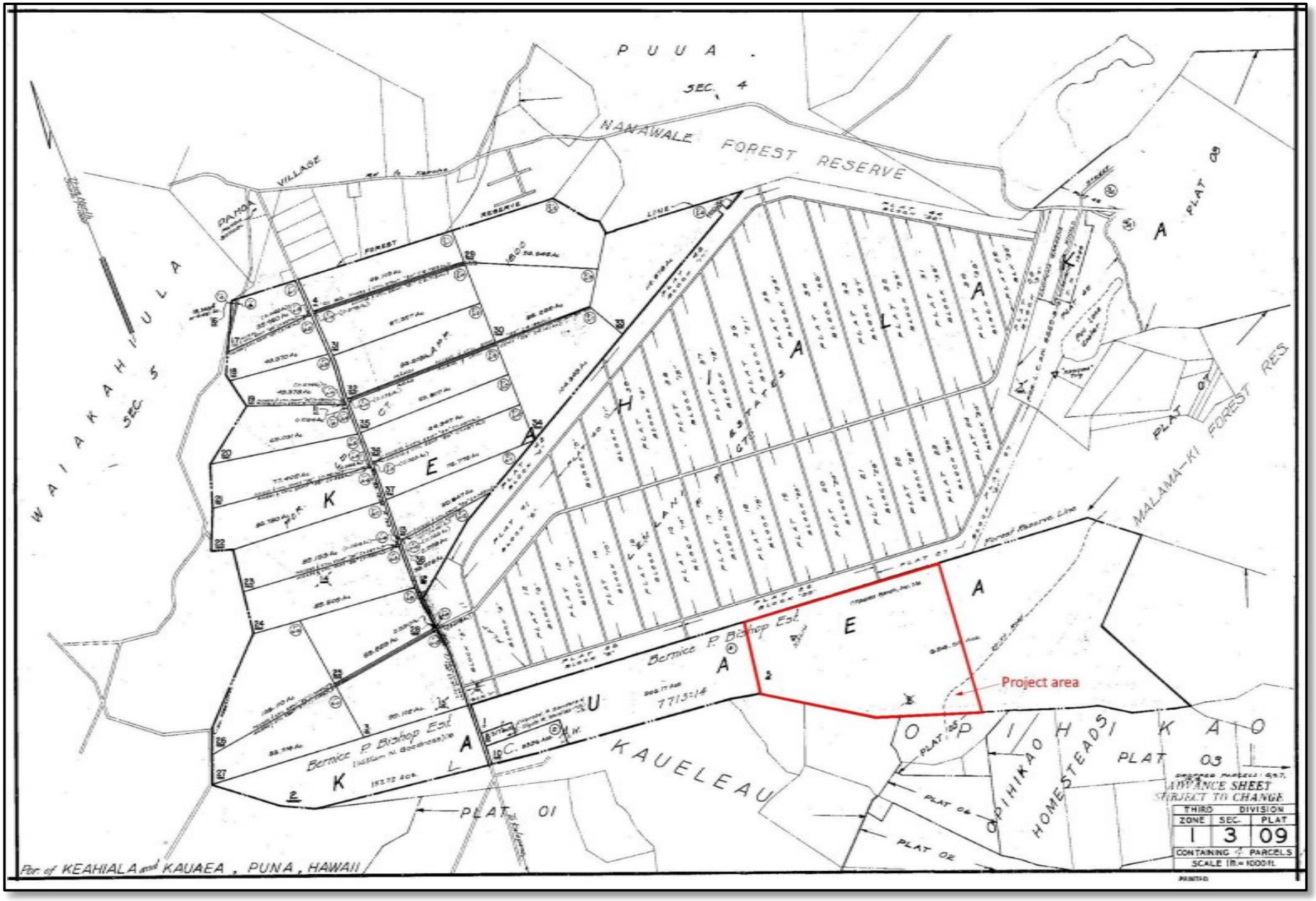


Figure 2. Tax Map Key 1-3-09 showing project area

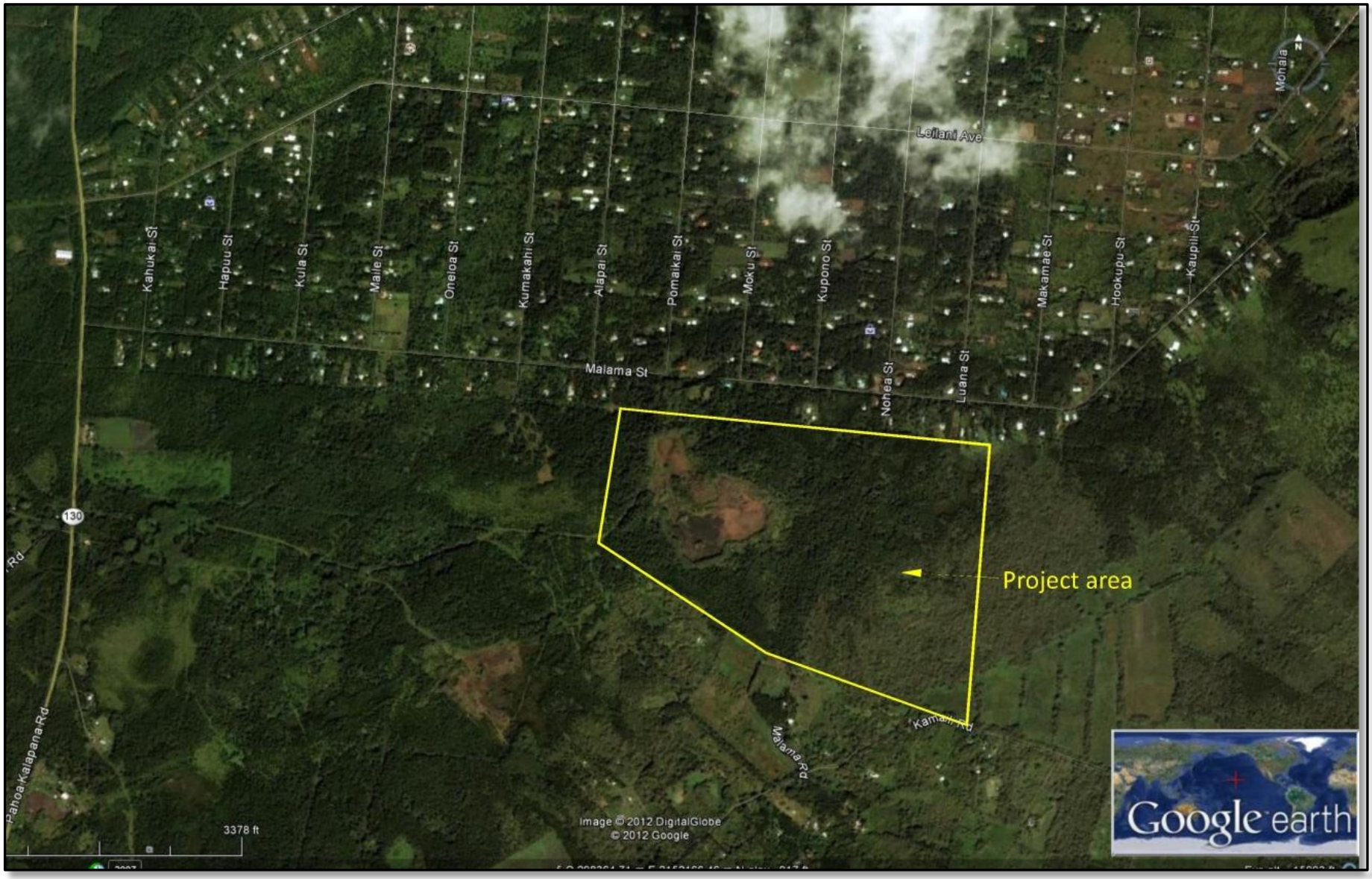


Figure 3. Aerial view of project area (from Google earth)

The entire project area spans the East Rift Zone of the Kiluaea Volcano. Large portions of the project area have been disturbed by cinder mining and agricultural activities (*Figure 4*). *Table 1* summarizes the disturbed areas and terrain types in the project area. The cinder quarry area comprises approximately 31-acres or 10% of the project area. This area includes an active cinder quarry (*Figure 5*) and areas that were previously disturbed by cinder mining (*Figure 6*). These areas have been excavated below the original ground surface and are vegetated with sparse grass and weeds.

***Table 1*. Areas of disturbance and terrain types in project area**

Area	Acres within project area	% of project area	Ground surface visilibity
Cinder quarry	31	10.0	Excellent
Impacted by sugarcane cultivation	66	21.0	Fair to good
Papaya farm	7	2.0	Excellent
1955 lava flow	13	4.0	Fair to good
High canopy forest	53	17.0	Fair to good
High canopy forest - Hazardous terrain	139	45.0	Fair
	309	**100.0**	

The southeastern portion of the project area was disturbed by historic and modern sugarcane cultivation. This area comprises 66-acres or 21% of the total parcel and is characterized by relatively flat, gently sloping terrain with introduced plant species including strawberry guava (*Psidium cattleianum*), Coster's curse (*Clidemia hirta*), lantana (*Lantana camara*), Miconia (*Miconia calvescens*), Hawaiian raspberry (*Rubus hawaiensis),* avocado (Persea americana), coconut (*Cocos nucifera*), mango (*Mangifera indica*), red ginger (*Alpinia purpurata*), grasses and vines (*Figure 7*). The dense vegetation in this area resulted in fair to good ground surface visibility.

An active papaya (*Carica papaya*) farm is located in the southeast corner of the parcel, occupying 7-acres or 2% of the parcel (*Figure 8*). The ground surface visibility in the papaya farm is excellent. This area also was formerly used for sugarcane cultivation.

There is a U-shaped area in the northeastern portion of the project area that was covered by a 1955 lava flow from Kiluaea Volcano (13-acres, 4%). This area is vegetated with young *ohia* (*Metrosideros polymorpha*) trees, ferns and grasses with fair to good ground surface visibility (*Figure 9*).

The southwestern portion of the project area consists of a high canopy forest comprising 53-acres or 17% of the total project. The terrain in this area is relatively level with moderately thick vegetation dominated by strawberry guava and large ohia trees. Occasional fissures associated with the East Rift Zone are present in this area (*Figure 10*). Ground surface visibility in this area is fair to good.

The remaining 139-acres (45%) are comprised of a high canopy forest with hazardous terrain. This area is characterized by an extremely uneven ground surface that is bisected by narrow ridges and deep fissures and channels. Examples of the terrain are presented in *Figures 11* and *12.* The vegetation in this area consists of strawberry guava, African tulip (*Spathodea campanulata*), albizia (*Falcataria moluccana*), avocado, autograph tree (*Clusia rosea*), bamboo (*Bambusa spp.*), bamboo orchid (*Arundina graminifolia*), Coster's curse, gunpowder tree (*Trema orientalis*, Hawaiian raspberry, *kukui* (*Aleurites moluccana*), *ohia,* paper mulberry (*Broussonetia papyrifera*), staghorn fern, (*Dicranopteris linearis*), *ti* (*Cordyline fruticosa*), *uluhe* (Dicranopteris linearis), grasses and vines. Ground surface visibility in this area is fair.

Sato *et al*. (1973) indicates that there are six soil types present within the project area (*Table 2* and *Figure 13*). These are either comprised of surface lava flows or thin rocky and stony muck soils over

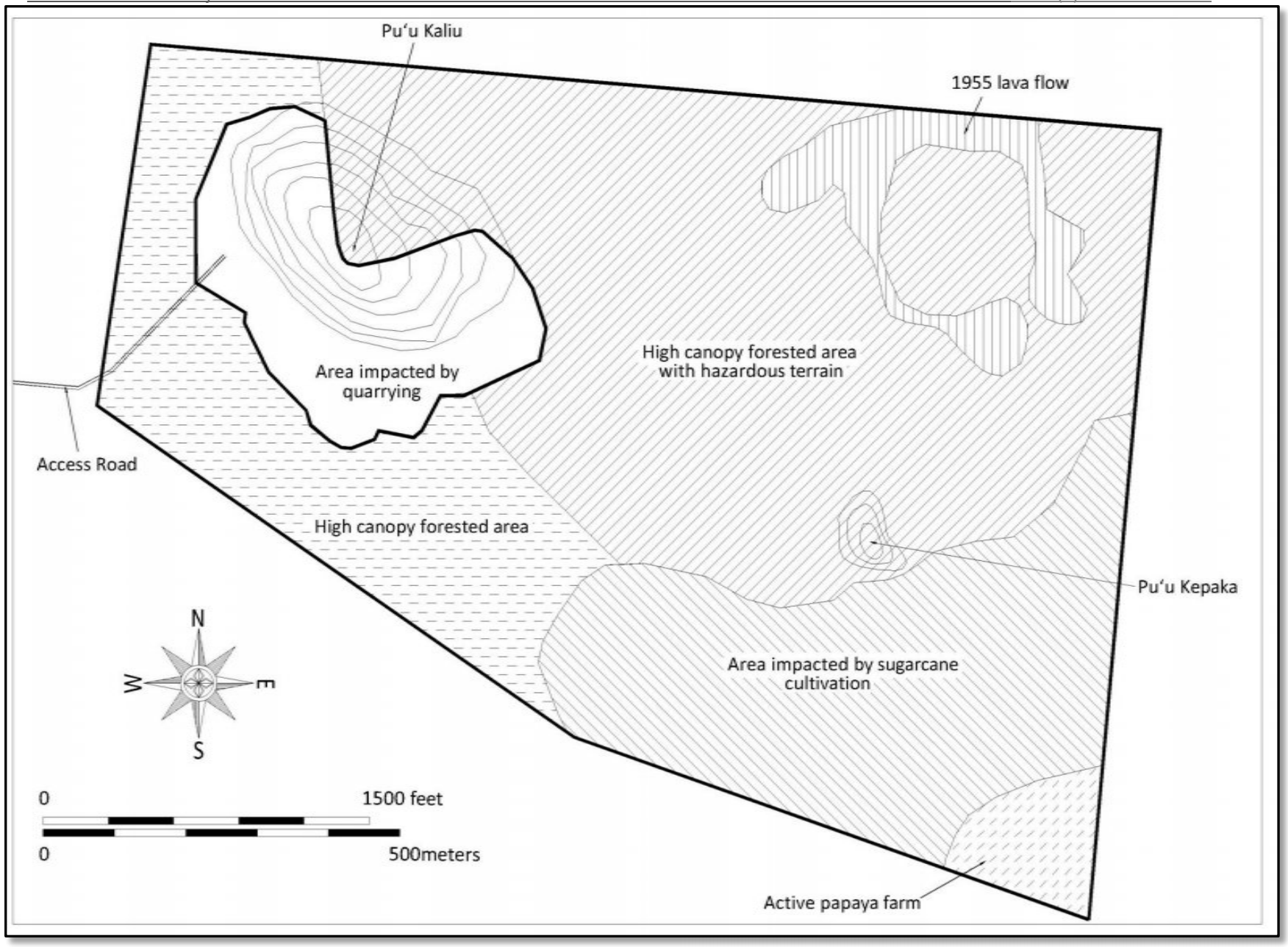


Figure 4. Areas of disturbance and terrain types within project area



Figure 5. Active cinder quarry, view to northwest



Figure 6. Abandoned cinder quarry, view to east-southeast



Figure 7. Area impacted by sugarcane cultivation



Figure 8. Papaya farm, view to northeast



Figure 9. 1955 lava flow area, view to east



Figure 10. Fissure within High Canopy Forest area, view to east



Figure 11. Deep fissure within High Canopy Forest with hazardous terrain, view to north



Figure 12. Terrain with High Canopy Forest with hazardous terrain, view to northeast

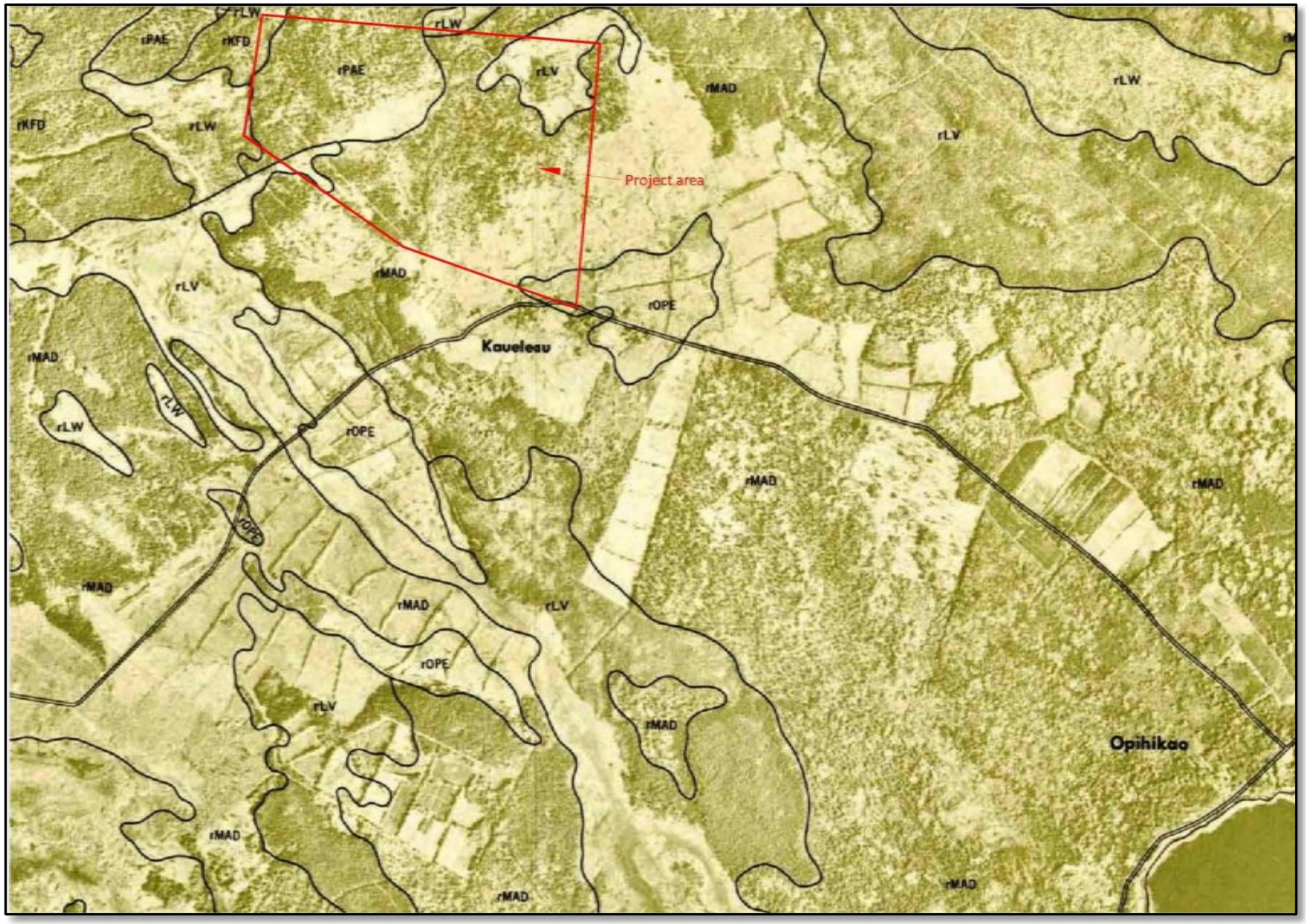


Figure 13. Soil types present within the project area

lava substrates. These soils are typically suitable for watershed, woodlands and native forest, with none particularly suited for cultivation.

Table 2. **Soil Types in the project area**

Soil designation*	Soil name	Acres within project area	% of project area	Location with project area	Soil use
rMAD	Malama extremely stony muck (3-15% slopes)	175	56.7	Majority of eastern two-thirds	Woodland, pasture and orchards
rPAE	Papai extremely stony muck (3-25% slopes)	91	29.4	Majority of western one-third	Woodland
rLV	Aa lava	33	10.6	NE and SW corners	Watershed
rOPE	Opihikao extremely rocky muck (3-25% slopes)	6	1.8	SE corner	Native forest or pasture
rKFD	Keaukaha extremely rocky muck (6-20% slopes)	4	1.2	NW corner	Native forest or pasture
rLW	Pahoehoe lava	1	0.3	SE corner and north-central	Watershed
Total		**309**	**100.0**		

** - from Sato et al. (1973)*

The majority of the parcel is comprised of Malama extremely stony muck on 3-15% slopes (rMAD), occupying most of the eastern two-thirds of the project, or 175-acres (56.7%). According to Sato *et al*., "This soil overlies relatively young a'a lava flows on the windward side of Kiluaea Crater" (1973:37). This soil is characterized by a 3" thick layer of very dark brown extremely stony muck over the a'a lava substrate. It evidences a rapid permeability, a very slow runoff and a slight erosion hazard and is classified as suitable primarily for woodlands with smaller areas in pasture and orchards.

Papai extremely stony muck on 3-25% slopes (rPAE) occupies most of the western one-third of the project area (91 acres, 29.4%). This soil is similar to the Malama soil consisting of an 8 inch thick layer of very dark brown extremely stony muck over a fragmental a'a lava substrate (*ibid* 1973:46). This soil has a rapid permeability, a slow runoff and a slight erosion hazard and is classified as suitable primarily for woodlands.

There are isolated areas of surface lava (rLV) located in the northeast and southwest portion of the parcel (33 acres, 10.6%). The lava is a miscellaneous land type with little vegetation, "except for mosses, lichens, ferns and a few small ohia trees" (*ibid* 1973:34). The area of a'a lava in the northeastern portion of the parcel corresponds to the 1955 lava flow from Kiluaea Volcano. It is characterized as a "mass of clinkery, hard, glassy, sharp pieces piled in tumbled heaps" (*ibid* 1973:34) and is classified as suitable for watershed.

A small area of Opihikao extremely rocky muck on 3-25% slopes (rPOE) is located in the southeastern corner of the parcel (6 acres, 1.8%). This area roughly corresponds to the location of the papaya farm discussed above. This soil consists of a 3" thick layer of very dark brown muck over a pahoehoe lava substrate (*ibid* 1973:43). It evidences a rapid permeability, slow runoff and slight erosion hazard with rock outcrops present over 30-50% of the area. It primarily is vegetated with native forest with cleared areas suitable for pasture.

There is a small area of Keaukaha extremely rocky muck on 6-20% slopes (rKFD) in the northwestern corner of the project area. This soil is similar to the Opihikao soil and consists of a surface layer of dark brown muck (8") over pahoehoe bedrock (*ibid* 1973:27). The Keaukaha soil has rock outcrops

over 25% of the surface, has a rapid permeability, a medium runoff and a slight erosion hazard. It also is primarily in native forest with cleared areas suitable for pasture.

There are two small areas of pahoehoe lava (rLW, 1-acre, 0.3%) located in the southeastern corner of the parcel and along the northern project area boundary in the center of the parcel. This is also a miscellaneous land type with little or no soil or vegetation with the exception of mosses and lichens. According to Sato *et al*., "This lava has a billowy, glassy surface that is relatively smooth. In some areas however, the surface is rough and broken, and there are hummocks and pressure domes" (1973:34). It is classified as suitable for watershed.

The project area has been inundated by lava flows from Kiluaea Volcano that date to as early as 1,500 years ago (*Figure 14* and *Table 3*). The most recent flow was deposited in 1955 and comprises 15 acres of the project area (5%). The flow is located in the northeastern portion of the parcel (designated as a "p5" flow by Wolfe and Morris 2001). This flow is U-shaped and surrounds an area of lava deposited 750-1500 years ago. The current condition of this flow is depicted in *Figure 9*.

***Table 3*. Lava flows in the project area**

Lava flow designation*	Lava flow age	Acres within project area	% of project area	Location with project area
p5	AD 1955	15	5	Northeast corner of parcel
p5	AD 1790	3	1	North-central area and along south boundary
pc40	450-750 years old	62	20	Pu'u Kaliu
p40	450-750 years old	210	68	Majority of parcel
pc3	750-1500 years old	12	4	Pu'u Kepaka
pc3	750-1500 years old	6	2	Northeast corner of parcel
Total		**309**	**100**	

** - from Wolfe and Morris 2001*

There are two small lava flows associated with a 1790 eruption (p5), located along the northern boundary in the central portion of the parcel, and along the south boundary in the southwestern portion. The 1790 flow occupies 3 acres or 1% of the project area. The flow along the north boundary corresponds to an area of pahoehoe lava (see *Figure 13*) and the flow along the south boundary corresponds to an area of a'a lava.

The majority of the project area is characterized by lava flows that date from 450-750 years ago comprising 272 acres (88%). The Pu'u Kaliu area is designated as "pc4-0" by Wolfe and Morris (2001) and encompasses 62 acres (20%). This flow roughly corresponds to the Papai extremely stony muck soil area discussed above. The remaining 210 acres (68%) are designated as "p40" and correspond to the Malama extremely stony muck soil area.

The oldest flows in the parcel date from 750 to 1,500 years ago (pc3) and are located in two areas. A 12-acre (4%) area corresponds to the Pu'u Kepaka area (see *Figure 1*) indicating that this smaller hill pre-dates Pu'u Kaliu. The second area is situated in the northeastern corner of the parcel and is surrounded by the 1955 flow. It is 6 acres in area and comprises 2% of the project area.

In addition to the sites documented during the survey, 20 caves and three overhangs were identified. These features were carefully examined and no evidence of cultural use or modification was evident resulting in their designation as non-cultural features.

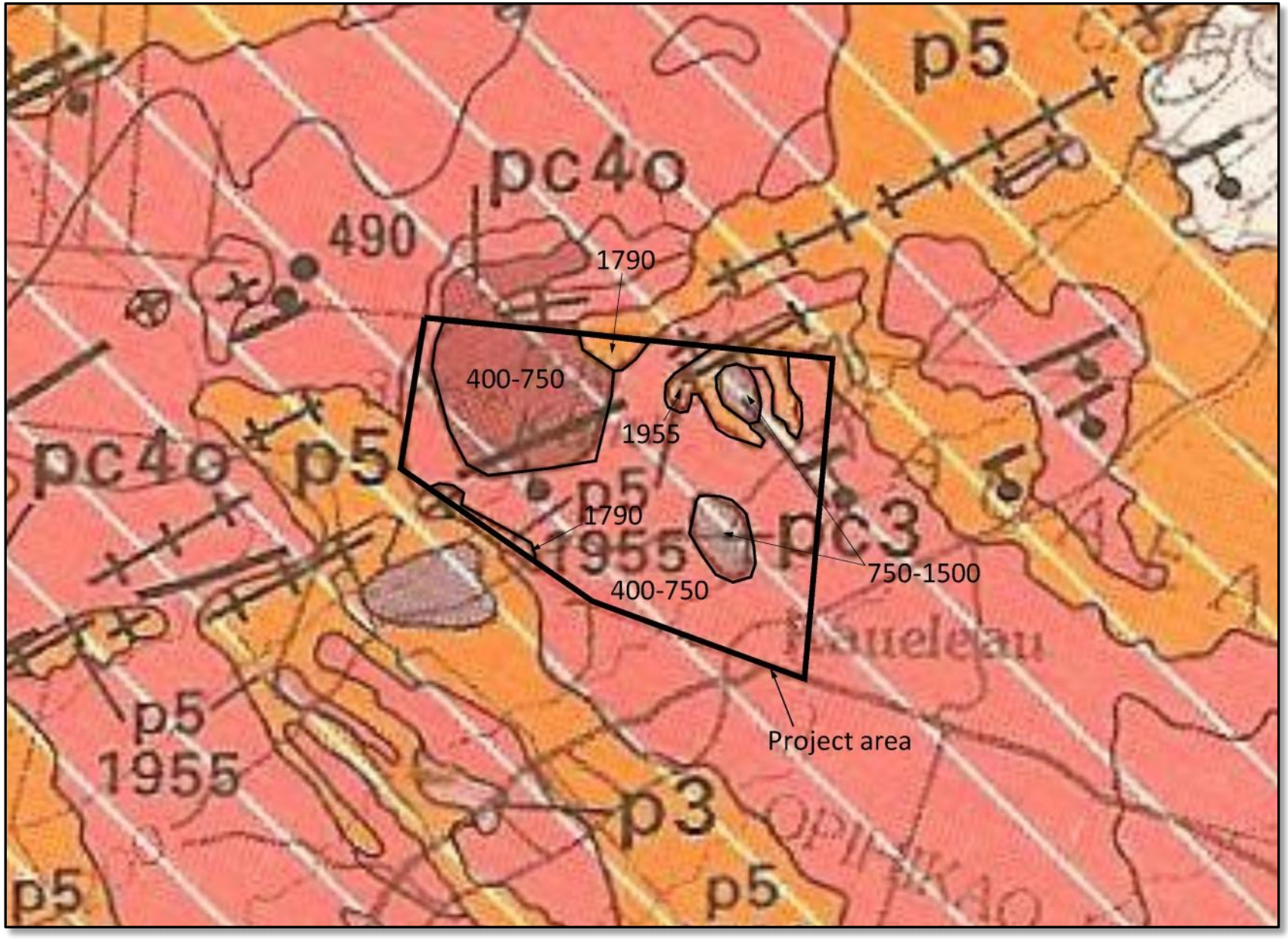


Figure 14. Lava flows present within the project area

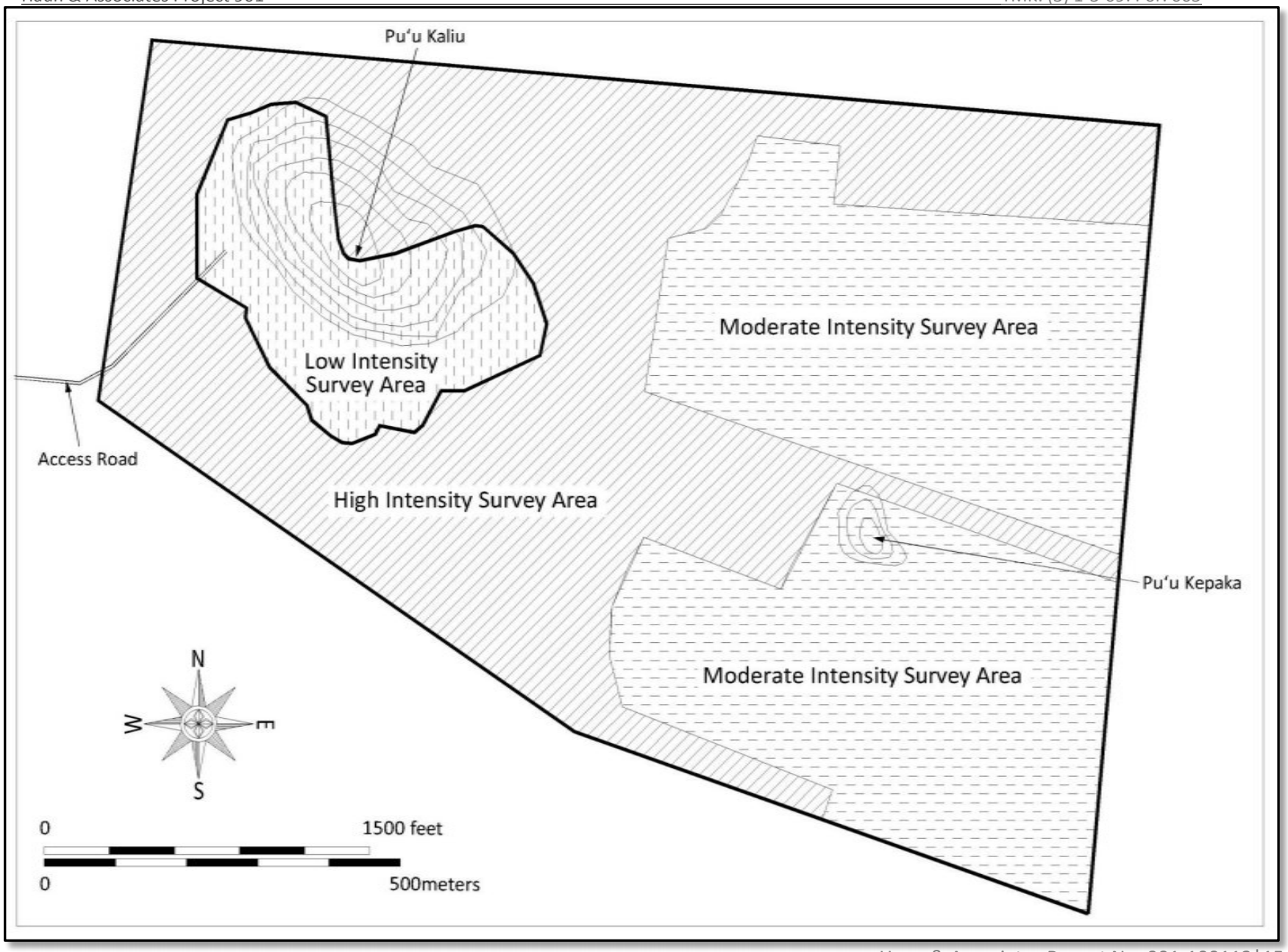


Figure 15. Low, Moderate and High Intensity survey areas within project area

Methods

The project area was subjected to a 100% variable intensity inventory survey based the survey findings as the work progressed and it became apparent that some areas lacked sites. Nearly half of the project area (146-acres or 47%) was subjected to a high intensity survey with the surveyors spaced at 10 m intervals (*Figure 15*). The cinder quarry area (31-acres, 10%) was subjected to a low intensity survey which consisted of a non-systematic vehicular and pedestrian examination of this disturbed area. The remaining 132-acres (43%) was subjected to a moderate intensity survey with the surveyors spaced at 30 to 50 m intervals.

Table 4 summarizes the survey areas. The high intensity survey area consists of the entire high canopy forest area (53-acres), and portions of the area impacted by sugarcane cultivation, the 1955 lava flow, and the high canopy forest with hazardous terrain area. The moderate intensity survey area consists of the entire papaya farm area (7-acre), and portions of the area impacted by sugarcane cultivation, the 1955 lava flow and the high canopy forest with hazardous terrain area.

Table 4. **Variable intensity survey areas in project area**

Area	Acres within project area	% of project area	High Intensity		Moderate Intensity		Low Intensity	
			Acres	% of area	Acres	% of area	Acres	% of area
Cinder quarry	31	10					31	100
Impacted by sugarcane cultivation	66	21	9	14	57	86		
Papaya farm	7	2			7	100		
1955 lava flow	13	4	6	46	7	54		
High canopy forest	53	17	53	100				
High canopy forest - Hazardous terrain	139	45	78	56	61	44		
	309	**100**	**146**		**132**		**31**	

In the 66-acre area impacted by sugarcane cultivation, 9-acres (14%) of the area was subjected to high intensity survey. The remaining 57 acres (86%) were examined with a moderate intensity survey. The 13-acre 1955 lava flow was surveyed with a combination of high intensity survey (6-acres, 46%) and a moderate Intensity survey (7 acres, 54%). More than half (78 acres, 56%) of the 139-acre high canopy forest with hazardous terrain was subjected to a high intensity survey. The remainder of the area (61 acres, 44%) was covered using a moderate intensity survey.

With the exception of a survey marker on top of Pu'u Kaliu, all of the sites in the project area are located in the high canopy forest in the southwestern portion of the parcel and in the area impacted by sugarcane cultivation.

The identified sites were subjected to detailed recording consisting of mapping, preparing standardized site and feature forms, and photographic documentation. Archaeological features were flagged with pink and blue flagging tape and their locations geo-referenced with the assistance of a Garmin Global Positioning System (GPS) Model 60-series device using the NAD 83 datum. The accuracy of the GPS device for a single point is +/- 3–5 meters. This accuracy is increased to approximately 2–3 meters by recording multiple geo-reference points, including property corners and overlying the plotted points on a scaled map using AutoCAD software. No subsurface testing was undertaken during the survey and no cultural remains were recovered for analysis.

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Historical Documentary Research

The project area is situated in the *ahupua'a* of Kauaea in Puna District (*Figure 16*). There is little mention of Kauaea in Hawaiian traditional and legendary accounts. Crozier and Barrere (1971) note that in Puna few pre-missionary traditions and legends survived because of intensive mission work by Reverend Titus Coan between 1835 and the 1870s. Emory *et al*. (1959) suggest that Puna's traditional history is difficult to follow because of the dominating influence of the ruling families in the neighboring districts of Hilo and Ka'u. Handy and Handy (1972:542) state that Hawaiian traditions suggest that Puna "was once Hawaii's richest agricultural region and that it is only in relatively recent time that volcanic eruption has destroyed much of its best land".

According to Kamakau (1961), Hua'a was the chief of Puna when it was seized by 'Umi-a-Liloa, unifying his control over the Island of Hawai'i. Hua'a was killed during a battle with one of 'Umi's warrior sons, Pi'i-mai-wa'a, at Kuolo in Kea'au. Kalani`opu`u unified his control over Hawaii Island when he gained control of Ka'u and Puna following Alapa'i's defeat in a battle at Mahinaakaka. During Kalani`opu`u's rule, the Puna chief, I-maka-koloa, attempted a rebellion and seized the valuable products of the district including *'o'o* and *mamo* bird features, hogs, fine mats made from pandanus blossoms and from young pandanus leaves, gray tapa cloth, and tapa cloth made from *mamaki* bark.

Following the death of Kalani`opu`u, in 1782, a dispute over ascendancy ensued culminating in the battle of Moku'ohai (Kamakau 1961, Kuykendall 1938). Following the battle, control over the island was divided between Keoua Ku'ahulu'ula, who held Ka'u and a portion of Puna; Keawema'uhili, who controlled the remainder of Puna, Hilo, and southern Hamakua; and Kamehameha, who controlled northern Hamakua, Kohala, and Kona. A feud between Keoua and Keawema'uhili in 1785 resulted in Keawema'uhili's death and the expansion of Keoua's territory, including the unification of Puna. The island was finally re-unified in 1791 when Kamehameha killed Keoua at Kawaihae. In 1790, a lava flow extended diagonally across Kaueleau from the northeast above Opihikao to the coast at Kamaili (Wolfe and Morris 2001).

Early historic accounts document that Puna was well populated and intensively cultivated. In 1823, Ellis (1963) traveled along the coast to Kaimu, where he reported a sandy beach and village with an estimated 725 occupants. At Kaimu, there were plantations and groves of coconuts and *kou*. Ellis estimated that the population of Kaimu and nearby villages was approximately 2,000. Ellis described a village at Kamaili surrounded by plantations where they were given taro and potatoes. Other crops noted by Ellis in Puna included bananas and sugar cane.

The following summarizes Burtchard (1994) discussion of Puna's later history. Prior to the 1870s, foreign influence in Puna primarily was limited to missionaries. In the late 1870s, Robert Rycroft moved to Pohoiki and built a home, wharf, sawmill, jail and courthouse. He later began growing coffee in the area and built a coffee mill. In the mid-1880s, the government began selling land in Puna for homesteads. Most of the homestead land was acquired for coffee cultivation in the 1890s.

The Waihona 'Aina (2000) Mahele Database; which is a compilation of data from the Indices of Awards (Indices 1929), Native Register (NR n.d.), Native Testimony (NT n.d.), Foreign Register (FR n.d.) and Foreign Testimony (FT n.d.); indicates that only one Land Commission Award (LCA) was awarded in Kauaea. LCA 7713*H was awarded to Victoria Kamamalu, Kuhina Nui of the Hawaiian Islands between 1855 and 1863. This LCA is depicted on *Figure 17,* a map of Kauaea Ahupua'a by D.B Lyman. This figure is a tracing of the original Lyman map, which belonged to Princess Ruth Keelikolani, made by E. Baldwin in February 1882. According to the map, Kauaea encompassed 2,449 and ¾ acres.

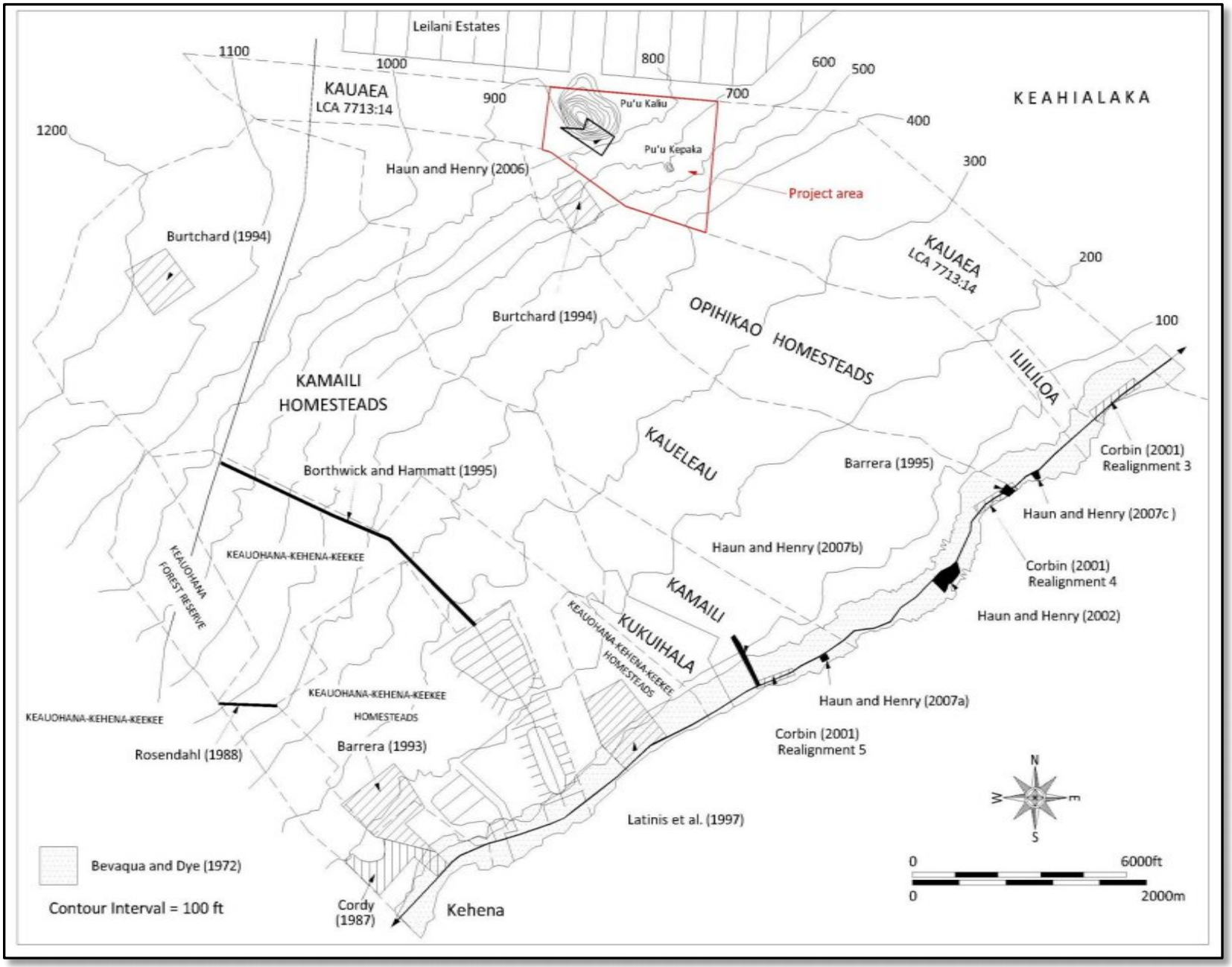


Figure 16. Ahupua'a boundaries and previous archaeological work

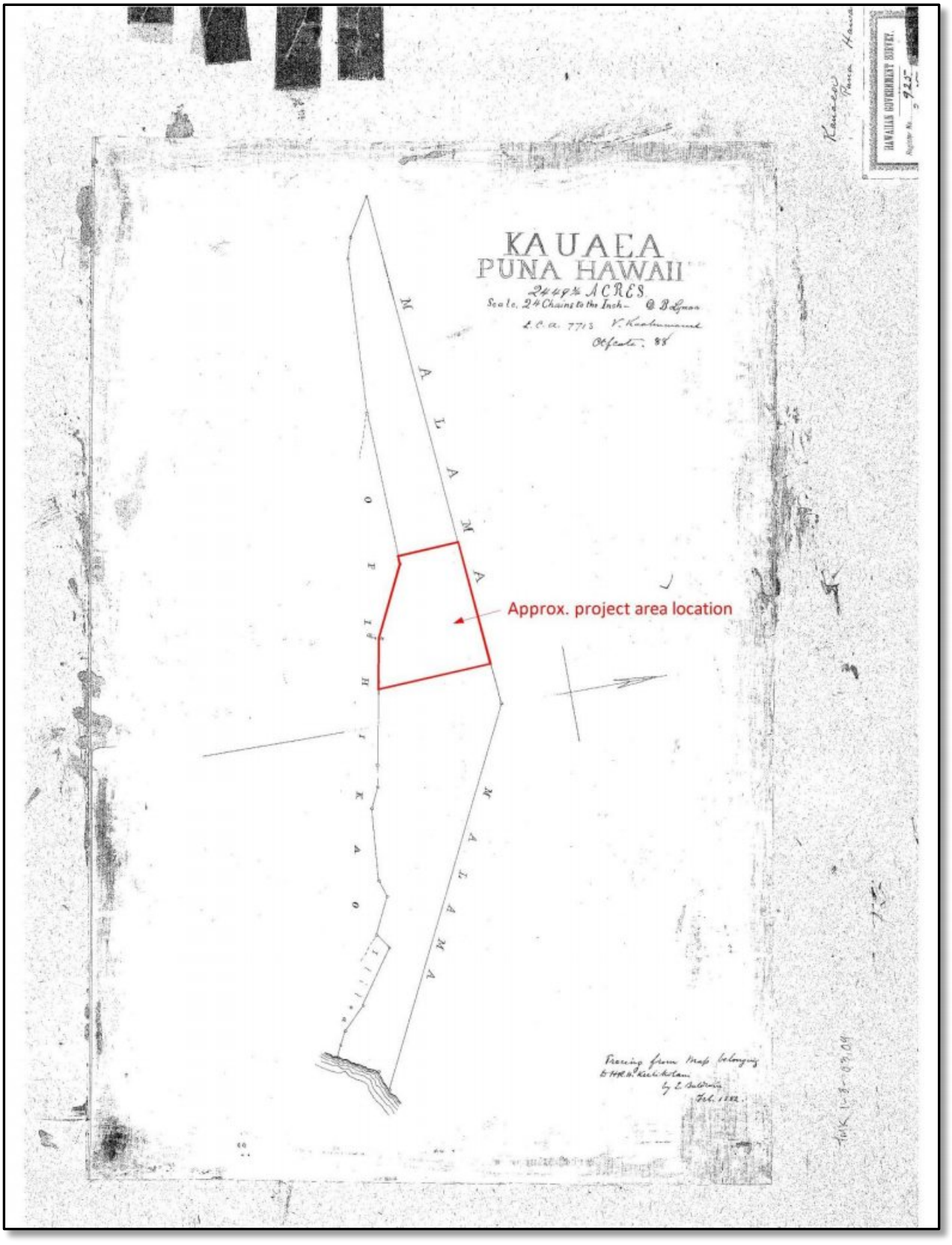


Figure 17. 1882 tracing of Lyman's Map of Kauaea Ahupua'a showing LCA 7713.

Figure 18 is a portion of Loebenstein's 1895 Hawaii Government Survey map of Puna from Pohoiki to Kehena. The boundary of Kauaea Ahupua'a on this map appears to be inaccurate, depicting it as slightly wider in the project area vicinity than it appears on later maps. This map depicts a network of transportation routes that extended through this portion of Puna. Three of the routes were labeled as roads by Loebenstein and the remainder depicted as trails. The three roads consist of the Government Road that parallels the shoreline, Puna Road located in Kaiahiku and Keahialaka Ahupua'a, and Rycroft's Road in Pohoiki.

The main transportation routes were the Government Road following the coast and the Kehena Trail, located further inland paralleling the shoreline. A series of inland-seaward trails and roads connect the main transportation routes, providing access from mountain communities to the sea. Several of the trails are listed as ancient in origin including the Kipapaia Trail in Kamaili, and the Kauaea Trail located in Kauaea Ahupua'a.

Figure 19 is a close-up of the 1895 Loebenstein map showing the project area vicinity. The Kehena Trail extends through the southwestern corner of the parcel in an east-west direction. A house belonging to "Kaaukai" is located on the north side of the trail and a coconut tree is located to the east of the house.

The ancient Kauaea Trail originates at a coconut grove and community named Kikiikii seaward of the project area (see *Figure 18*). The trail enters the project area at the southeast corner and extends inland, roughly paralleling the southern side of project area on the boundary between Kauaea and Opihikao. It appears to terminate in the forest at the base of Pu'u Kaliu. Houses owned by "Elia" and "Maluo" are located to the southwest of the Kauaea Trail, just outside the project area.

Figure 19 also indicates that in 1895, most of the northeastern portion of the project area, on the "Slope of Kaliu" was "Good coffee land". An area listed as "Thin woods on clinkers" is surrounded by the "Good coffee land" along the northern project area boundary.

Pu'u Kaliu has been in use as a triangulation station to map the displacement of Kilauea Volcano's south flank from as early as 1896 (Swanson *et al.* 1976). A series of triangulation surveys used Pu'u Kaliu, among other volcanic summits to track the horizontal ground displacement over time, within the Kilauea Rift Zones (*ibid.*:8). These surveys were conducted in 1896 and 1949 by the U.S Coast and Geodetic Survey, in 1958 and 1961 by the U.S. Geological Survey, and in 1970 and 1971 by personnel from the Hawaiian Volcano Observatory. The data from the earliest study was obtained in 1896, but was not triangulated until 1914. A sign marking the data point is present on the summit of Pu'u Kaliu. The sign was found to be in good condition in 1967 (pers. comm., Robert Shrai, Island Survey). The sign was located during the project and has been designated as Site 29727 (discussed in detail in Findings section).

A September 30, 1908 article in the Hilo Tribune described the effects of a violent earthquake in the Puna District that opened cracks throughout the region, destroyed homes and stone walls, and damaged a school house in coastal Kauaea. This school house is depicted in *Figure 18.*

> Gerritt P. Wider and I (A. Gartley) just came through Puna from the Volcano on horseback, and saw many evidences of the earthquake which were of interest. We left the Volcano on Keauhou trail, passing the line of small craters Panau, Panau-iki, Kapaahu, Kalapana, Pahoa, Kapoho and to Hilo. At the crater of Makaopuhi tons of material have been shaken down from the vertical banks into the mauka pit below. Some smoke was issuing from the bottom of the mauka pali and quite large deposits of sulphur have formed. The shake must have been very heavy in Puna. At Kapaahu a crack about a foot wide opened for about 500 feet, extending mauka from the sea. At

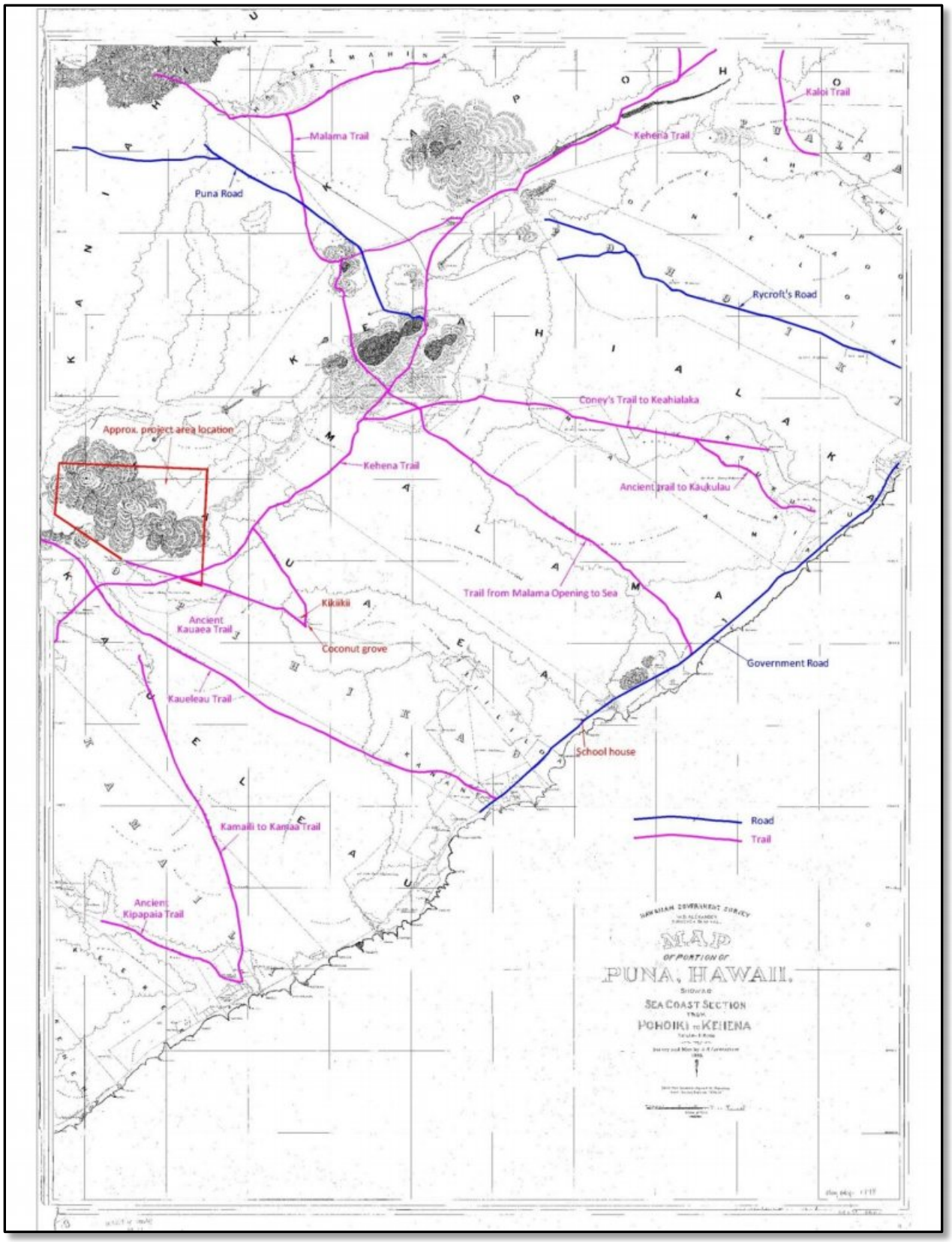


Figure 18. Loebenstein's 1895 Hawaii Government Survey Map of Puna from Pohoiki to Kehena

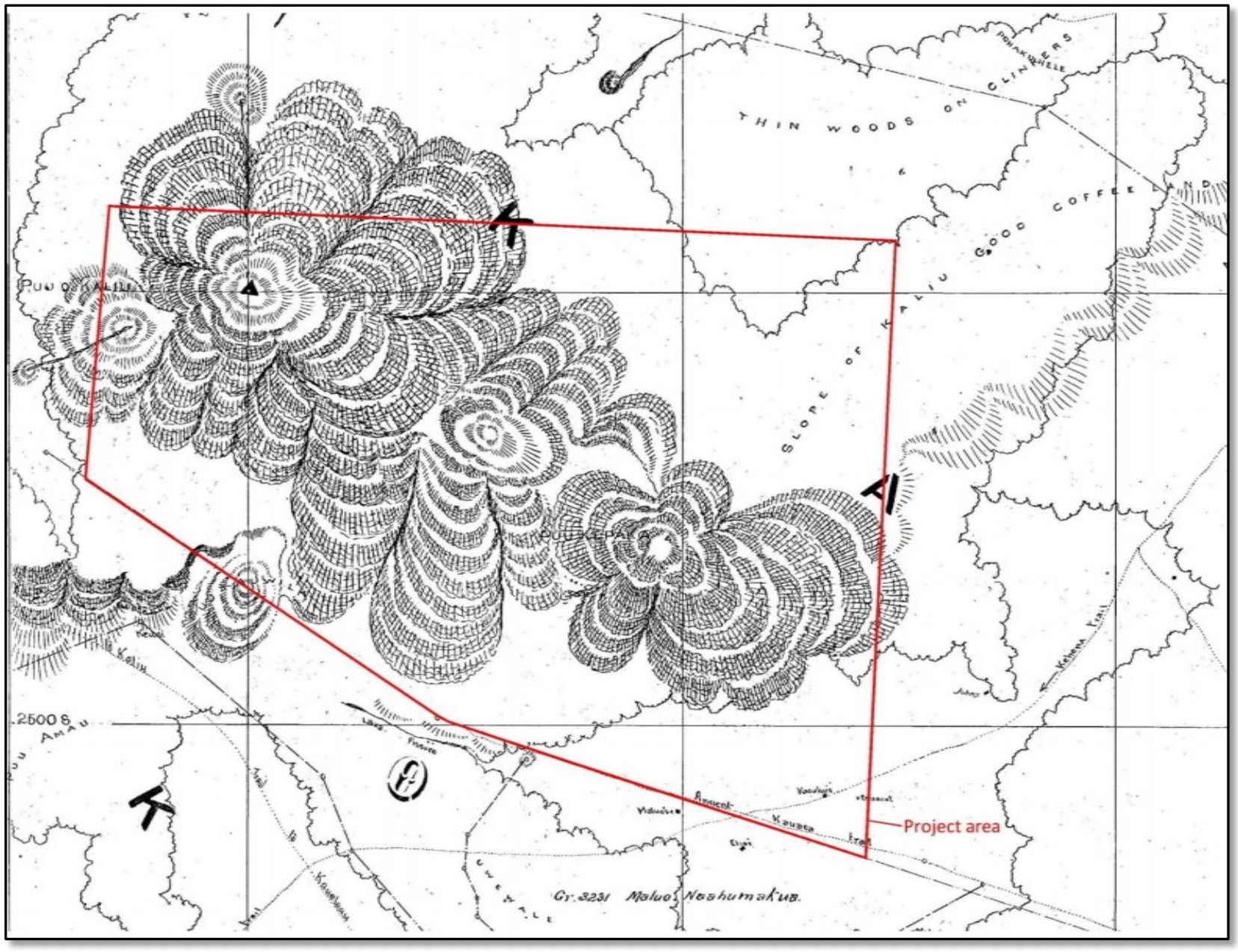


Figure 19. Portion of Loebenstein's 1895 map showing project area vicinity

> Kalapana the old '68 crack, which opened when the Puna coast sunk, opened about twelve inches more, and about a quarter mile back of this crack toward Kau a new crack has opened, extending from pali to pali and several hundred feet long. Some say there was a small crack before one or two inches wide, but it is now twelve to eighteen inches wide. At Kahena it is reported that a strip of the pali (about 100 feet high) along the coast, some 50 feet wide and half a mile long, split off and dropped into the sea, and a new crack has opened parallel with the front of the pali 50 feet back and over two miles long. Three houses and many water tanks were overturned in Kalapana and nearly every stone wall was thrown down. On the trail from Kalapana to Kahena the walls on the mauka side of the road suffered, those on the makai side being left intact. The schoolhouse at Kauaea was either overturned or badly set off its foundation (USGS.gov website).

The Olaʻa Sugar Company was founded in 1899 by B.F. Dillingham, Lorrin A. Thurston, Alfred W. Carter, Samuel M. Damon, and Wm. H. Shipman. The plantation was to become one of the largest in the state. According to the Hawaii Sugarcane Plantation Archives:

> With a $5,000,000 investment, the promoters purchased 16,000 acres in fee simple land and nearly 7,000 acres in long leasehold from W.H. Shipman. They also purchased 90% of the stock in the adjacent Puna Plantation, adding another 11,000 acres to the holdings. Olaʻa Sugar Company began as one of Hawaii's largest sugar plantations with much of its acreage covered in trees.
>
> The task of setting up the plantation was enormous. Before 1900, coffee was the chief agricultural crop in the area. Over 6,000 acres of coffee trees were owned by approximately 200 independent coffee planters and 6 incorporated companies. The coffee trees were uprooted to make way for cane. Ohia forests had to be cleared, field rock piled, land plowed by mules or dug up by hand with a pick, quarters for laborers and staff had to be built, the mill constructed, and the first cane planted.
>
> The cane was transported to the mill by fluming and by railroad. Although Olaʻa Sugar Company had 72 miles of flumes, it had no dependable water source for their operation. The railroad was relied upon for delivery of 60% of the cane. In addition to its own standard gauge 35 miles of railway track, the company ran cars over the Consolidated Railway tracks to bring its cane in from more distant fields. The history of Olaʻa Sugar Company is closely connected with the southern branches of the Hawaii Consolidated Railway Co. because they were interdependent from the start. The cane fields were in four widely separated areas cut off from each other by stretches of barren lava. The railroad was therefore vital to the plantation, which in turn helped support the railroad. When a tidal wave on April 1, 1946 destroyed much of the Hawaii Consolidated Railway Company's tracks, it ceased operations. The plantation was then forced to convert to trucks in order to transport sugar and molasses to the Hilo wharf.
>
> Fortunately, under the management of Wm. L.S. Williams, a major road-building program had been started in 1939 for the purpose of eliminating the portable track. He started the plantation on its way to modernization by laying a network of 500 miles of roads for hauling cane. Since 1948, all the cane hauling has been by truck (Hawaii Sugarcane Plantation Archives).

By the end of the 1940s, Olaʻa Sugar Company was deeply in debt, owing American Factors, Ltd (AMFAC) $2,000,000. The debt was the result of insect epidemics, volcanic eruptions and drop in sugar prices. By 1953, the company was $4,100,000 in debt and in 1959 it was decided that the plantation

would sell some of its 35,700-acres to offset the debt. In 1960, the company changed its name to the Puna Sugar Company, primarily because it was thought a name change would give the company a new start. Apparently this strategy worked because in 1963 the company had its best year ever with a 36% increase in profits. The company was debt free for the first time in its history by 1966, and in 1969 the Puna Sugar Company was purchased outright by AMFAC. The company closed in 1982 following cancelation of government subsidies and tax breaks and the introduction of high fructose corn syrup, a cheap low-cost substitute for sugar.

Figure 20 is a portion of Walter E. Wall's 1915 Hawaii Territory Survey Map of Puna Homestead Subdivisions and Government Tracts. This map indicates that formal roads in the area had been expanded since 1895, connecting the town of Pahoa with coastal communities. Despite this expansion, many of the trails depicted on the 1895 map appear to have still been in use in 1915. This map also depicts the Hilo Railroad lines to the east of Pahoa with a line extending as far south as Kapoho Ahupua'a,.

By the late 1920s, concern over forest depletion and watershed maintenance lead to the creation of forest reserves in the Puna District. *Figure 21* is portion of Wall's 1927 Hawaii Territory Survey Map of Puna, Keauohana and Malama-Iki Forest Reserves. This map indicates that few new roads had been built since the 1915 map. It also shows that fewer trails were being utilized in 1927.

Figure 21 also indicates that the railroad lines, used to transport sugar cane were expanded since 1915. One line extended from Pahoa town into the *ahupua'a* of Waiakahiula and Keahialaka. The rail line that formerly terminated in Kapoho (see *Figure 21*) was expanded to the east as far as Kaueleau Ahupua'a. This section of track passed through the southeastern corner of the present project area.

Figure 22 is a close-up of Wall's 1927 map showing the project area vicinity. As discussed above, a portion of the railroad line extended into the project area. This rail line roughly follows the path of the Kehena Trail depicted on *Figures 18-20*, suggesting that railroad utilized the pre-existing transportation route. The rail line was identified during the present project and was documented as Site 29728 that is discussed the Findings section. *Figure 22* also depicts a trail that enters the project area along its southern side, roughly paralleling the inland portion of this boundary. This trail may represent an inland extension of the Kaueleau Trail as depicted on *Figure 18* and *Figure 20.*

The Kauaea School discussed above is also depicted on Wall's 1915 (see *Figure* 20) and 1927 maps of the area (see *Figure 21*). This indicates that the school was re-built following the 1908 earthquake and used until at least 1927.

Handy and Handy (1972) citing oral historical sources, indicate that in the 1930s there were homesteading areas in the *ahupua'a* of 'Opihikao, Kaueleau, Kamaili, Ke'eke'e, Kehena, and Keauohana, in the general vicinity of the project area. Dry land taro was grown throughout the inland portions of these *ahupua'a*. A particular taro cultivation method, *pa-hala,* is described for the area from Kalapana to Kamaili.

The method involved excavating a hole in a'a lava in a pandanus grove. The hole was then filled with weeds, which were allowed to rot for six weeks or more. A taro cutting (*huli*) was wrapped in pandanus leaves and planted in the hole. After the cutting produced three or four leaves, the pandanus branches were cut to provide sunlight and the taro plant was covered with pandanus leaves. After the pandanus leaves were sufficiently dry, the leaves were burned reducing them ash that provided nourishment to the taro plant, which grew tall enough to hide a man beneath the leaves.

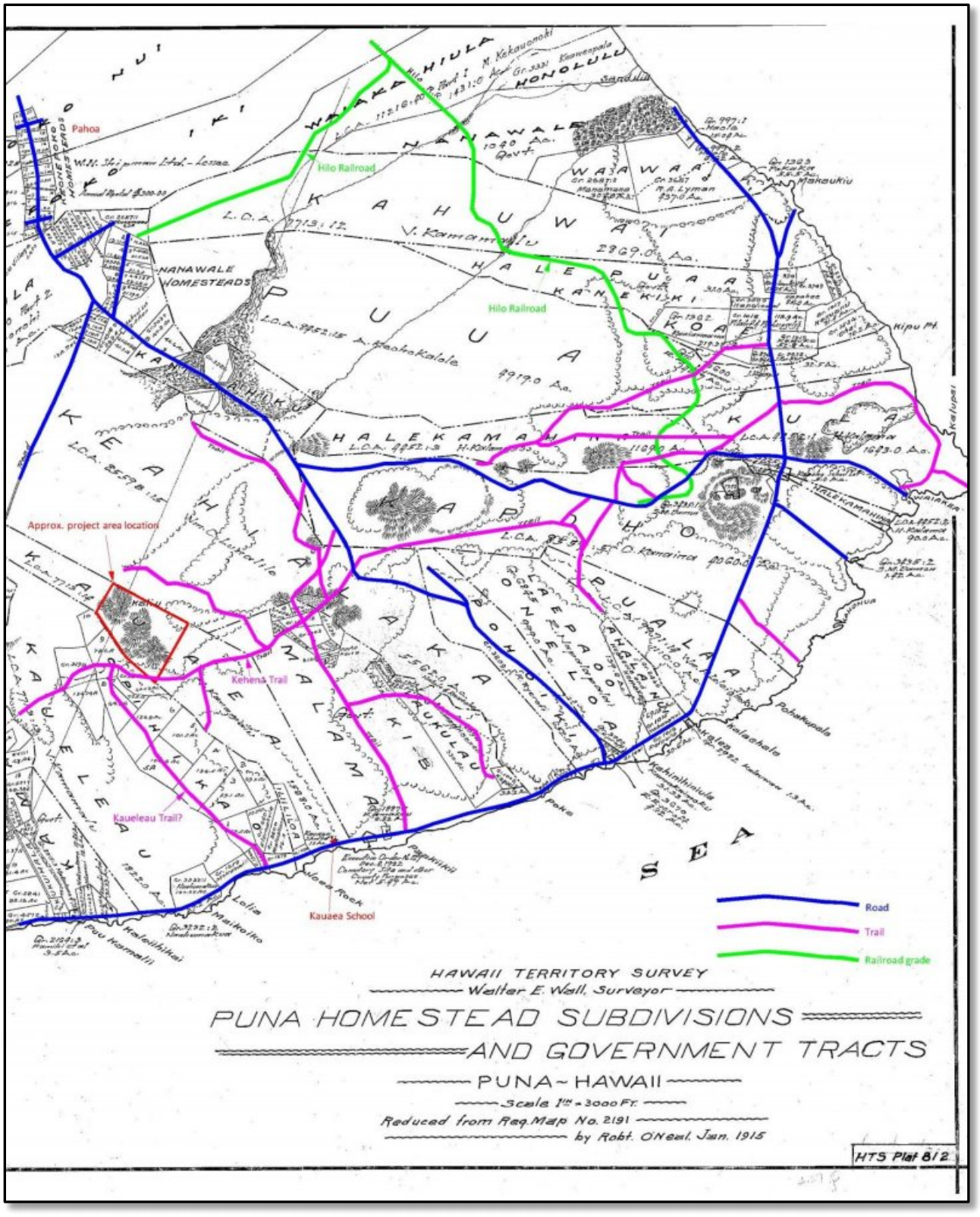


Figure 20. Portion of Wall's 1915 Hawaii Government Survey Map of Puna Homestead Subdivision and Government Tracts

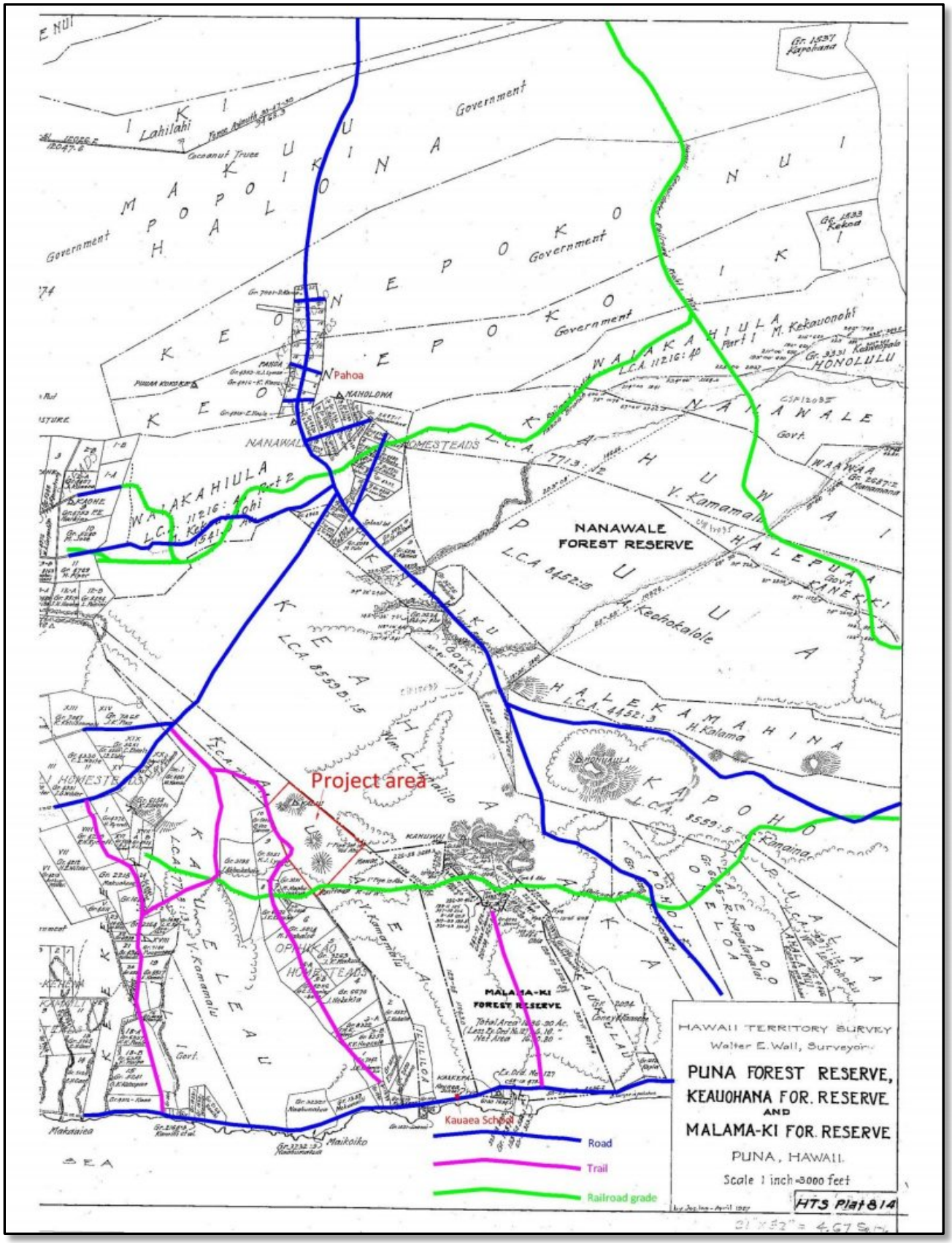


Figure 21. Portion of Wall's 1927 Hawaii Government Survey Map of Puna, Keauohana and Malama-iki Forest Reserve

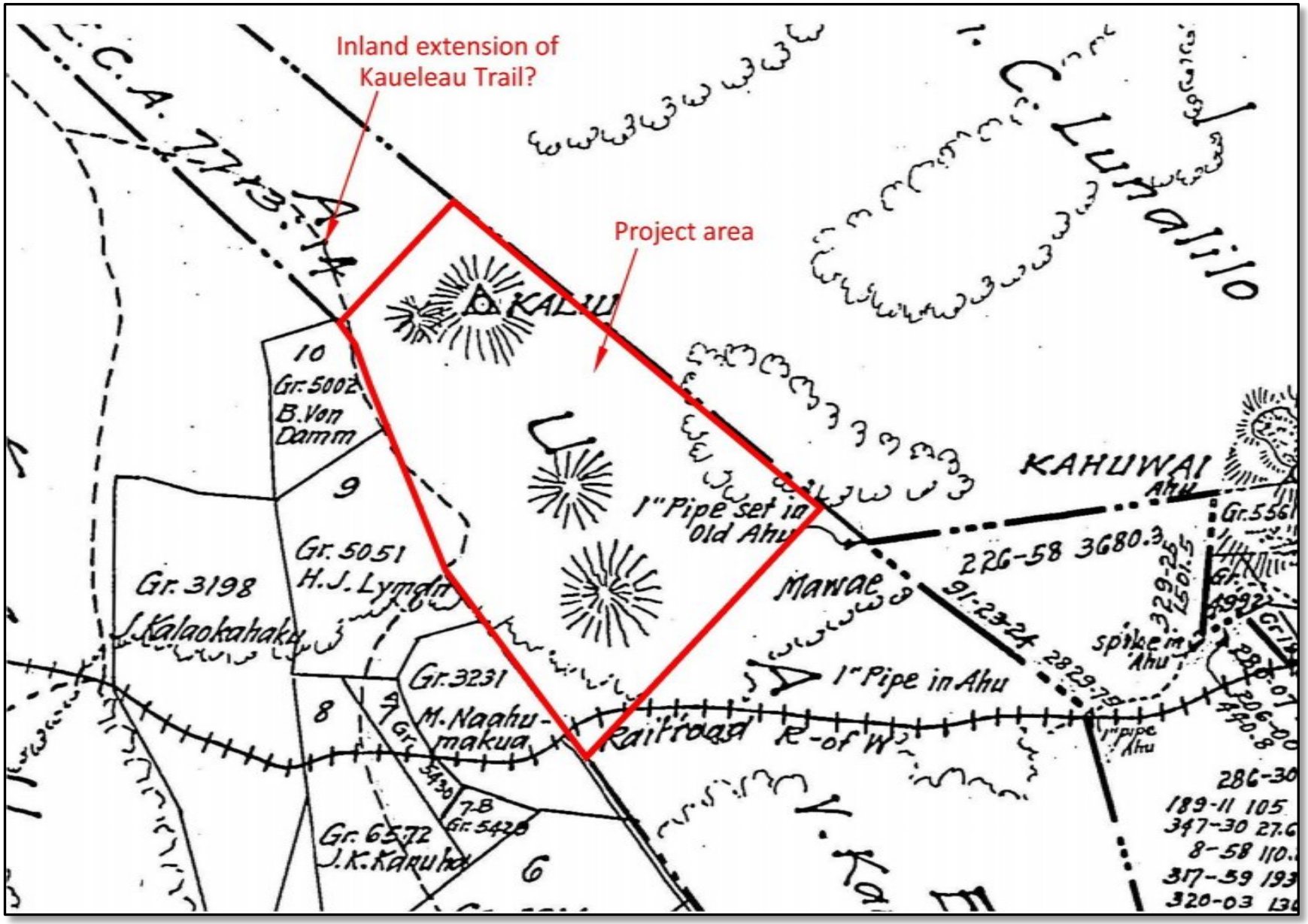


Figure 22. Close-up of Wall's 1927 map showing project area vicinity

Figure 23 is a 1965 aerial photograph of the project area vicinity. It depicts the Site 29728 railroad grade that extends through the southeastern corner of the parcel. The area to the south of the railroad line appears to be cultivated in formal fields, and the area to the north has been cleared of trees. A linear cleared swath extends through the central portion of the parcel in a northeast by southwest direction.

Portions of the present project area have been used as a cinder mine. The cinder mining activity has been in operation by Sanford Service Center since 1987. Cinder mining was also undertaken along the northern slopes of Pu‘u Kaliu, outside the project area to the north. Cinders mined from this area were used to create the Leilani Estates subdivision, founded in 1964 (lelaniestates.org).

An interview with a local resident of the project area vicinity was conducted by Haun & Associates Project Supervisor Shawn Fackler during the project. Mr. Kahaloa was born in 1959 and raised near the project area. During the interview he stated, “I used all that area [from his house up to Pu‘u Kaliu and Kepaka] as my playground as a kid”. He explained that the vegetation used to be mainly guava and it was easy to venture all the way up to either *pu’u*. The only cultural resource in the project area that he could remember is the Site 29726, Feature A enclosure (discussed in Findings section). He originally thought the structure might have been a World War II era feature, but now thinks it is related to sugarcane cultivation in the area.

Mr. Kahaloa began leasing land and running his papaya farm in the southeastern portion of the project area approximately 25 years ago. He explained that a cherry orchid previously grew on the land where his papaya farm is now, but that he could not remember who ran it. He did indicate that a ranch [name unknown] grazed cattle in the area *mauka* of his farm up to the Leilani Estates area for at least 30 years before he began growing papaya. He also indicated that the ranch routinely used tractors in its later years to clear vegetation for grazing cattle and also confirmed that the wooden posts observed during the survey along the old sugar cane railroad grade were part of a cattle chute built within the past 50 years.

Mr. Kahaloa recalled that, “the land *mauka* of the road used to be sugarcane fields all the way up to the tops of the *pu’us*. They [field workers] used donkeys and carts to harvest the cane but then stopped all together when the railroad stopped running.” Kahaloa also mentioned that his grandmother told him that taro used to grow in the fields before the introduction of sugar cane.

Another informant interview was conducted with Emily Naeole-Beason by telephone on February 4, 2013. She is 56 years old and has lived in Opihikao her entire life. Her parents and grandparents also lived in Opihikao. She is very familiar with the project area. Her granddaughter is named after the cinder cone Pu‘u Kaliu that dominates the western half of the area and is referenced in a *hula* performed by her daughter. She was not aware of any traditional activities or resources in the area. She recalled that sugar cane was once grown in the vicinity.

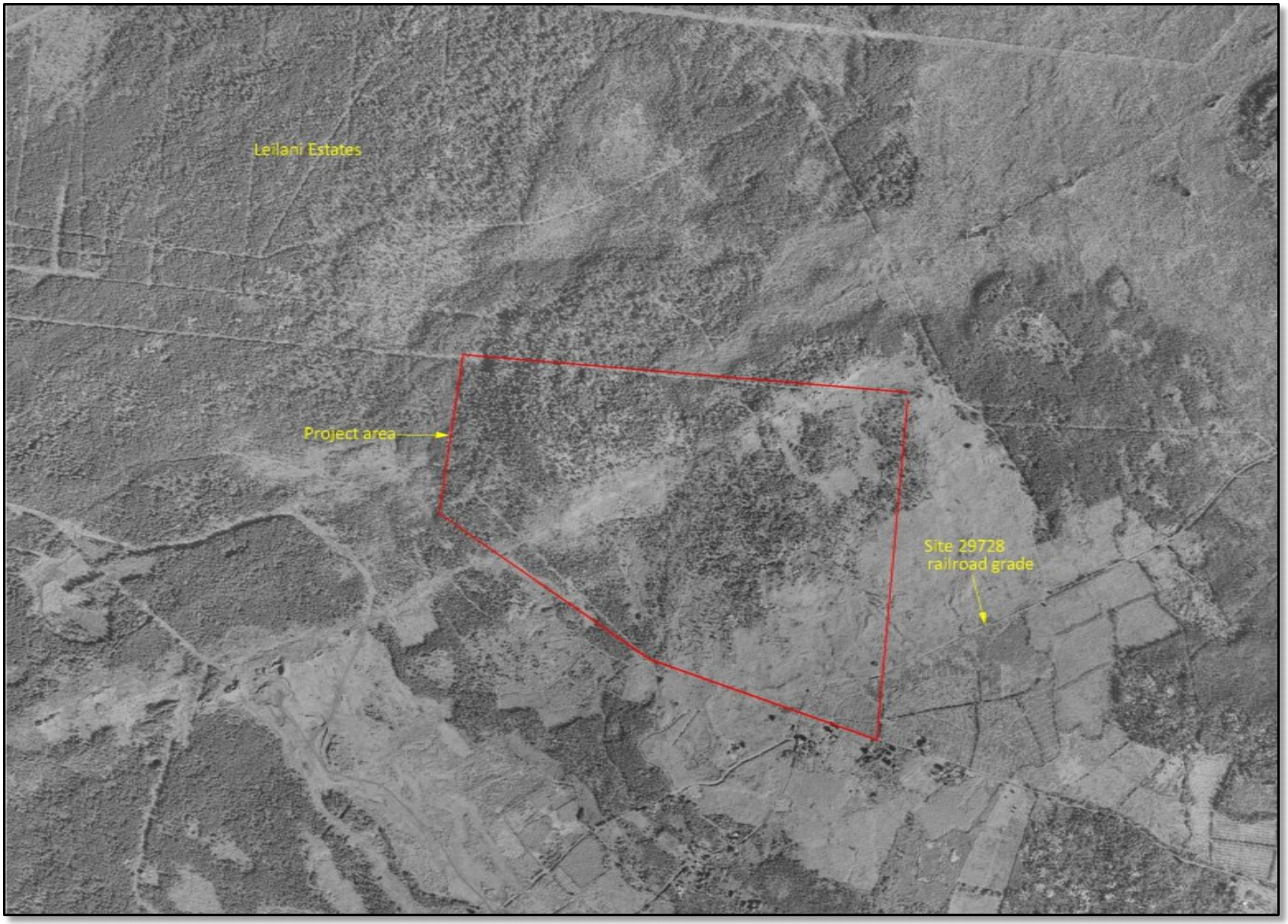


Figure 23. 1965 aerial photograph showing project area vicinity

Previous Archaeological Research

A search of the DLNR-SHPD archaeological report database and other sources identified 16 archaeological projects between Kauaea and Kehena. *Figure 16* shows the project locations and *Table 5* summarizes the projects. Not included in the figure or table are the studies by Stokes (Stokes and Dye 1991), which focused on major sites, primarily *heiau* throughout Hawaii Island and a survey of east Hawaii by Hudson (1932).

Stokes (Stokes and Dye 1991), relying in part on the earlier observations of Thrum, reported fourteen *heiau* in Puna of which three were destroyed at the time of Stokes fieldwork in 1906. Several of the *heiau* were reported to be agricultural temples. Hudson (1932) reported 32 sites along the coast between Kapoho and Kaimu including the Hilo-Puna Trail, habitation platforms and enclosures, water sources (cave and well), windbreak shelters, and four *heiau*: Mahinaʻakaka Heiau at Keahialaka, Kalepa at Kalepa Point, "Old" Wahaula Heiau at Kamaili, and Kumakaula at Keʻekeʻe.

The surveys in *Table 5* cover more than 650 acres of Puna between sea level and 1,540 ft elevation. Cultural remains identified by the surveys consist of 113 sites with nearly 940 features. To aid in reconstructing settlement patterns, features were quantified by probable age and function, and the studies are ordered by elevation. Traditional Hawaiian features were categorized as habitation, agricultural, burial (including possible burials), ritual, and trail. Features not assignable to these categories were categorized as miscellaneous. Traditional sites in this category include petroglyphs, *holua* slides, water sources, and *ahu*. Density values are given for sites, features, and habitation and agricultural features.

Overall, the studies have identified more than 76 habitation features, 314 agricultural features, 269 burials, 7 ritual features, and 18 trails. The large number of burials includes several historic cemeteries. Other historic features were not segregated by function. The majority of the historic features are walls and roads. None of the studies processed radiocarbon dates.

A 15-acre portion of the present 309-acre project area was previously examined by Haun and Henry (2006). The majority of the Haun and Henry (2006) study area (c. 95%) was comprised of the cinder quarry area, with a narrow (10-30 m wide) disturbed vegetated band present around the southwest and west sides. No sites or features were present.

McEldowney (1979) primarily used historic documentary evidence to develop a land use and settlement pattern model for the windward Hilo area that is probably applicable to most of Puna. The model consists of five elevation-defined zones: Coastal Settlement, Upland Agricultural, Lower Forest, Rainforest, and Sub-Alpine or Montane. The Coastal Settlement Zone extended approximately 0.5 miles inland from the shoreline between sea level and 50 ft elevation. The zone was the most densely populated with both permanent and temporary habitations, high status chiefly residences, and *heiau*. Settlements were concentrated at Hilo Bay and sheltered bays and coves. Also present were fishponds and gardens where breadfruit, coconut, *kukui*, banana, *wauke*, sugar cane, sweet potato, and wet and dryland taro were cultivated. The ocean provided fish and other marine resources.

The Upland Agricultural Zone was situated between approximately 50 ft and 1,500 ft elevation. Settlement in the zone consisted of scattered residences among economically beneficial trees and agricultural plots of dryland taro and bananas. Lava tubes were utilized for shelter. A pattern of shifting cultivation is believed to have converted the original forest cover to parkland of grass and scattered groves of trees. Wetland cultivation of taro occurred along streams.

Table 5. **Previous archaeological work**

Author	Land	Study Type*	Elevation	Acreage	No. of sites	Sites/ acre	No. of Feas.	Feas/ acre	Hab Feas	Hab Feas/ acre	Ag Feas	Ag Feas/ acre	Burial Feas	Ritual Feas	Trail	Misc	Historic Feas	Comment
Haun and Henry (2007c)	Opihikao	IN	10-25	1	2	2.00	2	2.00									2	
Corbin (2001)	Kamaili, Kauaea, Kaueleau	IN	20-40	5.3	1	0.19	40	7.55			40	7.55	1					
Bevaqua and Dye (1972)	Kapoho-Kalapana	RN	20-40	151	48	0.32	426	2.82	61	0.40	many		156	3	5	188	7	Feature totals estimated, most not quantified in report; misc. incl. 165 petroglyphs
Haun and Henry (2007a)	Kamaili	IN	20-38	1	*		*											* = Identified portion of trail initially identified by Bevaqua and Dye (1972)
Haun and Henry (2007b)	Kamaili	IN	30-115	4.274	5	1.17	10	2.34									10	
Barrera (1995)	Kaueleau	DR	35-40	3	3	1.00	9	3.00	2	0.67							7	
Haun and Henry (2002)	Kaueleau	IN	80-100	7	0	0.00												
Cordy (1987)	Keauohana	RN	80-250	39	15	0.38	92	2.36		0.00	20	0.51	63		4		5	
Latinis, Moore and Kennedy (1997)	Keekee	IN	100-300	94	6	0.06	128	1.36	3	0.03	88	0.94	24	3	4	2	4	
Barrera (1993)	Keauohana	RN	120-300	66	1	0.02	167	2.53	5	0.08	150	2.27	3				9	
Borthwick and Hammatt (1995)	Kamaili, Keekee, Kehena, Keauohana	AS	280-860	9.99	0													
MLK Rosendahl (1988)	Keauohana and Kehena	FI	540-620	1.7	0													
Burtchard (1994)	various	RN	650-1200	247	34	0.14	65	0.26	5	0.02	16	0.06	22	1	5	8	11	
Haun and Henry (2006)	Kauaea	AS	780-1050	15	0													
Bonk (1989, 1990)	Kaimu, Makuu, Kaohe, Kehena, Kaapahu and Mamaili	RN/ MON	1480-1540	10	0													
	Total/Average			**655.26**	**113**	**0.53**	**939**	**2.69**	**76**	**0.20**	**314**	**2.27**	**269**	**7**	**18**	**198**	**55**	

IN = Inventory Survey, RN = Reconnaissance Survey, DR = Data Recovery, AS = Archaeological Assessment

The Lower Forest Zone ranged from 1,500 ft to 2,500 ft elevation. Timber and other forest resources such as medicinal plants, *olona*, and birds were gathered from the zone. Site types consisted of temporary habitations, trials, shrines, and minor agricultural features in forest clearings and along streams. Sites in the Rainforest Zone (2,500-5,000 ft elevation) and Subalpine or Montane Zone (5,000-9,000 ft) were limited to trails and associated temporary habitations. These zones were used for intra-island travel and gathering of valued resources including hardwoods, birds, and stone for tool making.

PROJECT EXPECTATIONS

Based on historic documentary research and previous archaeological work, the prehistoric use of the project area, located in McEldowney's (1979) Upland Forest Zone, would likely consist of agricultural features and lava tubes used for temporary habitation and burial. Habitation and ceremonial sites would be rare. Interviews with longtime residents of the area indicate that portions of the project area have been used for cattle ranching and the cultivation of sugarcane. These historic activities potentially obliterated pre-existing prehistoric sites. The relatively recent lava flows within the project area may have also destroyed early sites.

The remains of historic sites are likely to be encountered. These sites would likely date to the 1900s and would consist of roads, cattle walls and fences, railroad lines, historic houses and sites associated with ranching and sugarcane cultivation.

FINDINGS

The survey identified six sites with ten features. The sites are comprised of four single feature sites and two feature complexes. The features consist of five roads, an enclosure, an enclosure with a ramp, a slab with a vertical metal post supporting a sign, a trail and a railroad grade. Feature function includes transportation (7), survey marker (1), triangulation station (1) and loading ramp (1). One site is probably prehistoric in age and 5 are historic. The sites are summarized in *Table 6* and their locations are presented in *Figure 24.*

Table 6. **Summary of Sites**

SIHP Site No.	Formal Type	Function	Age	No. of Features	Formal Type						Function				Haun & Associates Temp. Site No.
					Road	Enclosure	Enclosure with ramp	Slab with sign	Trail	Railroad Grade	Transportation	Survey marker	Traiangulation station	Loading ramp	
29723	Trail	Transportation	Prehistoric	1					1		1				1
29724	Complex	Transportation	Historic	4	4						4				4, 6, 7, 13
29725	Enclosure	Survey Marker	Historic	1		1						1			8
29726	Complex	Loading ramp, Transportation	Historic	2	1		1				1			1	10
29727	Slab with sign	Triangulation station	Historic	1				1					1		16
29728	Railroad grade	Transportation	Historic	1						1	1				17
Total				**10**	**5**	**1**	**1**	**1**	**1**	**1**	**7**	**1**	**1**	**1**	

In addition to the six sites, 20 caves and three overhangs were identified during the project (see *Figure 24* and *Table 7*). The 20 caves consist of 8 vertical shafts with chambers at the base, 8 caves at the base of deep depressions, and 4 caves at the base of fissures. The 3 overhangs include 2 located on the side of fissures and 1 located on the side of a surface outcrop. The majority of these features are located in the southwestern portion of the parcel (n=18). Of the five remaining features, two are located along the northern slopes of Pu‘u Kaliu and three are situated in the northwestern portion of the parcel. These natural features were thoroughly inspected during the project and no evidence of cultural use or modification was present, resulting in their designation as non-cultural features.

Site 29723

Site 29723 is a trail located in the southwestern corner of the project area. The trail is comprised of a cleared path through an area of uneven rocky terrain (*Figure 25*). The trail originates along the southwestern project boundary at approximately 855 ft elevation. It extends downhill in an easterly direction for 91 m where it becomes indiscernible at approximately 845 ft elevation. The area outside the parcel to the west has been disturbed and no evidence of the trail was observed there.

A 4.5 m long section of the trail was mapped (see *Figure 25*). The cleared area varies in width from 0.55 to 1.0 m. Linear piles of cobbles and small boulders, cleared from the trail have been placed along each side. These linear piles are 0.4 to 0.6 m wide and 0.15 to 0.4 m in height. The stones are moss-

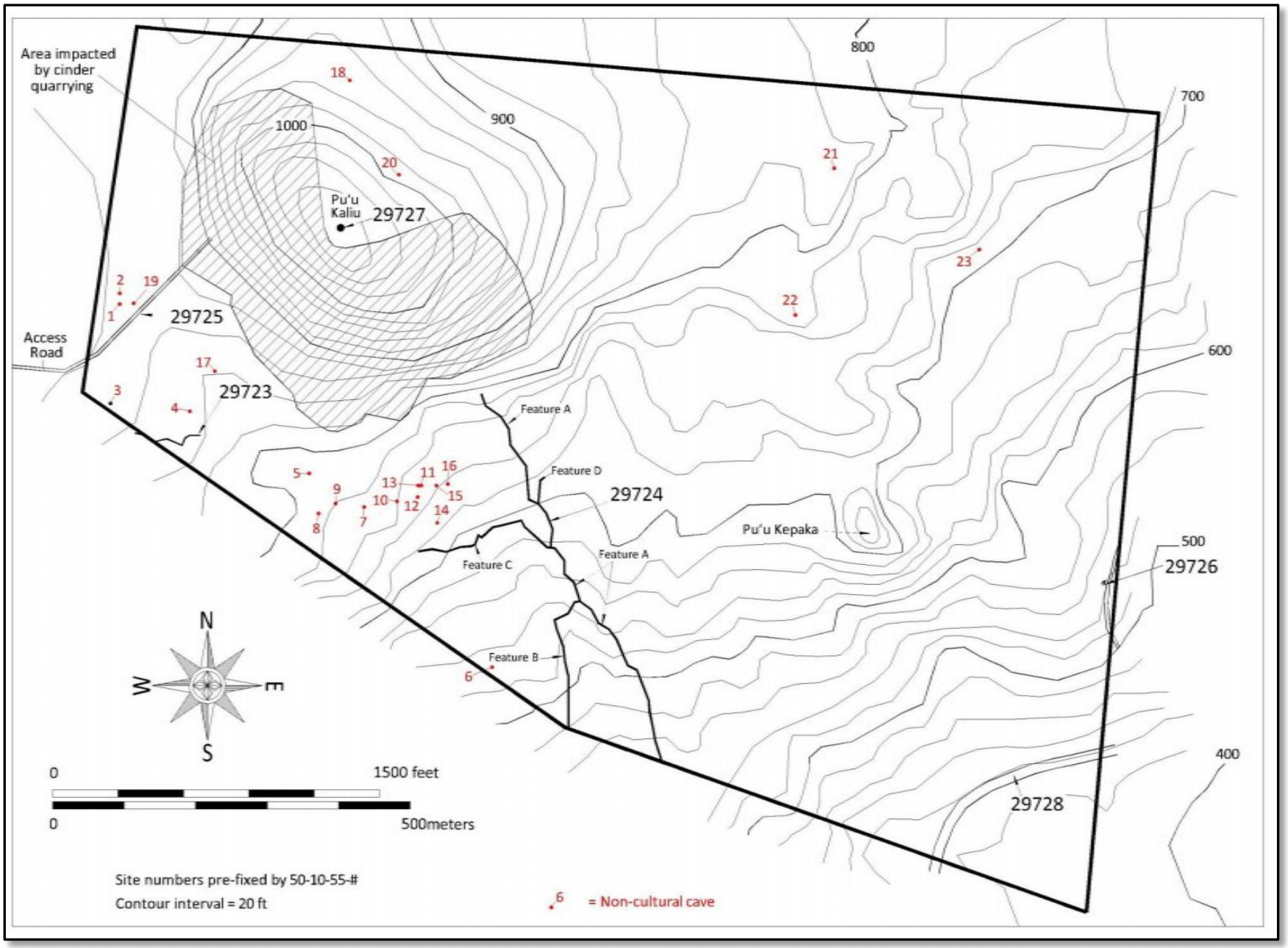


Figure 24. Site location map

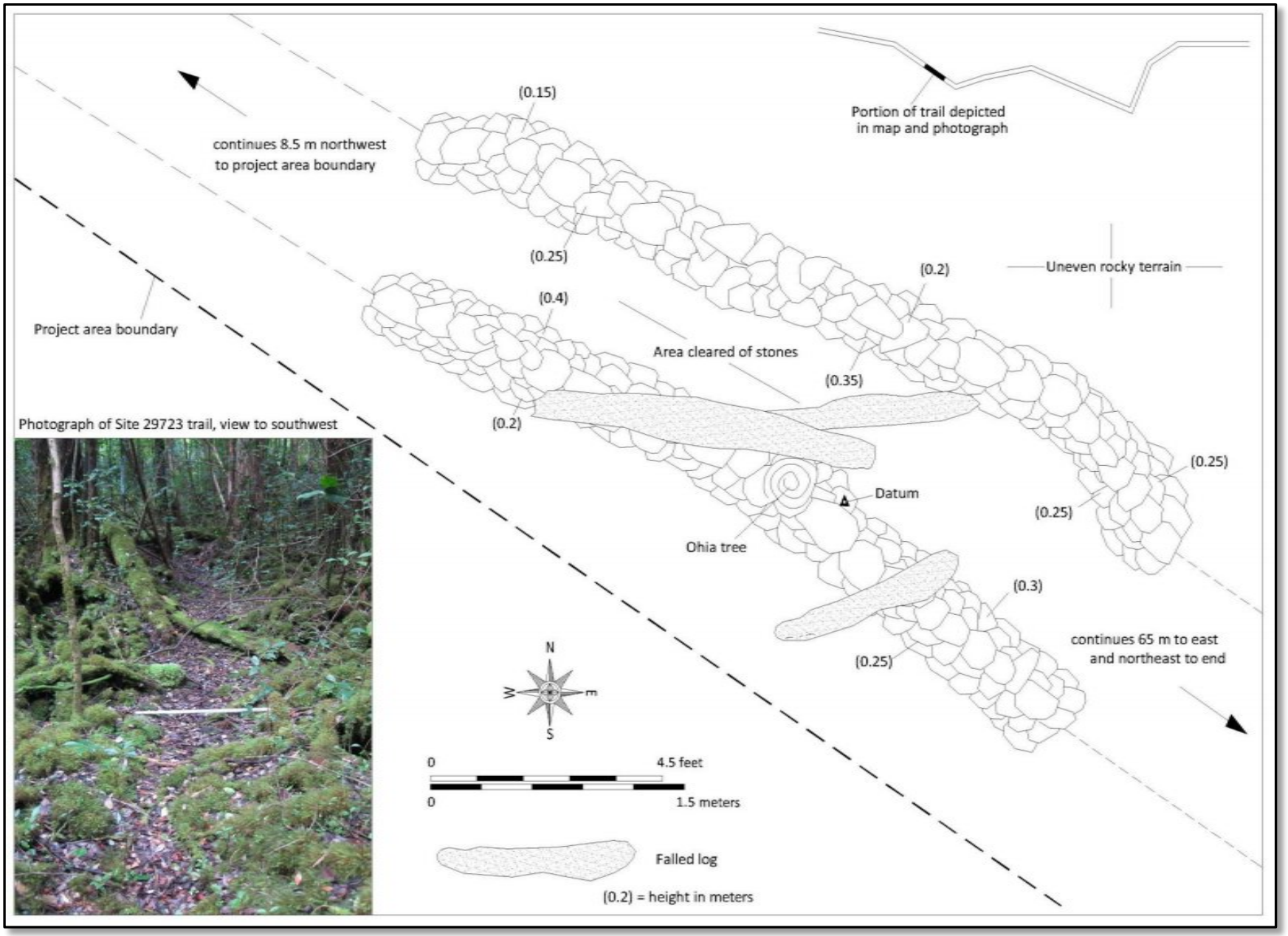


Figure 25. Site 29723 plan map and photograph

Table 7. **Summary of non-cultural caves**

Non-cultural cave number	Type of feature
1	Small cave
2	Small overhang on side of fissure
3	Small cave
4	Small cave
5	Small cave in depression
6	Small cave
7	Small cave
8	Small cave in depression
9	Small cave in depression
10	Small cave in depression
11	Small cave in depression
12	Small cave in depression
13	Small cave in depression
14	Small cave in depression
15	Small cave
16	Small cave
17	Small cave
18	Small cave on side of fissure
19	Small cave on side of fissure
20	Small cave at base of fissure
21	Deep fissure with overhangs at base
22	Small cave on side of fissure
23	Small overhang on side of outcrop

covered and logs have fallen over the trail in several locations. No cultural remains were observed at the site.

It is possible that the Site 29723 trail may represent a portion of the Kauaea Trail, listed as an ancient trail on the Loebenstein's 1895 map of the area (see *Figure 18*). The Kauaea Trail originated seaward of the project area at a coconut grove and community labeled Kikiikii. It extended inland and entered the project area at its southeast corner, roughly paralleling the southern boundary on the land division between Kauaea and Opihikao. According to *Figure 18,* trail terminates at the edge of the forest at the base of Pu'u Kaliu. It is possible that the portion of the trail within the forest was not mapped and Site 29723 is an inland extension of it. The Site 29723 trail also roughly corresponds to a trail depicted on a 1927 map of the area (see *Figure 22*).

Site 29723 is interpreted as a prehistoric and historic transportation route based on its formal type, appearance and its possible association with trails on historic maps of the area. The trail is interpreted as a Type A, single file foot trail using Apples (1965) typology of trails for Honaunau. According to Apple, a Type A trail was used during the pre-Contact to early Historic period prior to the abolishment of the *kapu* system, from prehistory to AD 1819. The portion of the trail within the project area is in fair condition and is unaltered, although the portion on the adjacent parcel, to the west of the project area apparently has been destroyed. It is assessed as significant for its information content and for its cultural value.

Site 29724

Site 29724 is a complex of four road segments (Features A-D) located in the south-central portion of project area. The overall extent of the road network is depicted in *Figure 24.* The road segments have a combined length of 3,251 ft (991 m) and range in elevation from 790 ft at the northern end to 555 ft at the southern end.

The **Feature A** road appears to represent the main segment of the complex, with the Feature B-D road segments branching off of it. Feature A originates along the southern project area boundary at approximately 645 ft elevation. It extends upslope in a north-northwesterly direction for 1,880 ft (573 m) where it becomes indiscernible at approximately 790 ft elevation. The area outside the parcel to the south has been disturbed and no evidence of the road was observed there.

A section of the southern portion of Feature A is depicted in *Figure 26.* The road extends through a dense strawberry guava forest and is 13 to 16.5 feet (c. 4.0 to 5.0 m) wide. The surface of the road is comprised of soil cleared of stones and is bordered along the sides by discontinuous berms of soil and stones. These berms are linear and range in height from 10 to 20 inches (0.25 to 0.5 m). No cultural remains are present in association with the feature.

The **Feature B** road extends to the west from the Feature A road at 645 ft elevation. This road segment has an overall length of 620 ft (189 m). The road extends to the west from Feature A for 26 ft (8 m) and then angles to the south for 92 ft (28 m). It then turns to the south and extends in this direction for 502 ft (153 m) where it terminates along the southern project area boundary at approximately 580 ft elevation. No evidence of the road is present outside the parcel.

The Feature B road is comprised of a cleared path that extends through a dense strawberry guava forest that slopes to the south. It ranges in width from 10 to 13 ft (3.0 to 4.0 m). *Figure 27* depicts a section of the Feature B road where a causeway constructed over a low swale. The causeway is built of stacked cobbles and small boulders and is 17 ft long (north-south) and 10 ft (3.1 m) wide. The sides of the causeway vary in height from 12 to 16 inches (30.5 to 40.5 m). A section of displaced railroad rail is located on the surface of the Feature B road, 164 ft (50 m) to the north of the causeway. No other cultural remains are present.

The **Feature C** road extends to the northwest from Feature A at approximately 675 ft elevation . This road has an overall length of 626 ft (191 m). The road extends to the northwest from Feature A for 141 ft (43 m), then turns in a roughly west-southwesterly direction for 485 ft (148 m) where it becomes indiscernible at approximately 719 ft elevation. *Figure 28* depicts a section of the road.

The Feature C road is narrower than the other features, ranging in width from 4.5 to 11.5 ft (1.4 to 3.5 m), following the contour of a south sloping a‘a ridge. It appears that portions of the bank on the upslope (north) side of the road has been excavated into the slope, evidenced by a vertical cut that ranges in height from 19 to 70 inches (0.48 to 1.8 m) above the surface of the road cut. A linear berm of sloping soil and stones is located below the road on the southern side. This berm is 16 to 52 inches (40.5 to 1.3 m) wide and 36 to 59 inches (0.9 to 1.5 m) in height. No cultural remains are present at the feature.

The **Feature D** road extends in a northerly direction from the Feature A road at approximately 700 ft elevation. This road continues in this direction for 125 ft (38 m) where is becomes indiscernible at approximately 715 ft elevation. *Figure 29* depicts a section of the Feature D road. It is 13 to 17.5 ft (4 to 5.3 m) wide and is comprised of a soil surface bordered along each side by low berms of soil and stones. These berms vary in width from 23 to 53 inches (0.58 to 1.35 m) and 4 to 28 inches (0.1 to 0.7 m) in height. The surface of the road is soil that slopes gently to the south. No cultural remains are present.

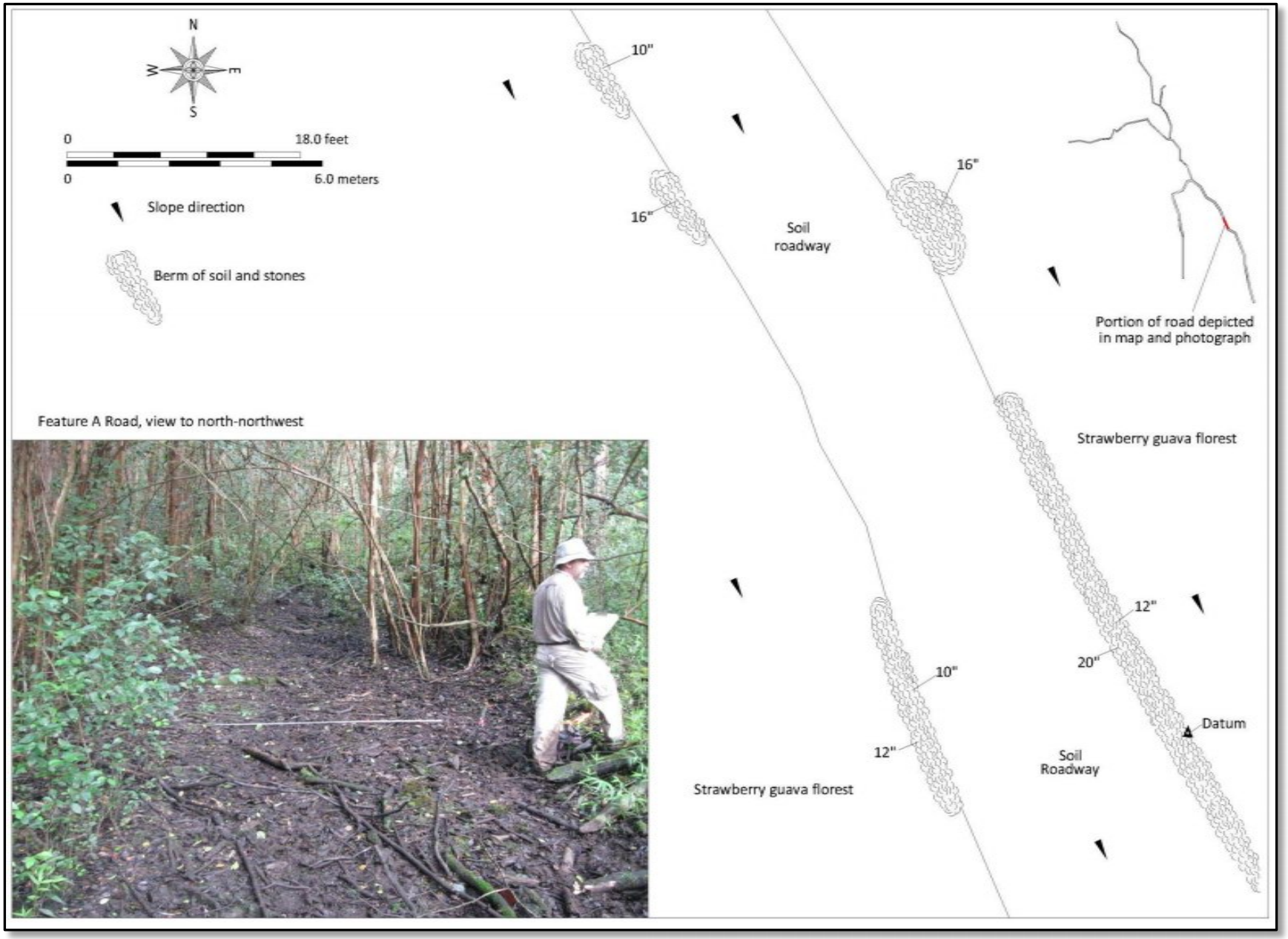


Figure 26. Site 29724, Feature A plan map and photograph

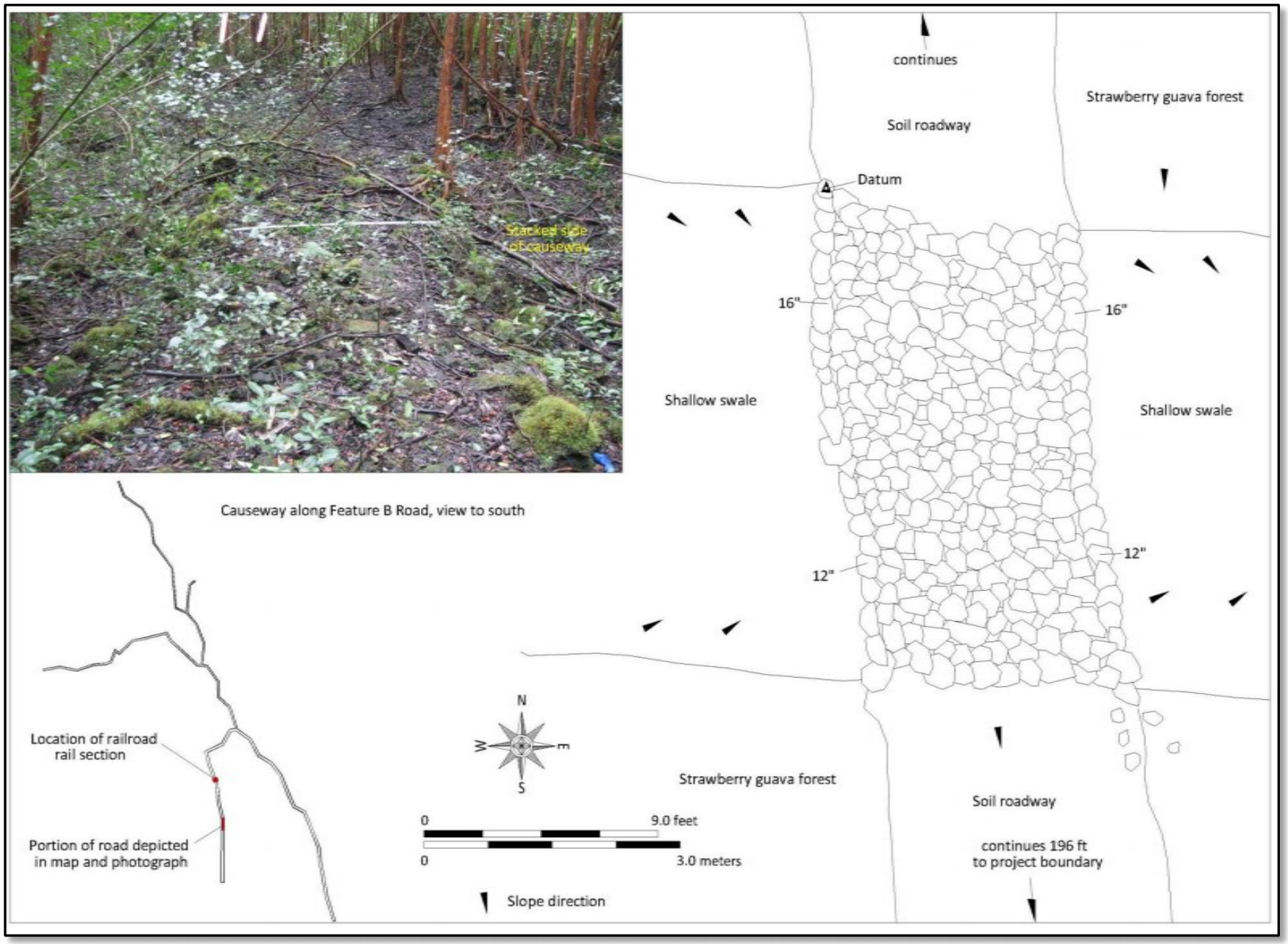


Figure 27. Site 29724, Feature B plan map and photograph

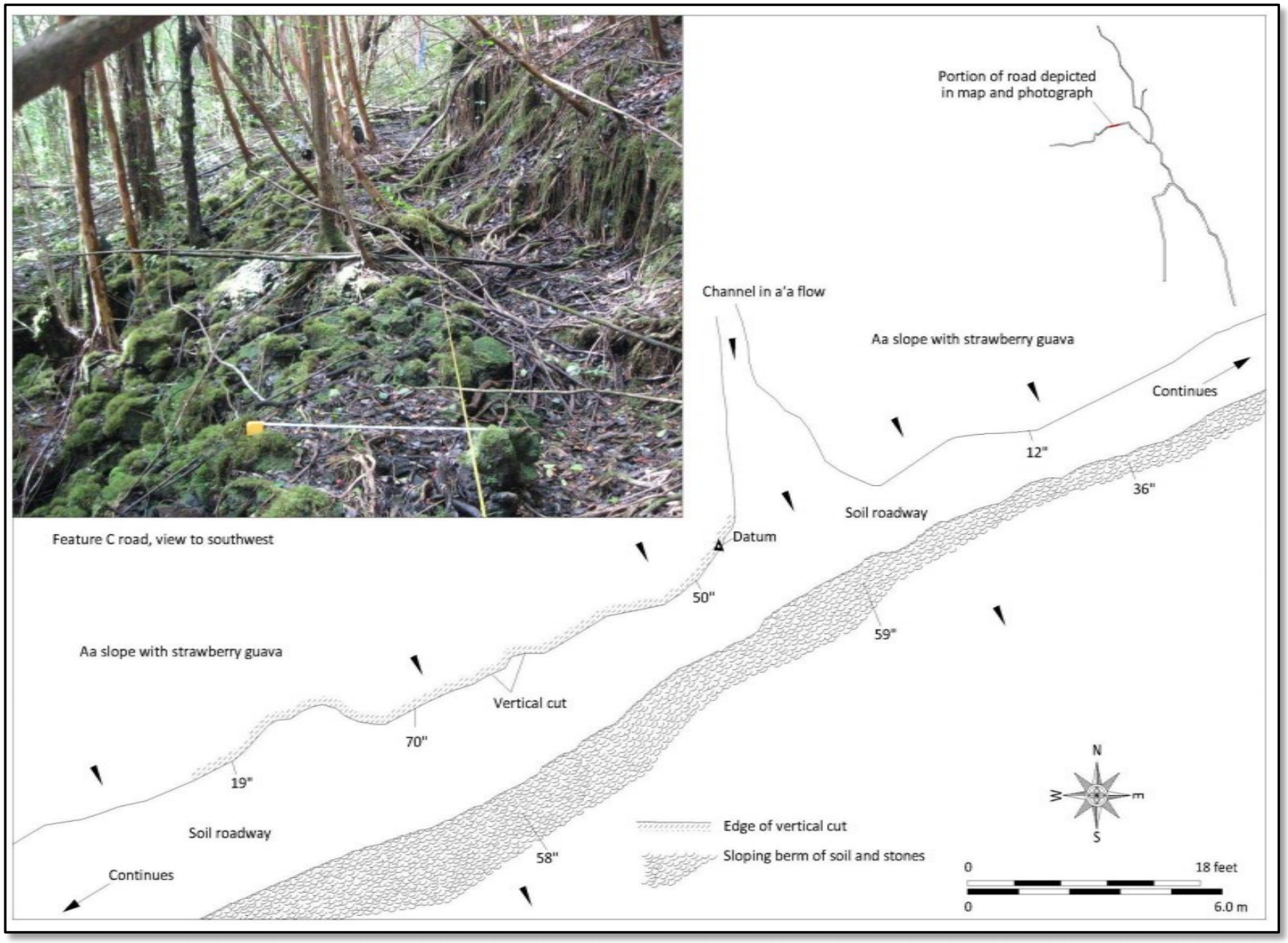


Figure 28. Site 29724, Feature C plan map and photograph

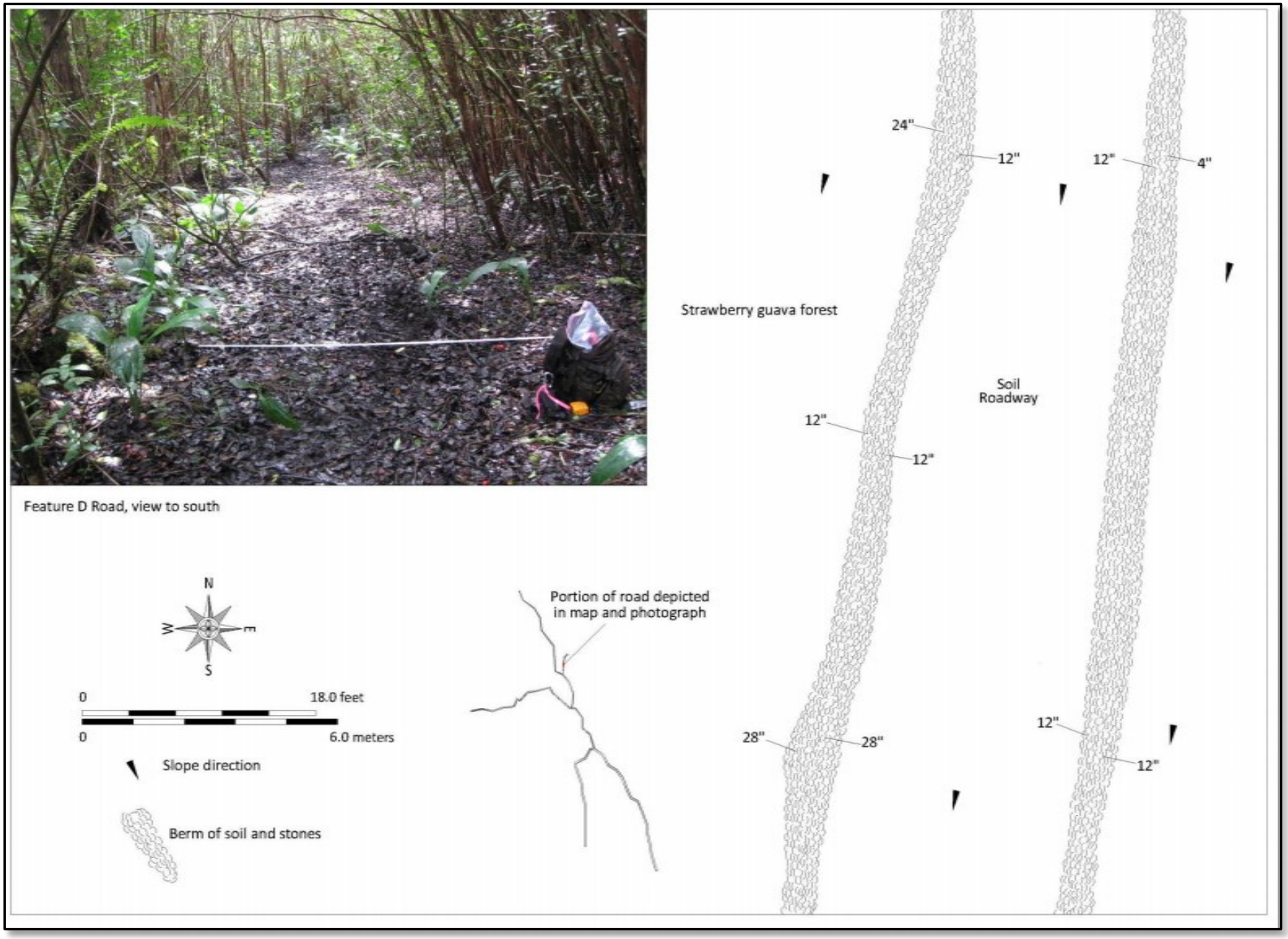


Figure 29. Site 29724, Feature D plan map and photograph

Site 29724 is interpreted as a network of historic roads features that likely functioned to transport sugarcane from the fields to the Site 29728 railroad grade (discussed below). The displaced rail noted at Feature B suggests that this road section may have been a spur line off the main rail line. The width of the Feature A, B and D roads would have been wide enough to have accommodated a truck; however, the Feature C road is only 4.5 to 11.5 ft wide, suggesting the cane may have been moved from the fields in this area to the main Feature A road in carts, or possible a temporary railroad spur. Site 29724 is altered and in poor to fair condition. It is assessed as significant for its information content.

Site 29725

Site 29725 is a small roughly circular-shaped enclosure located in the southwestern portion of the project area at approximately 870 ft elevation. The site is situated on a small knoll with a level soil surface on the southeast side of the access road into the parcel. The enclosure is 47 ½" (1.21 m) long (east-west) and 42 ¾" (1.09 m) wide, built of stacked cobbles and small boulders that are covered in thick moss (*Figures 30* and *31*). The walls of the enclosure are one to two courses wide (7 ½ to 13" or 0.19 to 0.33 m) and two to three courses in height (11 ¾ to 17 ¾" or 0.3 to 0.45 m).

The interior of the enclosure is comprised of a thick root mat with no cultural remains present. A 1 ½"galvanized metal pipe extends vertically out of the ground in the center of the enclosure. The pipe is 3 ¾" (0.1 m) in height.

Site 29725 is interpreted as an historic survey marker base on its formal type and the presence of the vertical metal pipe. The moss accumulation on the stones suggests that the structure is historic in age. The site is unaltered, in good condition and is accessed as significant for its information content.

Site 29726

Site 29726 is a complex of two features located along the eastern project area boundary at approximately 545 ft elevation. The features consist of an enclosure with an attached ramp (Feature A) and a road (Feature B). *Figure 32* illustrates the Feature A enclosure and a portion of the Feature B road. The entire extent of Feature B is depicted in *Figure 24.*

Feature A is a U-shaped enclosure located in an area of level soil with a ramp extending from the north wall. The enclosure portion is 12' 2" long (3.7 m) and 10' 8" to 12' 2" (3.3 to 3.7 m) wide, open to the south-southwest. The walls of the feature are constructed of stacked and faced cobbles and small boulders. The walls range in width from 23" (0.57 m) to 25" (0.63 m) and slope down from north to south. The northern end of the enclosure walls are 41 to 55" (1.05 to 1.4 m) in height, tapering down to 12" (0.3 m) at the southern end (*Figure 33*). The interior of the enclosure is comprised of level soil with no cultural remains.

The ramp portion of the feature extends from the north side of the enclosure (*Figure 34*). The ramp is 9'8" to 15' 2" long (3.0 to 4.65 m) and 7' to 8'2" (2.15 to 2.5 m) wide. The sides of the ramp are built of stacked and faced cobbles and small boulders and the surface is roughly paved with cobbles (*Figure 35*). An '*ohia* tree is growing out of the surface of the ramp in the southeastern corner. The southwest end of the ramp, adjacent to the enclosure is 49 to 51" (1.24 to 1.29 m) high. The ramp slopes down to the northwest to heights ranging from 4 to 32" (0.1 to 0.81 m). A raised outcrop is located adjacent to the northwest end of the ramp. No cultural remains are present on or adjacent to the structure.

The **Feature B** road is situated adjacent to Feature A to the east. The road is 488' (148 m), long and ranges between 500 and 530 ft elevation – see *Figure 24*). The northern end of the road terminates

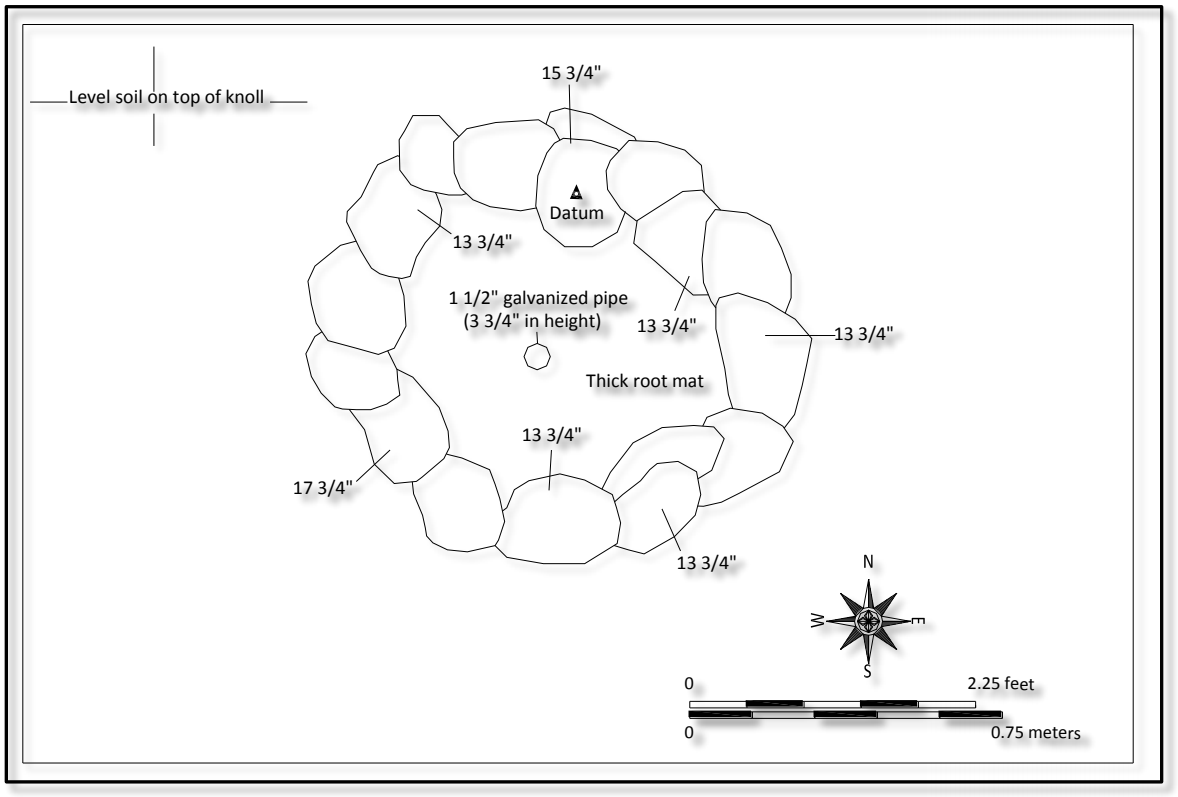


Figure 30. Site 29725 plan map



Figure 31. Site 29725 circular enclosure, view to north

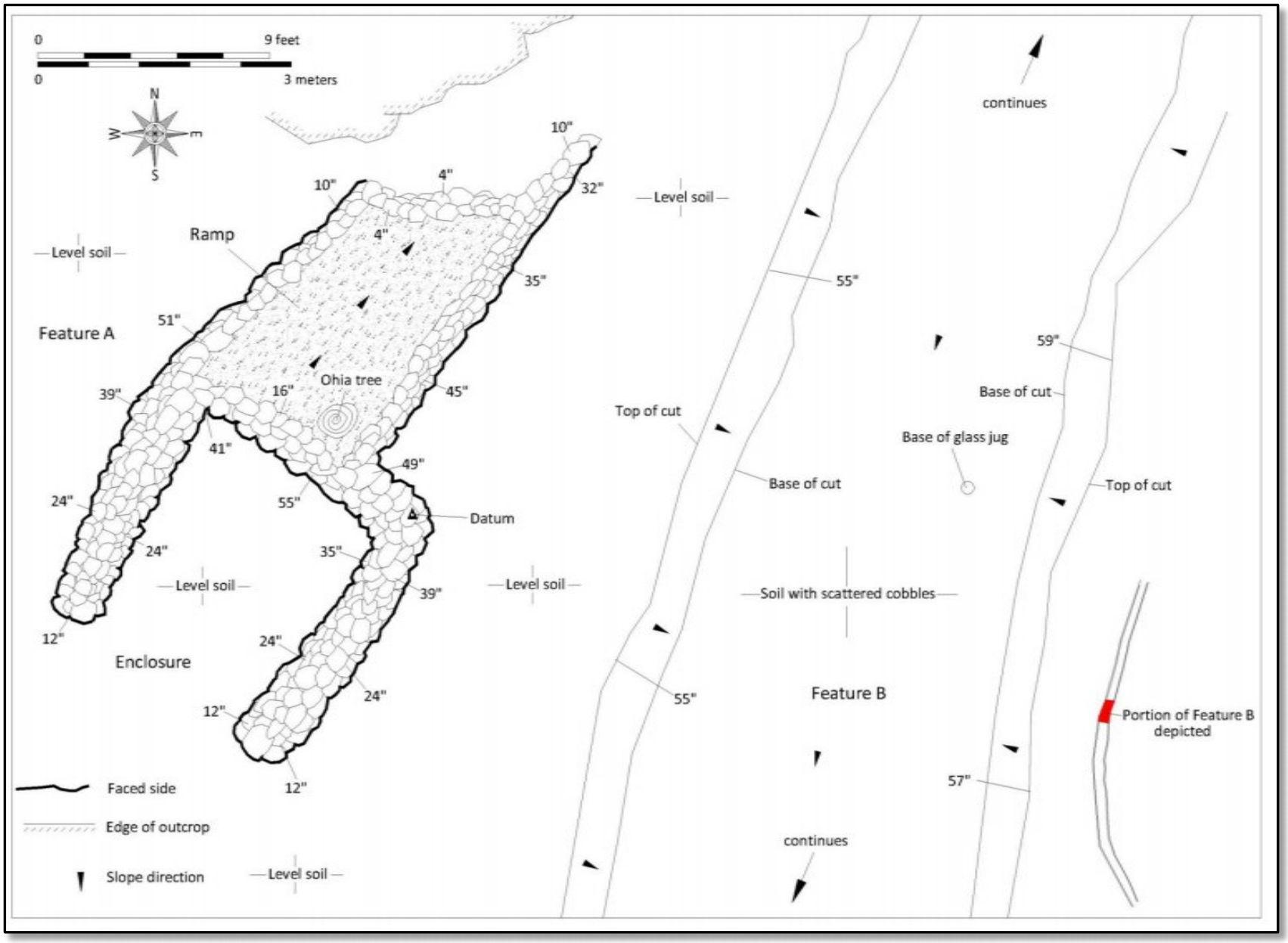


Figure 32. Site 29726 plan map showing Feature A and portion of Feature B



Figure 33. Site 29726, enclosure portion of Feature A, view to northeast



Figure 34. Site 29726, enclosure and ramp portions of enclosure, view to southeast



Figure 35. Site 29726, ramp portion of Feature A, view to southwest



Figure 36. Site 29726, Feature B road, view to north

131 ft (40 m) to the north of the Feature A enclosure. The southern end extends outside the project area, angling to the south-southeast. The road is 10 to 13' (3.0 to 4.0 m) wide and has been excavated into the sloping terrain (*Figure 36*). The surface of the road is 55 to 59" (1.39 to 1.5m) below the surrounding ground surface. The clear glass base of a jug is present on the surface of the road directly east of Feature A. "Hilo Brewery LTD" is embossed on the base. No other cultural remains are present.

Site 29726 was probably associated with sugarcane cultivation in the project area. The Feature A structure likely functioned as a loading ramp based on its shape. The ramp was likely used to load material, potentially sugarcane onto a vehicle parked in the U-shaped enclosure. The interior width of the enclosure is only 7' 7" (2.3 m) potentially indicating that it was too narrow to accommodate a truck, and that horse drawn carts were used. The adjacent Feature B road functioned as the transportation route. It is likely that the southern portion of the road continued downhill outside the parcel, eventually intersecting the Site 29728 railroad (discussed below). The site is in fair to good condition and is unaltered. It is assessed as significant for its information content.

Site 29727

Site 29727 consists of a concrete slab located on the summit of Pu'u Kaliu in the western portion of the project area. According to the USGS quadrangle map (see *Figure 1*) the summit is 1,071 ft in elevation. The top of the *pu'u* is level and is densely vegetated with strawberry guava. The slab is 67" (1.7 m) square and 4" (0.1 m) thick (*Figure 37*). There is a trapezoidal concrete pier on top of the slab that is 16" (0.4 m) square at the base, 10" (0.25 m) square at the top and 24" (0.61 m) in height (*Figure 38*). The pier is positioned over a recessed area in the slab that is 8" (0.2 m) square and 4" deep (0.1 m) on each side.

A 2" (0.05 m) diameter metal pipe extends out of the top of the pier, attached to a 2 ½" (0.06 m) metal threaded metal flange. The pipe is 7'8" (2.4 m) in height above the flange and has a metal sign on top comprised of four rectangular fins welded to the side of the pipe (*Figure 39*). Each fin is 3' (0.92 m) long and 9 ½" (0.24 m) wide and each has seven 1 ½" holes along the sides. The upper portion of the sign and the post is painted red with the lower portion painted white. No cultural remains are present.

Site 29727 is a triangulation station that is used to track the horizontal displacement of the south flank of Kilauea over time. The Pu'u Kaliu summit has been used for this purpose since as early 1896. The Site 29727 sign has been in existence since prior to 1967 when it was found to be in good condition during an examination by the United States Geologic Survey (pers. comm. Robert Shrai, Island Survey, Inc.). The site is unaltered and in fair condition. It is assessed as significant for its information content.

Site 29728

Site 29728 is a section of abandoned railroad grade that extends through the southeastern corner of the project area, roughly paralleling the 480 ft elevation contour. The portion of the site within the project area is 787 ft (230 m) in length. It enters the parcel along the eastern project boundary and extends 626 ft (191 m) to the southwest, then curves to the south-southwest for an additional 161 ft (49 m) where it exits the project area along the southern boundary.

A 108 ft long (33 m) long section of the railroad grade is depicted in *Figure 40.* The site is comprised of the main railroad grade that is bordered along the northwest side by a raised level bench and on the southeast by a steep slope above the papaya farm. The main railroad grade is comprised of a linear, level soil area that is 28.5 ft (8.7 m) to 34 ft (10.5 m) wide (*Figure 41*). The raised level bench is 12'

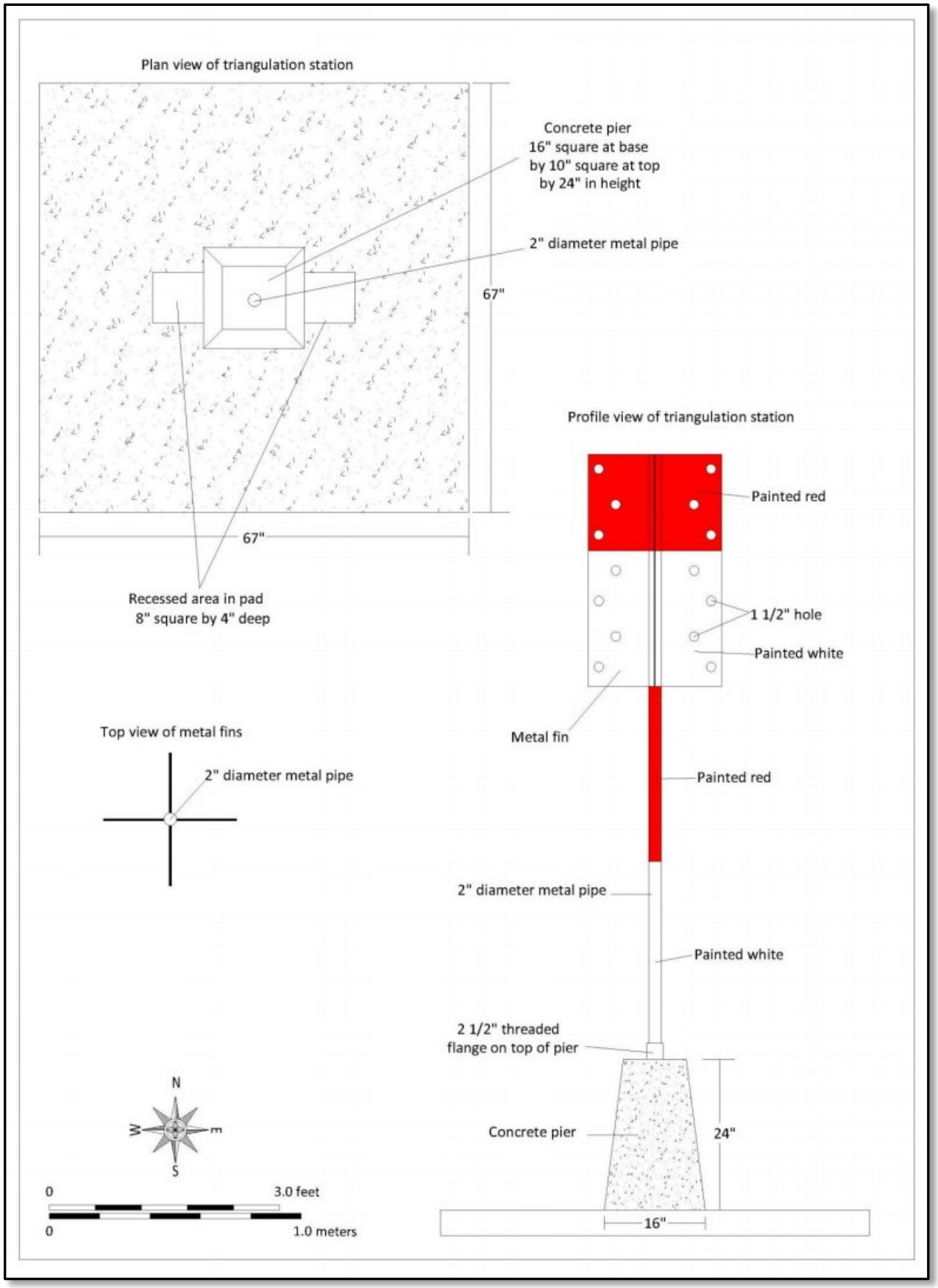


Figure 37. Site 29727 plan map



Figure 38. Site 29727, concrete slab and sign, view to north

Figure 39. Site 29727, close-up of sign, view to north



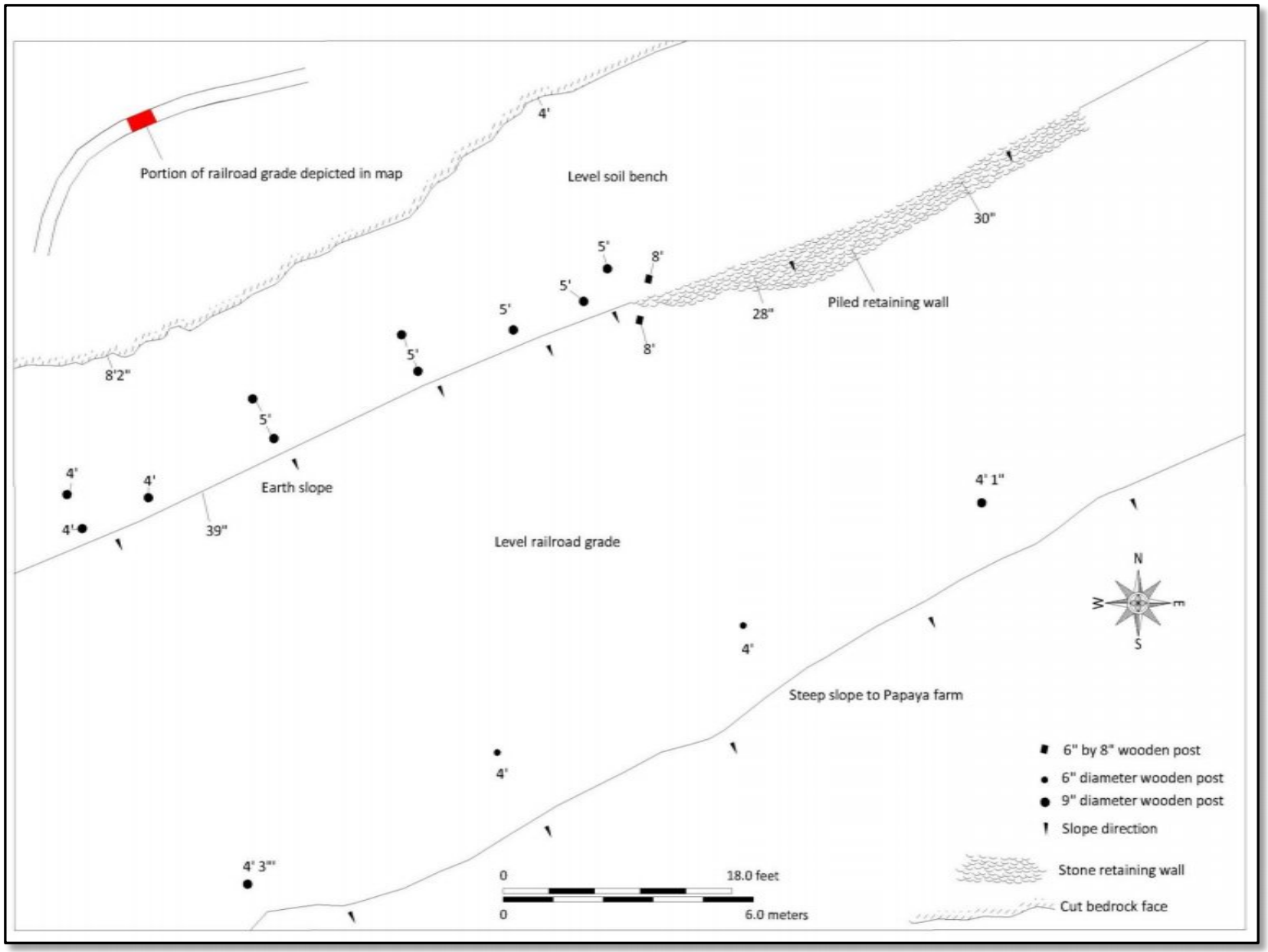


Figure 40. Site 29728 plan map



Figure 41. Site 29728 railroad grade, view to east



Figure 42. Site 29728, raised bench and wooden posts, view to north

(3.65 m) to 18'6" (5.7 m) wide and is 28 to 39" in height above the surface of the main railroad grade. The raised bench is bordered on the southeast by an earthen slope with intermittent areas of a piled cobble and small boulder retaining wall (*Figure 42*). The northwestern side of the bench has been cut out of the bedrock slope. This cut varies in height from 4' (1.2 m) to 8'2" (2.49 m). No intact or displaced sections of rail or wooden ties are present and no cultural remains were observed.

There are a series of wooden posts located primarily in the portion of the site mapped in *Figure 40.* The posts are predominately 9" in diameter, two are 6" in diameter, and two are 6" by 8" rectangular posts. There is an alignment of four posts located along the southwestern side of the main railroad grade that are 4' (1.2 m) to 4'3" (1.29 m) in height and are spaced c. 22" (6.7 m) apart. The remaining posts are located on or adjacent to the raised bench. Several of the posts are positioned in a double alignment spaced 32" (0.82 m) to 36" (0.92 m) wide and 11' (3.3 m) to 15' (4.6 m) apart.

It is possible that the posts supported a fence along the southeast side of the railroad grade, used to restrict the movement of cattle. The paired posts associated with the raised bench potentially represent the remnants of a cattle chute. Longtime resident of the area, Rodney Kahaloa confirm this, stating that the wooden posts along the railroad grade were part of a cattle chute built within the past 50 years.

Site 29728 is an historic railroad grade used to transport sugarcane from the fields to the Ola'a sugar mill. This section of this rail line was constructed between 1915 and 1927 based on historic maps of the area (see *Figures 20* and *21*). The railroad grade follows the approximate path of the Kehena Trail (see *Figures 19* and 20) potentially indicating the prehistoric transportation route was re-utilized historically. Site 29728 is unaltered and in fair condition. The site is assessed as significant for its information content.

CONCLUSION

Discussion

Historic documentary research indicates that several named trails were present in the project area vicinity. These include the Kehena Trail that extended across the southeastern corner of the area and the Kauaea Trail which entered the project area at the southeast corner and extended inland, paralleling the southern project area boundary. The Kaueleau Trail is also documented in the vicinity of the project area passing to the south of the area in the late 1800s and later, in 1927, potentially extending through the southwestern corner of the project area.

Figure 43 is a map overlaying the identified sites with trails depicted on 1895 (see *Figures 18* and *19*), 1915 (see *Figure 20*), and 1927 (see *Figures 21* and *22*) maps of the area. The Site 29728 railroad grade follows the approximate path of the Kehena Trail, indicating that this probable prehistoric to early historic transportation route was re-utilized in the early 1900s for transporting sugarcane. The trail is depicted on both the 1895 and 1915 maps; however, on the 1927 map the trail was replaced by the railroad grade indicating that the grade was constructed during the period between 1915 and 1927.

The Kauaea Trail originates seaward of the project area at a coconut grove and community labeled Kikiikii. It extends inland and enters the project area at the southeast corner, roughly paralleling the southern boundary on the land division between Kauaea and Opihikao. According to the 1895 map, the trail terminated at the edge of the forest at the base of Puʻu Kaliu. The portion of the Kauaea Trail on the 1895 map is located in an area that was altered by sugarcane cultivation and the depicted trail segment in this area was not relocated during the project.

The 1895 map also shows the Kaueleau Trail that originates in coastal Opihikao and extends inland through Kaueleau Ahupuaʻa. This map shows the trail continuing inland to the south of Puʻu Kaliu and the project area. The 1915 map shows a trail that likely represents the Kaueleau Trail, but it terminates along the seaward side of the Kehena Trail and does not continue inland. The 1927 map of the area depicts the same trail continuing inland beyond the former path of the Kehena Trail (current path of Site 29728 railroad grade). This trail enters the project area along the southern boundary and extends to the west, exiting the parcel at the southwest corner and continuing inland.

According to *Figure 43*, the inland end of the Kauaea Trail terminated at the southern end of the Site 29724, Feature B road. This road segment also roughly matches the route of the Kaueleau Trail on the 1927 map. This suggests that this section of road may have followed the route of a pre-existing prehistoric to early historic trail that was re-used in the early 1900s.

The Site 29723 trail may represent the inland extension of the Kauaea Trail. It is also possible that Site 29723 may be an inland portion of the Kaueleau Trail. On the 1895 map the Kaueleau Trail is depicted south of the project area within Kaueleau Ahupuaʻa. On the 1915 map, it terminates at the Kehena Trail; however, on the 1927 map the Kaueleau Trail appears to extend into the project area, roughly following the path of the Site 29724, Feature B road, then turning to the west and northwest, roughly following the alignment of the Site 29723 trail segment. The varying trail routes on historic maps suggest that the locations of the trails may have shifted over time, and that the inland portions of the Kaueleau and Kauaea trails may have merged in the early 1900s.

The survey confirmed that a large portion of the parcel was used for sugarcane cultivation. Sugarcane plantation agriculture in Puna began with the founding of the Olaʻa Sugar Company in 1899; however, cultivation in the project area likely did not occur until between 1915 and 1927. This is indicated by the presence of the railroad grade on a 1927 map (see *Figure 21*) and its absence on the 1915 map (see *Figure 20*).

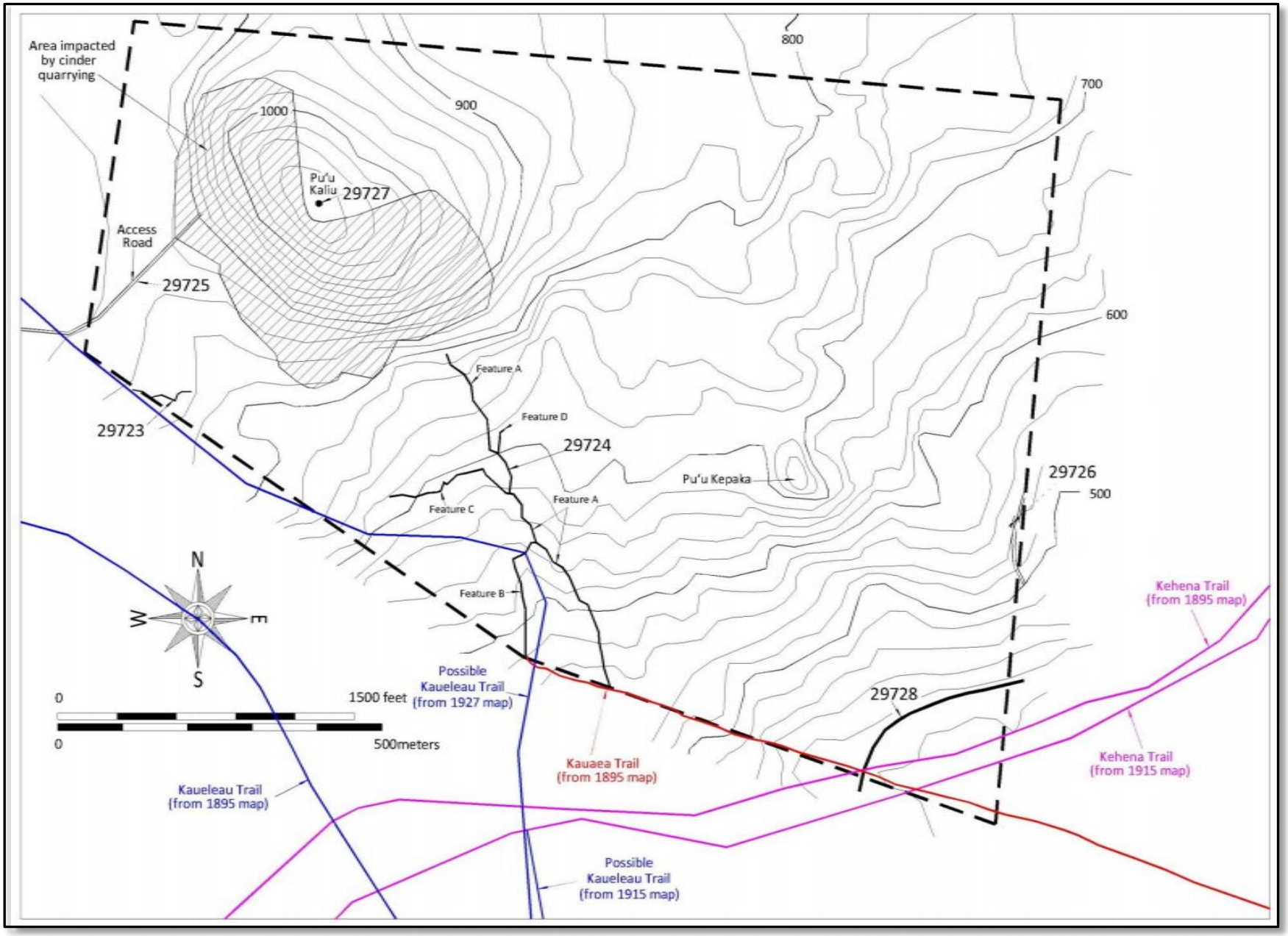


Figure 43. Site location map showing trails depicted on historic maps

According to a longtime resident of the area, Mr. Rodney Kahaloa, sugarcane in the project area was harvested by field workers who used donkeys and carts to transport the cane to the railroad. According to Kahaloa, sugarcane cultivation ended when the railroad stopped operation. The Hawaii Sugarcane Plantation Archives records indicate that the railroad was abandoned after it was damaged by the 1946 tidal wave.

The two remaining sites documented in the project area are associated with historic land surveying. The Site 29725 enclosure functioned as a survey marker. Site 29727, which is situated on the summit of Pu'u Kaliu, functioned as a triangulation station for mapping the horizontal ground displacement of Kiluaea Volcano.

As discussed in the Methods section of this report, the project area was subjected to a variable intensity survey based the survey findings as the work progressed and as it became apparent that some areas lacked sites (see *Table 4*). Nearly half of the project area (146-acres or 47%) was subjected to a high intensity survey with the crewmembers spaced at 10 meter intervals. The disturbed quarry area (31-acres, 10%) was subjected to a low intensity survey, comprised of a non-systematic vehicular and pedestrian survey.

The remaining 132-acres (43%) were examined using a moderate intensity survey with crewmembers spaced at intervals ranging from 30 to 50 meters. These areas were either disturbed by sugarcane (57-acres) or papaya (7-acres) cultivation, located on a 1955 lava flow (7-acres), or were in the area of high canopy forest with hazardous terrain where no sites were expected based high intensity survey of adjacent portions of the same high canopy forested hazardous terrain.

According to Wolfe and Morris (2001), the high canopy forest with hazardous terrain area is characterized by lava flows that date to either 400-750 or 750 to 1,500 years ago (see *Figure 14*); however, the nature of the terrain and one historic map potentially indicate a more recent age for some lava flows in this area. The 1895 map of the project area vicinity (see *Figure 19*) indicates that much of this area, located on the "Slopes of Kaliu" was characterized as "Good coffee land" at the time the map was made. It is very unlikely that this area; which today is characterized by a very uneven ground surface with narrow ridges, deep fissures, and lava channels that is almost devoid of soil; would be suitable for coffee cultivation. These terrain characteristics and map notations potentially indicate that portions of this area were covered by lava flows post-dating 1895.

The Wolfe and Morris map was compiled using aerial photograph interpretation, radiocarbon dating, and previous data collected by Sterns and Macdonald (1946). It is possible that the dense, high canopy forest in this area obscured evidence of more recent volcanic activity. The obscuring effect of this forest vegetation is also reflected in the USGS Quadrangle topography that shows this area as characterized by nearly level to very gently sloping terrain when it is actually extremely irregular with numerous localized changes in elevation exceeding the 20 ft contour line interval on the USGS map (see *Figure 1* and *43*).

Significance Assessments

Pursuant to DLNR (2003) Chapter 13-284-6, the initial significance assessments provided herein are not final until concurrence from the DLNR has been obtained. Sites identified during the survey are assessed for significance based on the criteria outlined in the Rules Governing Procedures for Historic Preservation Review (DLNR 2003, Chapter 284). According to these rules, a site must possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of the following criteria:

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

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

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

4. Criterion “d”. Have yielded, or is likely to yield, information important for research on prehistory or history; and

5. Criterion “e”. Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional 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.

Based on the above criteria, all of the sites are assessed as significant under Criterion “*d”.* These sites have yielded information important for understanding prehistoric to historic land use in project area. The Site 29723 trail is additionally assessed as culturally significant under Criterion “e”1
as a main, probably named trail.

Recommended Treatments

The mapping, written descriptions and photography at Sites 29724-29728 adequately document them and no further work or preservation is recommended. The Site 29723 trail is recommended for preservation. Measures to protect this site would be detailed in a Site Preservation Plan prepared for DLNR-SHPD review and approval. Consultation with the Na Ala Hele is also recommended.

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901 Rec'd 9/30/13

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601 Kamokila Boulevard, Suite 555
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September 23, 2013

Alan E. Haun, Ph. D.
Haun & Associates
73-1168 Kahuna A'o Road
Kailua-Kona, Hawai'i 96740

LOG NO: 2013.4598
DOC NO: 1309SN12
Archaeology

Dear Dr. Haun:

SUBJECT: **Chapter 6E-42 Historic Preservation Review –**
Archaeological Inventory Survey of 309 Acres
Kauaea Ahupua'a, Puna District, Island of Hawai'i
TMK: (3) 1-3-009:005 (por)

Thank you for submitting the report titled *Archaeological Inventory Survey TMK (3) 1-3-009:005 (por) Kauaea Nui Ahupua'a, Puna District, Island of Hawaii* (A. Haun and D. Henry, August, 2013). We received your submittal on August 22, 2013. The surveyed area described in the report consists of a 309-acre portion of the 694.5-acre parcel. The fieldwork portion of this survey consisted of a 100% variable intensity survey method dependent upon the area in the project area being surveyed. The report indicates that 146-acres or 47% of the project area was subjected to a high intensity survey using 10 m intervals, 132-acres or 43% employed a moderate intensity survey spaced at 30-50 m and 31-acres or 10% of the project area utilized a low intensity survey. The low intensity survey consisted of a 100% non-systematic vehicular and pedestrian examination of the previously disturbed cinder quarry.

The survey identified six (6) sites comprised of ten (10) features, all of which are newly identified (SIHP Site 50-10-55-29723 through 29728. One of the sites, a portion of the Kauaea Trail (Site 29723) is determined to be Precontact; the remaining sites are historic is age and include roads (Site 29724), a survey marker (Site 29725), a sugarcane loading amp (Site 29726), a trig station (Site 29727), and a railroad grade (Site 29728). A 4.5 meter section of the approximately 91 meter long Kauaea Trail within the project area was mapped. The survey also included and documented 20 caves and three overhangs. All of these natural features were thoroughly inspected and determined to have no evidence of cultural use or modification. SHPD believes that the survey has adequately covered the project area.

SHPD concurs with significance assessments for all six sites as being significant under HAR 13-284-6 Criterion "d". Site 29723 has also been assessed as being culturally significant under Criterion "e" as a named trail. SHPD concurs with this assessment as well. SHPD concurs with the recommended treatments that no further work or preservation is necessary for Sites 29724-29728. We believe these to have been adequately documented. We look forward for the opportunity to review and approve the recommended preservation plan for Site 29723 and also concur with the recommended consultation with the DLNR Nā Ala Hele program regarding this trail.

With a few minor revisions as outlined in the attachment, SHPD believes that this report meets the requirements of HAR 13-276-5 and it is accepted by SHPD. Please send one hardcopy of the document with the revisions listed below, clearly marked FINAL, along with a copy of this review letter and a text-searchable PDF version on CD to the Kapolei SHPD office, attention SHPD Library. Please contact Sean Naleimaile at (808) 933-7651or Sean.P.Naleimaile@Hawaii.gov if you have any questions or concerns regarding this letter.

Aloha,

Theresa K. Donham
Archaeology Branch Chief

Attachment

Archaeological Inventory Survey TMK (3) 1-3-009:005 (por) Kauaea Nui Ahupua'a, Puna District, Island of Hawaii (A. Haun and D. Henry, August, 2013)

1. Findings- page 33, paragraph 2: The number of sites should be 6 and not 10.
2. Page 37, paragraph 2, Feature A is determined to be a road; however the last sentence calls it a trail. Please change and check the sentence structure. Please check the spelling on the word segment in paragraph 1 as well.
3. Page 56, paragraph 1, please add the appropriate reference to HAR 13-284-6 regarding Criterion "e" for Site 29723.

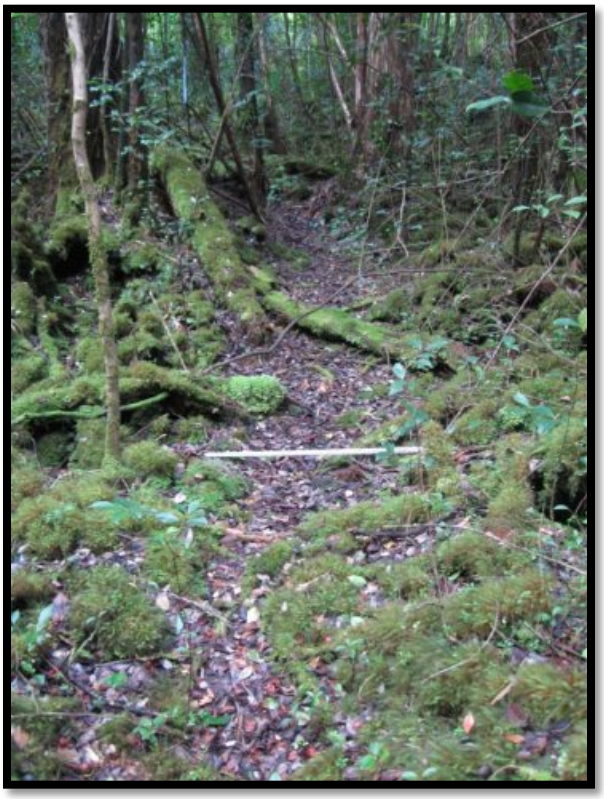
Appendix H

Archaeological Site Preservation Plan

Haun & Associates Report 990-030314

ARCHAEOLOGICAL SITE PRESERVATION PLAN

SITE 50-10-55-29723



KAUAEA AHUPUA‘A

PUNA DISTRICT, ISLAND OF HAWAI’I

TMK: (3) 1-3-09:POR. 005

Haun & Associates

Archaeological, Cultural, and Historical Resource Management Services

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ARCHAEOLOGICAL SITE PRESERVATION PLAN

SITE 50-10-55-29723

KAUAEA AHUPUA'A

PUNA DISTRICT, ISLAND OF HAWAI'I

TMK: (3) 1-3-09:POR. 005

By:

Alan E. Haun, Ph.D.
and
Dave Henry, B.S.

Prepared for:

Sanford Service Center
15-2628 Keaau-Pahoa Road
Pahoa, HI
96778

May 2013

HAUN & ASSOCIATES

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MANAGEMENT SUMMARY

This Archaeological Site Preservation Plan addresses provisions for the preservation of one site located in Kauaea Ahupua'a, Puna District, Island of Hawai'i. The site consists of a 91.0 m long segment of a single file foot trail located at approximately 845 to 855 ft elevation (Site 50-10-55-29723).

Project Proponent: Sanford Service Center
Project Description: Preservation protocols for one historic property
Project Location: TMK: (3) 1-3-09:Por. 005, Kauaea Ahupua'a, Puna District, Island of Hawai'i
Project Acreage: 309 acres
Land Jurisdiction: owned in fee simple by Kamehameha Schools
Plan Proposal: Identification of preservation site, appropriate form of preservation, and conservation measures
Preservation Site: Site 29723 Trail

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INTRODUCTION

Project Identification

Haun & Associates prepared this Archaeological Site Preservation Plan at the request of the property owner, Kamehameha Schools. The preservation site is located in a 309 acre portion of the 694.5 acre TMK: (3) 1-3-09: Por. 005 in Kauaea Ahupua'a, Puna District, Island of Hawai'i (**Figures 1** and **2**). This preservation plan was prepared in accordance with the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) *Rules Governing Requirements for Archaeological Site Preservation and Development* in Hawai'i Administrative Rules (HAR) Title 13, Subtitle 13, Chapter 277 (DLNR 2003).

The project area is a trapezoidal-shaped parcel located in the inland portion of Kauaea Ahupua'a at elevations that range from 380 to 1,070 feet. The project area is bordered to the north by the Leilani Estates subdivision and Keahialaka Ahupua'a, by Opihikao and Kaueleau Ahupua'a to the south, by undeveloped land to the west and by undeveloped land and a papaya farm to the east. An existing cinder quarry is located in the western portion of the parcel and the remaining portion is undeveloped. An aerial view of the project area is presented in **Figure 3.**

Plan Purpose

The purpose of this plan is to describe measures to preserve Site 29723 during and after planned development. The proposed development of the parcel consists of the expansion of the cinder quarrying activities that are currently being conducted within the project area. This plan explains the timing of the protection measures required to ensure the physical integrity of the site, describes the site, and identifies the form of preservation.

BACKGROUND

Environmental Setting

There are two hills (*pu'u*) in the project area. Pu'u Kaliu is a 1,071 ft high hill located in the northwestern portion of the parcel. The cinder quarry is located on the slope flank of Pu'u Kaliu. The second *pu'u,* Pu'u Kepaka, is approximately 760 ft high and is located in the eastern portion of the parcel. The entire project area spans the East Rift Zone of the Kiluaea Volcano. Large portions of the project area have been disturbed by cinder mining and agricultural activities (**Figure 4**). **Table 1** summarizes the disturbed areas and terrain types in the project area. The cinder quarry area comprises approximately 31-acres or 10% of the project area. This area includes an active cinder quarry (**Figure 5**) and areas that were previously disturbed by cinder mining (**Figure 6**). These areas have been excavated below the original ground surface and are vegetated with sparse grass and weeds.

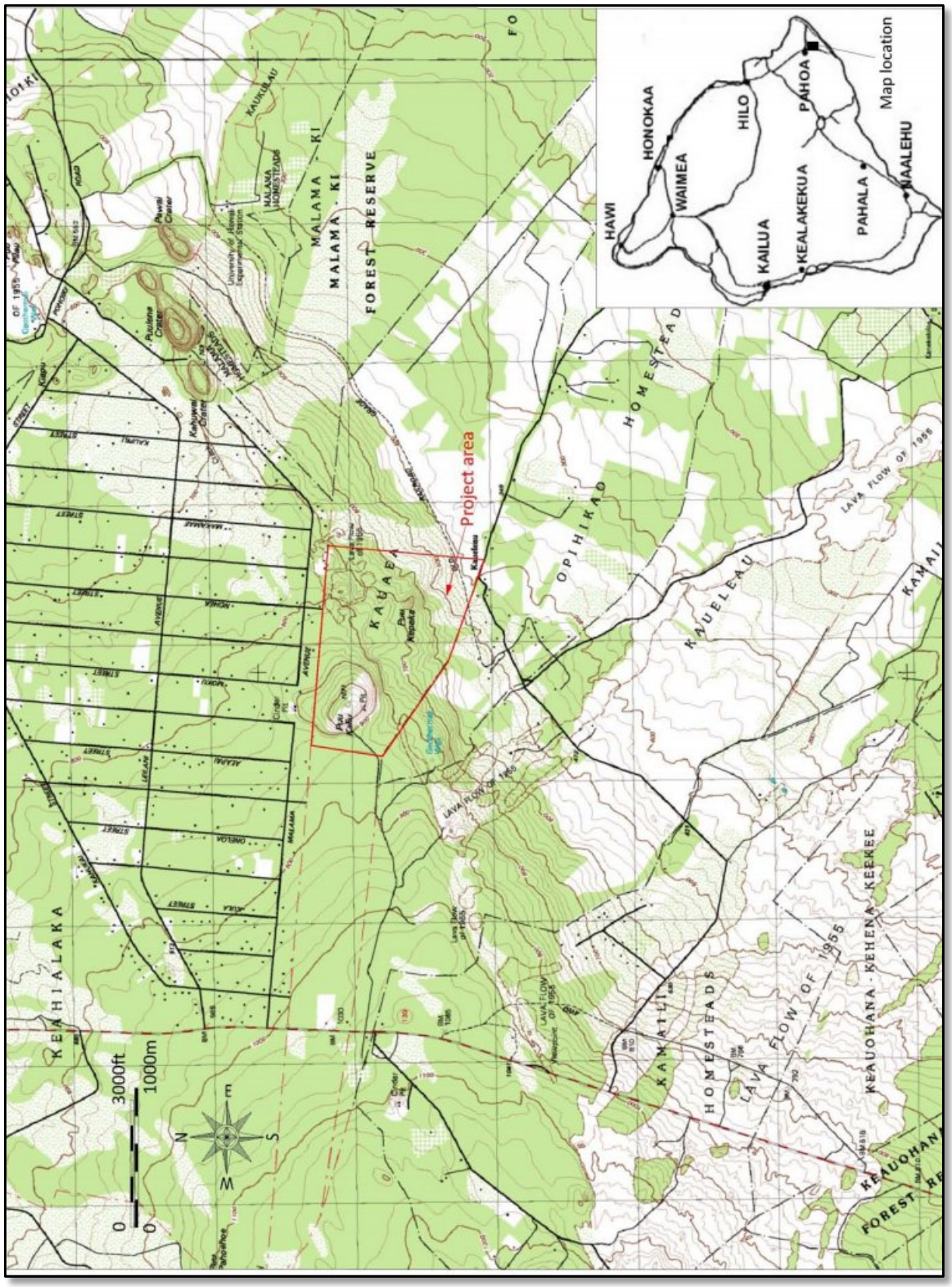


Figure 1. Portion of 1994 USGS Pahoa South Quadrangle showing project area

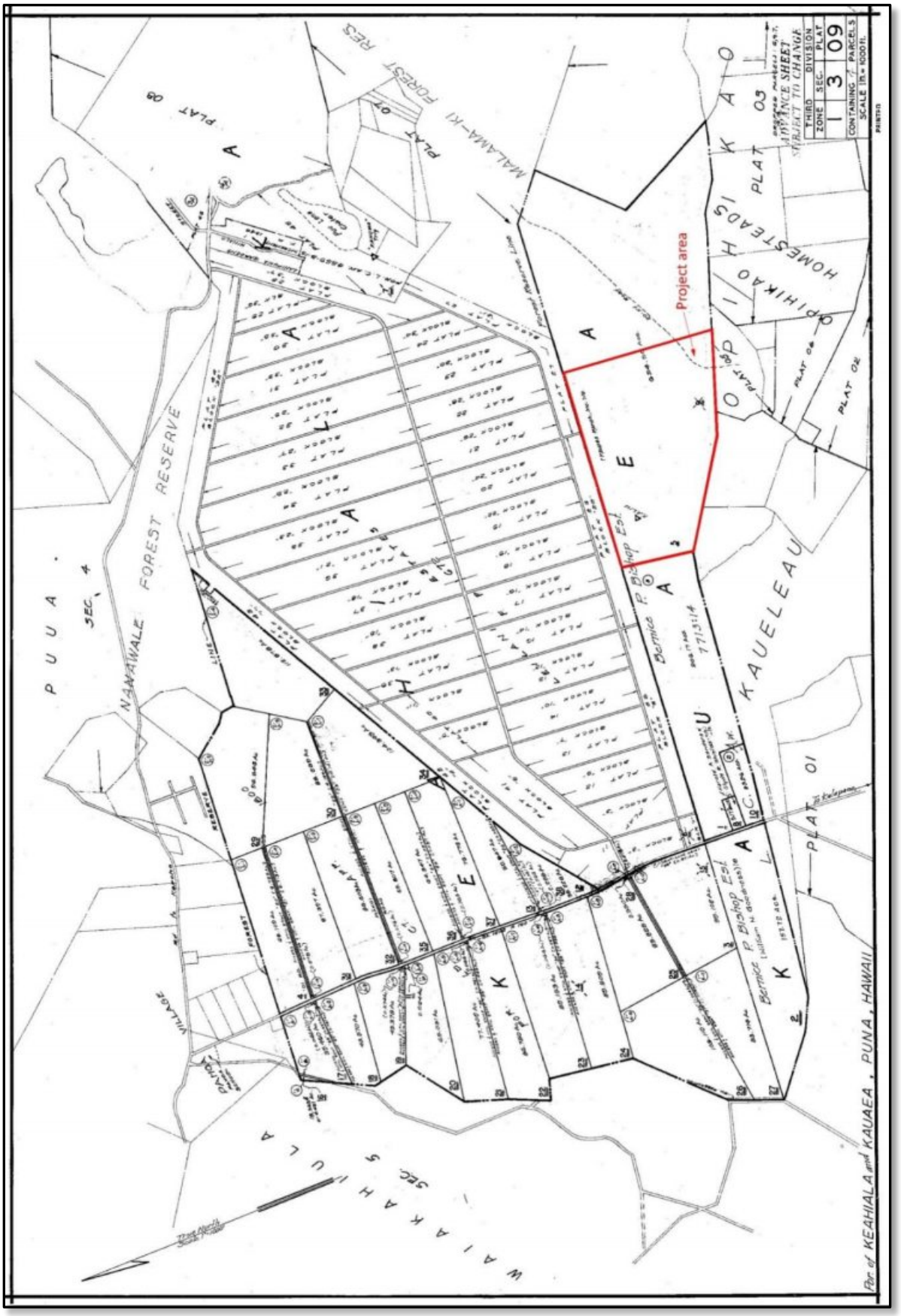


Figure 2. Tax Map Key (3) 1-3-09 showing project area

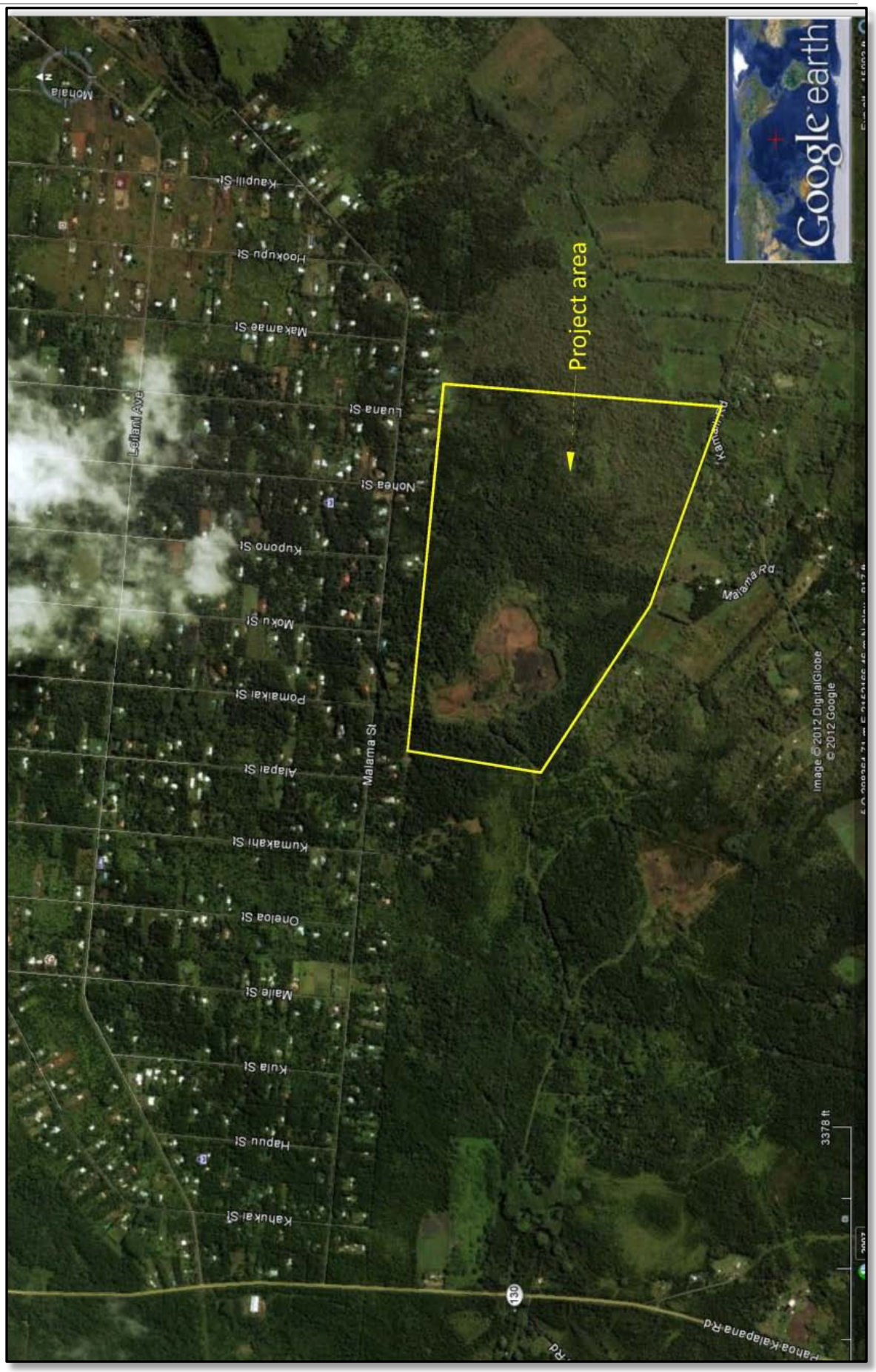


Figure 3. Aerial view of project area (from Google earth)

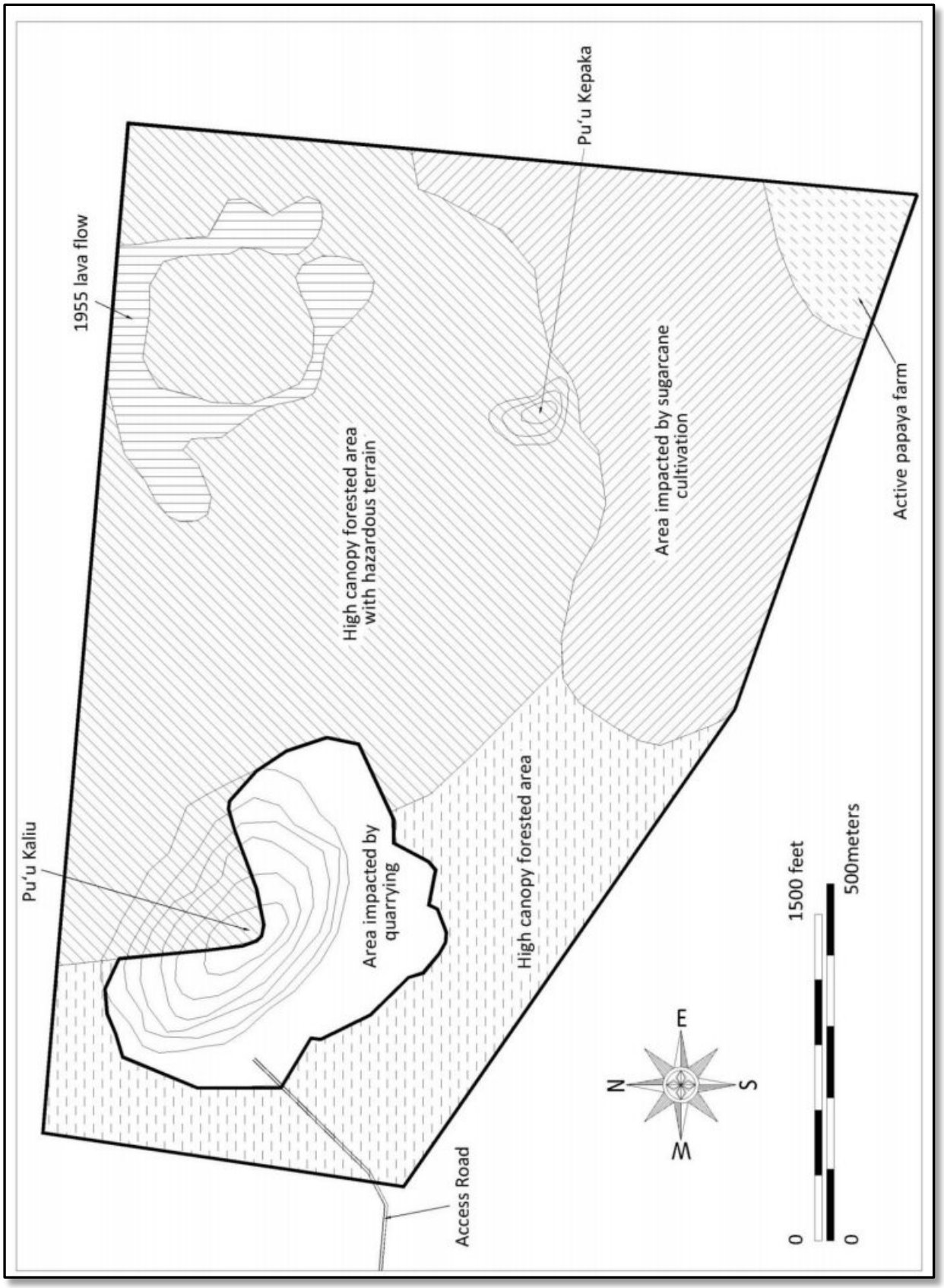


Figure 4. Areas of disturbance and terrain types within project area



Figure 5. Active cinder quarry, view to northwest



Figure 6. Abandoned cinder quarry, view to east-southeast

Table 1. Areas of disturbance and terrain types in project area

Area	Acres within project area	% of project area	Ground surface visilibity
Cinder quarry	31	10.0	Excellent
Impacted by sugarcane cultivation	66	21.0	Fair to good
Papaya farm	7	2.0	Excellent
1955 lava flow	13	4.0	Fair to good
High canopy forest	53	17.0	Fair to good
High canopy forest - Hazardous terrain	139	45.0	Fair
	309	**100.0**	

The southeastern portion of the project area was disturbed by historic and modern sugarcane cultivation. This area comprises 66-acres or 21% of the total parcel and is characterized by relatively flat, gently sloping terrain with introduced plant species including strawberry guava (*Psidium cattleianum*), Coster's curse (*Clidemia hirta*), lantana (*Lantana camara*), Miconia (*Miconia calvescens*), Hawaiian raspberry (*Rubus hawaiensis),* avocado (Persea americana), coconut (*Cocos nucifera*), mango (*Mangifera indica*), red ginger (*Alpinia purpurata*), grasses and vines (**Figure 7**). The dense vegetation in this area resulted in fair to good ground surface visibility.

An active papaya (*Carica papaya*) farm is located in the southeast corner of the parcel, occupying 7-acres or 2% of the parcel (**Figure 8**). The ground surface visibility in the papaya farm is excellent. This area also was formerly used for sugarcane cultivation.

There is a U-shaped area in the northeastern portion of the project area that was covered by a 1955 lava flow from Kiluaea Volcano (13-acres, 4%). This area is vegetated with young *ohia* (*Metrosideros polymorpha*) trees, ferns and grasses with fair to good ground surface visibility (**Figure 9**).

The southwestern portion of the project area consists of a high canopy forest comprising 53-acres or 17% of the total project. The terrain in this area is relatively level with moderately thick vegetation dominated by strawberry guava and large ohia trees. Occasional fissures associated with the East Rift Zone are present in this area (**Figure 10**). Ground surface visibility in this area is fair to good.

The remaining 139-acres (45%) are comprised of a high canopy forest with hazardous terrain. This area is characterized by an extremely uneven ground surface that is bisected by narrow ridges and deep fissures and channels. Examples of the terrain are presented in **Figures 11** and **12.** The vegetation in this area consists of strawberry guava, African tulip (*Spathodea campanulata*), albizia (*Falcataria moluccana*), avocado, autograph tree (*Clusia rosea*), bamboo (*Bambusa spp.*), bamboo orchid (*Arundina graminifolia*), Coster's curse, gunpowder tree (*Trema orientalis*, Hawaiian raspberry, *kukui* (*Aleurites moluccana*), *ohia,* paper mulberry (*Broussonetia*



Figure 7. Area impacted by sugarcane cultivation



Figure 8. Papaya farm, view to northeast



Figure 9. 1955 lava flow area, view to east



Figure 10. Fissure within High Canopy Forest area, view to east



Figure 11. Deep fissure within High Canopy Forest with hazardous terrain, view to north



Figure 12. Terrain with High Canopy Forest with hazardous terrain, view to northeast

papyrifera), staghorn fern, (*Dicranopteris linearis*), *ti* (*Cordyline fruticosa*), *uluhe* (Dicranopteris linearis), grasses and vines. Ground surface visibility in this area is fair.

Sato *et al*. (1973) indicates that there are six soil types present within the project area (**Table 2** and **Figure 13**)These are either comprised of surface lava flows or thin rocky and stony muck soils over lava substrates. These soils are typically suitable for watershed, woodlands and native forest, with none particularly suited for cultivation.

Table 2. Soil Types in the project area

Soil designation*	Soil name	Acres within project area	% of project area	Location with project area	Soil use
rMAD	Malama extremely stony muck (3-15% slopes)	175	56.7	Majority of eastern two-thirds	Woodland, pasture and orchards
rPAE	Papai extremely stony muck (3-25% slopes)	91	29.4	Majority of western one-third	Woodland
rLV	Aa lava	33	10.6	NE and SW corners	Watershed
rOPE	Opihikao extremely rocky muck (3-25% slopes)	6	1.8	SE corner	Native forest or pasture
rKFD	Keaukaha extremely rocky muck (6-20% slopes)	4	1.2	NW corner	Native forest or pasture
rLW	Pahoehoe lava	1	0.3	SE corner and north-central	Watershed
Total		**309**	**100.0**		

** - from Sato et al. (1973)*

The majority of the parcel is comprised of Malama extremely stony muck on 3-15% slopes (rMAD), occupying most of the eastern two-thirds of the project, or 175-acres (56.7%). According to Sato *et al*., "This soil overlies relatively young a'a lava flows on the windward side of Kiluaea Crater" (1973:37). This soil is characterized by a 3" thick layer of very dark brown extremely stony muck over the a'a lava substrate. It evidences a rapid permeability, a very slow runoff and a slight erosion hazard and is classified as suitable primarily for woodlands with smaller areas in pasture and orchards.

Papai extremely stony muck on 3-25% slopes (rPAE) occupies most of the western one-third of the project area (91 acres, 29.4%). This soil is similar to the Malama soil consisting of an 8 inch thick layer of very dark brown extremely stony muck over a fragmental a'a lava substrate (*ibid* 1973:46). This soil has a rapid permeability, a slow runoff and a slight erosion hazard and is classified as suitable primarily for woodlands.

There are isolated areas of surface lava (rLV) located in the northeast and southwest portion of the parcel (33 acres, 10.6%). The lava is a miscellaneous land type with little vegetation, "except for mosses, lichens, ferns and a few small ohia trees" (*ibid* 1973:34). The area of a'a lava in the northeastern portion of the parcel corresponds to the 1955 lava flow from Kiluaea Volcano. It is

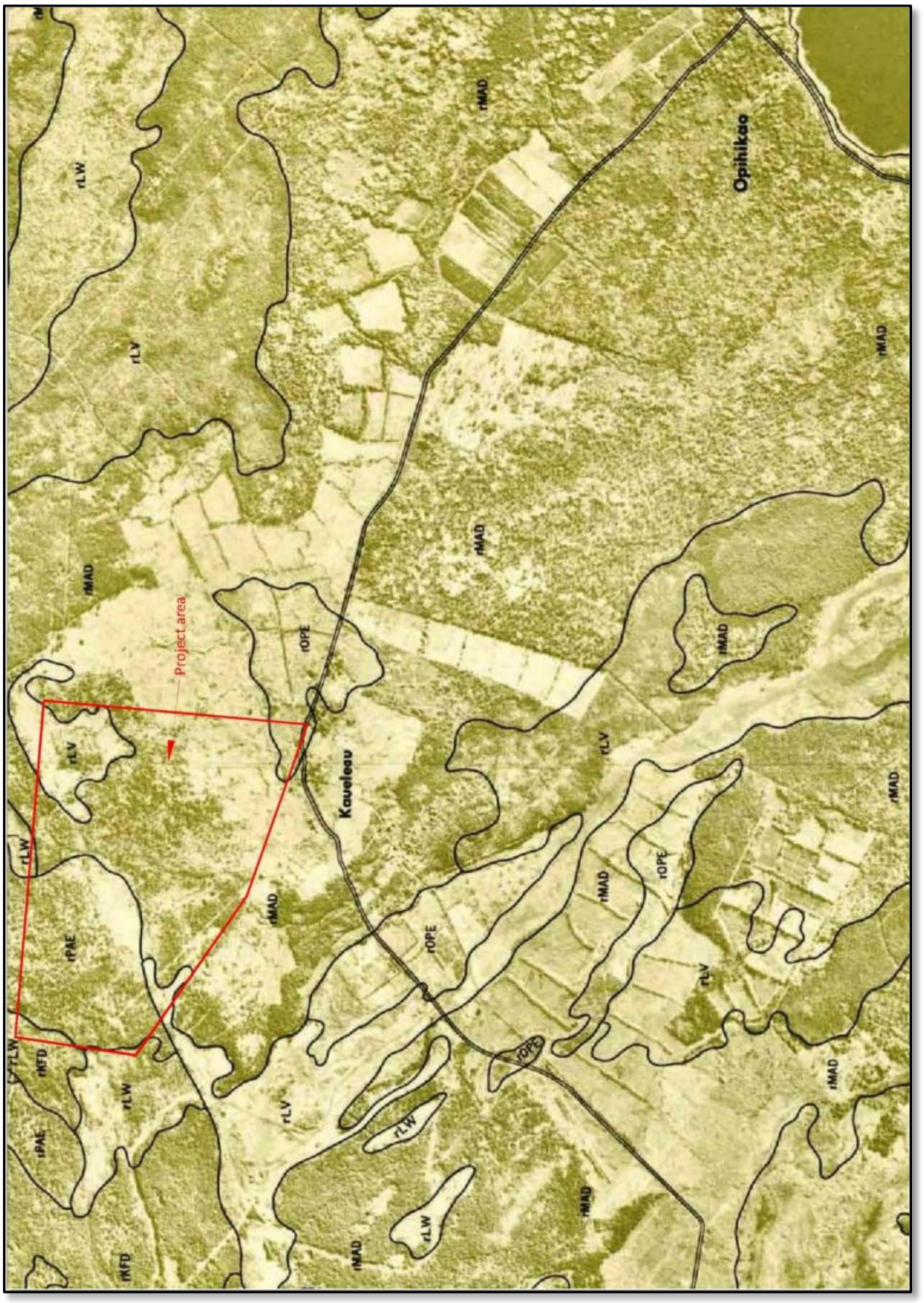


Figure 13. Soil types present within the project area

characterized as a "mass of clinkery, hard, glassy, sharp pieces piled in tumbled heaps" (*ibid* 1973:34) and is classified as suitable for watershed.

A small area of Opihikao extremely rocky muck on 3-25% slopes (rPOE) is located in the southeastern corner of the parcel (6 acres, 1.8%). This area roughly corresponds to the location of the papaya farm discussed above. This soil consists of a 3" thick layer of very dark brown muck over a pahoehoe lava substrate (*ibid* 1973:43). It evidences a rapid permeability, slow runoff and slight erosion hazard with rock outcrops present over 30-50% of the area. It primarily is vegetated with native forest with cleared areas suitable for pasture.

There is a small area of Keaukaha extremely rocky muck on 6-20% slopes (rKFD) in the northwestern corner of the project area. This soil is similar to the Opihikao soil and consists of a surface layer of dark brown muck (8") over pahoehoe bedrock (*ibid* 1973:27). The Keaukaha soil has rock outcrops over 25% of the surface, has a rapid permeability, a medium runoff and a slight erosion hazard. It also is primarily in native forest with cleared areas suitable for pasture.

There are two small areas of pahoehoe lava (rLW, 1-acre, 0.3%) located in the southeastern corner of the parcel and along the northern project area boundary in the center of the parcel. This is also a miscellaneous land type with little or no soil or vegetation with the exception of mosses and lichens. According to Sato *et al*., "This lava has a billowy, glassy surface that is relatively smooth. In some areas however, the surface is rough and broken, and there are hummocks and pressure domes" (1973:34). It is classified as suitable for watershed.

The project area has been inundated by lava flows from Kiluaea Volcano that date to as early as 1,500 years ago (**Figure 14** and **Table 3**). The most recent flow was deposited in 1955 and comprises 15 acres of the project area (5%). The flow is located in the northeastern portion of the parcel (designated as a "p5" flow by Wolfe and Morris 2001). This flow is U-shaped and surrounds an area of lava deposited 750-1500 years ago. The current condition of this flow is depicted in **Figure 9**.

Table 3. Lava flows in the project area

Lava flow designation*	Lava flow age	Acres within project area	% of project area	Location with project area
p5	AD 1955	15	5	Northeast corner of parcel
p5	AD 1790	3	1	North-central area and along south boundary
pc40	450-750 years old	62	20	Pu'u Kaliu
p40	450-750 years old	210	68	Majority of parcel
pc3	750-1500 years old	12	4	Pu'u Kepaka
pc3	750-1500 years old	6	2	Northeast corner of parcel
Total		**309**	**100**	

** - from Wolfe and Morris 2001*

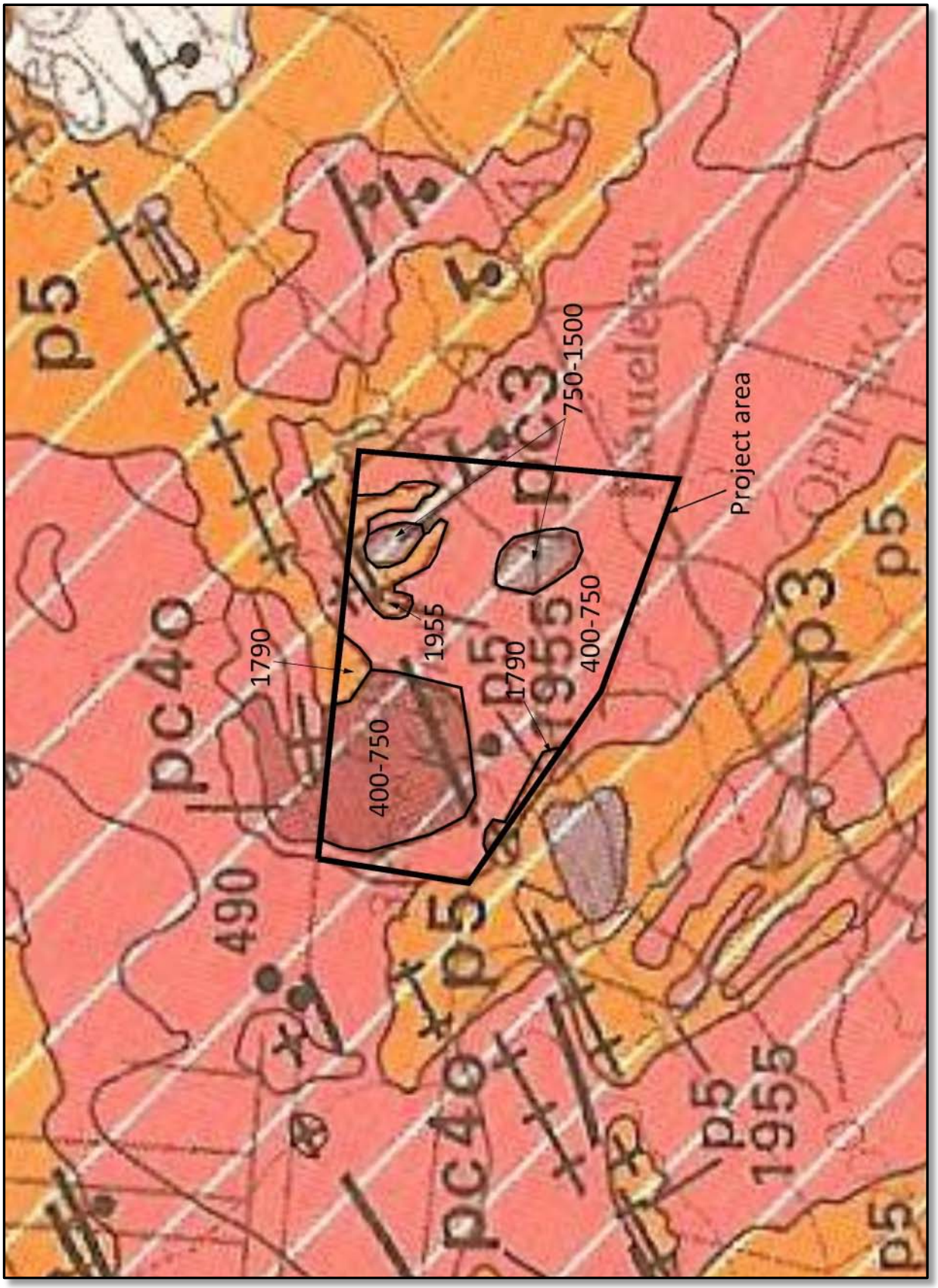


Figure 14. Lava flows present within the project area

There are two small lava flows associated with a 1790 eruption (p5), located along the northern boundary in the central portion of the parcel, and along the south boundary in the southwestern portion. The 1790 flow occupies 3 acres or 1% of the project area. The flow along the north boundary corresponds to an area of pahoehoe lava (see **Figure 13**) and the flow along the south boundary corresponds to an area of a‘a lava.

The majority of the project area is characterized by lava flows that date from 450-750 years ago comprising 272 acres (88%). The Pu‘u Kaliu area is designated as “pc4-0” by Wolfe and Morris (2001) and encompasses 62 acres (20%). This flow roughly corresponds to the Papai extremely stony muck soil area discussed above. The remaining 210 acres (68%) are designated as “p40” and correspond to the Malama extremely stony muck soil area.

The oldest flows in the parcel date from 750 to 1,500 years ago (pc3) and are located in two areas. A 12-acre (4%) area corresponds to the Pu‘u Kepaka area (see **Figure 1**) indicating that this smaller hill pre-dates Pu‘u Kaliu. The second area is situated in the northeastern corner of the parcel and is surrounded by the 1955 flow. It is 6 acres in area and comprises 2% of the project area.

Previous archaeological work in project area

Haun & Associates conducted an archaeological inventory survey (AIS) of the 309 acre project area in November and December 2012 (Haun and Henry 2012). The survey identified six sites with ten features (**Figure 15**). The sites consist of a portion of a prehistoric trail (Site 29723), a complex of four historic roads (Site 29724), an historic survey marker (Site 29725), a complex comprised of a historic loading ramp and adjacent road (Site 29726), an historic triangulation station (Site 29727) and an historic railroad grade.

In addition to the six sites, 20 caves and three overhangs were identified during the project (see **Figure 15**). The 20 caves consist of 8 vertical shafts with chambers at the base, 8 caves at the base of deep depressions, and 4 caves at the base of fissures. These natural features were thoroughly inspected by Haun and Henry (2012) and no evidence of cultural use or modification was present, resulting in their designation as non-cultural features.

All six sites were assessed as significant for information content. The sites have yielded information important for understanding historic and prehistoric activity in the Puna District. The Site 29723 trail was additionally assessed as culturally significant as a main, probably named trail. With minor revisions, DLNR-SHPD concurred with these assessments and recommendations in a September 23, 2013 letter from DLNR-SHPD Archaeology Branch Chief Theresa Donham to Dr. Haun (LOG N0: 2013:4598; DOC NO: 1309SN12; **Appendix A**).

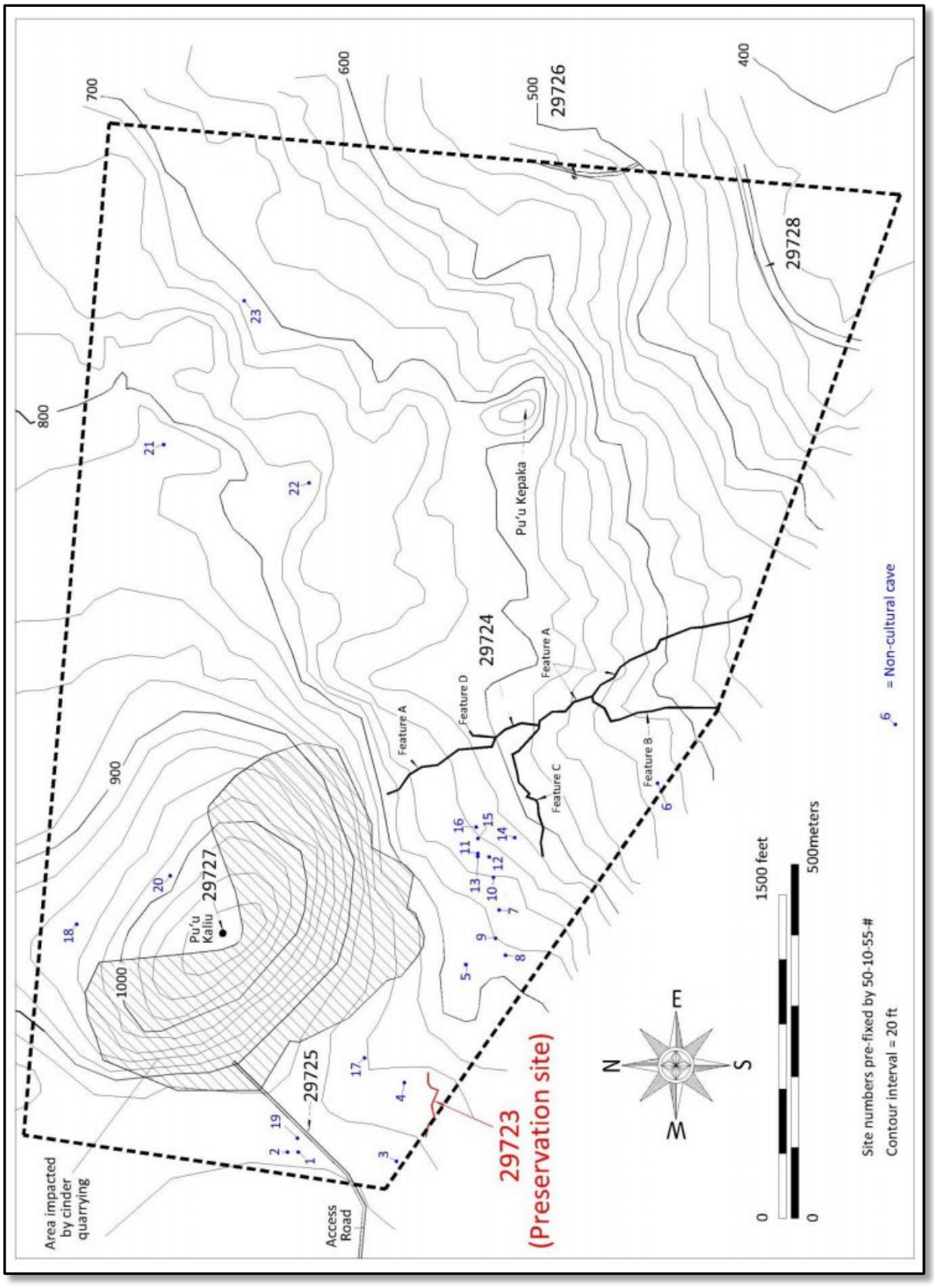


Figure 15. Haun and Henry (2012) Site Location Map

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Historic Documentary Research

The project area is situated in the *ahupua'a* of Kauaea in Puna District (**Figure 16**). There is little mention of Kauaea in Hawaiian traditional and legendary accounts. Crozier and Barrere (1971) note that in Puna few pre-missionary traditions and legends survived because of intensive mission work by Reverend Titus Coan between 1835 and the 1870s. Emory *et al*. (1959) suggest that Puna's traditional history is difficult to follow because of the dominating influence of the ruling families in the neighboring districts of Hilo and Ka'u. Handy and Handy (1972:542) state that Hawaiian traditions suggest that Puna "was once Hawaii's richest agricultural region and that it is only in relatively recent time that volcanic eruption has destroyed much of its best land".

According to Kamakau (1961), Hua'a was the chief of Puna when it was seized by 'Umi-a-Liloa, unifying his control over the Island of Hawai'i. Hua'a was killed during a battle with one of 'Umi's warrior sons, Pi'i-mai-wa'a, at Kuolo in Kea'au. Kalani`opu`u unified his control over Hawaii Island when he gained control of Ka'u and Puna following Alapa'i's defeat in a battle at Mahinaakaka. During Kalani`opu`u's rule, the Puna chief, I-maka-koloa, attempted a rebellion and seized the valuable products of the district including *'o'o* and *mamo* bird features, hogs, fine mats made from pandanus blossoms and from young pandanus leaves, gray tapa cloth, and tapa cloth made from *mamaki* bark.

Following the death of Kalani`opu`u, in 1782, a dispute over ascendancy ensued culminating in the battle of Moku'ohai (Kamakau 1961, Kuykendall 1938). Following the battle, control over the island was divided between Keoua Ku'ahulu'ula, who held Ka'u and a portion of Puna; Keawema'uhili, who controlled the remainder of Puna, Hilo, and southern Hamakua; and Kamehameha, who controlled northern Hamakua, Kohala, and Kona. A feud between Keoua and Keawema'uhili in 1785 resulted in Keawema'uhili's death and the expansion of Keoua's territory, including the unification of Puna. The island was finally re-unified in 1791 when Kamehameha killed Keoua at Kawaihae. In 1790, a lava flow extended diagonally across Kaueleau from the northeast above Opihikao to the coast at Kamaili (Wolfe and Morris 2001).

Early historic accounts document that Puna was well populated and intensively cultivated. In 1823, Ellis (1963) traveled along the coast to Kaimu, where he reported a sandy beach and village with an estimated 725 occupants. At Kaimu, there were plantations and groves of coconuts and *kou*. Ellis estimated that the population of Kaimu and nearby villages was approximately 2,000. Ellis described a village at Kamaili surrounded by plantations where they were given taro and potatoes. Other crops noted by Ellis in Puna included bananas and sugar cane.

The following summarizes Burtchard (1994) discussion of Puna's later history. Prior to the 1870s, foreign influence in Puna primarily was limited to missionaries. In the late 1870s, Robert Rycroft moved to Pohoiki and built a home, wharf, sawmill, jail and courthouse. He later began growing coffee in the area and built a coffee mill. In the mid-1880s, the government began selling land in Puna for homesteads. Most of the homestead land was acquired for coffee cultivation in the 1890s.

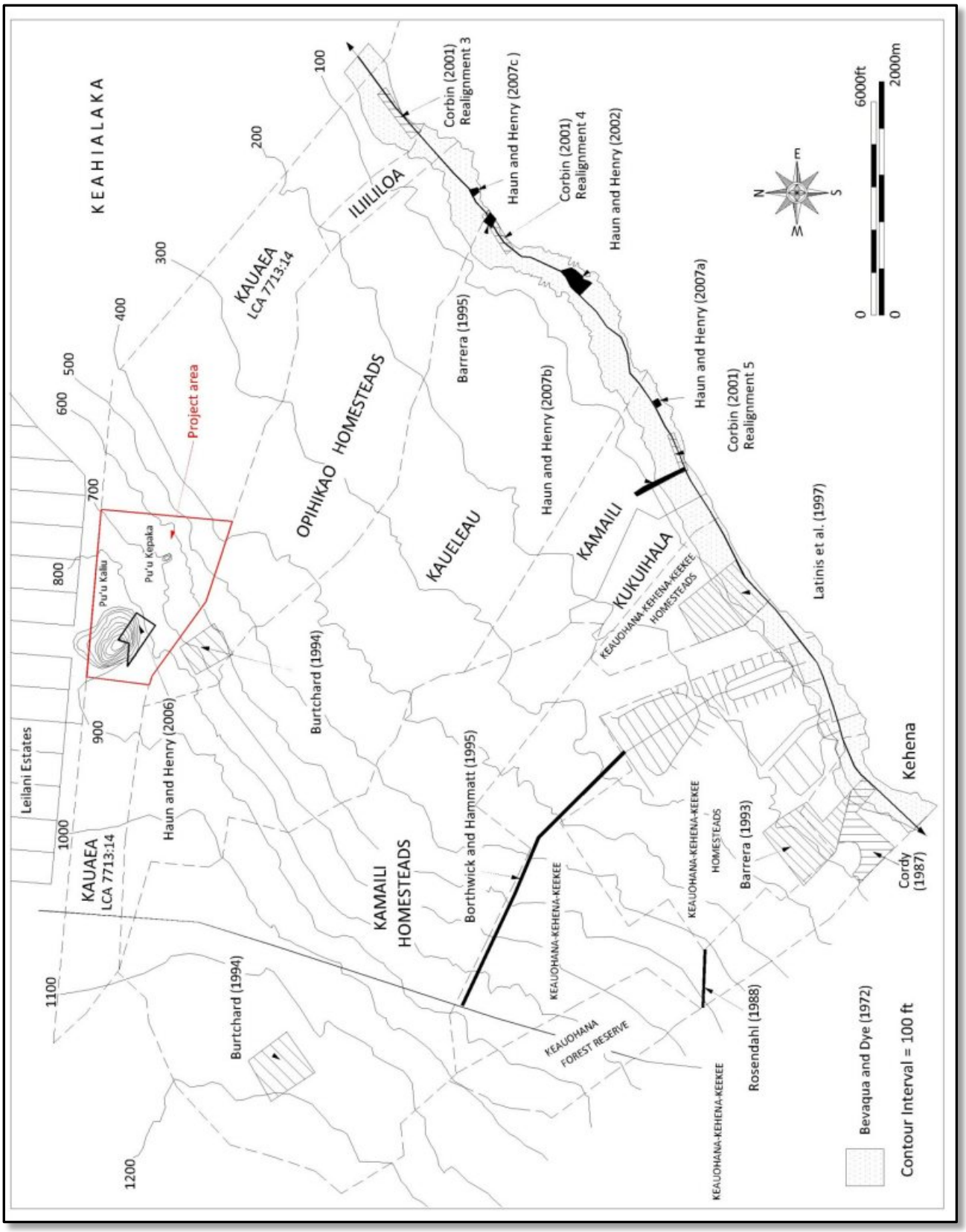


Figure 16. Ahupua'a boundaries and previous archaeological work

The Waihona 'Aina (2000) Mahele Database; which is a compilation of data from the Indices of Awards (Indices 1929), Native Register (NR n.d.), Native Testimony (NT n.d.), Foreign Register (FR n.d.) and Foreign Testimony (FT n.d.); indicates that only one Land Commission Award (LCA) was awarded in Kauaea. LCA 7713*H was awarded to Victoria Kamamalu, Kuhina Nui of the Hawaiian Islands between 1855 and 1863. This LCA is depicted on **Figure 17***,* a map of Kauaea Ahupua'a by D.B Lyman. This figure is a tracing of the original Lyman map, which belonged to Princess Ruth Keelikolani, made by E. Baldwin in February 1882. According to the map, Kauaea encompassed 2,449 and ¾ acres.

Figure 18 is a portion of Loebenstein's 1895 Hawaii Government Survey map of Puna from Pohoiki to Kehena. The boundary of Kauaea Ahupua'a on this map appears to be inaccurate, depicting it as slightly wider in the project area vicinity than it appears on later maps. This map depicts a network of transportation routes that extended through this portion of Puna. Three of the routes were labeled as roads by Loebenstein and the remainder depicted as trails. The three roads consist of the Government Road that parallels the shoreline, Puna Road located in Kaiahiku and Keahialaka Ahupua'a, and Rycroft's Road in Pohoiki.

The main transportation routes were the Government Road following the coast and the Kehena Trail, located further inland paralleling the shoreline. A series of inland-seaward trails and roads connect the main transportation routes, providing access from mountain communities to the sea. Several of the trails are listed as ancient in origin including the Kipapaia Trail in Kamaili, and the Kauaea Trail located in Kauaea Ahupua'a.

Figure 19 is a close-up of the 1895 Loebenstein map showing the project area vicinity. The Kehena Trail extends through the southwestern corner of the parcel in an east-west direction. A house belonging to "Kaaukai" is located on the north side of the trail and a coconut tree is located to the east of the house.

The ancient Kauaea Trail originates at a coconut grove and community named Kikiikii seaward of the project area (see **Figure 18**). The trail enters the project area at the southeast corner and extends inland, roughly paralleling the southern side of project area on the boundary between Kauaea and Opihikao. It appears to terminate in the forest at the base of Pu'u Kaliu. Houses owned by "Elia" and "Maluo" are located to the southwest of the Kauaea Trail, just outside the project area.

Figure 19 also indicates that in 1895, most of the northeastern portion of the project area, on the "Slope of Kaliu" was "Good coffee land". An area listed as "Thin woods on clinkers" is surrounded by the "Good coffee land" along the northern project area boundary.

Pu'u Kaliu has been in use as a triangulation station to map the displacement of Kilauea Volcano's south flank from as early as 1896 (Swanson *et al.* 1976). A series of triangulation surveys used Pu'u Kaliu, among other volcanic summits to track the horizontal ground

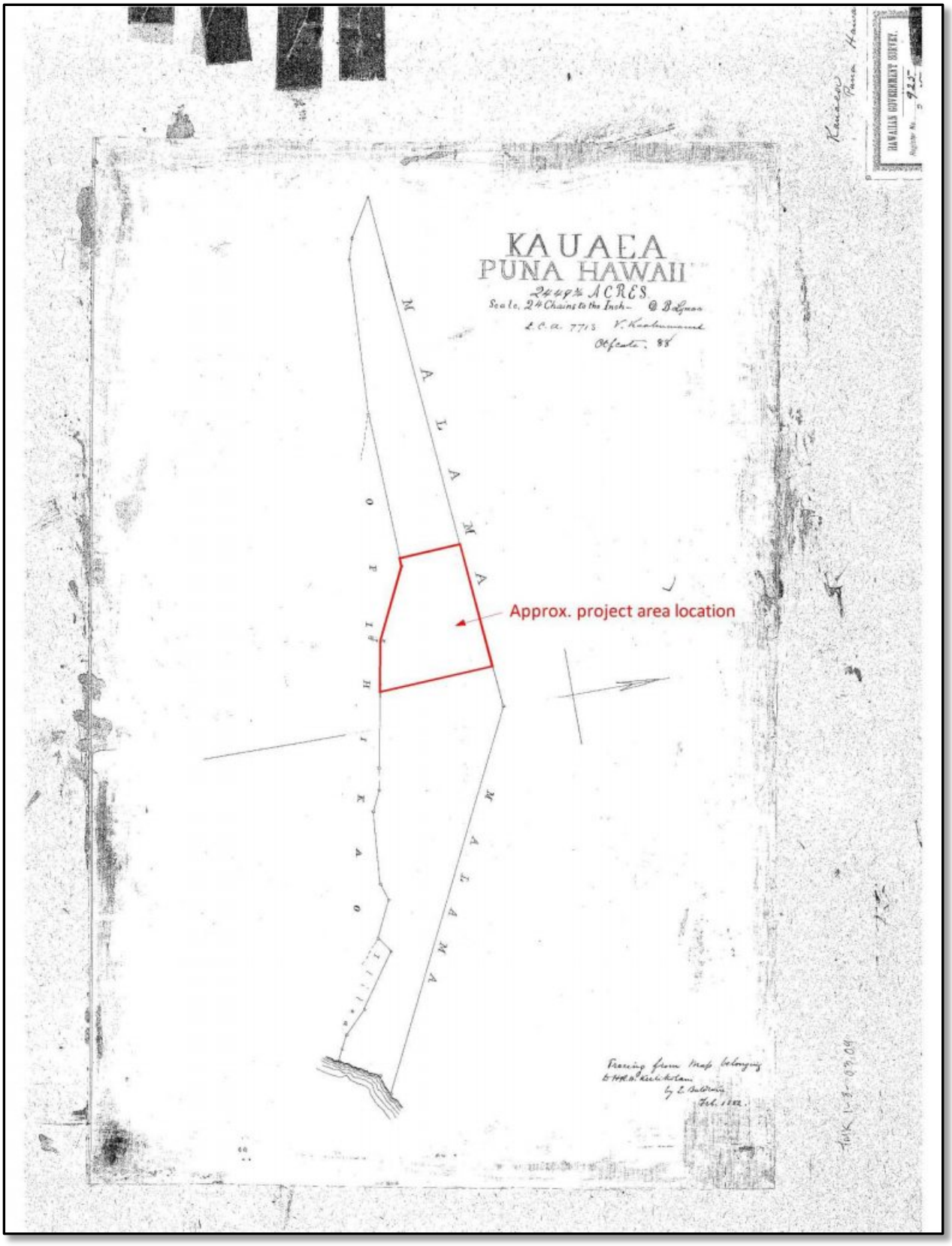


Figure 17. 1882 tracing of Lyman's Map of Kauaea Ahupua'a showing LCA 7713.

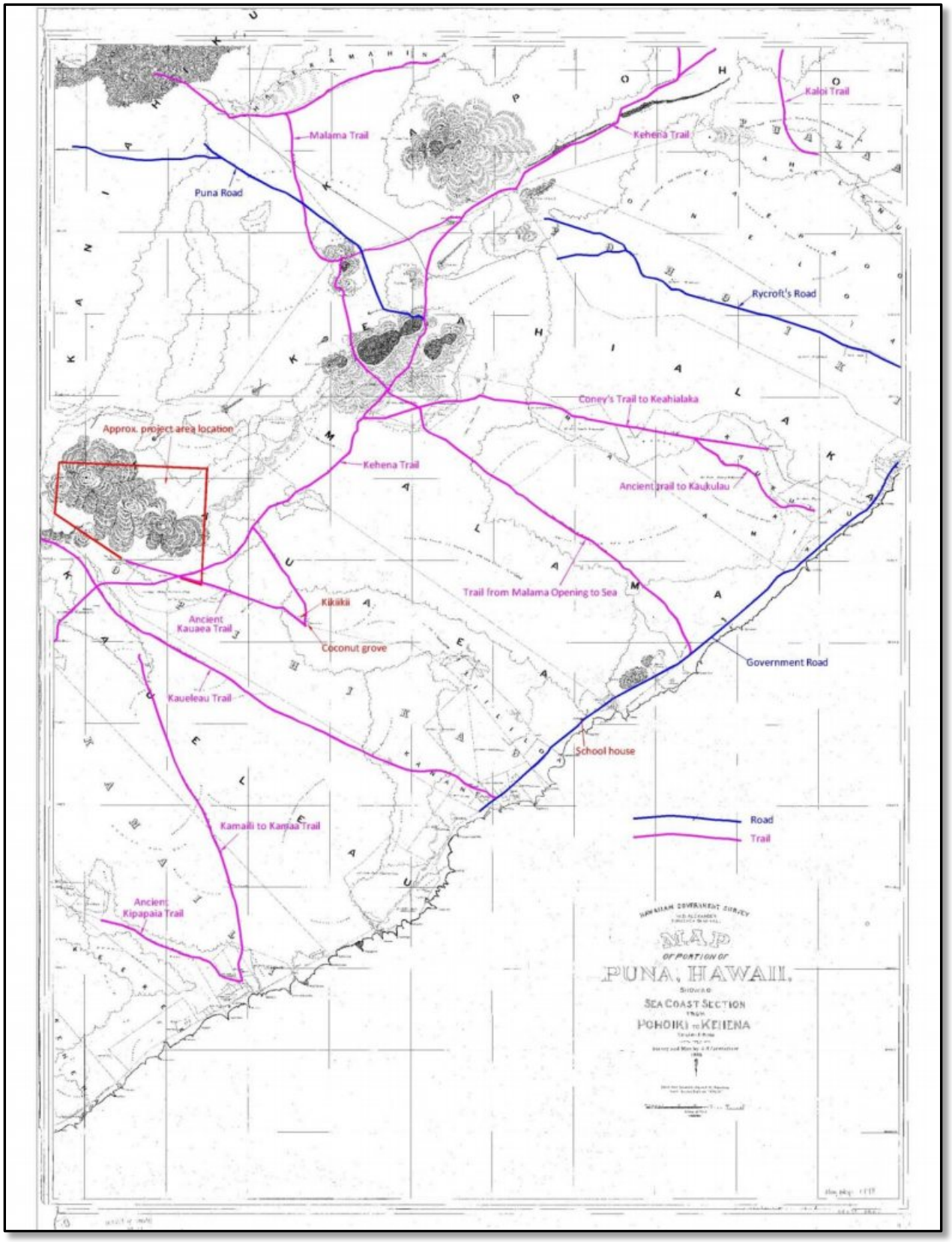


Figure 18. Loebenstein's 1895 Hawaii Government Survey Map of Puna from Pohoiki to Kehena

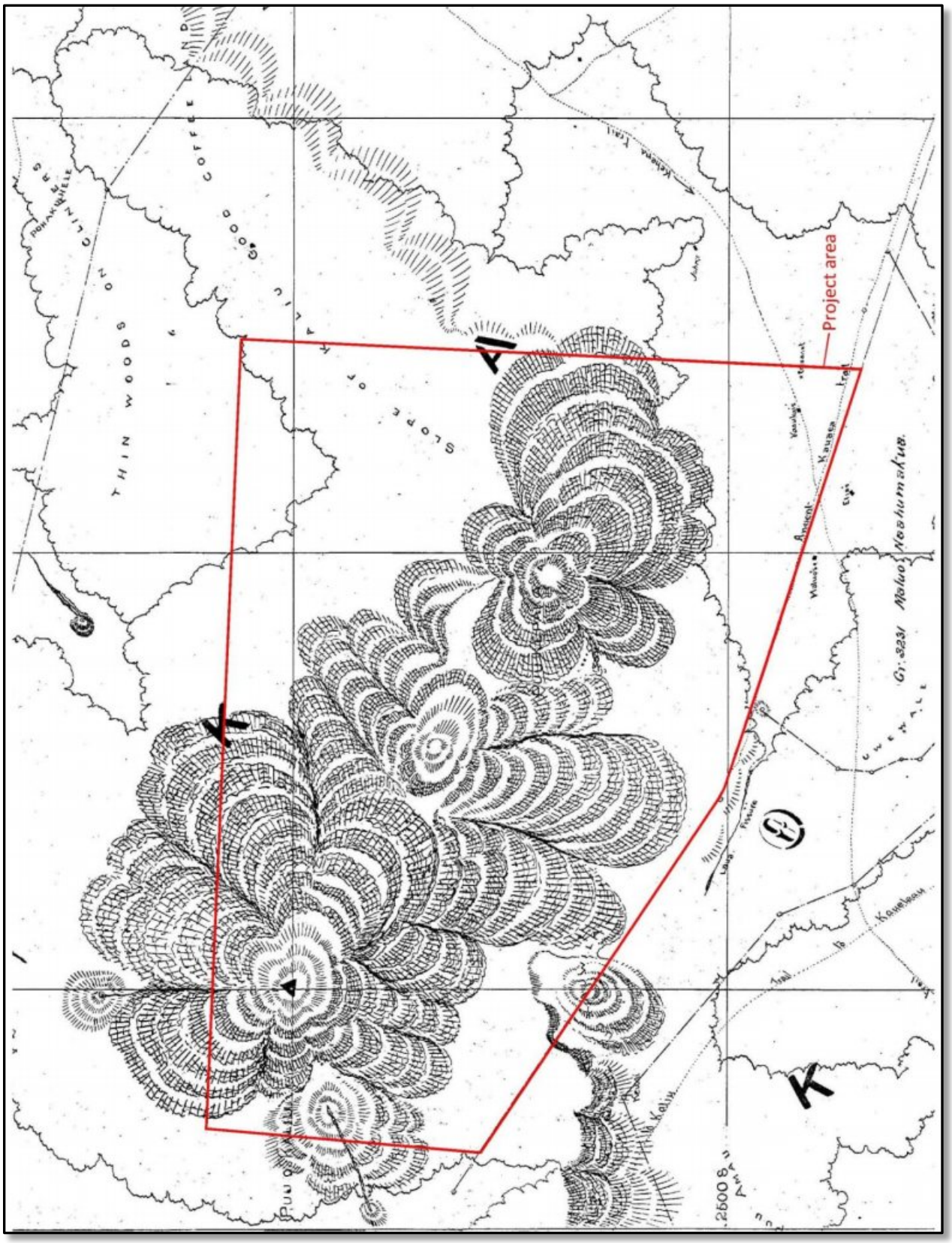


Figure 19. Portion of Loebenstein's 1895 map showing project area

displacement over time, within the Kilauea Rift Zones (*ibid.*:8). These surveys were conducted in 1896 and 1949 by the U.S Coast and Geodetic Survey, in 1958 and 1961 by the U.S. Geological Survey, and in 1970 and 1971 by personnel from the Hawaiian Volcano Observatory. The data from the earliest study was obtained in 1896, but was not triangulated until 1914. A sign marking the data point is present on the summit of Pu'u Kaliu. The sign was found to be in good condition in 1967 (pers. comm., Robert Shrai, Island Survey). The sign was located during the project and has been designated as Site 29727.

A September 30, 1908 article in the Hilo Tribune described the effects of a violent earthquake in the Puna District that opened cracks throughout the region, destroyed homes and stone walls, and damaged a school house in coastal Kauaea. This school house is depicted in **Figure 18**.

> Gerritt P. Wider and I (A. Gartley) just came through Puna from the Volcano on horseback, and saw many evidences of the earthquake which were of interest. We left the Volcano on Keauhou trail, passing the line of small craters Panau, Panau-iki, Kapaahu, Kalapana, Pahoa, Kapoho and to Hilo. At the crater of Makaopuhi tons of material have been shaken down from the vertical banks into the mauka pit below. Some smoke was issuing from the bottom of the mauka pali and quite large deposits of sulphur have formed. The shake must have been very heavy in Puna. At Kapaahu a crack about a foot wide opened for about 500 feet, extending mauka from the sea. At Kalapana the old '68 crack, which opened when the Puna coast sunk, opened about twelve inches more, and about a quarter mile back of this crack toward Kau a new crack has opened, extending from pali to pali and several hundred feet long. Some say there was a small crack before one or two inches wide, but it is now twelve to eighteen inches wide. At Kahena it is reported that a strip of the pali (about 100 feet high) along the coast, some 50 feet wide and half a mile long, split off and dropped into the sea, and a new crack has opened parallel with the front of the pali 50 feet back and over two miles long. Three houses and many water tanks were overturned in Kalapana and nearly every stone wall was thrown down. On the trail from Kalapana to Kahena the walls on the mauka side of the road suffered, those on the makai side being left intact. The schoolhouse at Kauaea was either overturned or badly set off its foundation (USGS.gov website).

The Ola'a Sugar Company was founded in 1899 by B.F. Dillingham, Lorrin A. Thurston, Alfred W. Carter, Samuel M. Damon, and Wm. H. Shipman. The plantation was to become one of the largest in the state. According to the Hawaii Sugarcane Plantation Archives:

> With a $5,000,000 investment, the promoters purchased 16,000 acres in fee simple land and nearly 7,000 acres in long leasehold from W.H. Shipman. They also purchased 90% of the stock in the adjacent Puna Plantation, adding another

11,000 acres to the holdings. Ola'a Sugar Company began as one of Hawaii's largest sugar plantations with much of its acreage covered in trees.

The task of setting up the plantation was enormous. Before 1900, coffee was the chief agricultural crop in the area. Over 6,000 acres of coffee trees were owned by approximately 200 independent coffee planters and 6 incorporated companies. The coffee trees were uprooted to make way for cane. Ohia forests had to be cleared, field rock piled, land plowed by mules or dug up by hand with a pick, quarters for laborers and staff had to be built, the mill constructed, and the first cane planted.

The cane was transported to the mill by fluming and by railroad. Although Ola'a Sugar Company had 72 miles of flumes, it had no dependable water source for their operation. The railroad was relied upon for delivery of 60% of the cane. In addition to its own standard gauge 35 miles of railway track, the company ran cars over the Consolidated Railway tracks to bring its cane in from more distant fields. The history of Ola'a Sugar Company is closely connected with the southern branches of the Hawaii Consolidated Railway Co. because they were interdependent from the start. The cane fields were in four widely separated areas cut off from each other by stretches of barren lava. The railroad was therefore vital to the plantation, which in turn helped support the railroad. When a tidal wave on April 1, 1946 destroyed much of the Hawaii Consolidated Railway Company's tracks, it ceased operations. The plantation was then forced to convert to trucks in order to transport sugar and molasses to the Hilo wharf.

Fortunately, under the management of Wm. L.S. Williams, a major road-building program had been started in 1939 for the purpose of eliminating the portable track. He started the plantation on its way to modernization by laying a network of 500 miles of roads for hauling cane. Since 1948, all the cane hauling has been by truck (Hawaii Sugarcane Plantation Archives).

By the end of the 1940s, Ola'a Sugar Company was deeply in debt, owing American Factors, Ltd (AMFAC) $2,000,000. The debt was the result of insect epidemics, volcanic eruptions and drop in sugar prices. By 1953, the company was $4,100,000 in debt and in 1959 it was decided that the plantation would sell some of its 35,700-acres to offset the debt. In 1960, the company changed its name to the Puna Sugar Company, primarily because it was thought a name change would give the company a new start. Apparently this strategy worked because in 1963 the company had its best year ever with a 36% increase in profits. The company was debt free for the first time in its history by 1966, and in 1969 the Puna Sugar Company was purchased outright by AMFAC. The company closed in 1982 following cancelation of government subsidies and tax breaks and the introduction of high fructose corn syrup, a cheap low-cost substitute for sugar.

Figure 20 is a portion of Walter E. Wall's 1915 Hawaii Territory Survey Map of Puna Homestead Subdivisions and Government Tracts. This map indicates that formal roads in the area had been expanded since 1895, connecting the town of Pahoa with coastal communities. Despite this expansion, many of the trails depicted on the 1895 map appear to have still been in use in 1915. This map also depicts the Hilo Railroad lines to the east of Pahoa with a line extending as far south as Kapoho Ahupua'a,.

By the late 1920s, concern over forest depletion and watershed maintenance lead to the creation of forest reserves in the Puna District. **Figure 21** is portion of Wall's 1927 Hawaii Territory Survey Map of Puna, Keauohana and Malama-Iki Forest Reserves. This map indicates that few new roads had been built since the 1915 map. It also shows that fewer trails were being utilized in 1927.

Figure 21 also indicates that the railroad lines, used to transport sugar cane were expanded since 1915. One line extended from Pahoa town into the *ahupua'a* of Waiakahiula and Keahialaka. The rail line that formerly terminated in Kapoho (see *Figure 21*) was expanded to the east as far as Kaueleau Ahupua'a. This section of track passed through the southeastern corner of the present project area.

Figure 22 is a close-up of Wall's 1927 map showing the project area vicinity. As discussed above, a portion of the railroad line extended into the project area. This rail line roughly follows the path of the Kehena Trail depicted on **Figures 18-20**, suggesting that railroad utilized the pre-existing transportation route. The rail line was identified during the present project and was documented as Site 29728 that is discussed the Findings section. *Figure 22* also depicts a trail that enters the project area along its southern side, roughly paralleling the inland portion of this boundary. This trail may represent an inland extension of the Kaueleau Trail as depicted on **Figure 18** and **Figure 20.**

The Kauaea School discussed above is also depicted on Wall's 1915 (see *Figure* 20) and 1927 maps of the area (see **Figure 21**). This indicates that the school was re-built following the 1908 earthquake and used until at least 1927.

Handy and Handy (1972) citing oral historical sources, indicate that in the 1930s there were homesteading areas in the *ahupua'a* of 'Opihikao, Kaueleau, Kamaili, Ke'eke'e, Kehena, and Keauohana, in the general vicinity of the project area. Dry land taro was grown throughout the inland portions of these *ahupua'a*. A particular taro cultivation method, *pa-hala,* is described for the area from Kalapana to Kamaili.

The method involved excavating a hole in a'a lava in a pandanus grove. The hole was then filled with weeds, which were allowed to rot for six weeks or more. A taro cutting (*huli*) was wrapped in pandanus leaves and planted in the hole. After the cutting produced three or four leaves, the pandanus branches were cut to provide sunlight and the taro plant was covered with pandanus

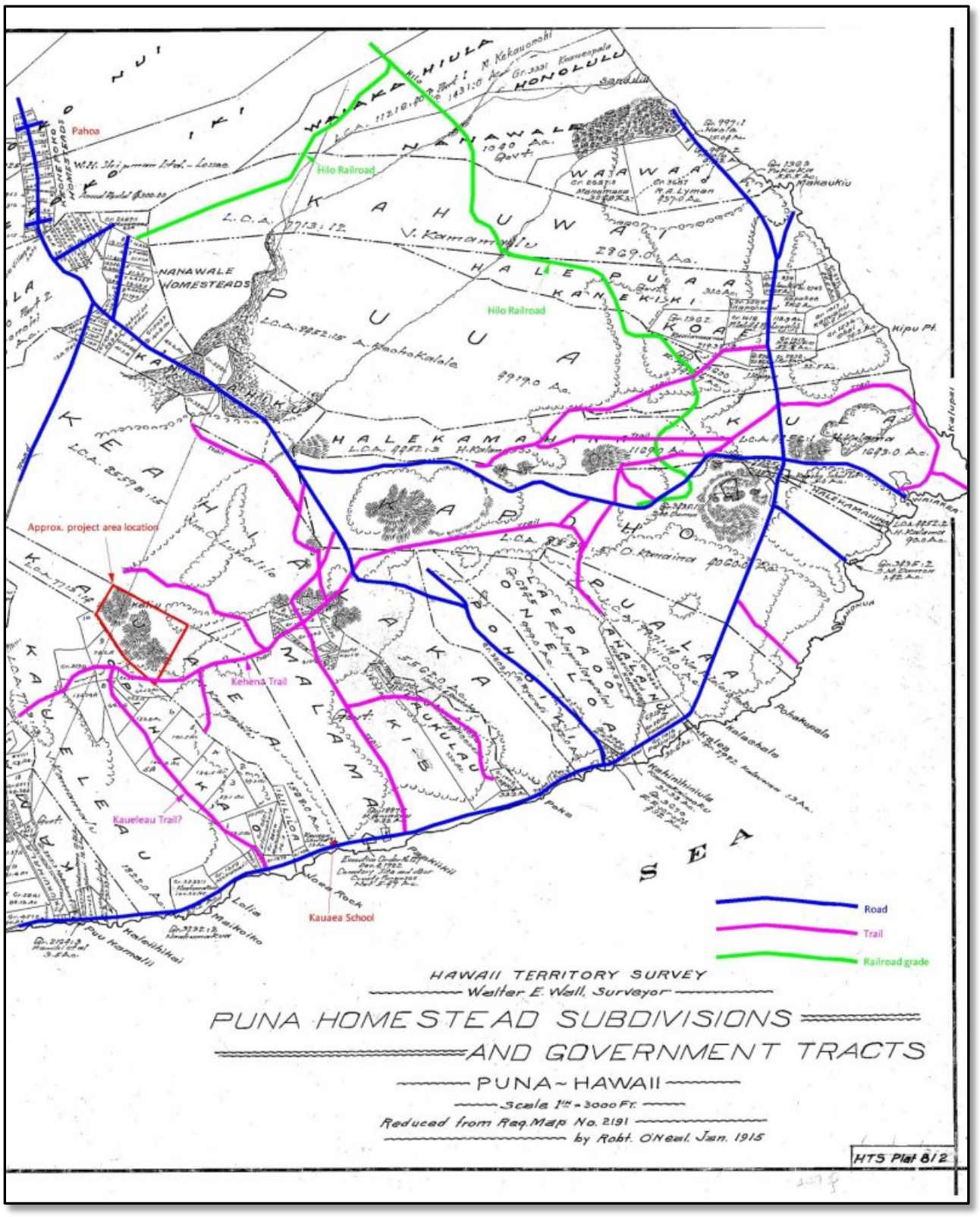


Figure 20. Portion of Wall's 1915 Hawaii Government Survey Map of Puna Homestead Subdivision and Government Tracts

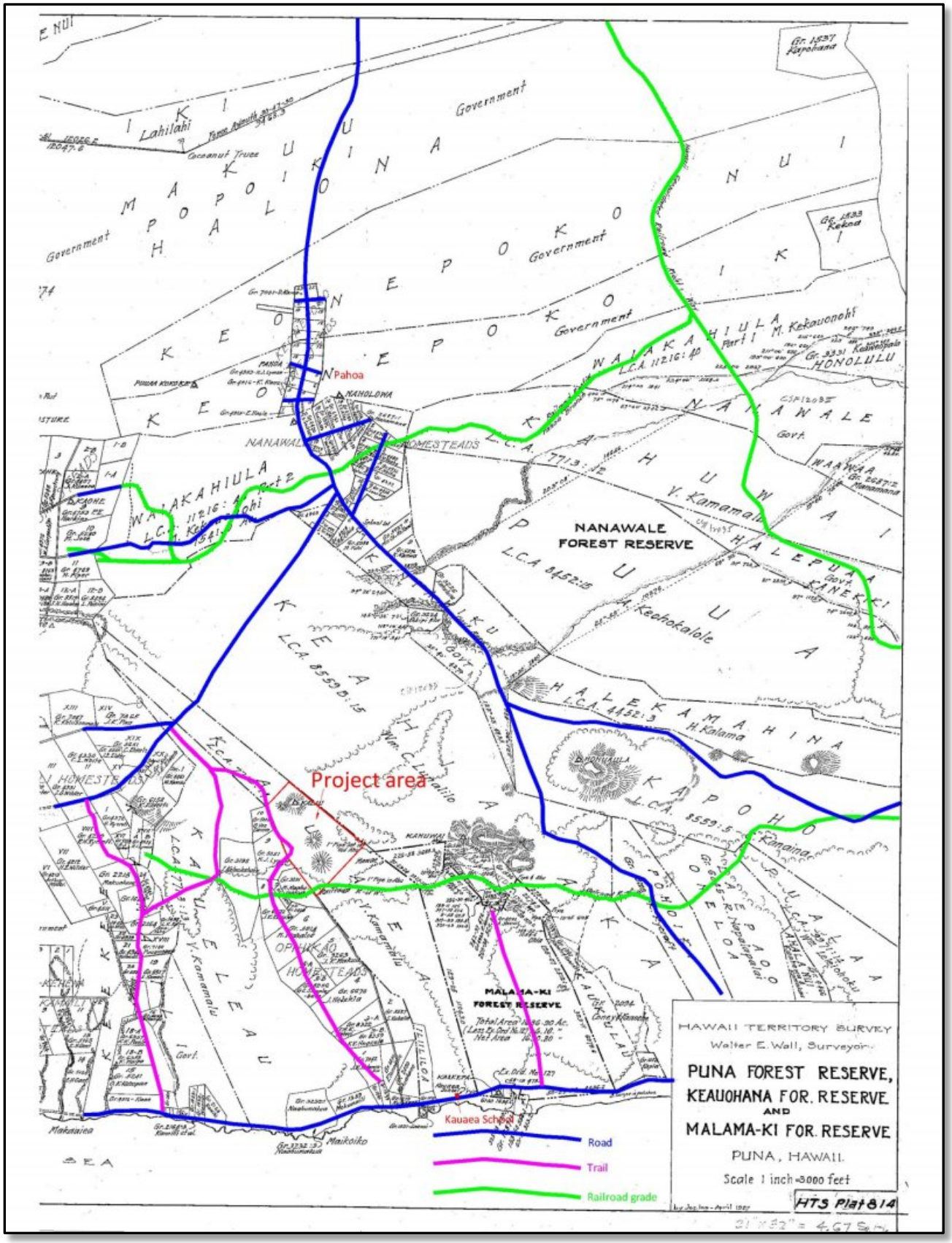


Figure 21. Portion of Wall's 1927 Hawaii Government Survey Map of Puna, Keauohana and Malama-iki Forest Reserve

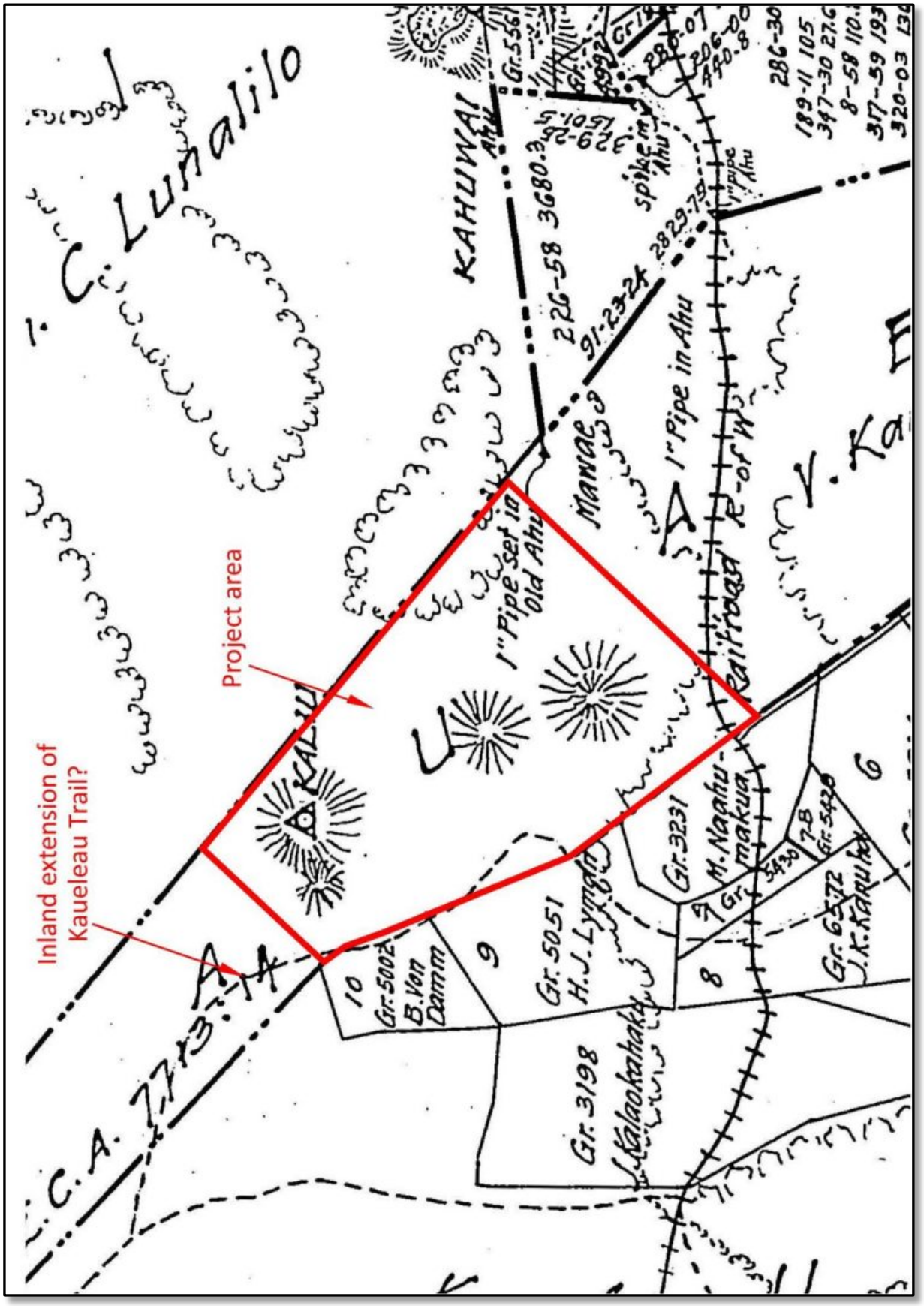


Figure 22. Close-up of Wall's 1927 map showing project area vicinity

leaves. After the pandanus leaves were sufficiently dry, the leaves were burned reducing them ash that provided nourishment to the taro plant, which grew tall enough to hide a man beneath the leaves.

Portions of the present project area have been used as a cinder mine. The cinder mining activity has been in operation by Sanford Service Center since 1987. Cinder mining was also undertaken along the northern slopes of Pu'u Kaliu, outside the project area to the north. Cinders mined from this area were used to create the Leilani Estates subdivision, founded in 1964 (lelaniestates.org).

Previous Archaeological Research

A search of the DLNR-SHPD archaeological report database and other sources identified 16 archaeological projects between Kauaea and Kehena. *Figure 16* shows the project locations and **Table 4** summarizes the projects. Not included in the figure or table are the studies by Stokes (Stokes and Dye 1991), which focused on major sites, primarily *heiau* throughout Hawaii Island and a survey of east Hawaii by Hudson (1932).

Table 4. Previous archaeological work

Author	Land	Study Type*	Elevation	Acreage	No. of sites	Sites/ acre	No. of Feas.	Feas/ acre	Hab Feas	Hab Feas/ acre	Ag Feas	Ag Feas/ acre	Burial Feas	Ritual Feas	Trail	Misc	Historic Feas	Comment
Haun and Henry (2007c)	Opihikao	IN	10-25	1	2	2.00	2	2.00									2	
Corbin (2001)	Kamaili, Kauaea, Kaueleau	IN	20-40	5.3	1	0.19	40	7.55			40	7.55	1					
Bevaqua and Dye (1972)	Kapoho-Kalapana	RN	20-40	151	48	0.32	426	2.82	61	0.40	many		156	3	5	188	7	Feature totals estimated, most not quantified in report; misc. incl. 165 petroglyphs
Haun and Henry (2007a)	Kamaili	IN	20-38	1	*		*											* = Identified portion of trail initially identified by Bevaqua and Dye (1972)
Haun and Henry (2007b)	Kamaili	IN	30-115	4.274	5	1.17	10	2.34									10	
Barrera (1995)	Kaueleau	DR	35-40	3	3	1.00	9	3.00	2	0.67							7	
Haun and Henry (2002)	Kaueleau	IN	80-100	7	0	0.00												
Cordy (1987)	Keauohana	RN	80-250	39	15	0.38	92	2.36		0.00	20	0.51	63		4		5	
Latinis, Moore and Kennedy (1997)	Keekee	IN	100-300	94	6	0.06	128	1.36	3	0.03	88	0.94	24	3	4	2	4	
Barrera (1993)	Keauohana	RN	120-300	66	1	0.02	167	2.53	5	0.08	150	2.27	3				9	
Borthwick and Hammatt (1995)	Kamaili, Keekee, Kehena, Keauohana	AS	280-860	9.99	0													
MLK Rosendahl (1988)	Keauohana and Kehena	FI	540-620	1.7	0													
Burtchard (1994)	various	RN	650-1200	247	34	0.14	65	0.26	5	0.02	16	0.06	22	1	5	8	11	
Haun and Henry (2006)	Kauaea	AS	780-1050	15	0													
Bonk (1989, 1990)	Kaimu, Makuu, Kaohe, Kehena, Kaapahu and Mamaili	RN/ MON	1480-1540	10	0													
Total/Average				**655.26**	**113**	**0.53**	**939**	**2.69**	**76**	**0.20**	**314**	**2.27**	**269**	**7**	**18**	**198**	**55**	

IN = Inventory Survey, RN = Reconnaissance Survey, DR = Data Recovery, AS = Archaeological Assessment

Stokes (Stokes and Dye 1991), relying in part on the earlier observations of Thrum, reported fourteen *heiau* in Puna of which three were destroyed at the time of Stokes fieldwork in 1906. Several of the *heiau* were reported to be agricultural temples. Hudson (1932) reported 32 sites along the coast between Kapoho and Kaimu including the Hilo-Puna Trail, habitation platforms and enclosures, water sources (cave and well), windbreak shelters, and four *heiau*: Mahina'akaka Heiau at Keahialaka, Kalepa at Kalepa Point, "Old" Wahaula Heiau at Kamaili, and Kumakaula at Ke'eke'e.

The surveys in **Table 4** cover more than 650 acres of Puna between sea level and 1,540 ft elevation. Cultural remains identified by the surveys consist of 113 sites with nearly 940 features. To aid in reconstructing settlement patterns, features were quantified by probable age and function, and the studies are ordered by elevation. Traditional Hawaiian features were categorized as habitation, agricultural, burial (including possible burials), ritual, and trail. Features not assignable to these categories were categorized as miscellaneous. Traditional sites in this category include petroglyphs, *holua* slides, water sources, and *ahu*. Density values are given for sites, features, and habitation and agricultural features.

Overall, the studies have identified more than 76 habitation features, 314 agricultural features, 269 burials, 7 ritual features, and 18 trails. The large number of burials includes several historic cemeteries. Other historic features were not segregated by function. The majority of the historic features are walls and roads. None of the studies processed radiocarbon dates.

A 15-acre portion of the present 309-acre project area was previously examined by Haun and Henry (2006). The majority of the Haun and Henry (2006) study area (c. 95%) was comprised of the cinder quarry area, with a narrow (10-30 m wide) disturbed vegetated band present around the southwest and west sides. No sites or features were present.

McEldowney (1979) primarily used historic documentary evidence to develop a land use and settlement pattern model for the windward Hilo area that is probably applicable to most of Puna. The model consists of five elevation-defined zones: Coastal Settlement, Upland Agricultural, Lower Forest, Rainforest, and Sub-Alpine or Montane. The Coastal Settlement Zone extended approximately 0.5 miles inland from the shoreline between sea level and 50 ft elevation. The zone was the most densely populated with both permanent and temporary habitations, high status chiefly residences, and *heiau*. Settlements were concentrated at Hilo Bay and sheltered bays and coves. Also present were fishponds and gardens where breadfruit, coconut, *kukui*, banana, *wauke*, sugar cane, sweet potato, and wet and dryland taro were cultivated. The ocean provided fish and other marine resources.

The Upland Agricultural Zone was situated between approximately 50 ft and 1,500 ft elevation. Settlement in the zone consisted of scattered residences among economically beneficial trees and agricultural plots of dryland taro and bananas. Lava tubes were utilized for shelter. A pattern of shifting cultivation is believed to have converted the original forest cover to parkland of grass and scattered groves of trees. Wetland cultivation of taro occurred along streams.

The Lower Forest Zone ranged from 1,500 ft to 2,500 ft elevation. Timber and other forest resources such as medicinal plants, *olona*, and birds were gathered from the zone. Site types consisted of temporary habitations, trials, shrines, and minor agricultural features in forest clearings and along streams. Sites in the Rainforest Zone (2,500-5,000 ft elevation) and Subalpine or Montane Zone (5,000-9,000 ft) were limited to trails and associated temporary habitations. These zones were used for intra-island travel and gathering of valued resources including hardwoods, birds, and stone for tool making.

2012 Consultation

An interview with a local resident of the project area vicinity was conducted by Haun & Associates Project Supervisor Shawn Fackler during the 2012 fieldwork. Mr. Kahaloa was born in 1959 and raised near the project area. During the interview he stated, "I used all that area [from his house up to Pu'u Kaliu and Kepaka] as my playground as a kid". He explained that the vegetation used to be mainly guava and it was easy to venture all the way up to either *pu'u*. The only cultural resource in the project area that he could remember is the Site 29726, Feature A enclosure (discussed in Findings section). He originally thought the structure might have been a World War II era feature, but now thinks it is related to sugarcane cultivation in the area.

Mr. Kahaloa began leasing land and running his papaya farm in the southeastern portion of the project area approximately 25 years ago. He explained that a cherry orchid previously grew on the land where his papaya farm is now, but that he could not remember who ran it. He did indicate that a ranch [name unknown] grazed cattle in the area *mauka* of his farm up to the Leilani Estates area for at least 30 years before he began growing papaya. He also indicated that the ranch routinely used tractors in its later years to clear vegetation for grazing cattle and also confirmed that the wooden posts observed during the survey along the old sugar cane railroad grade were part of a cattle chute built within the past 50 years.

Mr. Kahaloa recalled that, "the land *mauka* of the road used to be sugarcane fields all the way up to the tops of the *pu'us*. They [field workers] used donkeys and carts to harvest the cane but then stopped all together when the railroad stopped running." Kahaloa also mentioned that his grandmother told him that taro used to grow in the fields before the introduction of sugar cane.

Another informant interview was conducted with Emily Naeole-Beason by telephone on February 4, 2013. She is 56 years old and has lived in Opihikao her entire life. Her parents and grandparents also lived in Opihikao. She is very familiar with the project area. Her granddaughter is named after the cinder cone Pu'u Kaliu that dominates the western half of the area and is referenced in a *hula* performed by her daughter. She was not aware of any traditional activities or resources in the area. She recalled that sugar cane was once grown in the vicinity.

IDENTIFICATION OF THE PRESERVATION SITE

Site 29723 is a trail located in the southwestern corner of the project area. The trail is comprised of a cleared path through an area of uneven rocky terrain. The trail originates along the southwestern project boundary at approximately 855 ft elevation. It extends downhill in an easterly direction for 91 m where it becomes indiscernible at approximately 845 ft elevation. The area outside the parcel to the west has been disturbed and no evidence of the trail was observed there.

A 4.5 m long section of the trail was mapped (**Figure 23**). The cleared area varies in width from 0.55 to 1.0 m. Linear piles of cobbles and small boulders, cleared from the trail have been placed along each side. These linear piles are 0.4 to 0.6 m wide and 0.15 to 0.4 m in height. The stones are moss-covered and logs have fallen over the trail in several locations. No cultural remains were observed at the site.

It is possible that the Site 29723 trail may represent a portion of the Kauaea Trail, listed as an ancient trail on the Loebenstein's 1895 map of the area (see **Figure 18**). The Kauaea Trail originated seaward of the project area at a coconut grove and community labeled Kikiikii. It extended inland and entered the project area at its southeast corner, roughly paralleling the southern boundary on the land division between Kauaea and Opihikao. According to **Figure 18**, trail terminates at the edge of the forest at the base of Pu'u Kaliu. It is possible that the portion of the trail within the forest was not mapped and Site 29723 is an inland extension of it.

Site 29723 is interpreted as a prehistoric and historic transportation route based on its formal type, appearance and its possible association with trails on historic maps of the area. The trail is interpreted as a Type A, single file foot trail using Apples (1965) typology of trails for Honaunau. According to Apple, a Type A trail was used during the pre-Contact to early Historic period prior to the abolishment of the *kapu* system, from prehistory to AD 1819. The portion of the trail within the project area is in fair condition and is unaltered, although the portion on the adjacent parcel, to the west of the project area apparently has been destroyed. It is assessed as significant for its information content and for its cultural value.

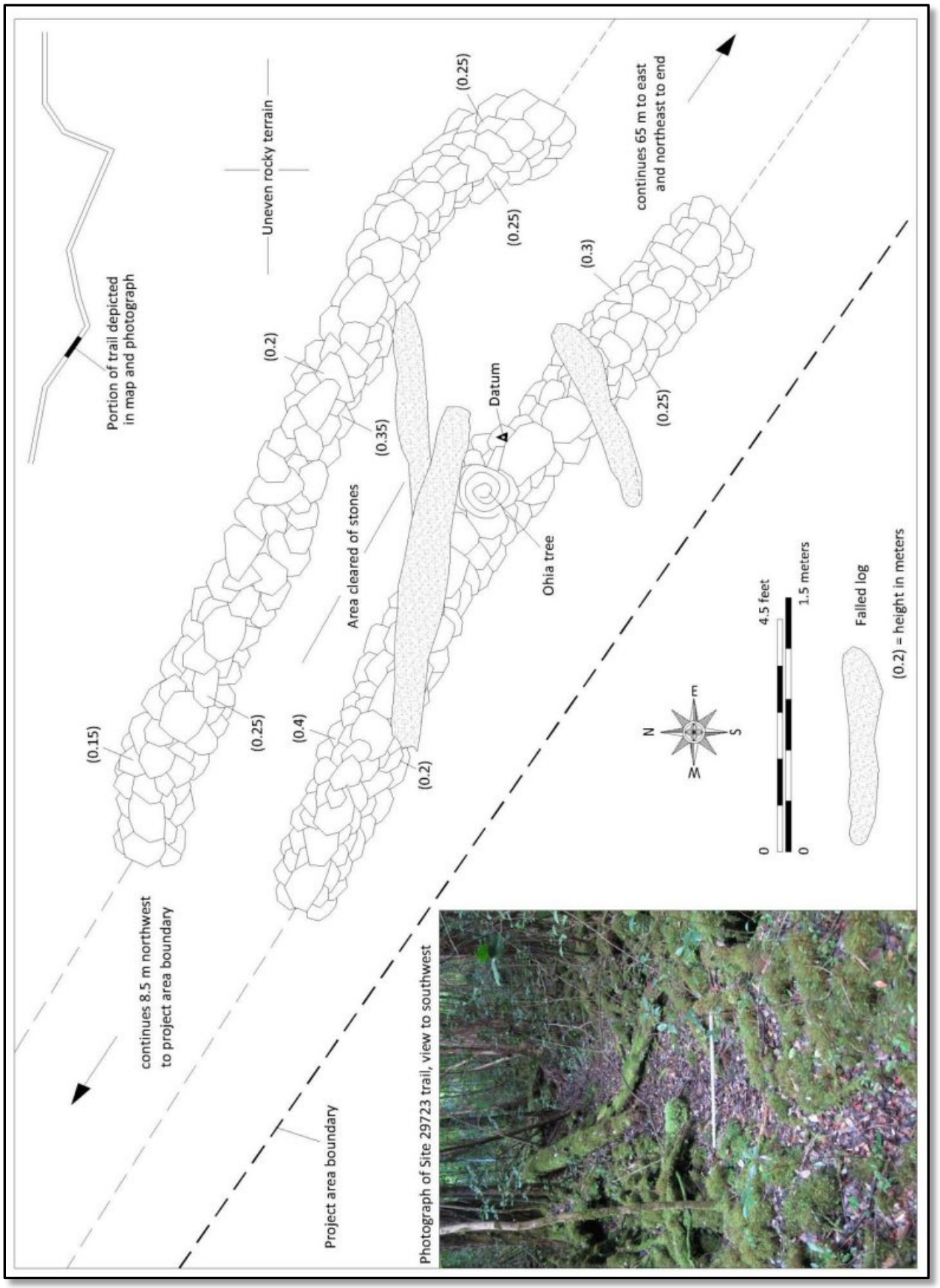


Figure 23. Site 29723 plan map and photograph

PRESERVATION PLAN

This Preservation Plan provides specific protective measures for Site 29723. The site will be protected and preserved during and after the development of the project area. This plan will address the preservation areas, specifications for protective measures during and after construction, access, and consultation.

Forms of Preservation

Preservation is a mitigation strategy in which a historic property and the qualities that contribute to its significance are preserved. Mitigation consists of specific measures to avoid, limit or minimize adverse effects resulting from development activity. Specific mitigation measures can consist of documentation and archaeological excavation (data recovery) and preservation, among others. DLNR-SHPD rules recognize several forms of preservation (HAR §13-13-277). These consist of avoidance and protection (conservation), stabilization, rehabilitation, restoration, reconstruction, interpretation and appropriate cultural use.

Avoidance and Protection (Conservation)

The form of preservation selected for Site 29723 is avoidance and protection (conservation). This form of preservation is the most appropriate manner of mitigating the effects of development within the parcel because the site can be easily avoided. Conservation in this plan means preserving a site in place and ensuring that the site's physical integrity is not compromised by means of avoidance and protection. The site will be protected in perpetuity. This means that the site will be avoided during development and protected during and after development. There are penalties for damage to a historic property on state or private land, including the imposition of monetary fines (Hawai'i Revised Statutes § 6E-11).

Conservation is recommended for 29723. Site protection will require an active effort on the part of the landowner to ensure development does not inadvertently cause impacts to this historic property. This plan formalizes the long-term commitment site preservation will entail. The location of the site will not be available for public access and no additional forms of preservation are proposed.

Conservation Measures

Conservation for Site 29723 will require immediate, short-term and long-term protection measures. These measures provide for actions to ensure the site is protected in perpetuity and that damage does not occur through negligent or unintentional means and can be implemented as soon as feasible. The landowner will be responsible for implementing the preservation measures contained in this plan.

The immediate conservation measures include establishing the location of a permanent buffer boundary around Site 29723 at a distance of 10 ft from the sides of the site by a legal land surveyor and registering the metes and bounds descriptions as a preservation area with the Bureau of Conveyances. Short-term

conservation measures include construction of a physical barrier 15 feet from the sides and ends of the trail to mark a temporary buffer zone to control site accessibility during development. The western end of the trail terminates at the project area boundary. Long-term conservation measures will consist of maintaining the current condition of the site with the provision that the landowner will notify DLNR-SHPD of any degradation or change of site condition. No physical barriers will mark the preservation buffer.

Preservation buffers

A permanent buffer zone is stipulated in this plan. The buffer zone will be established around Site 29723 by a legal land surveyor and will be registered as a preservation area with the Bureau of Conveyances. A proposed buffer of 10 ft is to be established along the north and south sides of the trail and at the eastern end (**Figure 24**). The western end of the trail terminates at the project area boundary. No physical barriers will mark the boundaries of the preservation area. The proposed buffer is depicted on **Figure 24**.

Immediate Conservation Measures

Two conservation measures can be implemented as soon as feasible upon approval of this Archaeological Site Preservation Plan. A licensed land surveyor is required to establish the metes and bounds description of the Site 29723 preservation buffer. All requirements and restrictions of this preservation plan, including a metes and bounds description of the permanent buffer will be incorporated into the property deed as a restrictive covenant and will be recorded with the Bureau of Conveyances with a copy sent to SHPD. Registration with the Bureau of Conveyances normally includes a copy of the Archaeological Site Preservation Plan.

Short-Term Conservation Measures

Short-term conservation measures will be implemented both prior to and during all phases of development. The measure will consist of erecting a temporary buffer fence set 15 feet from the north and south sides of the trail and from the eastern end see **Figure 24**). The temporary buffer wall also extend along the project area boundary at the west end of the trail The fencing will be installed prior to the commencement of any ground altering activity. The fencing will consist of orange safety fence that is ultraviolet ray resistant high-density polyethylene with diamond or square mesh, with a minimum weight of 20 lbs per 100 ft by 4 ft wide. The fencing will be removed following the development of the parcel.

Long-Term Conservation Measures

Long-term conservation measures include maintaining the current condition of the site with the provision that the landowner will notify DLNR-SHPD of any degradation or change of site condition. No physical barriers will be located along the boundaries of the Site 29723 permanent buffer.

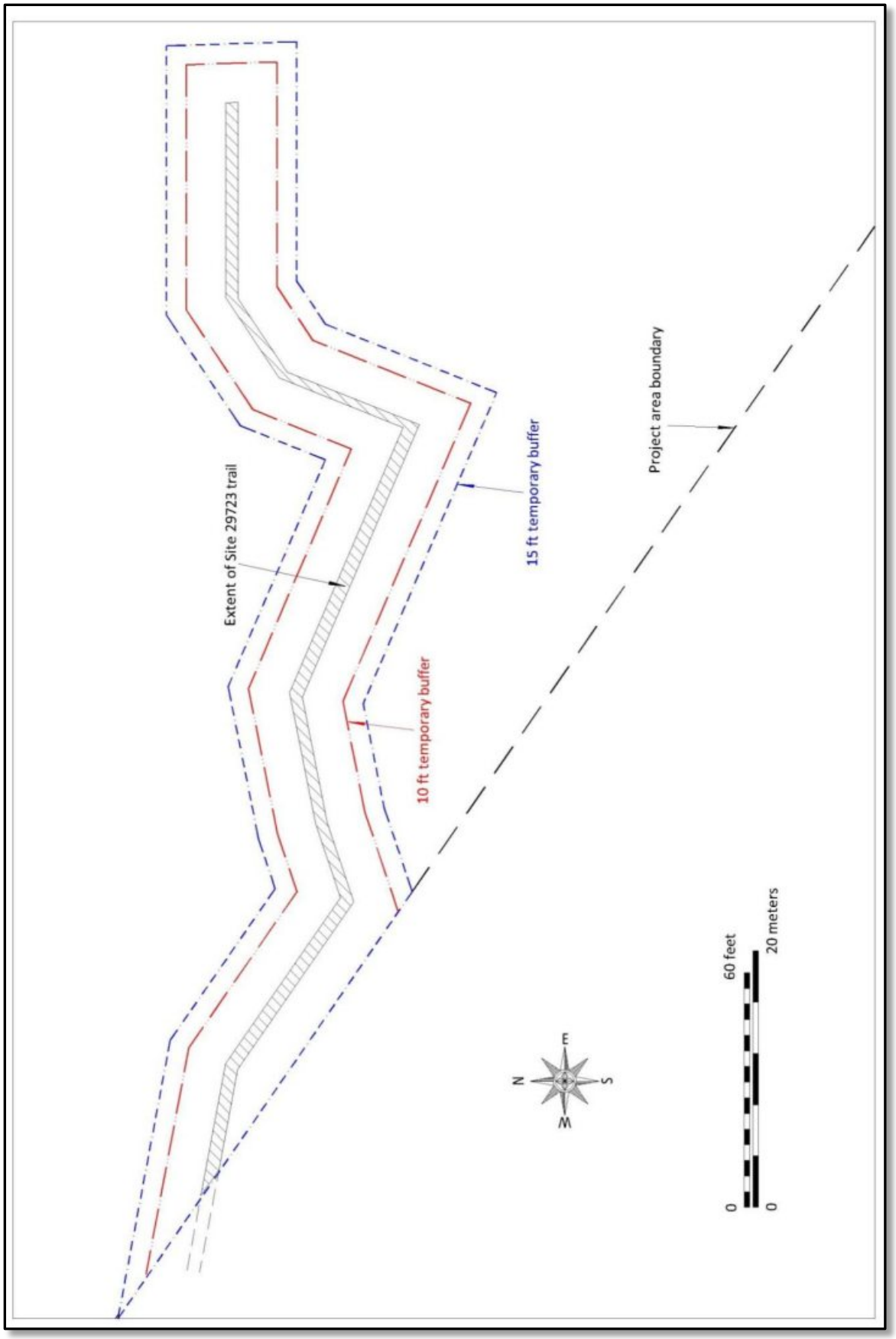


Figure 24. Preservation buffera at Site 29723

The terrain and vegetation within the preservation buffer will be left in its current condition. No vegetation clearing or landscaping will be conducted. All use of the interior of the permanent buffer zone is prohibited.

Access

The landowner will have unlimited access to the site, but no provision is made for public access. SHPD personnel will also have access to the site with prior notice and landowner permission.

Site Preservation Plan Consultation

Haun & Associates submitted the draft plan to the DLNR Nā Ala Hele Program, Hilo Office for consultation on March 3, 2014 (**Appendix B**)., No response was received as of May 14, 2014.

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APPENDIX A: SHPD Acceptance Letter

901 Rec'd 9/30/13

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ESTHER KIA'AINA
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
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ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

601 Kamokila Boulevard, Suite 555
Kapolei, HI 96806

September 23, 2013

Alan E. Haun, Ph. D.
Haun & Associates
73-1168 Kahuna A'o Road
Kailua-Kona, Hawai'i 96740

LOG NO: 2013.4598
DOC NO: 1309SN12
Archaeology

Dear Dr. Haun:

SUBJECT: **Chapter 6E-42 Historic Preservation Review –**
Archaeological Inventory Survey of 309 Acres
Kauaea Ahupua'a, Puna District, Island of Hawai'i
TMK: (3) 1-3-009:005 (por)

Thank you for submitting the report titled *Archaeological Inventory Survey TMK (3) 1-3-009:005 (por) Kauaea Nui Ahupua'a, Puna District, Island of Hawaii* (A. Haun and D. Henry, August, 2013). We received your submittal on August 22, 2013. The surveyed area described in the report consists of a 309-acre portion of the 694.5-acre parcel. The fieldwork portion of this survey consisted of a 100% variable intensity survey method dependent upon the area in the project area being surveyed. The report indicates that 146-acres or 47% of the project area was subjected to a high intensity survey using 10 m intervals, 132-acres or 43% employed a moderate intensity survey spaced at 30-50 m and 31-acres or 10% of the project area utilized a low intensity survey. The low intensity survey consisted of a 100% non-systematic vehicular and pedestrian examination of the previously disturbed cinder quarry.

The survey identified six (6) sites comprised of ten (10) features, all of which are newly identified (SIHP Site 50-10-55-29723 through 29728. One of the sites, a portion of the Kauaea Trail (Site 29723) is determined to be Precontact; the remaining sites are historic is age and include roads (Site 29724), a survey marker (Site 29725), a sugarcane loading amp (Site 29726), a trig station (Site 29727), and a railroad grade (Site 29728). A 4.5 meter section of the approximately 91 meter long Kauaea Trail within the project area was mapped. The survey also included and documented 20 caves and three overhangs. All of these natural features were thoroughly inspected and determined to have no evidence of cultural use or modification. SHPD believes that the survey has adequately covered the project area.

SHPD concurs with significance assessments for all six sites as being significant under HAR 13-284-6 Criterion "d". Site 29723 has also been assessed as being culturally significant under Criterion "e" as a named trail. SHPD concurs with this assessment as well. SHPD concurs with the recommended treatments that no further work or preservation is necessary for Sites 29724-29728. We believe these to have been adequately documented. We look forward for the opportunity to review and approve the recommended preservation plan for Site 29723 and also concur with the recommended consultation with the DLNR Nā Ala Hele program regarding this trail.

With a few minor revisions as outlined in the attachment, SHPD believes that this report meets the requirements of HAR 13-276-5 and it is accepted by SHPD. Please send one hardcopy of the document with the revisions listed below, clearly marked FINAL, along with a copy of this review letter and a text-searchable PDF version on CD to the Kapolei SHPD office, attention SHPD Library. Please contact Sean Naleimaile at (808) 933-7651or Sean.P.Naleimaile@Hawaii.gov if you have any questions or concerns regarding this letter.

Aloha,

Theresa K. Donham
Archaeology Branch Chief

APPENDIX B: Haun & Associates to Na Ala Hele Consultation Letter

HAUN & ASSOCIATES

ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL RESOURCE MANAGEMENT SERVICES
PHONE: 808.325.2402 | FAX: 808.325.1520 | WEB: haunandassociates.com
73-1168 KAHUNA A'O ROAD | KAILUA-KONA | HI 96740

March 3, 2014 Project 990

Nelson Ayers
Division of Forestry and Wildlife
Na Ala Hele Trail and Access Program
Department of Land and Natural Resources
1151 Punchbowl Street
Room 325, Kalanimoku Building
Honolulu, Hawaii 96813

Subject: Draft Archaeological Site Preservation Plan,
Site 50-10-55-29723, Kauaea Ahupua'a, Puna District,
Island of Hawai'i, TMK: (3) 1-3-09: Por.005

Dear Mr. Ayers:

As part of on-going consultation, Haun & Associates is submitting the enclosed draft archaeological site preservation plan to the Department of Land and Natural Resources (DLNR) *Na Ala Hele Trail and Access Program*. Please review the plan to determine if the DLNR is interested incorporating Site 50-10-55-29723 into the *Na Ala Hele Trail and Access Program*.

If you have any questions, or require additional information, please contact me at (808) 325-2402.

Sincerely,

Alan E. Haun, Ph.D.
Principal Investigator

Enclosure: Draft Archaeological Site Preservation Plan

cc: Clement Chang, Trail and Access Specialist, DLNR, 19 E. Kawili St., Hilo, HI, 96720 w/enclosure
Sanford Service Center, 15-2628 Keaau-Pahoa Rd., Pahoa, HI, 96778 w/enclosure
Tim Lui-Kwan, Carlsmith Ball LLP, 1001 Bishop St., Suite 2200, Honolulu, HI, 96813 w/enclosure

Recd 6/30/14 990

NEIL ABERCROMBIE
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LAND
STATE PARKS

HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

601 Kamokila Boulevard, Suite 555
Kapolei, HI 96806

June 24, 2014

Dr. Alan Haun
Haun and Associates
73-1168 Kahuna A'o Road
Kailua Kona, Hawai'i 96740

LOG NO: 2014.02243
DOC NO: 1406SN18
Archaeology

Dear Dr. Haun:

SUBJECT: **Chapter 6E-42 Historic Preservation Review -**
Archaeological Site Preservation Plan for the Kauaea Trail (SIHP Site 50-10-55-29723)
Kauaea Ahupua'a, Puna District, Island of Hawai'i
TMK (3) 1-3-009:005 por

Thank you for the opportunity to review the revised draft plan titled *Archaeological Site Preservation Plan, Site 29723 Kauaea Ahupua'a, Puna District, Island of Hawai'i TMK (3) 1-3-009:005* by Haun and Henry 2013. This document was received by our office on May 16, 2014. The plan outlines the preservation measures that will be used to insure the conservation and perpetual preservation of Kauaea Trail that was recommended for preservation in the accepted archaeological inventory survey (AIS) report for this property (Haun and Henry 2013, *Log No. 2013.4598 Doc. No. 1309SN12*). A section of the trail approximately 91 meter long is within the southeastern corner of the subject parcel; it once continued mauka and makai along the along the southern boundary of Kauaea Ahupua'a.

The plan indicates that the permanent buffer for SIHP 29723 will be 10 feet with a 15 foot temporary buffer zone during construction. The permanent buffer for Site 29723 will be subjected to a meets and bounds survey and will be recorded with the Bureau of Conveyances. The land owner will be responsible for the maintenance of the site, and no public access will be provided. We believe that this plan meets the requirements of Hawaii Administrative Rule 13-277 and is accepted by SHPD. Please send one hardcopy of the document, clearly marked **FINAL**, along with a copy of this review letter and a text-searchable PDF version on CD, to the Kapolei SHPD office, attention SHPD Library.

Please contact Sean Nāleimaile at (808) 933-7651or Sean.P.Naleimaile@Hawaii.gov if you have any questions or concerns regarding this letter.

Aloha,

Theresa K. Donham
Archaeology Branch Chief

Appendix I

EISPN Scoping Comment Reproductions

Appendix I
Scoping Comment Reproductions

Scoping Comment Reproductions

Federal Agencies

From: Cole, Colleen <colleen_cole@fws.gov>
Sent: Monday, February 10, 2025 4:31 PM
To: 224055-01 Puna Quarry EIS
Cc: Javar-Salas, Chelsie; Gary, Deena T
Subject: Comments for EIS Preparation Notice for the Leilani Quarry
Attachments: IPaC Info Letter_Species List Instructions_PIFWO_20Apr2022_Final.pdf

Aloha Kawika McKeague,
We received your request for comments on the Second Environmental Impact Statement Preparation Notice for the Leilani Quarry in Kauaea Ahupuaʻa Puna District, island of Hawaiʻi on January 8, 2025.

First, we recommend you obtain an official species list using the Information for Planning and Consultation (IPaC) online tool by accessing this link: https://ipac.ecosphere.fws.gov/

Please see the attached pdf with detailed directions on how you obtain an official species list in IPaC. You will receive the US Fish and Wildlife Service (Service) recommended avoidance and minimization measures (AMMs) for the listed species potentially impacted by the project activities. We recommend you incorporate those AMMs into the project description.

We support the following activities highlighted in the notice:

- The applicant establishing fenced buffer zones for the federally listed plant, *Cyrtrandra nanawaleensis*.
- The plan to survey for listed plants before any vegetation removal or expansion of quarry activities.
- Landscaping plan with protocols limiting introduction of new pests and the spread of known noxious plant, invertebrate, and animal species, and light minimization efforts for night-time activities.

We recommend evaluating the structural integrity of the Pu'u in relation to quarry activities, so that quarry activities will not impact individuals of *Cyrtandra nanawaleensis*.

Please let me know if you have any questions regarding these comments. We appreciate the opportunity to provide comments on this notice.

Mahalo,
Colleen Cole
Biologist - Maui Nui & Hawaiʻi Island Team
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
154 Waiānuenue Avenue Suite 103
PO Box 10225
Hilo, Hawaiʻi 96720-2452

Desk Phone: (808) 460-7697
Cell Phone: (808) 859-1002
Email: colleen_cole@fws.gov

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.

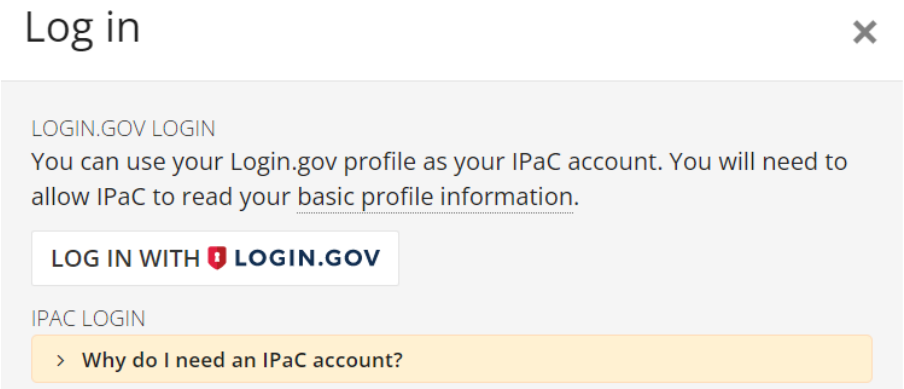
Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of your species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors 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.

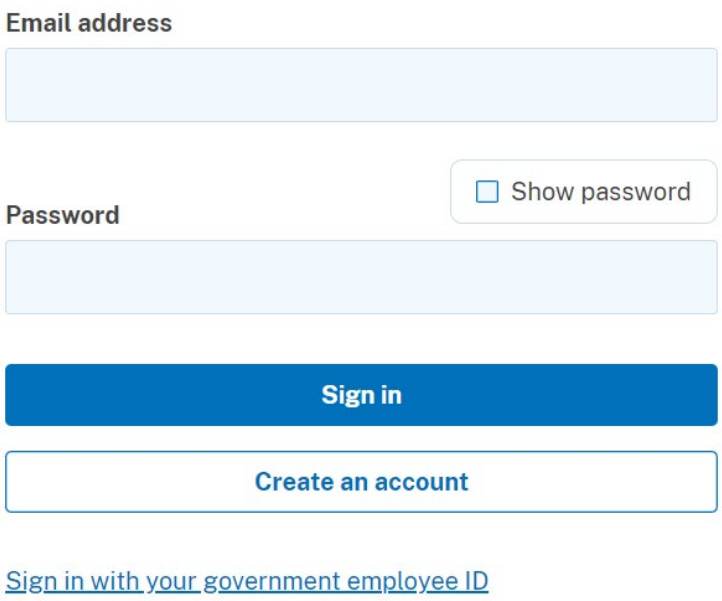
If you have questions about a species list obtained through the IPaC system or need assistance in completing an IPaC species list request, please contact the Service at 808-792-9400 or via email at pifwo_admin@fws.gov. We appreciate your efforts to conserve listed species across the Pacific Islands.

Instructions for Action Agencies and partners to obtain an official species list in IPaC

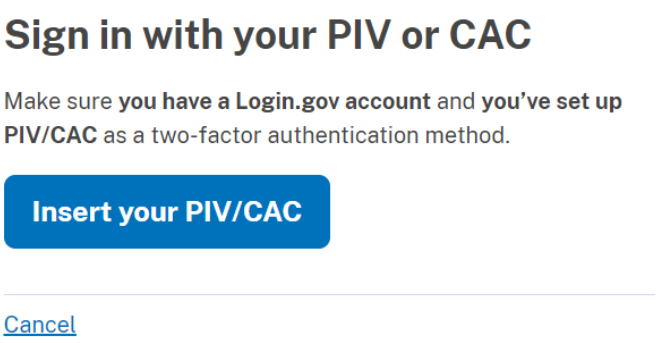
- Navigate to https://ipac.ecosphere.fws.gov/
- You can get an unofficial species list without logging in. However, if you want an official species list you will need to log in first using your Login.gov account. If you don't have an IPaC account, they are easy to create.



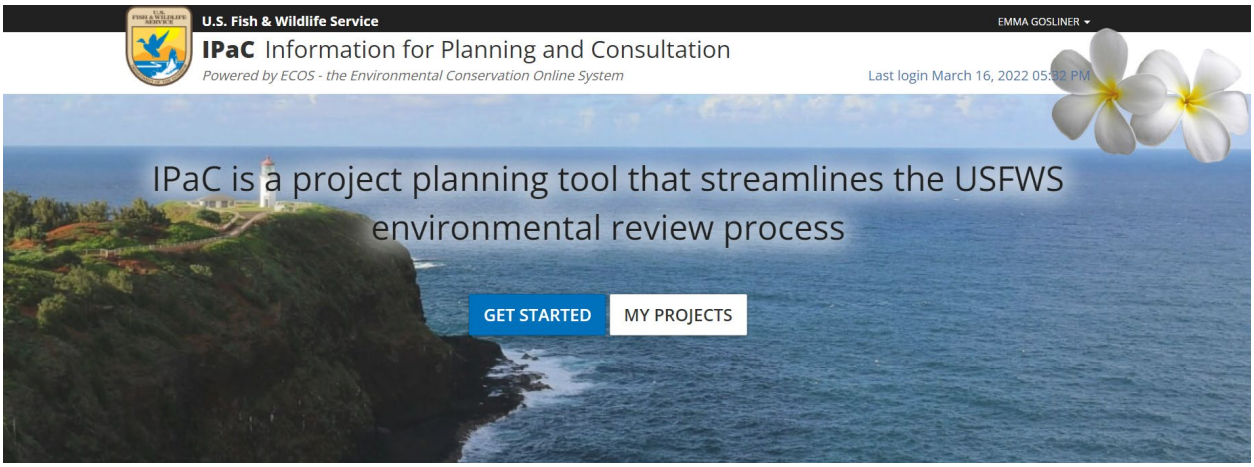
Select Log in with Login.gov and sign in using your email and password.



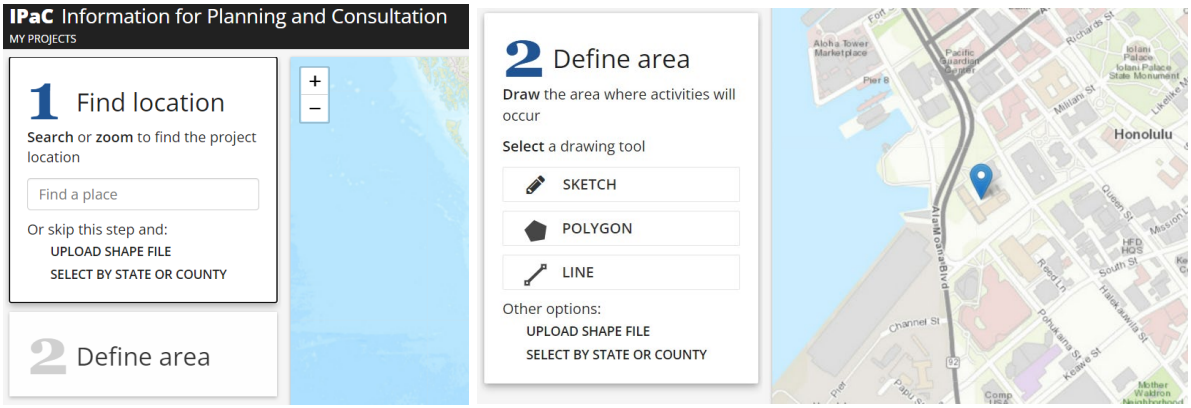
If you have a PIV or CAC card, you can sign in using that method as well.

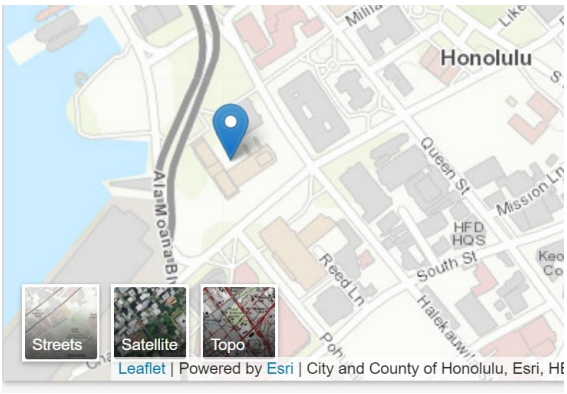


- Once you log in, select "Get Started".

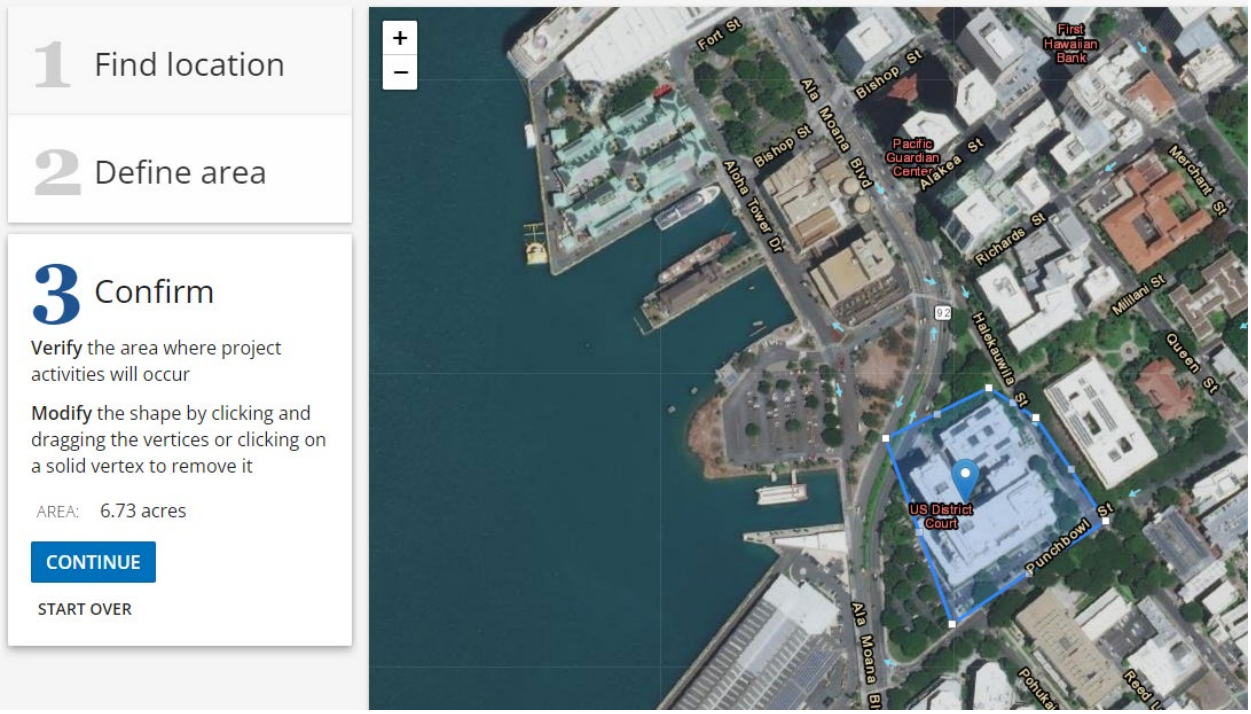


- Define the action area: Identify the location of the proposed action by uploading an existing shapefile or by entering an address or coordinates of the action area. Once identified on the map, you can manually draw the action area using the drawing tools.



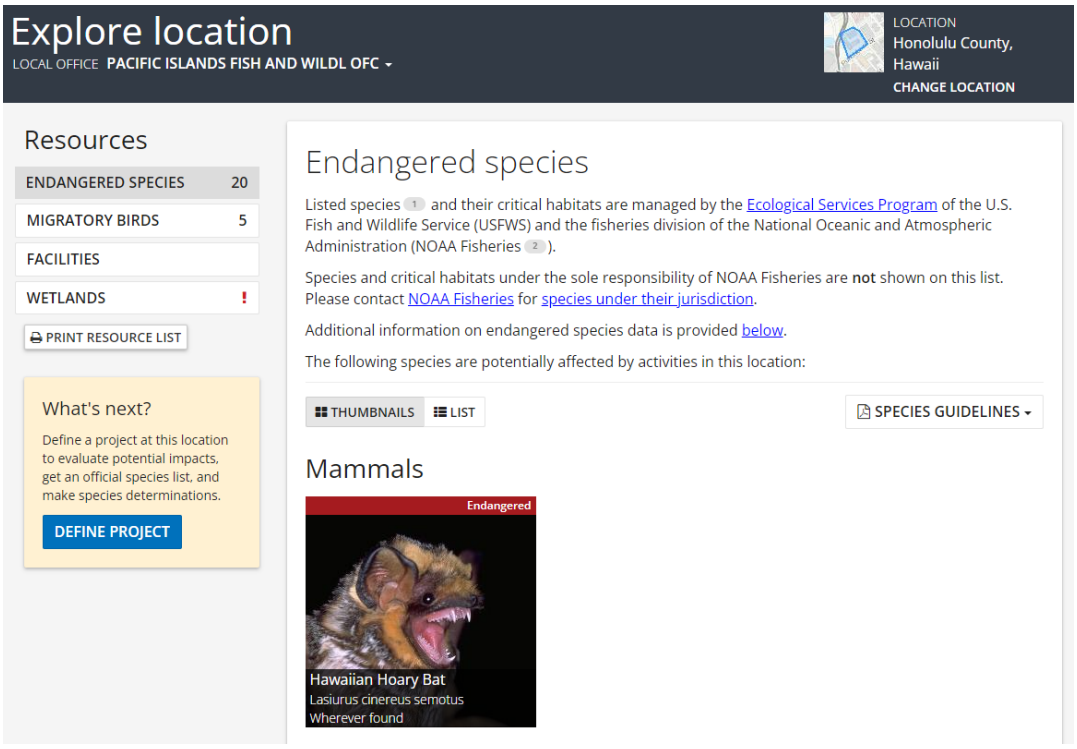


To help identify your action area you can choose between multiple base maps available.

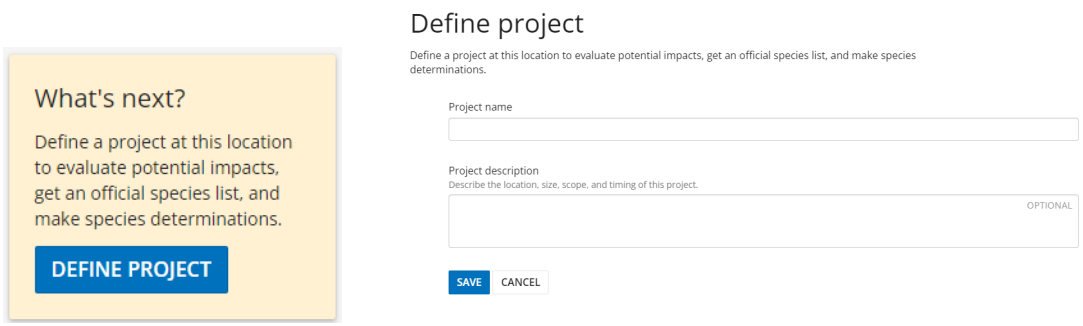


Press continue when you have finished drawing or uploading the action area location.

- 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.

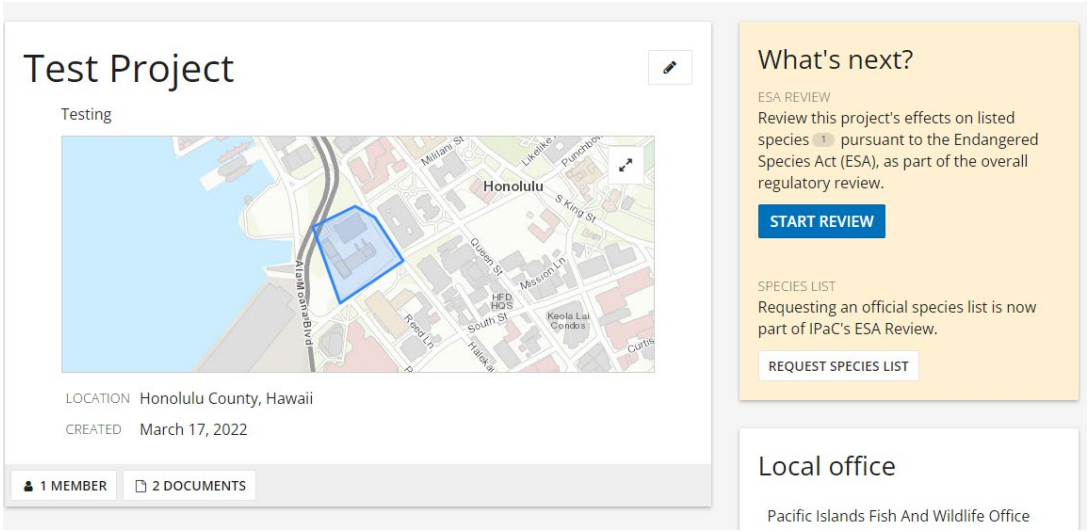


- Continue with the following steps to comply with the requirements of ESA section 7 to obtain an **official species list**.
- Select Define Project

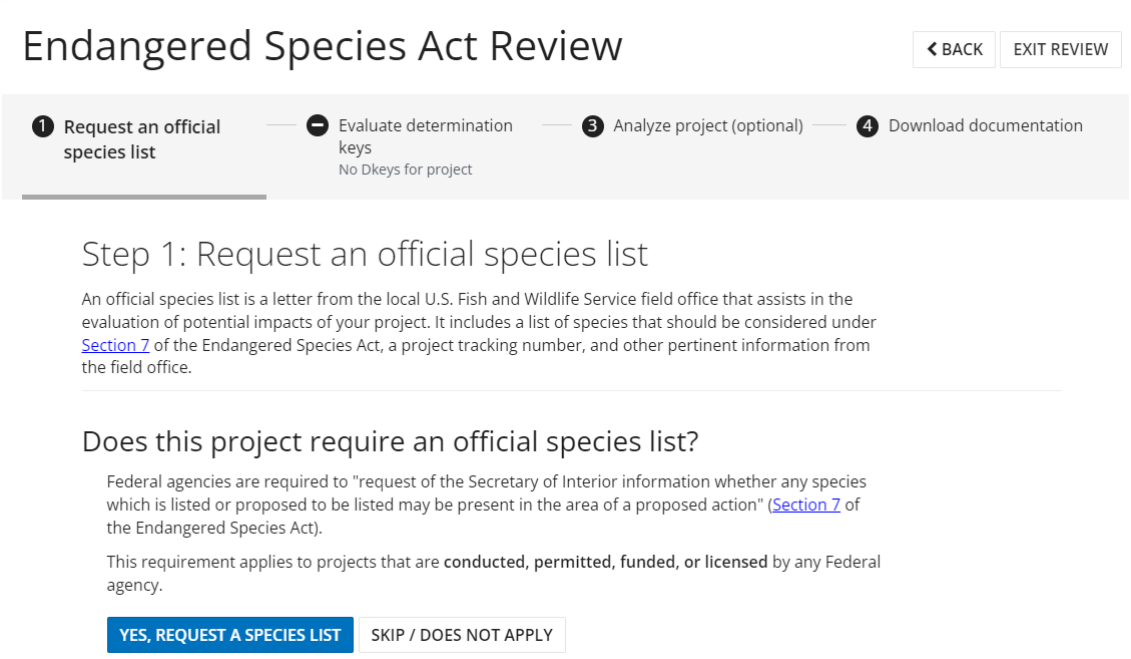


Enter the Project Name and a brief description of the project (a description is not mandatory, but recommended for future coordination with the Service). Click SAVE at bottom of page.

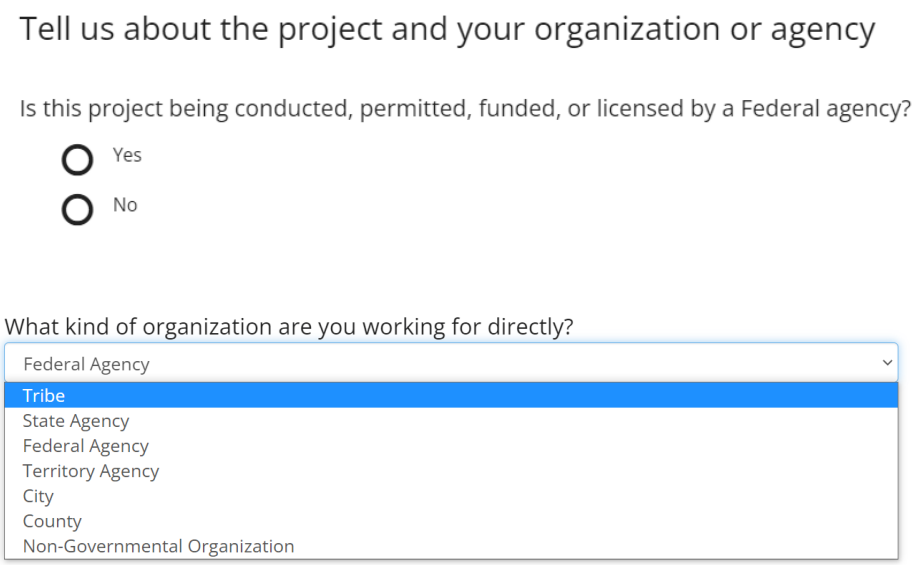
- At the bottom of the What's next box on the right, click Request Species List



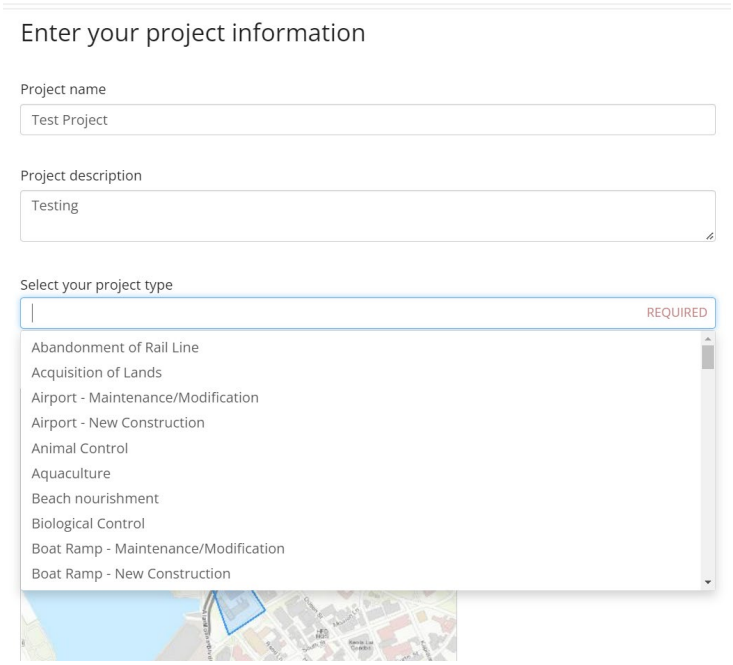
- on the following screen, click Yes, Request Species List



- 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.

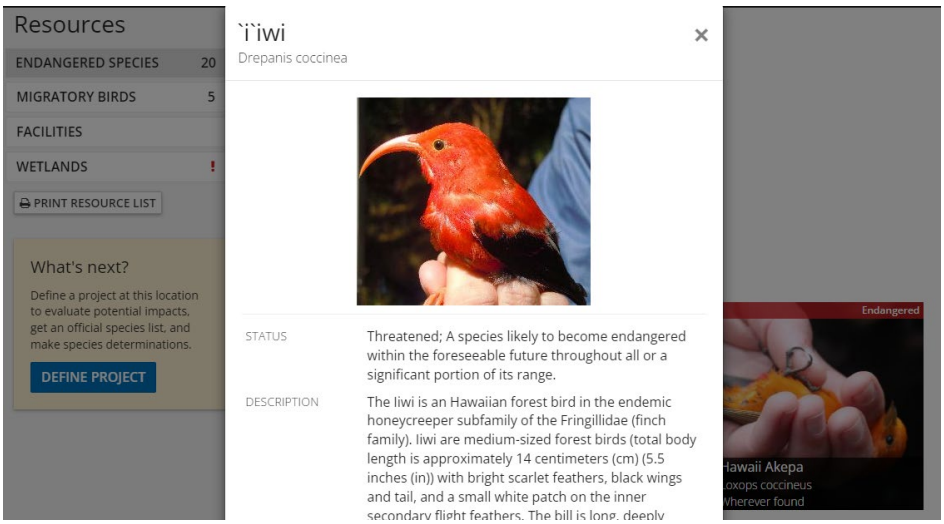


- Once all required sections are filled out, press SUBMIT OFFICIAL SPECIES LIST REQUEST



- 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.



Irene Nichols-Ferguson

From: Cole, Colleen <colleen_cole@fws.gov>
Sent: Friday, March 7, 2025 9:15 AM
To: Ethan McKown; Kawika McKeague; Irene Nichols-Ferguson; Reyna L. DePonte
Cc: Javar-Salas, Chelsie; Gary, Deena T; Yamaguchi, Kelli; Adams, Jesse W; Kinsley McEachern; joshua.vandemark@hawaii.gov; Lyman.Perry@hawaii.gov
Subject: Re: [EXTERNAL] RE: questions regarding Leilani Quarry EIS preparation notice
Attachments: Leilani Quarry_Animal Avoidance and Minimization Measures - FINAL May 2023.docx; Plant Avoidance and Minimization Measures_FINAL_May 2023.docx; Hawai'i_Invasive Species Biosecurity Protocols_w_notes_FINAL_Feb 2022.docx

Categories: Filed in TonicDM, 224055-01 Sanford Service Center

Aloha Ethan,

Thanks again for taking the time to meet with us yesterday, your presentation was very helpful as were your answers to our questions. As we discussed, we have additional questions and comments for the proposed action:

- Are the *Cyrtandra nanawaleensis* populations currently in a fenced exclosure? If so, how big is the exclosure and is the exclosure free of feral pigs and when was the exclosure built? We recommend using ungulate proof fencing for the exclosure and inspecting it regularly (at least twice a year, especially after storms and big wind events) to prevent ingress from feral pigs. Fences should be maintained so they remain in good condition and repaired immediately when signs of failure are observed.

- Genetic representation of this population of *Cyrtandra nanawaleensis* - Have propagules been collected, propagated, and/or planted else for this population of *Cyrtandra nanawaleensis*? Due to the decline of this population since 2013, we are concerned that the genetic representation of this species could be lost. We recommend collecting seeds to be placed in a seed storage facility and/or propagating and outplanting the species to establish a stable or increasing population(s) off-site to secure the genetics of this species.

- How will the *Cyrtandra nanawaleensis* populations be marked to ensure buffers are followed? We recommend using flagging (replace when needed) and/or permanent marking, so that plants are clearly marked and can be avoided. We recommend establishing a buffer distance of 250m from the populations to reduce impacts from heavy equipment. Our buffer distances by project actions are found in the attached Avoidance and Minimization Measures (AMMs) for Listed Plants.

- We recommend all staff working in the vicinity of the *Cyrtandra nanawaleensis* populations be made aware of this endangered plant by creating a flier to educate staff and posting this flier on site. Additionally, staff working in the vicinity should be made aware of the buffer distances and markers established to protect this plant.

- We recommend incorporating our AMMs for listed plant and animal species potentially occurring in the area into your project description (see attached AMMs for Plants and Animals). as Additionally, we recommend incorporating our Invasive Species Biosecurity Protocols for Hawai‘i to reduce spreading or introducing invasive species, which causes negative ecological consequences to new areas or islands, resulting in potential impacts to plants, wildlife, and their habitat.

Please let me know if you have any questions. We look forward to reviewing your draft EIS in the near future. We appreciate your efforts to protect listed species and native habitats.

Mahalo,

Colleen

Colleen Cole
Biologist - Maui Nui & Hawai‘i Island Team
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
154 Waiānuenue Avenue Suite 103
PO Box 10225
Hilo, Hawai‘i 96720-2452

Desk Phone: (808) 460-7697
Cell Phone: (808) 859-1002
Email: colleen_cole@fws.gov

From: Ethan McKown <ethanm@g70.design>
Sent: Friday, February 21, 2025 12:51 PM
To: Cole, Colleen <colleen_cole@fws.gov>; Kawika McKeague <kawikam@g70.design>; Irene Nichols-Ferguson <irenenf@g70.design>; Reyna L. DePonte <reynad@g70.design>
Cc: Javar-Salas, Chelsie <chelsie_javar-salas@fws.gov>; Gary, Deena T <deena_gary@fws.gov>
Subject: RE: [EXTERNAL] RE: questions regarding Leilani Quarry EIS preparation notice

Aloha Colleen,

We are ready to schedule a meeting with USFWS regarding the Leilani Quarry EIS preparation notice.

Can you please provide some potential times on USFWS’s end, and then coordinate with Reyna DePonte, cc’d here? Attendees from our end are below.

Mark Kawika McKeague, AICP: Principal planner
Ethan McKown: Senior planner
Irene Nichols Ferguson: Planner

Additional public scoping meeting
As an FYI, the scoping period for this EISPN has been extended to March 7, 2025. This will be announced in the February 23 publication of *The Environmental Notice*. We are holding another public scoping meeting on March 3, 2025. USFWS is welcome to attend this meeting, in addition to the meeting we are currently scheduling with this email.

Mahalo!

FINAL Avoidance and Minimization Measures (AMMs)
Final revised May 2023

ESA Listed Species

Endangered ʻōpeʻapeʻa (Hawaiian hoary bat, *Lasiurus cinereus semotus*): The Hawaiian hoary bat roosts in woody vegetation across all islands and will leave their young unattended in trees and shrubs when they forage. If trees or shrubs 15 feet or taller are cleared during the pupping season, June 1 through September 15, there is a risk that young bats could inadvertently be harmed or killed, since they are too young to fly or move away from disturbance. Hawaiian hoary bats forage for insects from as low as 3 feet to higher than 500 feet above the ground and can become entangled in barbed wire used for fencing.

To avoid and minimize impacts to the endangered Hawaiian hoary bat we recommend you incorporate the following applicable measures into your project description:

- Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15).
- Do not use barbed wire for fencing.

Endangered ʻuaʻu (Hawaiian petrel, *Pterodroma sandwichensis*), Threatened ʻaʻo, (Newell's shearwater, *Puffinus newelli*), and Endangered Hawaiʻi Distinct Population Segment of the ʻakēʻakē (band-rumped storm-petrel, *Hydrobates castro*):
Hawaiian seabirds may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable to light attraction.

To avoid and minimize potential project impacts to seabirds we recommend you incorporate the following measures into your project description:

- Fully shield all outdoor lights so the bulb can only be seen from below.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird fledging period, September 15 through December 15.

Threatened nēnē (Hawaiian goose, *Branta (Nesochen) sandvicensis*): Nēnē are found on the islands of Hawaiʻi, Maui, Molokaʻi, and Kauaʻi. They are observed in a variety of habitats, but prefer open areas, such as pastures, golf courses, wetlands, natural grasslands and shrublands,

and lava flows. Threats to the species include introduced mammalian and avian predators, wind facilities, and vehicle strikes.

To avoid and minimize potential project impacts to nēnē we recommend you incorporate the following measures into your project description:

- Do not approach, feed, or disturb nēnē.
- If nēnē are observed loafing or foraging within the project area during the breeding season (September through April), have a biologist familiar with nēnē nesting behavior survey for nests in and around the project area prior to the resumption of any work. Repeat surveys after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).
- Cease all work immediately and contact the Service for further guidance if a nest is discovered within a radius of 150 feet of proposed project, or a previously undiscovered nest is found within the 150-foot radius after work begins.
- In areas where nēnē are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.

A 4(d) rule was established at the time the nēnē was downlisted to threatened status. Under the 4(d) rule, the following actions are not prohibited under the Act, provided the additional measures described in the downlisting rule are adhered to:

- Take by landowners, or their agents, conducting intentional harassment in the form of hazing or other deterrent measures not likely to cause direct injury or mortality, or nēnē surveys.
- Take that is incidental to conducting lawful control of introduced predators or habitat management activities for nēnē.
- Take by authorized law enforcement officers for the purpose of aiding or euthanizing sick, injured, or orphaned nēnē; disposing of dead specimens; and salvaging a dead specimen that may be used for scientific study.

Endangered Hawaiian waterbirds (ae‘o, Hawaiian stilt, *Himantopus mexicanus knudseni*; ‘alae ke‘oke‘o, Hawaiian coot, *Fulica alai*; koloa maoli, Hawaiian duck, *Anas wyvilliana*): Hawaiian waterbirds are currently found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo‘i or patches, irrigation ditches, sewage treatment ponds, and in the case of the Hawaiian duck, montane streams and marshlands. Hawaiian stilts may also be found wherever ephemeral or persistent standing water may occur. Threats to these species include non-native predators, habitat loss, and habitat degradation. Hawaiian ducks are also subject to threats from hybridization with introduced mallards.

Based on the project details provided, your project may result in the creation of standing water or open water that could attract Hawaiian waterbirds to the project site. In particular, the Hawaiian stilt is known to nest in sub-optimal locations (e.g., any ponding water), if water is present. Hawaiian waterbirds attracted to sub-optimal habitat may suffer adverse impacts, such as predation and reduced reproductive success, and thus the project may create an attractive nuisance. Therefore, we recommend you work with our office during project planning so that we

may assist you in developing measures to avoid impacts to listed species (e.g., fencing, vegetation control, predator management).

To avoid and minimize potential project impacts to Hawaiian waterbirds we recommend you incorporate the following measures into your project description:

- In areas where waterbirds are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.
- If water resources are located within or adjacent to the project site, incorporate applicable best management practices regarding work in aquatic environments into the project design (see enclosure).
- Have a biological monitor that is familiar with the species' biology conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Repeat surveys again within 3 days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest). If a nest or active brood is found:
    - Contact the Service within 48 hours for further guidance.
    - Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.
    - Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

PIFWO Invasive Species Biosecurity Protocols

The following biosecurity protocol is recommended to be incorporated into planning for your project to avoid or minimize transportation of invasive species with potential to impact to fish, wildlife, and their habitat. Cleaning, treatment, and/or inspection activities are the responsibility of the equipment or vehicle owner and operator. However, it is ultimately the responsibility of the action agency to ensure that all project materials, vehicles, machinery, equipment, and personnel are free of invasive species before entry into a project site. Please refer to the resources listed below for current removal/treatment recommendations that may be relevant to your project.

1. Cleaning and treatment:
   Project applicants should assume that all project materials (i.e., construction materials, or aggregate such as dirt, sand, gravel, etc.), vehicles, machinery, and equipment contain dirt and mud, debris, plant seeds, and other invasive species, and therefore require thorough cleaning. Treatment for specific pests, for example, trapping and poison baiting for rodents, or baiting and fumigation for insects, should be considered when applicable. For effective cleaning we offer the following recommendations prior to entry into a project site:
   a. Project materials, vehicles, machinery, and equipment must be pressure washed thoroughly (preferably with hot water) in a designated cleaning area. Project materials, vehicles, machinery, and equipment should be visibly free of mud/dirt (excluding aggregate), seeds, plant debris, insects, spiders, frogs (including frog eggs), other vertebrate species (e.g., rodents, mongoose, feral cats, reptiles, etc.), and rubbish. Areas of particular concern include bumpers, grills, hood compartments, wheel wells, undercarriage, cabs, and truck beds. Truck beds with accumulated material are prime sites for hitchhiking invasive species.
   b. The interior and exterior of vehicles, machinery, and equipment must be free of rubbish and food, which can attract pests (i.e., rodents and insects). The interiors of vehicles and the cabs of machinery should be vacuumed clean particularly for any plant material or seeds.

2. Inspection:
   a. Following cleaning and/or treatment, project materials, vehicles, machinery, and equipment, must be visually inspected by its user, and be free of mud/dirt (excluding aggregate), debris, and invasive species prior to entry into a project site. For example, careful visual inspection of a vehicle's tires and undercarriage is recommended for any remaining mud that could contain invasive plant seeds.
   b. Any project materials, vehicles, machinery, or equipment found to contain invasive species (e.g., plant seeds, invertebrates, rodents, mongoose, cats, reptiles, etc.) must not enter the project site until those invasive species are properly removed/treated.

3. For all project site personnel:
   a. Prior to entry into the project site, visually inspect and clean your clothes, boots or other footwear, backpack, radio harness, tools and other personal gear and

equipment for insects, seeds, soil, plant parts, or other debris. We recommend the use of a cleaning brush with sturdy bristles. Seeds found on clothing, footwear, backpacks, etc., should be placed in a secure bag or similar container and discarded in the trash rather than being dropped to ground at the project site or elsewhere.

4. Additional considerations:
    a. Consider implementing a Hazard Analysis and Critical Control Point (HACCP) plan (https://www.fws.gov/policy/A1750fw1.html) to improve project planning around reducing the risk of introducing or spreading invasive species.
    b. When applicable, use pest-free or low-risk sources of plants, mulch, wood, animal feed or other materials to be transported to a project site.
    c. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected, and if necessary, appropriately cleaned or treated for invasive species prior to being transported to the project site.
    d. Avoid unnecessary exposure to invasive species at a particular site (to the extent practical) to reduce contamination and spread. For example, if your project involves people or equipment moving between multiple locations, plan and organize timelines so that work is completed in native habitat prior to working in a disturbed location to reduce the likelihood of introducing a pest into the native habitat.
    e. Maintain good communication about invasive species risks between project managers and personnel working on the project site (e.g., conduct briefings and training about invasive species). Ensure prevention measures are communicated to the entire project team. Also consider adding language on biosecurity into contracts or permitting mechanisms to provide clarity to all involved in the project. Report any species of concern or possible introduction of invasive species to appropriate land managers.

For current removal/treatment recommendations please refer to the following:
Hawaiian Islands:

- Hawai‘i Island – https://www.biisc.org/
- Maui – https://mauiinvasive.org/
- Moloka‘i - https://www.molokaiisc.org/
- Lāna‘i - https://pulamalanai.com/
- O‘ahu – https://www.oahuisc.org/
- Kaua‘i – https://www.kauaiisc.org/

Species-Specific Biosecurity Protocols

Rapid ‘Ōhi‘a Death (ROD)

Rapid ʻŌhiʻa Death (ROD) is a caused by a fungal pathogen (*Ceratocystis* spp.) that attacks and kills ʻōhiʻa trees (*Metrosideros polymorpha*). ʻŌhiʻa is endemic to the Hawaiian Islands and is the most abundant native tree species, comprising approximately 80 percent of Hawaiʻi's remaining native forests.

For more information about ROD including its current distribution, ROD science updates, and the latest on ROD protocol, please visit www.rapidohiadeath.org.

To reduce the risk of spreading ROD, the following best management practices and decontamination protocol are recommended:

Best Management Practices for ROD

1. Never transport any part of an ʻōhiʻa tree between different areas of an island or to a different island.

2. Do not use equipment from ROD infected islands on another island unless it is very specialized equipment and follows the decontamination protocol described below.

3. Avoid wounding ʻōhiʻa trees and roots with mowers, chainsaws, weed eaters, and other tools. If an ʻōhiʻa receives a minor injury like a small broken branch, then give the injury a clean, pruning-type cut (close to the main part of the trunk or branch) to promote healing, and then spray the entire wounded area with a pruning seal.

4. Always report suspect ROD ʻōhiʻa trees observed within you project area. ROD is a wilt disease that cuts off the supply of water and nutrients to the tree. The primary symptom to look for is an entire canopy or a large branch with dying leaves or red discolored leaves. Please record the GPS coordinates and location and take a picture of the tree if possible. Please report suspected ROD ʻōhiʻa trees to the following agencies:
    a. Island of Hawaiʻi – BIISC: 808-969-8268 (ohialove@hawaii.edu)
    b. Maui – MISC: 808-573-6472 (miscpr@hawaii.edu)
    c. Molokaʻi – TNC: 808-553-5236 ext. 6585 (lbuchanan@tnc.org)
    d. Oʻahu – OISC: 808-266-7994 (oisc@hawaii.edu)
    e. Kauaʻi – KISC: 808-821-1490 (kisc@hawaii.edu)

ROD Decontamination Protocol

1. Clothes, footwear, backpacks, and other personal equipment
    a. Before leaving the project site, remove as much mud and other contaminants as possible. Use of a brush with soap and water to clean gear is preferred. Footwear, backpacks, and other gear must be sanitized by spraying with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution.

2. Vehicles, machinery, and other equipment
    a. Vehicles, machinery, and other equipment must be thoroughly hosed down with water (pressure washing preferred) and visibly free of mud and debris, then

sprayed with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. Use of a "pump-pot" sprayer is recommended for the solution and a hot water wash is preferred. Be sure to thoroughly clean the undercarriage, truck bed, bumpers, and wheel wells.

b. If non-decontaminated personnel or items enter a vehicle, then the inside of the vehicle (i.e., floor mats, etc.) must be subsequently decontaminated by removing mud and other contaminants and sprayed with the one of the same aforementioned sanitizing solutions.

3. Cutting tools
    a. All cutting tools, including machetes, chainsaws, and loppers must be sanitized to remove visible mud and other contaminants. Tools must be sanitized using a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. One minute after sanitizing, one may apply an oil-based lubricant to chainsaw chains or other metallic parts to prevent corrosion as bleach is corrosive to metal.

    NOTE: When using a 10 percent bleach solution, surfaces should be cleaned with a minimum contact time of 30 seconds. Bleach must be mixed daily and used within 24 hours, as once mixed it degrades. Bleach will not work to disinfect surfaces that have high levels of organic matter such as sawdust or soil. Because bleach is also corrosive to metal, a water rinse after proper sanitization is recommended to avoid corrosion.

Little Fire Ant (LFA)

The little fire ant (*Wasmannia auropunctata*), or LFA, is an invasive species with a painful sting that can inhabit many different environments. In Hawai‘i, it often infests agricultural fields and farms, damaging crops and stinging unsuspecting workers. Little fire ants are also highly disruptive to native tropical ecosystems and harmful to wildlife. Slow moving, but tiny and capable of foraging 24 hours a day with multiple queens per colony, LFA is a formidable threat to biodiversity, agriculture, and quality of life on tropical islands in the Pacific.

For more information about LFA including helpful guides and workshops for treating or detecting LFA, please visit www.littlefireants.com.

To reduce the risk of spreading LFA, the following biosecurity protocol is recommended:

Biosecurity Protocol for LFA

1. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected for little fire ants and other pests prior to being transported to the project site. If plants are found to be infested by ants of any species, plants should be sourced from an alternative nursery and the infested nursery should follow treatment protocols recommended by the Hawai‘i Ant Lab (https://littlefireants.com/wp-content/uploads/2020-Management-of-Pest-Ants-in-Nurseries-min.pdf).

2. All work vehicles, machinery, and equipment should follow steps 1 and 2 in the "Invasive Species Biosecurity Protocol" for (1) cleaning and treatment and (2) inspection for invasive ants prior to entering a project site.

3. Any machinery, vehicles, equipment, or other supplies found to be infested with ants (or other invasive species) must not enter the project site until it is properly treated (https://littlefireants.com/how-to-treat-for-little-fire-ants-for-homeowners/#recommended-bait-products) and re-tested. Infested vehicles must be treated following recommendations by the Hawai'i Ant Lab (https://littlefireants.com/resource-center/) or another ant control expert and in accordance with all State and Federal laws. Treatment is the responsibility of the equipment or vehicle owner. Ultimately however, it is the responsibility of the action agency to ensure that all project materials, vehicles, machinery, and equipment follow the appropriate protocol(s).

4. General Vehicle Ant Hygiene: Even the cleanest vehicle can pick up and spread little fire ant. Place MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) into refillable tamper resistant bait stations. An example of a commercially available refillable tamper resistant bait station is the Ant Café Pro (https://www.antcafe.com/). Place a bait station (or stations) in the vehicle and note that larger vehicles, such as trucks, may require multiple stations. Monitor bait stations frequently (every week at a minimum) and replace bait as needed. If the bait station does not have a sticker to identify the contents, apply a sticker listing contents to the station.

5. Gravel, building materials, or other equipment such as portable buildings should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

6. Storage areas that hold field tools, especially tents, tarps, and clothing should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

7. Vehicles that have entered a project site known or thought to overlap with areas infested with LFA should subsequently be tested for LFA with baiting in accordance with protocol recommended by the Hawai'i Ant Lab (https://littlefireants.com/survey-your-home-for-lfa/).

8. If LFA are detected, please report it to 808-643-PEST (Hawai'i), 671-475-PEST (Guam), or 684-699-1575 (American Samoa). Please visit https://littlefireants.com/identification-of-little-fire-ants/ for assistance in identifying LFA.

Coconut Rhinoceros Beetle (CRB)

The coconut rhinoceros beetle (*Oryctes rhinoceros*), or CRB, is a large, horned scarab beetle native to Southeast Asia. An invasive pest where it occurs outside of its native range, the adult beetles primarily attack coconut palms by boring into the crowns to feed on developing leaves. It is also known to feed on bananas, sugarcane, pineapples, oil palms, and pandanus trees. The larval grub stage burrow into and feed upon decomposing mulch and vegetation. On most Pacific Islands it lacks natural predators, leading to severe declines and extirpations of palm species where it has become established. On Guam, researchers have recently documented a shift of CRB to the island's native and threatened cycad tree (*Cycas micronesica*) (Marler et al. 2020). In the Hawaiian Islands, CRB is a documented threat to archipelago's native *Pritchardia* palm species.

For more information about CRB including the current situation in Guam and high/low-risk areas on O'ahu, please visit http://cnas-re.uog.edu/crb/ or https://www.crbhawaii.org/.

To reduce the risk of spreading CRB, the following biosecurity protocol is recommended:

Biosecurity Protocol for CRB

1. Never transport green waste between islands and minimize the creation, storage, and transport of green waste within O'ahu, this also includes:
    a. Mulch, bark, compost
    b. Soil of any kind
    c. Potted plants of any kind

    Additional consultation is recommended if the project involves transportation of materials, soil, equipment, vehicles, etc. between islands.

2. If felling or trimming palms, contact CRB Response for a free inspection ((808) 679-5244 or email at info@crbhawaii.org)

3. Keep green waste whole until it is ready to be treated and removed.
    a. Chip green waste on site and transport it on the same day to a secure and managed green waste disposal site/facility.
    b. For chipped green waste in high-risk areas, re-chip prior to movement outside the infested area, treat with pesticide (when applicable), heat treatment (>130 degrees F), spread and dry, or store in sealed durable containers.

4. Minimize accumulations of green waste by regularly treating mulch piles or depositing it in sealed green waste bins. In low-risk areas, we also recommend thinly spreading mulch (less than 2 inches deep) and allowing it to dry (no irrigation).

5. If injured or dying coconut palm trees are observed or if CRB are detected, contact CRB Response at (808) 679-5244 or email at info@crbhawaii.org or online at https://www.crbhawaii.org/report

References Cited

Marler, T.E., Marler, F.C. Matanane, and L.I. Terry. 2020. Burrowing activity of coconut rhinoceros beetle on Guam cycads. Communicative & Integrative Biology, 13:1, 74-83. (https://www.tandfonline.com/doi/full/10.1080/19420889.2020.1774310)

Rogers, H.S., E.R. Buhle, J. Hille Ris Lambers, E.C. Fricke, R.H. Miller, and J.J. Tewksbury. 2017. Effects of an invasive predator cascade to plants via mutualism disruption. Nature Communications. 8:14557. https://www.nature.com/articles/ncomms14557/

Avoidance, Minimization, and Conservation Measures for listed plants in the Pacific Islands

Project activities may affect listed plant species by causing physical damage to plant parts (roots, stems, flowers, fruits, seeds, etc.) as well as impacts to other life requisite features of their habitat, which may result in reduction of germination, growth and/or reproduction. Cutting and removal of vegetation surrounding listed plants has the potential to alter microsite conditions (e.g., light, moisture, temperature), damaging or destroying the listed plants and also increasing the risk of invasion by nonnative plants, which can result in higher incidence or intensity of fire. Activities such as grazing, use of construction equipment and vehicles, and increased human traffic (i.e., trails, visitation, monitoring), can cause ground disturbance, erosion, and/or soil compaction, which decrease absorption of water and nutrients and damage plant root systems and may result in reduced growth and/or mortality of listed plants. Soil disturbance or removal has the potential to negatively impact the soil seed bank of listed plant species if such species are present or historically occurred in the project area.

In order to avoid or minimize potential adverse effects to listed plants that may occur on the proposed project site, we recommend minimizing disturbance outside of existing developed or otherwise modified areas. When disturbance outside existing developed or modified sites is proposed, conduct a botanical survey for listed plant species within the project action area, defined as the area where direct and indirect effects are likely to occur. Surveys should be conducted by a knowledgeable botanist with documented experience in identifying native Hawaiian and Pacific Islands plants, including listed plant species. Botanical surveys should optimally be conducted during the wettest part of the year (typically October to April) when plants and identifying features are more likely to be visible, especially in drier areas. If surveys are conducted outside of the wet season, the Service may assume plant presence.

The boundary of the area occupied by listed plants should be marked with flagging by the surveyor. To avoid or minimize potential adverse effects to listed plants, we recommend adherence to buffer distances for the activities in the **Table below**. Where disturbed areas do not need to be maintained as an open area, restore disturbed areas using native plants as appropriate for the location. Whenever possible we recommend using native plants for landscaping purposes. The following websites are good resources to use when choosing landscaping plants: Landscape Industry Council of Hawai‘i Native Plant Poster (https://hawaiiscape.com/Publications), Native Hawaiian Plants for Landscaping, Conservation, and Reforestation (https://www.ctahr.hawaii.edu/oc/freepubs/pdf/of-30.pdf), and Best Native Plants for Landscapes (https://www.ctahr.hawaii.edu/oc/freepubs/pdf/OF-40.pdf).

If listed plants occur in a project area, the avoidance buffers are recommended to reduce direct and indirect impacts to listed plants from project activities. However, where project activities will occur within the recommended buffer distances, additional consultation is required. The impacts to the plants of concern within the buffer area may be reduced by placing temporary fencing or other barriers at the boundary of the disturbance, as far from the affected plants as practicable.

The above guidelines apply to areas outside of designated critical habitat. If project activities occur within designated critical habitat unit boundaries, additional consultation is required.

All activities, including site surveys, risk introducing nonnative species into project areas. Specific attention needs to be made to ensure that all equipment, personnel, and supplies are properly checked and are free of contamination (weed seeds, organic matter, or other contaminants) before entering project areas. Quarantines and or management activities occurring on specific priority invasive species proximal to project areas need to be considered or adequately addressed. This information can be acquired by contacting local experts such as those on local invasive species committees (Kauaʻi: https://www.kauaiisc.org/; Oʻahu: https://www.oahuisc.org/; Maui Nui: https://mauiinvasive.org/; and Hawaiʻi: https://www.biisc.org/

Table 1. Recommended buffer distances to minimize and avoid potential adverse impacts to listed plants from activities listed below.

Action	**Buffer Distance (feet (meters)) – Keep Project Activity This Far Away from Listed Plant**	
	Grasses/Herbs/Shrubs and Terrestrial Orchids	**Trees and Arboreal Orchids**
Walking, hiking, surveys	3 ft (1 m)	3 ft (1 m)
Cutting and Removing Vegetation By Hand or Hand Tools (e.g., weeding)	3 ft (1 m)	3 ft (1 m)
Mechanical Removal of Individual Plants or Woody Vegetation (e.g., chainsaw, weed eater)	3 ft up to height of removed vegetation (whichever greater)	3 ft up to height of removed vegetation (whichever greater)
Removal of Vegetation with Heavy Equipment (e.g., bulldozer, tractor, "bush hog")	2x width equipment + height of vegetation	820 ft (250 m)

Action		Buffer Distance (feet (meters)) – Keep Project Activity This Far Away from Listed Plant	
		Grasses/Herbs/Shrubs and Terrestrial Orchids	**Trees and Arboreal Orchids**
Use of Approved Herbicides (following label)	**Ground-based Spray Application; hand application (no wand applicator; spot treatment)**	10 ft (3 m)	Crown diameter
	Ground-based Spray Application; manual pump with wand, backpack	50 ft (15 m)	Crown diameter
	Ground-based Spray Application; vehicle-mounted tank sprayer	50 ft (15 m)	Crown diameter
	Aerial Spray (ball applicator)	250 ft (76 m)	250 ft (76 m)
	Aerial Application – herbicide ballistic technology (individual plant treatment)	100 ft (30 m)	Crown diameter
	Aerial Spray (boom)	Further consultation required	Further consultation required
Use of Insecticides (pollinators, seed dispersers)		Further consultation required	Further consultation required
Ground/Soil Disturbance/Outplanting/Fencing (Hand tools, e.g., shovel, ʻōʻō; Small mechanized tools, e.g., auger)		20 ft (6 m)	2x crown diameter
Ground/Soil Disturbance (Heavy Equipment)		328 ft (100 m)	820 ft (250 m)
Surface Hardening/Soil compaction	**Trails (e.g., human, ungulates)**	20 ft (6 m)	2x crown diameter
	Roads/Utility Corridors, Buildings/Structures	328 ft (100 m)	820 ft (250 m)

Action	Buffer Distance (feet (meters)) – Keep Project Activity This Far Away from Listed Plant	
	Grasses/Herbs/Shrubs and Terrestrial Orchids	**Trees and Arboreal Orchids**
Prescribed Burns	Further consultation required	Further consultation required
Farming/Ranching/Silviculture	820 ft (250 m)	820 ft (250 m)

Definitions (Wagner *et al*. 1999)

Crown: The leafy top of a tree.
Herb: A plant, either annual, biennial, or perennial, with the non-woody stems dying back to the ground at the end of the growing season.
Shrub: A perennial woody plant with usually several to numerous primary stems arising from or relatively near the ground.
Tree: A woody perennial that usually has a single trunk

References Cited

USFWS. 2010. Endangered and threatened wildlife and plants; determination of endangered status for 48 species on Kauai and designation of critical habitat. Federal Register 75: 18960–19165.

. 2012. Endangered and threatened wildlife and plants; endangered status for 23 species on Oahu and designation of critical habitat for 124 species; final rule. Federal Register 77: 57648–57862.

. 2013a Endangered and threatened wildlife and plants; determination of endangered status for 38 species from Molokai, Lanai, and Maui. Federal Register 78: 32014–32065.

. 2013b. Endangered and threatened wildlife and plants; determination of endangered species status for 15 species on Hawaii Island. Federal Register 78: 64638–64690.

. 2016. Endangered and threatened wildlife and plants; determination of endangered status for 49 species from the Hawaiian Islands. Federal Register 81: 67786–67860.

. 2016. USFWS Rare plant database. Unpublished.

Wagner, W.L., Sohmer, S., and D.R. Herbst. 1999. Manual of the flowering plants of Hawaii, revised edition. Honolulu, Hawaii. University of Hawaii and Bishop Museum Press. 1,919 pp.

Scoping Comment Reproductions

State Agencies

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.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)25.004

JAN 21 2025

Kawika McKeague
Group 70 International, dba G70
111 S. King Street, Suite 170
Honolulu, HI 96813

Dear Kawika McKeague:

Subject: Second Environmental Impact Statement Preparation Notice
Sanford's Service Center, Leilani Quarry
Kauaea Ahupua'a, Puna District, Island of Hawaii
TMKs (3) 1-3-009:005

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,

GORDON S. WOOD
Public Works Administrator

DD:sn
c: DAGS Hawaii

From: DBEDT LUC <dbedt.luc.web@hawaii.gov>
Sent: Friday, February 7, 2025 4:03 PM
To: 224055-01 Puna Quarry EIS
Subject: Second Environmental Impact Statement Preparation Notice for Sanford's Service Center Comments: Land Use Commission
Attachments: A19-807 KSBE 2025-01-10 LUC Comments on EISPN (part 1) - signed.pdf

Aloha,

Please find the attached letter in response to request for comments on the Second Environmental Impact Statement Preparation Notice for Sanford's Service Center.

Mahalo,

State of Hawai'i, Land Use Commission
Mailing: PO Box 2359, Honolulu, HI 96804
Phone: 808 587-3823
Fax: 808 587-3827
Email: dbedt.luc.web@hawaii.gov
Website: http://luc.hawaii.gov/

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LAND USE COMMISSION

Komikina Ho'ohana 'Āina

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Ka 'Oihana Ho'omōhala Pā'oihana, 'Imi Wai wai a Ho'omāka'ika'i

235 S. Beretania Street, RM 406, Honolulu, Hawai'i 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawai'i 96804
Email Address: dbedt.luc.web@hawaii.gov

JOSH GREEN, M.D.
GOVERNOR

SYLVIA LUKE
LT. GOVERNOR

DANIEL ORODENKER
LUC EXECUTIVE OFFICER

Telephone: (808) 587-3822
Fax: (808) 587-3827
Website: luc.hawaii.gov

February 7, 2025

G70
111 S. King St.,
Suite 170 Honolulu, HI 96813
Kawika McKeague, AICP
Email: LeilaniQuarryProject@g70.design

SUBJECT: Second Environmental Impact Preparation Notice Comments
A19-807 KSBE Sanford Quarry
Kauaea Ahupua'a, Puna District, Island of Hawai'i TMK (3) 1-3-009:005

Dear Mr. McKeauge:

Thank you for providing the State of Hawai'i Land Use Commission ("LUC" or "Commission") with the Second Environmental Impact Preparation Notice ("EISPN") for Sanford's Service Center, Leilani Quarry Kauaea Ahupua'a, Puna District, Island of Hawai'i TMK (3) 1-3-009:005 (LUC Docket No. 19-807). LUC Staff has reviewed the EISPN and has the following questions and comments:

1.1 Project Description
Land Use Commission staff suggest including expected lifespan of mining operations within the Petition Area, as it would be beneficial during the Future District Boundary Amendment and Future Special Permit petitions. Additionally, please include any information on ancillary buildings required for mining operations.

3.0 Existing Conditions and Potential Impacts
In section 3.0 Existing Conditions and Potential Impacts, please include more information on the preexisting uses and structures within the Petition Area. As mentioned in section 1.0 Introduction, the Future District Boundary Amendment and Future Special Permit will provide improved land use conformance, which alludes to current use, and examining aerial imagery on figure maps it appears there is existing ground disturbance in the Petition Area.

Additionally, the EISPN mentions that the Petition Area is accessed by a private road that extends from Pahoa-Kalapana Road (State Route 130), crossing two privately-owned parcels. It should be noted that during the Special Permit proceedings the acreage if this road should be included, along with the other landowners' authorization and acknowledgement of inclusion.

Additional Map
Please provide an additional map that delineates and provides the acreage of the current area of use, and expansion area.

3.2 Hydrology and Water Resources
In section 3.2 Hydrology and Water Resources, the EISPN mentions that the mining and quarry activities do not require water, however, if there are any ancillary buildings, please include the information for water requirements.

3.3 Biological Resources
Section 3.2 Biological Resources and the various included studies indicate the Petition Area contains species listed as endangered, threatened, or proposed by the United States Fish and Wildlife Service and/or The Department of Land and Natural Resources. Land Use Commission Staff would like to note that in 2022, the Commission heard a Special Permit Petition for a similar land use, in an area with similar endangered/ threatened species, conditions were imposed in order to mitigate the potential impacts to the species. One of which was to protect ʻōhiʻa trees from Rapid ʻŌhiʻa Death adjacent to and on the subject property. An additional part of the condition was to make any ʻōhiʻa trees that are not infested but need to be removed, that the wood may be available for cultural use.

3.8 Historic and Cultural Resources
Land Use Commission Staff looks forward to the clearly labeled section in the Historic and Cultural Resource section that differentiates and articulates the Ka Paʻakai Analysis.

Place Name
In March 4, 2021, The Hawaiʻi Board on Geographic Names approved an official title for Fissure 8; Ahuʻailāʻau.

Should you have any questions, please contact our office at (808) 587-3822 or via email at dbedt.luc.web@hawaii.gov.

Sincerely,

Daniel Orodenker
Executive Officer
Land Use Commission
State of Hawaiʻi

From: Matsumoto, Emily M <Emily.M.Matsumoto@hawaii.gov>
Sent: Friday, January 17, 2025 10:01 AM
To: 224055-01 Puna Quarry EIS
Cc: Takara, Wayne J; Vegas, Johnna J; Matsumoto, Emily M
Subject: Second Environmental Impact Statement Preparation Notice
Attachments: 2025-0074 G70 Req Info, Second EIS Prep Notice Sanford's Svc Ctr Lailani Quarry (part 2) - signed.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Per your letter dated January 6, 2025, attached is our comments.

If you or your staff have any questions, please contact Mr. Wayne Takara, Chief Planner, at 808-587-3463.

Emily Matsumoto
Department of Corrections and Rehabilitation (DCR)
Ka ʻOihana Hoʻomalu Kalaima a Hoʻoponopono Ola
Administrative Services Office
Phone: 808.587.1236
email: emily.m.matsumoto@hawaii.gov

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JOSH GREEN, M.D.
GOVERNOR
KE KIA'ĀINA

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF CORRECTIONS AND REHABILITATION
Ka 'Oihana Ho'omalu Kalaima a Ho'oponopono Ola
1177 Alakea Street
Honolulu, Hawai'i 96813

TOMMY JOHNSON
DIRECTOR

Melanie Martin
Deputy Director
Administration

Pamela J. Sturz
Deputy Director
Correctional Institutions

Sanna Muñoz
Deputy Director
Rehabilitation Services
and
Programs

No. 2025-0074

January 16, 2025

Group 70 International, Inc., dba G70
111 S. King Street, Suite 170
Honolulu, HI 96813
Attn: Kawika McKeague, AICP

Dear Mr. McKeague

Subject: Second Environmental Impact Statement Preparation Notice
Sanford's Service Center, Leilani Quarry, Kauaea Ahupua'a, Puna District, Island of Hawai'i; TMK (3) 1-3-009:005

In response to your letter dated January 6, 2025, we reviewed the EIS Preparation Notice for the Leilani Quarry in Kauaea Ahupua'a, Puna District, island of Hawai'i., and have no comments at this time.

If you or your staff have any questions, please contact Mr. Wayne Takara, Chief Planner, at 808-587-3463.

Sincerely,

Tommy Johnson
Director

From: Nakamura, Darlene K <darlene.k.nakamura@hawaii.gov>
Sent: Thursday, February 6, 2025 12:53 PM
To: 224055-01 Puna Quarry EIS
Subject: Request for Comments - Second EISPN re Sanford's Service Center Leilani Quarry - Puna District, Hawaii
Attachments: Sanford's Service Center Leilani Quarry 2nd EISPN.signed.pdf; Sanford's Service Center Leilani Quarry 2nd EISPN.ENGR Comments.pdf; Sanford's Service Center Leilani Quarry 2nd EISPN.HDLO Comments.pdf

Aloha Kawika,

Attached are comments from the Hawaii Department of Land and Natural Resources ("DLNR") to the above-entitled subject project.

Please note that future requests for the DLNR's review and comments may be emailed to both of the following email addresses:

dlnr@hawaii.gov and dlnr.land@hawaii.gov

Mahalo,
Darlene

****

State of Hawaii
Department of Land and Natural Resources
Land Division
1151 Punchbowl Street, Room 220
Honolulu, Hawaii 96813
Main Line: (808) 587-0419
Fax No. (808) 312-6357
Website: https://dlnr.hawaii.gov/

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

February 6, 2025

Group 70 International, Inc., dba G70
Attn: Mr. Mark Kawika McKeague, Principal via email: LeilaniQuarryProject@g70.design
111 S. King Street, Suite 170
Honolulu, Hawaii 96813-4307

SUBJECT: Second EISPN re **Sanford's Service Center Leilani Quarry** located at Kauaea Ahupua'a, Puna District, Island of Hawaii; TMK: (3) 1-3-009:005 on behalf of Kamehameha Schools

Dear Mr. McKeague:

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

January 8, 2025

MEMORANDUM

FROM: ~~TO:~~ **DLNR Agencies:**
___Div. of Aquatic Resources
___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 (candace m. martin@hawaii.gov)
_X_ Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

TO: ~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Second EISPN re **Sanford's Service Center Leilani Quarry**
LOCATION: Kauaea Ahupua'a, Puna District, Island of Hawaii; TMK: (3) 1-3-009:005
APPLICANT: Group 70 International, Inc. dba G70 on behalf of Kamehameha Schools

Transmitted for your review and comment is information on the above-referenced subject matter. The Second EISPN was published on January 8, 2025, 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:

https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2025-01-08-TEN.pdf

Please submit any comments by **February 6, 2025**. 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: *[signature]*
Print Name: Dina U. Lau, Acting Chief Engineer
Division: Engineering Division
Date: Feb 4, 2025

Attachments
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

January 8, 2025

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___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 (candace m. martin@hawaii.gov)
_X_Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Second EISPN re **Sanford's Service Center Leilani Quarry**
LOCATION: Kauaea Ahupua'a, Puna District, Island of Hawaii; TMK: (3) 1-3-009:005
APPLICANT: Group 70 International, Inc. dba G70 on behalf of Kamehameha Schools

Transmitted for your review and comment is information on the above-referenced subject matter. The Second EISPN was published on January 8, 2025, 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:

https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2025-01-08-TEN.pdf

Please submit any comments by **February 6, 2025**. 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.
(X) We have no comments.
( ) We have no additional comments.
( ) Comments are included/attached.

Signed: _____
Print Name: CANDACE MARTIN
Division: LAND
Date: 1/30/2025

Attachments
cc: Central Files

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

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

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RYAN K.P. KANAKA'OLE
FIRST DEPUTY

CIARA W.K. KAHAHANE
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

REF: OCCL: KS

COR: HA 25-121

MEMORANDUM

Jan 31, 2025

TO: Group 70 International, Inc.

THROUGH: Russell Y. Tsuji, Land Administrator
Land Division, DLNR

FROM: Michael Cain, Administrator S Michael Cain
Office of Conservation and Coastal Lands, DLNR

SUBJECT: Second Environmental Impact Statement Preparation Notice (EISPN)
for Sanford's Service Center Leilani Quarry
Located at 15-2628 Keaau-Pahoa Road
Por. Keahiala & Kauaea, Puna, Island of Hawaii
Tax Map Key (TMK): (3) 1-3-009:005

The Office of Conservation and Coastal Lands (OCCL) has received Land Division's memo regarding the second EISPN regarding Sanford's Service Center Leilani Quarry. According the to information provided, Sanford's Service Center, in coordination with Kamehameha Schools, is preparing an Environmental Impact Statement (EIS) for the Leilani Quarry and is petitioning the State of Hawaii Land Use Commission (LUC) to pull 94.107-acres of the 694.5-acre parcel from the Limited Subzone of the State Land Use Conservation District to the State Land Use Agricultural District. See **Exhibit 1**.

Sanford's Service Center, at Leilani Quarry, produces a low-density type of black-colored cinder that is highly valued by the local horticultural and nursery industry. The proposed action will allow the expansion of cinder mining and quarrying activities within approximately 73 acres of the petition area, subject to the granting of a Special Permit by the LUC. See **Exhibit 2**.

According to our records, the Board of Land and Natural Resources (Board) approved Conservation District Use Permit (CDUP) HA-1957 on February 27, 1987, for an initial 15-acres of commercial cinder removal (Increment I) and approximately 1000-ft (length) road subject to sixteen conditions. On January 26, 1990, the Board approved an amendment to CDUP HA-1957 to expand the existing commercial cinder removal another 15-acres (Increment II), for a total of 30-acres, subject to 21 conditions. On April 4, 2008, the Chairperson approved the continuation to mine cinder and cinder soil.

The OCCL submitted comments on August 20, 2019, for the initial EISPN published on July 23, 2019, that are still valid. See **Exhibit 3**.

The permits previously approved were issued under a previous version of the rules and can be considered "non-conforming". A new or expanded quarry does not appear to be an identified land use under the current Hawaii Administrative Rules (HAR) 13-5.

HAR § 13-5 states that the objective of the Limited Subzone is *to limit uses where natural conditions suggest constraint on human activities.*

The OCCL would like to see the draft EIS document explain why the applicant feels this purpose is no longer applicable.

Should there be any questions regarding this memorandum, please contact Kariann Stark of our Office of Conservation and Coastal Lands at (808) 587-0380.

C: HDLO
DOFAW
LUC
County of Hawaii-Planning

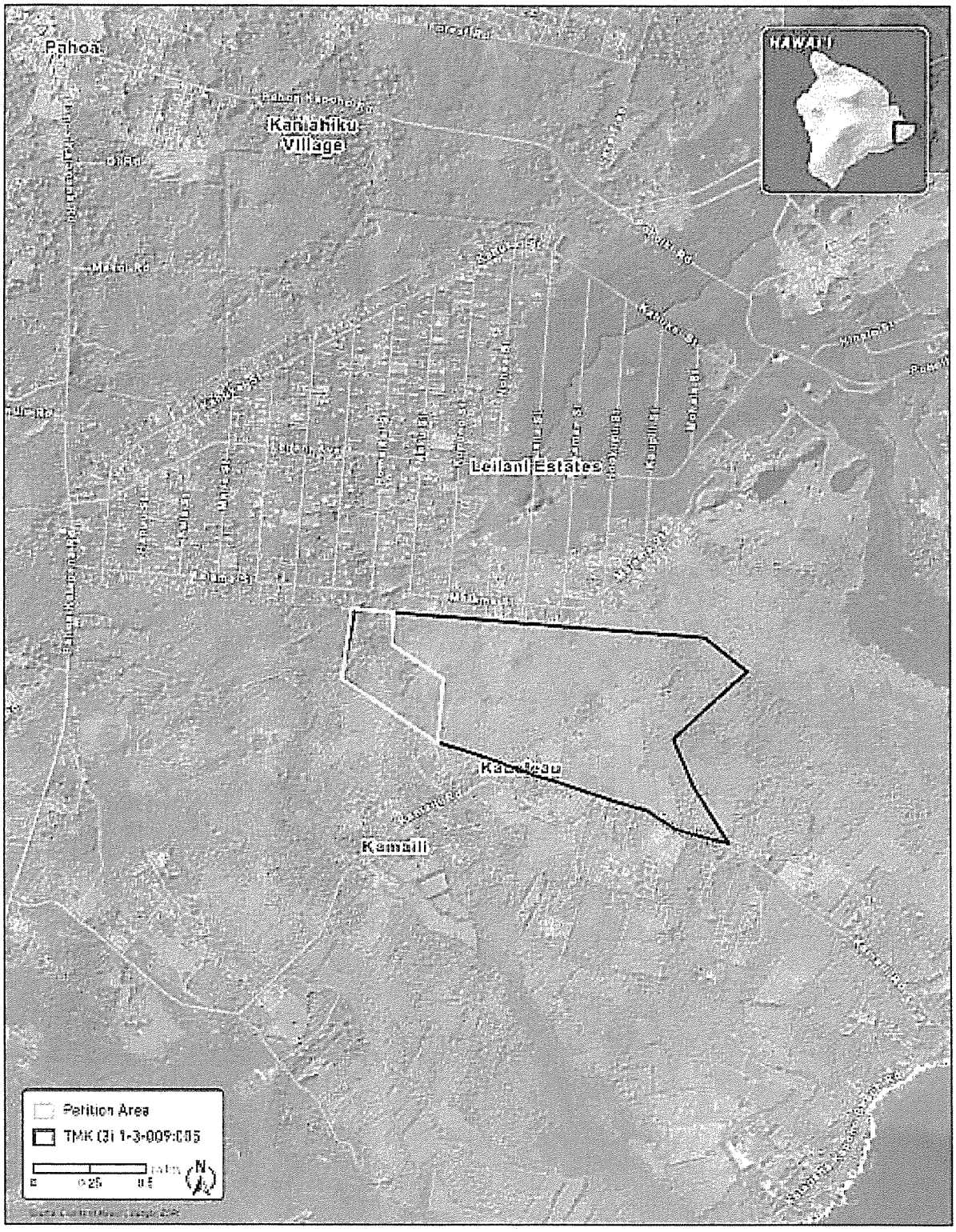

Pahoa
Kaniahiku Village
Leilani Estates
Kamaili
HAWAII
Petition Area
TMK (3) 1-3-009:005

Exhibit 1


License Area (73.075 acres)
Buffer Area (21.033 acres)
Petition Area
TMK (3) 1-3-009:005
Other Parcels
0
250
500
Feet
N

Exhibit 2

DAVID Y. IGE
GOVERNOR OF
HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:TM Correspondence: HA 20-22

MEMORANDUM

AUG 2 0 2019

To: Russ Tsuji, Administrator
Land Division

From: Sam Lemmo, Administrator
Office of Conservation and Coastal Lands

SUBJECT: Environmental Impact Statement Preparation Notice to Amend State Land Use District Boundaries from the Conservation State Land Use District to the Agricultural State Land Use District Located at Kauaca, Puna, Hawai'i, TMK: (3) 1-3-009:005

The Office of Conservation and Coastal Lands has reviewed the subject matter. According to the information presented Sanford's Service Center, Inc., in coordination with the property owner, the Kamehameha Schools is seeking to amend approximately 94-acres of a 694.5-acre parcel from the State Land Use Conservation District, Limited subzone to the State Land Use Agricultural District.

There appears to be incorrect statements pertaining to authorizations granted within the Conservation District. On **February 27, 1987** The Board of Land and Natural Resources (Board) approved Conservation District Use Permit (CDUP) HA-1957 for an initial 15-acres of Commercial Cinder Removal [Increment I] and an approximately 1000-ft (length) road subject to sixteen terms and conditions. On January 26, 1990, the Board approved an amendment to CDUP HA-1957 to expand the existing Commercial Cinder Removal another 15-acres [Increment II] subject to 21 terms and conditions. On April 4, 2008, the **Chairperson** approved the continuation to mine cinder and cinder soil from Increment I and II subject to CDUP HA-1957; CDUP HA-1957A; and 13 terms and conditions.

As the subject area lies within the Conservation District, we have attached each permit and request that compliance with the conditions of the permits be addressed in the draft EIS.

The OCCL notes that the USGS triangulation station and the summit of Pu'u Kali'u will not be 'jeopardized' and that this will be presented in the draft EIS and discussed in the Cultural Impact Assessment in further detail. The OCCL also notes the summit of Pu'u Kali'u may be suitable nesting habitat for the endangered/threatened 'Ua'u, 'A'o, and Band-rumped Storm-Petrel.

Exhibit 3

In addition, Hawaiian fauna [Ope'ape'a, I'o, Hawai'i Amakihi, Apapane] and several types of endemic, indigenous and native flora in the area will also be discussed in the draft EIS. The OCCL further notes, the rejuvenation of native plants of the area after the lava eruption should also be discussed in the draft EIS.

Due to the presence of 'Ohia, the OCCL requests that Rapid Ohia Death be discussed. As the subject vicinity appears to be the initial location and ground zero for the disease, what mitigation is in place to insure the distribution of the mined cinders does not spread the ROD disease?

The OCCL would like to review the draft EIS document upon completion. Should there be any questions regarding this memorandum, contact Tiger Mills of our Office at (808) 587-0382.

C: HDLO/DOFAW
LUC
County of Hawai'i
-Planning

Exhibit 3

From: DOH.CABPASS <DOH.CABPASS@doh.hawaii.gov>
Sent: Friday, February 7, 2025 3:23 PM
To: 224055-01 Puna Quarry EIS
Cc: Orodenker@hawaii.gov
Subject: CAB Comments: Sanford's Service Center Leilani Quarry project

To Mark Kawika McKeague,
Group 70 International Inc.,

Thank you for allowing us to review the Sanford's Service Center Leilani Quarry project published in the January 8th edition of TENs. Please go to the Clean Air Branch (CAB) website to download and utilize our Standard Comments for Land Use Reviews. The link is included below.

Clean Air Branch | Standard Comments for Land Use Reviews

Thank you,

Katt Marshall
Planner I | Clean Air Branch | Planning & Administrative Support Staff (PASS)
Hawai'i State Department of Health | Ka 'Oihana Olakino
2827 Waimano Home Road #139 | Pearl City, Hawaii 96782
Office: (808) 586-4200

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Standard Comments for Land Use Reviews
Clean Air Branch
Hawaii State Department of Health
July 3, 2024

All project activities shall comply with Hawaii Administrative Rules (HAR), Chapter 11-59 and 11-60.1.

If your proposed project:

Requires an Air Pollution Control Permit

- You must obtain an air pollution control permit from the Clean Air Branch and comply with all applicable conditions and requirements. If you do not know if you need an air pollution control permit, please contact the Permitting Section of the Clean Air Branch.
- Permit application forms can be found here: https://health.hawaii.gov/cab/permit-application- forms/

Has the potential to generate fugitive dust

- You must reasonably control the generation of all airborne, visible fugitive dust. Note that construction 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, visible fugitive dust. The plan, which does *not* require Department of Health approval, should help you recognize and minimize potential airborne, visible fugitive dust problems.
- Construction activities must comply with the provisions of Hawaii Administrative Rules, §11- 60.1-33 on Fugitive Dust. In addition, for cases involving mixed land use, it is strongly recommended that buffer zones be established, wherever possible, in order to alleviate potential dust concerns.
- You must provide reasonable measures to control airborne, visible fugitive dust from the road areas and during the various phases of construction. These measures include, but are not limited to, the following:
    - Planning the different phases of construction, focusing on minimizing the amount of airborne, visible fugitive dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact;
    - Providing an adequate water source at the site prior to start-up of construction activities;
    - Landscaping and providing rapid covering of bare areas, including slopes, starting from the initial grading phase;
    - Minimizing airborne, visible fugitive dust from shoulders and access roads;
    - Providing reasonable dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and
    - Controlling airborne, visible fugitive dust from debris being hauled away from the project site.
- If you have questions about fugitive dust, please contact the Enforcement Section of the Clean Air Branch. Please also see fugitive dust fact sheet at: https://health.hawaii.gov/cab/files/2024/02/Hawaii-Fugitive-Dust-Fact-Sheet-February-2024.pdf.

Includes construction, demolition, or renovation activities that involve potential asbestos and lead containing materials

- Please contact the Indoor and Radiological Health Branch at (808) 586-4700 or visit: https://health.hawaii.gov/irhb/

Increases the population and potential number of vehicles in an area

- The creation of apartment buildings, complexes, and residential communities may increase the overall population in an area. Increasing the population in an area may inadvertently lead to more air pollution via vehicle exhaust. Vehicle exhaust releases pollutants in the air that can negatively impact human health and air quality, including lung irritants, carcinogens, and greenhouse gases.
- Ensure that drivers keep vehicle idling times to three (3) minutes or less.
- Consider and incorporate support for alternative transportation options such as bike racks and/or electric vehicle charging stations where possible.

If you have any questions, please contact the Clean Air Branch at (808) 586-4200 or at cab@doh.hawaii.gov.

From: Lee, Jenny S <jenny.s.lee@hawaii.gov>
Sent: Friday, February 28, 2025 9:37 AM
To: 224055-01 Puna Quarry EIS
Cc: Thirugnanam, Jeyan
Subject: Sandford Services 2nd EISPN Letter of comment from HDOT
Attachments: DIR0001252 HWY-PL 25-2.35010 Sandfords Service 2025-002 (part 1) - signed.pdf

Hello,

FYI. Our Feb 4th letter of comment is provided for your review and records (see the attached PDF).

(Our reference case no is DIR0001438 and DIR0001252)

Mahalo.

Jenny Lee
Planner
Highways Division
State Department of Transportation
Tel: 587-1842

JOSH GREEN, M.D.
GOVERNOR
KE KIA'ĀINA

EDWIN H. SNIFFEN
DIRECTOR
KA LUNA HO'OKELE

Deputy Directors
Nā Hope Luna Ho'okele
DREANALEE K. KALILI
TAMMY L. LEE
CURT T. OTAGURO
ROBIN K. SHISHIDO

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF TRANSPORTATION | KA 'OIHANA ALAKAU
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

DIR0001252
HWY-PL 25-2.35010

February 4, 2025

Mr. Mark Kawika McKeague, AICP
Principal
Group 70 International, Inc., dba G70
111 South King Street, Suite 170
Honolulu, Hawaii 96813

Dear Mr. McKeague:

Subject: Second Environmental Impact Statement Preparation Notice (EISPN)
Sandford's Service Center Leilani Quarry
Kauaea, Puna, Hawaii
Tax Map Key No. (3) 1-3-009: 005

Thank you for your letter, dated January 6, 2025, requesting our comments on the second EISPN. We understand that the reason for the new filing of the EISPN was due to the prior 2019 Draft Environmental Impact Statement (EIS), which was withdrawn from being published.

The applicant proposes to amend the State Land Use District designation from Conservation to Agricultural for a 94-acre site. A 30-acre portion of the site is presently being used for mining and quarry activities under a nonconforming Conservation District Use Permit. The proposed operation would also require a Special Use Permit to allow an expansion that includes an additional 73 acres. We have reviewed the submitted application and provided our comments in the attachment.

If you have any questions, please contact Jeyan Thirugnanam, Land Use Planning Engineer, Planning Branch at (808) 587-6336 or by email at jeyan.thirugnanam@hawaii.gov. Please reference file review number PL 2025-002.

Sincerely,

EDWIN H. SNIFFEN
Director of Transportation

Attachment

ATTACHMENT The Hawaii Department of Transportation Comments DIR0001252	
No.	**Comment**
1.	We have no objections to the proposed land use action.
2.	The subject parcel is located east of Pahoa Kalapana Road (State Route 130) and adjacent to the Leilani Estates subdivision lots, which are located north of the project.
3.	Based on the information provided, the Draft EIS should provide adequate discussion to include the following: a. Jurisdiction of roadways in the vicinity. b. Location of existing and proposed site access points. c. Daily operation and trip patterns. d. Assessment of the project's potential secondary and cumulative impact to state highways.
3.	Describe strategies to reduce carbon emissions from the project, if any. Suggestions include: a. Incorporate elements that encourage and enhance the use of multiple types of transportation to reduce carbon emissions. b. Implement energy-efficient technologies and practices, such as light-emitting diode lighting. c. Use sustainable, recycled, or low-emission materials in construction and manufacturing.

From: Soo, Brandon A <brandon.a.soo@hawaii.gov>
Sent: Monday, February 3, 2025 4:07 PM
To: 224055-01 Puna Quarry EIS
Cc: Edwards, Ruby M; Nakayama, Megumi
Subject: Leilani Quarry 2nd EISPN OPSD Comments
Attachments: BS 1237NA Leilani Quarry_OPSD Comment 2nd EISPN - signed.pdf

Aloha,

Please see OPSD's comment letter on the subject EISPN.

Thank you,
Brandon

--
Brandon Soo
Planner, Land Use Division
(808) 587-2888

OPSD website | geospatial data portal | subscribe to OPSD newsletter

STATE OF HAWAI'I
OFFICE OF PLANNING & SUSTAINABLE DEVELOPMENT
Leiopapa A Kamehameha
235 South Beretania Street, 6th Floor · Honolulu, Hawai'i · 96813
PO Box 2359 · Honolulu, Hawai'i · 96804-2359
Phone (808) 587-2846 · Fax (808) 587-2824

STATE OF HAWAI'I
OFFICE OF PLANNING
& SUSTAINABLE DEVELOPMENT

JOSH GREEN, M.D.
GOVERNOR

SYLVIA LUKE
LT. GOVERNOR

MARY ALICE EVANS
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 202501081237NA
Transmitted via email

February 3, 2025

Mr. Mark Kawika McKeague
Group 70 International, Inc., dba G70
111 South King Street, Suite 170
Honolulu, Hawai'i 96813

Dear Mr. McKeague:

Subject: Second Environmental Impact Statement Preparation Notice
Sanford's Service Center, Leilani Quarry
15-2628 Keaau-Pahoa Road
Kauaea Ahupua'a, Puna District, Island of Hawai'i
Tax Map Key: (3) 1-3-009: 005

The Office of Planning and Sustainable Development (OPSD) received your January 6, 2024, letter requesting comments in response to an Environmental Impact Statement Preparation Notice (EISPN).

Sanford's Service Center, Inc. (Applicant), in coordination with the property owner, Kamehameha Schools, is preparing an EIS to support a petition for a State Land Use District Boundary Amendment (DBA) to reclassify 94.107 acres (Petition Area) from the State Conservation District to the State Agricultural District, as required by Hawai'i Revised Statutes (HRS) § 343-5(a)(7). The proposed action is to allow the Applicant's existing black cinder mining and quarry activities to be expanded within the Petition Area. If the boundary amendment is approved by the State Land Use Commission (LUC), the Applicant will pursue an LUC State Special Permit for the cinder mining and quarrying operations.

The existing mining and quarrying uses are permitted and grandfathered through an existing Conservation District Use Permit in the Limited subzone. However, mining and quarrying are now only allowed in the Resource subzone of the Conservation District.

OPSD offers the following comments for the subject EISPN.

1. The Draft EIS should discuss why Alternative 2 was not selected as the Proposed Action. Alternative 2 involves submission of a Conservation District Use Application to the Board of Land and

Natural Resources (BLNR) to reclassify the Conservation District subzone for the Petition Area from Limited (L) to Resource (R). The Resource subzone allows mining and extraction of materials or natural resources with a management plan approved by BLNR in conjunction with a Conservation District Use Permit.

2. Please consult Hawai'i Administrative Rules, Title 15, Chapter 15, for information on application requirements and decision-making criteria for DBAs and special permits before the LUC. The Draft EIS should assess the environmental impacts of the project and recommend mitigation measures to address these impacts, including those cited in the LUC rules and decision-making criteria.

3. Please note that the functions of the former Office of Environmental Quality Control have been reassigned to the Environmental Review Program established in OPSD pursuant to Act 152, Session Laws of Hawai'i 2021.

4. Section 4.2.4 Coastal Zone Management states that the Draft EIS will address the proposed action's conformance with the relevant sections of HRS Chapter 205A. Please note the Hawai'i coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" under HRS §205A-1. Pursuant to HRS §205A-4, in implementing the objectives of the CZM program, agencies shall give full consideration to ecological, cultural, historic, esthetic, recreational, scenic, open space values, coastal hazards, as well as to needs for economic development. The Draft EIS should include an assessment with necessary mitigation measures as to how the proposed project conforms to the applicable CZM objectives and supporting policies set forth in HRS §205A-2, as amended.

5. Advancement of Sustainability Objectives in the *Hawai'i 2050 Sustainability Plan*. The Draft EIS should generally discuss the technologies and best practices and other mitigation measures for the project that would advance implementation of the Recommended Actions in the 2021-2030 Focus Areas on pages 100-107 of the *Hawai'i 2050 Sustainability Plan*.

Thank you for the opportunity to review this zone change application. If you have any questions, please contact Brandon Soo at brandon.a.soo@hawaii.gov. If you respond to this comment letter, please include DTS 202501081237NA in the subject line.

Mahalo,

Mary Alice Evans

Mary Alice Evans
Director

Scoping Comment Reproductions

County Agencies

C. Kimo Alameda, Ph.D.
Mayor

Benjamin T. Moszkowicz
Police Chief

Reed K. Mahuna
Deputy Police Chief

County of Hawai`i

POLICE DEPARTMENT

349 Kapi'olani Street • Hilo, Hawai'i 96720-3998
(808) 935-3311 • Fax (808) 961-2389

January 13, 2025

Mr. Mark Kawika McKeague, AICP
Group 70 International, Inc., dba G70
111 S. King Street, Suite 170
Honolulu, HI 96813
Email: LeilaniQuarryProject@g70.design

Dear Mr. McKeague:

SUBJECT: SECOND ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
SANFORD'S SERVICE CENTER, LEILANI QUARRY
KAUAEA AHUPUA'A, PUNA DISTRICT, ISLAND OF HAWAI'I
TMK (3) 1-3-009:005

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 Todd Pataray, Puna Patrol, at 965-2716 or via email at Todd.Pataray@hawaiicounty.gov.

Sincerely,

KENNETH A.K. QUIOCHO
ASSISTANT POLICE CHIEF

Irene Nichols-Ferguson

From: Aki, Tara <Tara.Aki@hawaiicounty.gov>
Sent: Friday, February 7, 2025 3:01 PM
To: 224055-01 Puna Quarry EIS
Cc: Campbell, Jean K; Dacayanan, Melissa; Kay, Christian
Subject: PD Letter In Response to request for comments (EISPN) PL-ENV-2025-000033 on TMK: 1-3-009:005
Attachments: PL-ENV-2025-000033 Comments for Second ENV Impact Statement Preparation Notice.pdf

Good afternoon Kawika McKeague,

Please see the attached Planning Department's response to request for comments on the Second Environmental Impact Statement Preparation Notice regarding the subject matter .

There will be no hardcopy to follow.

Should there be any questions, feel free to contact Planner Christian Kay at (808) 961-8136.

Thank you.

Tara Aki
TA-PC Support Tech.
County of Hawai'i | Planning Department
101 Pauahi Street, Suite 3 | Hilo, HI 96720
tara.aki@hawaiicounty.gov
808.961.8002

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C. Kimo Alameda, Ph.D.
Mayor

William V. Brilhante, Jr.
Managing Director

West Hawai'i Office
74-5044 Ane Keohokālole Hwy
Kailua-Kona, Hawai'i 96740
Phone (808) 323-4770
Fax (808) 327-3563

County of Hawai'i

PLANNING DEPARTMENT

Jeffrey W. Darrow
Director

Michelle S. Ahn
Deputy Director

East Hawai'i Office
101 Pauahi Street, Suite 3
Hilo, Hawai'i 96720
Phone (808) 961-8288
Fax (808) 961-8742

February 07, 2025

Kawika McKeague, AICP
Group 70 International, Inc., dba G70
111 South King Street, Suite 170
Honolulu, Hawai'i 96813
VIA EMAIL

Dear: Kawika McKeague:

SUBJECT: Comments for Second Environmental Impact Statement Preparation Notice Sanford's Service Center, Leilani Quarry, State Land Use District Boundary Amendment (PL-ENV-2025-000033)
Tax Map Key: (3) 1-3-009:005 (por.), Keahiala and Kauaea, Puna, Hawai'i

This is in response to a request for comments on the subject Second Environmental Impact Statement Preparation Notice (EISPN) prepared for the Sanford's Service Center, Leilani Quarry State Land Use District Boundary Amendment (SLUBA) from a Conservation to an Agricultural District.

1. Please provide a discussion on the reasons the subject property was designated within the State Land Use Conservation District and classified under the "Limited" subzone. Specifically, explain what characteristics, natural/cultural resources, or site conditions led to its inclusion in these land use designations.

2. Please provide a copy of the existing Conservation District Use Permit (CDUP-1957) and an aerial map overlaid with the extent of the existing permit area.

3. Please provide a status report on how the petitioner is currently complying with CDUP-1957 requirements & conditions.

4. Please provide information on the history of any complaints, violations, or enforcement actions against the petitioner for the duration of the quarry operation.

5. Please provide data on the current annual extraction volume of black cinder from the CDUP-1957 permit area. Additionally, estimate the remaining black cinder reserves within the existing permit area and the projected timeframe until depletion at the current extraction rate.

6. Please provide an estimate of the anticipated amount of black cinder material to be extracted annually from the proposed petition area should the SLUBA and Special Permit be granted.

7. Please provide detailed information on the proposed quarry expansion, including the estimated lifespan of the expanded quarry based on projected extraction rates. Specify the anticipated increase in daily truck trips, including haul routes, roadway deterioration, and traffic impact projections. Identify the number and types of new jobs expected to be created, including quarrying, trucking, and post-excavation (e.g., processing, packaging, and delivery). Additionally, provide a breakdown of estimated expansion costs, including equipment, infrastructure, and regulatory compliance expenses. Please also provide a phased timeline for the proposed expansion.

8. The EISPN emphasizes the State's recognition of black cinder as an essential resource for Hawai'i's horticulture and nursery industries, using local demand as a justification for the quarry expansion. Given this, please provide detailed data on the current volume of black cinder material exported out of the State of Hawai'i from the existing permit area and the anticipated volume of black cinder material to be exported from the proposed expansion site. Include annual export quantities, primary export destinations, and the percentage of total production allocated for out-of-state distribution.

9. Under the alternatives analysis, please provide a more detailed explanation of why the applicant is pursuing a SLUBA and the subsequent Special Permit process is the preferred approach over seeking a Conservation District Subzone reclassification to "Resource" and obtaining a Conservation District Use Permit (e.g. less stringent permitting process, fewer regulatory restrictions on quarrying operations and output, and the overarching conservation priorities that may override quarrying plans in a Conservation District, etc.)

10. The preparation of an Environmental Impact Statement (EIS) assumes that certain impacts cannot be avoided, mitigated, or reversed. Please identify and provide details on these impacts.

We look forward to reviewing the Draft EIS when it is available.

If you have any questions, please feel free to contact Christian Kay at 808-961-8136.

Sincerely,

Jeffrey W. Darrow
Jeffrey W. Darrow (Feb 7, 2025 14:21 HST)

JEFFREY W. DARROW
Planning Director

CK: ta
V:\PL\PL\planning\public\wpwin60\CH343\2025\Sandford's Service Center\LG70_McKeague_EISPNComments_Sandford's_Svc_Cntr_Quarry.doc

cc via email: Jean Campbell, Esq., Deputy Corporation Counsel

From: Quiamas, Gene <Gene.Quiamas@hawaiicounty.gov>
Sent: Wednesday, January 15, 2025 2:40 PM
To: 224055-01 Puna Quarry EIS
Cc: dem@hawaiicounty.gov; Dixon, Ryan
Subject: Sanford Service Center TMK1-3-009:005

Follow Up Flag: Follow up
Flag Status: Flagged

Subject: Second Environmental Impact Statement Preparation Notice
Sanford's Service Center, Leilani Quarry
Kauaea Ahupua'a, Puna District, Island of Hawai'i
TMK (3) 1-3-009:005

Aloha Kawika. Our comments are listed below.

Please check our website for the functions and responsibilities of the Solid Waste Division Solid Waste | Hawaii County, Hi Department of Environmental Management

Specific to solid waste disposal, pasted below are our standard comments.

- *Commercial operations, State and Federal agencies, religious entities and non-profit organizations may not use any of the 21 County Transfer Stations for disposal.*
- *The East Hawaii Regional Sort Station, also known as Hilo Reload Facility, is limited in capacity - refer to our Administrative Rules 2023.04.19.pdf. All large volume disposal must the taken directly to the West Hawaii Sanitary Landfill.*
- *Aggregates and any other construction/demolition waste should be responsibly reused to its fullest extent.*
- *Ample and equal room should be provided for rubbish and recycling.*
- *Green waste may be transported to the green waste sites located at the West Hawai'i Organics Facility and East Hawai'i Organics Facility, or other suitable diversion programs.*
- *Construction and demolition waste is prohibited at all County Transfer Stations*

Should you have any questions, please email me at Gene.Quiamas@hawaiicounty.gov and copy swd@hawaiicounty.gov

Gene Quiamas
Acting Deputy Chief
Solid Waste Division
Department of Environmental Management
County of Hawaii

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Scoping Comment Reproductions

Organizations and Businesses

From: Eric Tanouye <eric@greenpointnursery.com>
Sent: Monday, January 20, 2025 7:44 PM
To: 224055-01 Puna Quarry EIS
Subject: Leillani Quarry testimony
Attachments: HFNA Eric -Sanford-Impact-Studay-support.pdf

Aloha,

Please see a ached comments.

Mahalo

Eric

January 16, 2025

RE: Second Environmental Impact Statement Preparation Notice
Sanford's Service Center, Leilani Quarry

Aloha,

My name is Eric S. Tanouye and I am the President for the Hawaii Floriculture and Nursery Association (HFNA). HFNA is a statewide umbrella organization with approximately 350 members. Our membership is made up with breeders, hybridizers, propagators, growers, shippers, wholesalers, retailers, educators, and the allied industry, which supports our efforts in agriculture.

This letter is to show support for the expansion of cinder mining and quarrying activities, this will help to continue providing cinder media to our nurserymen and nurserywomen.. It is important for industry to have reliable access to cinder media, as it is used by a significant number of agriculture businesses and is required for the exporting of potted plants.

Without access to cinder, the growth of our Ornamental/Floriculture industry will be limited. We consider access to cinder as a growing media to be essential to our industry and without it we can not flourish.

Thank you for your consideration on this matter and we can be reached by phone at 808-959-3535 ext. 2627, cell 960-1433 and email eric@greenpointnursery.com if you have any questions.

Supporting Agriculture and Hawaii,

Eric S. Tanouye
President
Hawaii Floriculture and Nursery Association

January 22, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: Environmental Impact Statement Preparation Notice
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Aloha Mr. McKeague:

My name is Thong Teng Neo and am the current President of the Hawaii Tropical Flower Council (HTFC). HTFC is a statewide association of commodity organizations, ie: anthurium, orchid, protea, tropic flowers and foliages, blooming and foliage plants. The Hawai`i Tropical Flower Council directs promotion and supports research of Hawaii's tropical flower industry. Each of the state's major flower commodity groups (anthuriums, orchids, proteas, tropic flowers and foliages, blooming and foliage plants) is represented on the council's board of directors. HTFC serves as a non-profit Hawaii Corporation to promote for its commodity groups and other producers of tropical horticulture grown in the State of Hawaii.

Thank you for allowing us to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. We support the continued use of the Leilani Quarry and its ability to responsibly expand to continue operations. We believe it is important to our industry to be able to grow and produce our products and to do so, we need the cinder that is produced at the Leilani Quarry.

This cinder pit has allowed the industry to receive cinder media in a timely manner. The media has been clean of nematodes and has been a good quality to use for floriculture and ornamental use. This media is the only affordable option for media for floriculture and ornamental use locally and a lack of supply would do serious harm to our industry as there is no other equivalent option.

Thank you for taking the time to read this correspondence and if you have any questions, I can be reached at neo@greenpointnursery.com or 808 959 3535 ext 2615.

Mahalo,

Thong Teng Neo
President
Hawaii Tropical Flower Council

ORCHID GROWERS OF HAWAI'I

January 22, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Aloha Mr. McKeague:

My name is Jon Tanouye and I am the current President of the Orchid Growers of Hawaii (OGOH).

OGOH would like to give our **support** for the continued use of the Leilani Quarry.

Access to this media allows our growers to have access to clean, quality cinder that can be used to grow the orchids and floriculture for our industry. This media has become prevalent throughout our industry and I could not imagine our industry without it's use. Our growers and landscapers would not have a reliable or economical alternative and many would be forced to quit.

If you have any other questions you may contact me to discuss and I can be reached by phone at 808-959-3535 and email jon@greenpointnursery.com.

Sincerely,

Jonathan Tanouye
President
Orchid Growers of Hawaii (OGOH)

From: Dayle Tsuha <daylekt@hawaii.edu>
Sent: Saturday, February 1, 2025 9:10 AM
To: 224055-01 Puna Quarry EIS
Subject: Sanford's Service Center, Inc.
Attachments: Support of Sanford's Service Black Cinder.pdf

Hi Mr. McKeague,
I am attaching my letter of support for Sanford's Service Center Leilani Quarry.
Let me know if you have any questions.
Thank you!
Aloha,
Dayle Tsuha

January 26, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St., Suite 170
Honolulu, HI 96813

Environmental Impact Statement Preparation Notice

Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i

Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague,

Thank you for the opportunity to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. This letter represents Waiakea Research Station's support for the continued use of the Leilani Quarry and it's ability to responsibly expand to continue operations.

Sanford's Service Center has been an important contact for our station. They are a small, local business in Puna, employing local people, and contributing to the economy of Hawai'i Island. The black cinder is of great importance to our island's horticultural and nursery industry and for our station's research done with floriculture and crops.

UH CTAHR's Waiakea Research Station has been utilizing black cinder ordered from Sanford's Service Center for many years. We utilize the low density, black colored cinder as a stand alone media for our current anthurium research and a media mixture for our taro, sweet potato and ginger research in the past. We also utilize it in a media mixture to germinate crops which we grow to create seed to provide UH Manoa's ADSC (Agricultural Diagnostic Service Center) Seed Catalogue for purchase by farmers and back yard growers. We need to ensure access to the black cinder at all times as we are always taking on new projects that require planting seeds, tissue culture, seedlings or grown crops into progressively larger pots with the media either being pure cinder for anthuriums or a mixture for other crops.

The State has previously acknowledged the economic importance of black cinder to the various horticultural and nursery industry and Sanford's Service Center remains one of the few reliable sources of this. The continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry as well as for our research and projects done at Waiakea Research Station.

Sincerely,

Dayle K Tsuha

Dayle Tsuha
Research Associate Senior/ Farm Manager

From: Darsen Aoki <bigislandscreenedcinder@gmail.com>
Sent: Friday, January 31, 2025 11:50 AM
To: 224055-01 Puna Quarry EIS
Cc: sanscinc.kim@hawaiiantel.net
Subject: Leilani Quarry Project
Attachments: Leilani Quarry Project.docx

Dear Mr. Mckeague and to whom it may concern,

Please find my letter of testimony in support for the expansion of the Leilani quarry.

Mahalo,
Darsen Aoki

January 31, 2025

Mr. Mark Kawika McKeague

Group 70

111 S. King St, Suite 170

Honolulu, HI 96813

Subject: Environmental Impact Statement Preparation Notice

Sanford's Service Center Leilani Quarry

Puna, Hawai'i

Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

Thank you for the opportunity to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. This letter represents my support for the continued use of the Leilani Quarry and its ability to responsibly expand to continue operations.

My name is Darsen Aoki, owner of Big Island Screened Cinder, a one-man, small business owner since 2017. My clientele is mainly marketed toward Bonsai enthusiast located throughout the state of Hawaii. I have clientele on Kauai and Oahu and ship to them several times a year. Black cinder is a critical component in the cultivation of bonsai. Without it, we would need to find another material to use, which would be most likely be imported and cost prohibitive. While plentiful on Hawaii Island, black cinder is a scarce resource on the other main Hawaiian Islands. Sanford's fills that need for black cinder, as well as other natural resources found on Hawaii island. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of, not only my business, but the horticultural and nursery industry in the State of Hawaii.

Best wishes,

Darsen Aoki

January 27, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

I am writing this in support of Sanford's cinders request for their black cinder quarry expansion at their Leilani location. We have a topsoil & aggregate company in Kona (C&S Topsoil). We supply contractors, gardeners, homeowners, state and county agencies.

Black cinder is a major component of our topsoil blends that we produce. We supply a large volume to landscape contractors that rely on us to provide them a specialized topsoil blend preferred by landscape architects and horticulturalists.

Currently Sanford's can not supply the black cinder that we need to service our customers. This will affect the entire landscape and nursery industry island wide as Sanford's is the only source for black cinder. It's critical that this expansion is approved.

Thank you for the opportunity to submit this letter of support.

Sincerely,
Dody Underwood
Manager C&S Topsoil
P.O. Box 390501
Keauhou, HI 96739

January 27, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

I am writing this letter of support for the expansion of Sanford's Leilani black cinder quarry. I have a landscaping and nursery operation with over 100 employees. We have been utilizing black cinder from Leilani quarry for many years. Black cinder is a major component of the landscape architect specified soil that we use on our installation projects. For the year of 2025 we will need approximately 20,000 cu. yds. of soil for our projects so not having access to black cinder is a major concern.

Our nursery operation utilizes black cinder daily as it is the preferred media to incorporate with topsoil for the planting mix that we use.

As Sanford's is the only source for black cinder it is critical to expedite their request for quarry expansion so they can continue to supply the landscaping industry.

Thank you for the opportunity to express support for Sanford's Cinder request.

Sincerely,
Craig Chambers
Chambers Landscaping C-23211
P.O. Box 390512
Keauhou Hi. 96739
808-936-4542

Mr. Mark Kawika McKeague
Group 70
111 S. King St. Suite 170
Honolulu, HI 96813

Subject: Environmental Impact Statement Preparation Notice
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

My name is Enrique Martinez. I am the General Manager for California and Hawaii Foliage Growers. I am writing to support the continued use of the Leilani Quarry.

California and Hawaii Foliage Growers have been providing top quality foliage plants to the U.S. mainland for over 40 years. Hawaii provides the perfect conditions for growing certain tropical plants. These plants cannot be produced any where else in the country. One of the vital components is the black cinder. Although environmental conditions can be altered and controlled, the cinder cannot be replaced.

California and Hawaii Foliage Growers employ nearly 40 employees and generate sales from the U.S. mainland totaling millions. Sanford's Service Center is one of the few sources of black cinder. Some say cinder is cinder however, each source has different characteristics and plants grow differently from each source. Presently the cinder at the Leilani Quarry provides the highest quality plants. In order to contend with high shipping costs of our goods, the quality needs to be at an unmatchable level. Without this cinder the industry may not be able to survive.

I wish to thank you for this opportunity. Please consider the request to continue and expand the Leilani Quarry.

Sincerely,

Enrique Martinez

General Manager, California and Hawaii Foliage Growers

From: Fronte & Company <efronte@sonic.net>
Sent: Wednesday, February 5, 2025 6:18 PM
To: 224055-01 Puna Quarry EIS
Cc: jfronte@sonic.net; 'Kim Iwata'
Subject: Sanford's Service Center Leilani Quarry

East Hawaii Carpentry & Maintenance
P.O. Box 887
Kurtistown, Hawaii 96760

February 5, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King Street, Suite 170
Honolulu, Hawaii 96813

Re: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawaii
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

We have been a small family-owned business in Mountain View on the Big Island of Hawaii for over 25 years. We supply high quality bagged black cinder to a majority of the hardware stores across the entire island. We source our cinder from Sanford's Service Center. We depend on Sanford's continual production of this product. Black cinder makes up a large portion of our business revenue as it does for other businesses, from farmers to landscapers, as well as the general public. It is imperative that we support our local farmers who produce our food and employ our local families.

As a long-time Hawaii resident and business owner, we strive to support local business and hire local people. I believe it is imperative to grow our economy on the Big Island for us and future generations. We strongly ask you to consider allowing Sanford's Service Center to expand the Leilani Quarry for its most valuable black cinder in the responsible way it has operated the existing site.

We ask you to please consider this when making a most important decision.

Sincerely,

Jac Fronte

jfronte@sonic.net
cc: efronte@sonic.net

Office: 808-968-6386
Cell: 808-896-0669
Fax: 808-968-9898

This message and any attachments contain information which may be confidential and privileged. Unless you are the addressee (or authorized to receive for the addressee), you may not use, copy or disclose to anyone any information contained in this message or in any attachments. If you have received this message in error, please advise the sender and destroy this message and any attachments.

From: Eric Tanouye <eric@greenpointnursery.com>
Sent: Monday, January 20, 2025 7:44 PM
To: 224055-01 Puna Quarry EIS
Subject: Leillani Quarry testimony
Attachments: HFNA Eric -Sanford-Impact-Studay-support.pdf

Aloha,

Please see a ached comments.

Mahalo

Eric

Green Point Nurseries, Inc.
www.greenpointnursery.com

January 22, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

My name is Chris Tanouye of Green Point Nurseries. Green Point Nurseries is a third-generation agribusiness, a business that produces Hawaii's cut flowers and foliage and tropical blooming plants. Our products are distributed and exported locally, nationally, and internationally.

We would like to share our **STRONG SUPPORT** for the continued use of the Leilani Quarry cinder pit. It is important for floriculture growers to have access to a source of affordable and quality media to grow our plants with.

The Leilani Quarry provides access to black cinder that is an economical growing media for our anthurium and tropical plants. It also serves as an economical media for island landscapers. We do not have access to other media that could serve in this role, especially when taking into account the price of other media options.

This cinder allows us to grow tropical cut flowers and foliage that we export locally, nationally and internationally. As part of generation succession, I do have concerns on the future of our industry if we do not find and are provided more access to quality black cinder. This is a valuable resource that is unique to Hawaii and assists nurserymen and women to produce high quality Floriculture and ornamentals.

If you have any questions, please feel free to contact me at chris@greenpointnursery.com.

Mahalo Nui Loa,

Chris Tanouye
Sales Manager
Green Point Nurseries

From: Kim Iwata <sanscinc.kim@hawaiiantel.net>
Sent: Monday, January 27, 2025 3:08 PM
To: 224055-01 Puna Quarry EIS
Subject: FW: Sanford's letter
Attachments: Sanfords cinder letter 1-27-25.pdf

From: Ross Reyes <rossr@hawaiianearth.com>
Sent: Monday, January 27, 2025 2:57 PM
To: Kim Iwata <sanscinc.kim@hawaiiantel.net>
Subject: FW: Sanford's letter

Aloha Kim! This is for you. Hope we can help support you with this! Have a good rest of day!

Ross Reyes
Hawaiian Earth – Director of Sales and Transportation
65-1101 Wilikina Drive
PO Box 861601
Wahiawa, HI 96786

Cell: (808) 563-0205
Email: rossr@hawaiianearth.com

HAWAIIAN EARTH
RECYCLING LLC
65-1101 Wilikina Drive
PO Box 861601
Wahiawa, HI 96786

Wahiawa · Waimanalo · Campbell Industrial Park

January 27, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague,

We would like to submit this letter of **recommendation and support** of Sanford's cinder expansion in order to meet the State of Hawaii demand. Their request to expand and continue to serve business statewide and expand the Leilani Quarry ensures that the state will have a steady continued supply of this precious locally made resource.

Sanford's and Hawaiian Earth (Hawaii's largest recycling & composting facility) have been working together for decades. Sanford's service and cinder material have allowed us at Hawaiian Earth to provide our customers statewide with the very best soil products to undertake many development projects both past and present. We service customers on every island. Hawaiian Earth services developers, contractors, landscapers, nurseries, and every day residents. We truly believe that our locally produced black cinders are unique to Hawaii and stand behind the quality and great service performed by Sanford's.

The Hawaii Department of Agriculture also promotes "Buy Local" (see picture below from the HDOA) and it is vital that we support local businesses such as Sanford's.

The only option available to us beside black cinders would be to ***import*** both foreign or mainland pumice (volcano stones) or perlite (volcanic glass)- both of which are very expensive. The high cost of shipping these products in are not in Hawaii's best interest. These are the reasons why it is important to "Buy Local" and keep monies in the state and reward our local businesses who work tirelessly to support not only the Big Island, but the entire state. The State has previously acknowledged the economic significance of black cinder to the horticultural and nursery industries. Sanford's Service Center remains the only reliable sources of this essential resource, as they have invested in equipment, trucks, loaders, screeners and more importantly, the local employees. Therefore, the continued use and expansion of Leilani Quarry is vital to

ensure the viability and sustainability of the horticultural and nursery industries. This will contribute to the economic growth of both Hawai‘i Island and the entire State. We, at Hawaiian Earth appreciate the opportunity to support local business in Hawaii!

Thank you for considering this important matter. We strongly urge your support and to expedite the process for this much needed expansion of the Leilani Quarry black cinder pit.



Marvin Min
Senior Vice President, Hawaii Division
Hawaiian Earth
65-1101 Wilikina Drive
PO Box 861601
Wahiawa, HI 96786

Cell: (808) 426-6652
Email: marvin.min@hawaiianearth.com

From: Vance Peter <admin@hawaiiislandcinder.com>
Sent: Tuesday, January 28, 2025 11:34 AM
To: 224055-01 Puna Quarry EIS
Subject: Hawaii Island Cinder LLC Support Letter
Attachments: Hawaii Island Cinder LLC.pdf

Aloha,

Attached you will find a support letter for Sanford's Service Center Leilani Quarry. My company imports cinder to Oahu from Sanford's since 2008 to support various nurseries and landscapers on Oahu.

Mahalo,
Vance Peter
Hawaii Island Cinder LLC
P O Box 2245
Ewa Beach HI 96706
(808) 256-2679

January 28, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

Thank you for the opportunity to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. This letter represents our support for the continued use of the Leilani Quarry and its ability to responsibly expand to continue operations.

Sanford's Service Center is a small, local business within the growing community and economy of Puna, employing local people and supporting local, working families. The cinder produced at the Leilani Quarry is a low-density, black-colored cinder highly valued by the nursery industry. Sanford's Service Center provides reliable access to this specific cinder media to local nurseries, of which there are 80 on Hawai'i Island. Aside from the direct employment of Puna residents, the black cinder produced by the Leilani Quarry supports local businesses and the economy of East Hawai'i.

The State has previously acknowledged the economic importance of black cinder to the horticultural and nursery industry. Sanford's Service Center remains one of the few reliable sources of this important resource. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry, further contributing to the economic progress of not only Hawai'i Island, but the entire State.

Sincerely,

Vance Peter
Hawaii Island Cinder LLC
P.O. Box 2245 Ewa Beach, Hi 96706
808-256-2679

From: Island Landscaping & Maintenance <ilm@islandscapinc.com>
Sent: Monday, January 27, 2025 8:38 AM
To: 224055-01 Puna Quarry EIS
Cc: Kim Iwata
Subject: Re: Sanford's-request for support
Attachments: Sanford Service Center- ILM.pdf

Good Morning,

Please see attached letter of support.

Thank you,

Miles Yoneshige
Island Landscaping & Maintenance, Inc.
94-1388 Moaniani Street #301
Waipahu, HI 96797
Phone: (808) 349-1434
Fax: (808) 671-3082

From: Kim Iwata <sanscinc.kim@hawaiiantel.net>
Sent: Wednesday, January 22, 2025 10:13 AM
To: islandlandscaping@hawaiiantel.net <islandlandscaping@hawaiiantel.net>
Subject: Sanford's-request for support

Hi Miles! Please see attached. Anything you can do is appreciated! Thank you.

Kimberly Iwata
Office Manager
Sanford's Service Center, Inc.
P: 808.965.8144
F: 808.965.9447

Island Landscaping & Maintenance, Inc
94-1388 Moaniani Street, #301
Waipahu, Hawaii 96797
(808) 677-0906
(808) 677-3489 facsimile

January 24, 2025

ATTN: Mr. Mark Kawika McKeague
Group 70
111 S. King Street, Suite 170
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement Preparation Notice
Sanford's Service Center Leilani Quarry

Dear Mr. Mark Kawika McKeague,

This letter represents our continued support for Sanford's Service Center Leilani Quarry and its production of cinder which we use for creating a lightweight media for raised planters on roof top gardens and inorganic mulch for groundcover minimizing chemical weed control.

Our nursery incorporates cinder in propagation media to allow for aeration which plants require for root development and growth, especially for the expanding native plant market.

Sanford's Service Center has been a reliable source for a cost-effective resource vital to sustaining and expanding plant production as well as the high-rise landscaping projects for where alternative products needs to be outsourced from Hawaii which is not cost effective.

We will continue as a customer and need Sanford's Service Center to provide the resource for an expanding market for which its product is essential

Sincerely,

Patrick G. Kuniyoshi, President
Island Landscaping & Maintenance, Inc.

M. Nakamura Nursery, LLC
1382 Puuale Place
Hilo, Hawaii 96720
(808) 959-2065

February 5, 2025

Mr. Mark Kawika Mckeague
Group 70
111 S. King St., Suite 170
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement Preparation Notice
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawaii
Tax Map Key (3) 1-3-009-005

Dear Mr. McKeague,

Thank you for the opportunity to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry.

My name is Ray Nakamura and I am the owner/operator of M. Nakamura Nursery, LLC. located in Panaewa on the Big Island of Hawaii. We are a "certified" nursery that ships potted plants to California. I have been in the nursery industry for 40 years.

Our entire nursery industry, about 80 on the Big Island alone, relies heavily on the availability of the quality and quantity of low-density, black colored cinders from the Leilani quarry, which Sanford's Service Center has been providing us reliably for many years.

When shipping to California a nursery must meet stringent requirements to become certified to ship to California. One of the approved media we are allowed to grow our potted plants in consists of the type of black cinder Sanford's Service Center has been providing us.

Sanford's is a small, local business that has been employing many local people and supporting local, working families. They are a business that cares about the community and the industry they serve. In the past, the nursery encountered a crisis that had the potential to shut down all potted plant export nursery shipments into California. This was due to reniform nematodes detected in several shipments of potted plants that were inspected in California. It was determined to originate from the black cinders used in the potting mix. Fortunately, along with the State of Hawaii Department of Agriculture, and working closely with Dr. Arnold Hara (University of Hawaii and State Entomologist) and his research team, Stanford's developed and implemented a steam treatment system to disinfest truckloads of cinders prior to delivery to

the certified nurseries, which safeguarded the Hawai'i foliage industry, allowing shipments in to California to continue to this day.

The State of Hawaii has previously acknowledged the economic importance of black cinder to the horticultural and nursery industry. Sanford's Service Center remains one of the few reliable sources of this important resource, and the only ones I am aware of that steams its truckload of cinders for the nurseries that require it.

The continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry, further contributing to the economic progress of not only Hawaii island, but the entire State as well. And for the growers like myself who export our products out of state, we are able to bring in "fresh" money into Hawaii.

Thank you very much for your time and consideration regarding this very important matter.

Sincerely,

Ray T. Nakamura

January 22, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

Thank you for this opportunity to comment on Sanford's Service Center to continue mining and expanding their quarry at Leilani.

We are a landscape plant nursery in Panaewa on the Big Island and we use hundreds of cubic yards of cinder from Sanford's on a weekly basis. Our market encompasses Oahu, Maui, Kauai, and the Big Island. We need Sanford's services, a critical part of our business. Sanford's is our only source of cinder. Your support will be greatly appreciated.

Sincerely,

Raymond H. Tanouye
President of Mountain Meadows, Inc.



Letter of Support for the Expansion of Sanford's Service Center Leilani Quarry

Mr. Mark Kawika McKeague

Group 70

111 S. King St. Suite 170

Honolulu, HI. 96813

Dear Mr. McKeague,

I am writing to express my strong support for the proposed action to expand Sanford's Service Center Leilani Quarry to allow them to produce the quality black cinder we require to have the potting media we use to grow potted ornamental plants we export. As a resident and member of the community, I believe that the expansion of this facility will bring significant benefits to our area and contribute to its long-term growth and sustainability.

Sanford's Service Center Leilani Quarry has been a cornerstone of our local economy for many years, providing essential cinder for construction, nursery operations, and infrastructure projects. The quarry's operations have consistently demonstrated a commitment to environmental stewardship, safety, and community engagement. Their adherence to stringent regulatory standards ensures that their activities have a minimal impact on the surrounding environment while delivering critical resources for our community's development.

The proposed expansion of Leilani Quarry is a necessary step to meet the increasing demand for high-quality cinder in our state. As our industry continues to grow, so too does the need for reliable sources of this essential material. Expanding the quarry's operations will allow Sanford's Service Center to supply cinder efficiently and cost-effectively, supporting the many nurseries on our island and state.

Moreover, the expansion of Leilani Quarry will create job opportunities for local residents, contributing to economic stability and prosperity. The quarry's operations require a diverse range of skilled workers, from heavy equipment operators to truck drivers. By providing stable, well-paying jobs, the quarry helps to support families and strengthen our community's social fabric.

The cinder produced from Leilani Quarry is critical for our nursery operations. It's low density and high porosity is critical for the cultivation of high quality potted ornamental plants which in turn sustains our local agricultural industry. Our company employs 25 workers and generates millions of dollars annually for Hawaii's economy. Without the cinder from Leilani Quarry, we wouldn't be able to produce quality potting media to keep growing high-quality plants.

In conclusion, I wholeheartedly support the proposed expansion of Sanford's Service Center Leilani Quarry and their continued use to produce to critical black cinder we need. The benefits to our community are manifold, encompassing economic growth, job creation, environmental stewardship, and regional development. I urge you to approve this proposal and allow Sanford's Service Center to continue their valuable work in our community.

Thank you for considering my views on this important matter. I am confident that the expansion of Leilani Quarry will bring positive and lasting impacts to our region.

Yours sincerely,



Kurt Fujioka

President

Panaewa Foliage

859 Awa St.

Hilo, HI. 96720

From: pineback landscaping <pinebackland@gmail.com>
Sent: Monday, February 3, 2025 7:01 AM
To: 224055-01 Puna Quarry EIS
Cc: Kim Iwata
Subject: Support of Sandfords Service

To whom it may concern,

Please allow Sandfords to provide a much valuable product to our State. The black cinder is used widely used in the agricultural industry as a media and amendment for our local soils.
As we all strive for sustainability we must all contribute for this purpose.

My name is Andrew Matsuura,president of Pineback Landscaping,Inc. I have been a local landscaper in Hilo since 1992,and in agriculture since the late 70s working on my Dad's nursery,Orchid Isle Nursery growing Orchids.

I mentioned a valuable asset for our state, because the black cinder my colleagues throughout our state always reminds how fortunate I am to live on the Big Island where this is available without shipping.

Please allow Sandfords to continue to help provide a valuable product to the agricultural industry in Hawaii.

Sincerely,
Andrew Matsuura
Sent from my iPhone

From: susana@punacertifiednursery.com
Sent: Friday, January 31, 2025 5:19 PM
To: 224055-01 Puna Quarry EIS
Cc: malcolm@punacertifiednursery.com
Subject: RE: Sanford's Service Center Support Letter
Attachments: Sanfords Service Center Support Letter.pdf

To: Mr. Mark Kawika McKeague:

Attached please find support letter for Sanford's Service Center from my boss Malcolm Saxby.

Should you have any questions, feel free to contact him at (808)937-5278 or via email at malcolm@punacertifiednursery.com.

Thank you!

Aloha!
Susana Lopez
PUNA CERTIFIED NURSERY
P.O. BOX 771
HILO, HAWAII 96721-0771
Office Phone #(808)966-8300
Cellular #(808)938-5445
Fax #(808)982-8090
Email: susana@punacertifiednursery.com
IMPORTANT/CONFIDENTIAL: This message may contain confidential and privileged in□ormation. I□it has been sent to you in error, please reply to in□orm the sender o□the error and then delete this message.

PUNA
CERTIFIED NURSERY
INCORPORATED

January 29, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

Thank you for the opportunity to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. This letter represents our support for the continued use of the Leilani Quarry and its ability to responsibly expand to continue operations.

Sanford's Service Center is a small, local business within the growing community and economy of Puna, employing local people and supporting local, working families. The cinder produced at the Leilani Quarry is a low-density, black-colored cinder highly valued by the nursery industry. Sanford's Service Center provides reliable access to this specific cinder media to local nurseries, of which there are 80 on Hawai'i Island. Aside from the direct employment of Puna residents, the black cinder produced by the Leilani Quarry supports local businesses and the economy of East Hawai'i.

The State has previously acknowledged the economic importance of black cinder to the horticultural and nursery industry. Sanford's Service Center remains one of the few reliable sources of this important resource. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry, further contributing to the economic progress of not only Hawai'i Island, but the entire State.

Sincerely,

Malcolm Saxby
President

Specializing in Dracaenas, Palms and Landscape Plants, Landscaping License # C-21348
P.O. BOX 771 HILO, HI 96721-0771 PH: (808) 966-8300 Fax: (808) 982-8090

From: Kim Iwata <sanscinc.kim@hawaiiantel.net>
Sent: Monday, January 27, 2025 9:44 AM
To: 224055-01 Puna Quarry EIS
Subject: FW: Sanford's-request for support
Attachments: Sanfords Letter of Support.docx

From: Russell Kuwaye <rkuwaye@gmail.com>
Sent: Saturday, January 25, 2025 6:14 AM
To: 'Kim Iwata' <sanscinc.kim@hawaiiantel.net>; tkuwaye@gmail.com
Subject: RE: Sanford's-request for support

Aloha Kim

Attached is our letter of support.

Russell Y. Kuwaye
PUNA ROCK CO., LTD.
Ph: (808) 896-5246

From: Kim Iwata <sanscinc.kim@hawaiiantel.net>
Sent: Wednesday, January 22, 2025 10:31 AM
To: 'Russell Kuwaye' <rkuwaye@gmail.com>; tkuwaye@gmail.com
Subject: Sanford's-request for support

Hi Russell & Tyson! Please see attached. Anything you can do is appreciated! Thank you.

Kimberly Iwata
Office Manager
Sanford's Service Center, Inc.
P: 808.965.8144
F: 808.965.9447

PUNA ROCK CO., LTD.
PO Box 566· Keaau, Hawaii 96749
Tel: (808) 966·ROCK (7625)
Email: punarockco@gmail.com

January 25, 2025

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

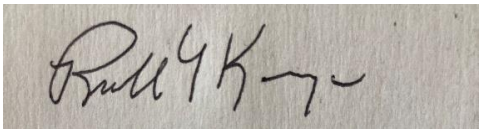
Thank you for the opportunity to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. This letter represents our support for the continued use of the Leilani Quarry and its ability to responsibly expand to continue operations.

Sanford's Service Center is a small, local business within the growing community and economy of Puna, employing local people and supporting local, working families. The cinder produced at the Leilani Quarry is a low-density, black-colored cinder highly valued by the nursery industry. Sanford's Service Center provides reliable access to this specific cinder media to local nurseries, of which there are 80 on Hawai'i Island. Aside from the direct employment of Puna residents, the black cinder produced by the Leilani Quarry supports local businesses and the economy of East Hawai'i.

The State has previously acknowledged the economic importance of black cinder to the horticultural and nursery industry. Sanford's Service Center remains one of the few reliable sources of this important resource. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of the horticultural and nursery industry, further contributing to the economic progress of not only Hawai'i Island, but the entire State.

Sincerely,

PUNA ROCK CO., LTD.



Russell Y. Kuwaye, President

From: Quindembo <sales@bamboonursery.com>
Sent: Wednesday, January 22, 2025 3:00 PM
To: 224055-01 Puna Quarry EIS
Subject: in support of Sanford Service Center's use of Leilani Quarry

22 January 2025

Subject: Environmental Impact Statement Preparation Notice

Sanford's Service Center Leilani Quarry

Kauaea, Puna, Hawai'i

Tax Map Key (3) 1-3-009:005

Aloha to Whom it May Concern:

We are Quindembo Bamboo Nursery LLC based in North Kohala, and have been in business for 34 years. We very much appreciate the opportunity to support Sanford's Service Center in their request for their continued use of the Leilani Quarry.

The black cinder that Sanford's Service Center supplies is essential to our business; there is no acceptable replacement or substitute for the black cinder they provide.

We wholeheartedly support the Proposed Action for Sanford Service Center Leilani Quarry.

You undoubtedly know that Sanford's Service Center Is important to the economy of Puna as they employ local people, and therefore also their families. And, in extension, their black cinder helps support countless others on this island who are engaged in horticulture for whom their black cinder is important or essential.

It is apparent that the State of Hawaii is aware of the importance of black cinder for the horticultural industry as a whole, and has been supportive of that endeavor historically. In addition to supplying the black cinder itself, Sanford's Service Center also steams that cinder to help prevent the distribution of nematodes, Little Fire Ants, and a variety of other potentially harmful pests – this is a very critical thing for us, as we ship interisland, and it is necessary for us to remain free of Little Fire Ants.

Please feel free to reach out to us for further comment or information.

Mahalo,

Susan Ruskin & Peter Berg

Owners of Quindembo Bamboo Nursery LLC

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P O Box 1614
Kapaau, HI 96755
Quindembo Bamboo Nursery
Instagram
www.bamboonursery.com
808-987-6452

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From: Sandra Kuwahara <nursery@slkuwaharapartners.com>
Sent: Thursday, February 6, 2025 10:24 PM
To: 224055-01 Puna Quarry EIS
Cc: Kim Iwata
Subject: Support Letter for the Proposed Action for Sanford's Service Center Leilani Quarry
Attachments: 02062025_002.pdf

Dear Mr. McKeague,

Attached please find our letter in support of Sanford's Service Center.

Thank you,

Sandra Kuwahara for Lance Kuwahara
SL Kuwahara Partners, LLC
163 Mamaki St.
Hilo, HI 96720
Ph (808) 960-4633 cell

Mr. Mark Kawika McKeague
Group 70
111 S. King St, Suite 170
Honolulu, HI 96813

February 6, 2025

Subject: Environmental Impact Statement Preparation Notice
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawaii
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague:

Thank you for the opportunity to provide comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. This Letter represents our support for the continued use of the Leilani Quarry and its ability to responsibly expand to continue operations.

My name is Lance Kuwahara, and my wife Sandra and I own and operate a landscape plant nursery named SL Kuwahara Partners, LLC. Our nursery is in the Panaewa District of Hilo on the Big Island. We currently farm 5 acres of potted landscape plants ranging in size from 4" pots to 100-gallon pots. Our current inventory consists of over 100 different varieties of plants. We currently have 4 employees working for us.

99% of our planting media consists of black cinder from Sanford's Service Center, Inc. Their low-density, black cinder is extremely vital to our business. Having a reliable supply of clean, consistent black cinder is the backbone of our nursery business, and we are only a small part of the landscaping and nursery industry on Hawai'i Island. Sanford's Service Center, Inc. has been a dependable and valued supplier of this low-density black cinder to our entire industry for over 40 years.

The economic importance of this black cinder to our State's horticultural and nursery industry has already been acknowledged, and Sanford's Service Center, Inc. is one of the few reliable sources of this important and vital resource. Therefore, the continued use and further expansion of Leilani Quarry is essential to ensure the viability and sustainability of our horticultural and nursery industry. This directly contributes to the economic progress of Hawai'i Island and the entire State.

In closing, with global warming and wildfires destroying thousands of acres all over the world, I feel that we all need to try to do our part to contribute to keeping our planet green. At this point, denying Sanford's Service Center's request will have a bigger negative impact on our economy as well as our environment.

Sincerely,

Lance Kuwahara
General Manager
SL Kuwahara Partners, LLC

Big Island Hauling Inc. dba
SOIL PLUS
"Grow With Us"

SoilPlusKona.com

PO Box 4916
Kailua-Kona, HI 96745

Office: (808) 326-9645
Fax: (808) 329-3513
Mark@SoilPlusKona.com

January 22, 2025

Subject: **Environmental Impact Statement Preparation Notice**
Sanford's Service Center Leilani Quarry
Kauaea, Puna, Hawai'i
Tax Map Key (3) 1-3-009:005

Dear Mr. McKeague,

Thank you for the opportunity to submit comments in support of the Proposed Action for Sanford's Service Center Leilani Quarry. I am writing to express strong support for the continued operation and responsible expansion of this quarry, which provides significant economic and agricultural benefits to our community and beyond.

Sanford's Service Center is a valued local business serving the growing community and economy of Puna. By employing local residents and supporting working families, the quarry plays an important role in sustaining local livelihoods. The black, low-density cinder produced at Leilani Quarry is especially prized by the nursery industry, which depends on reliable access to this unique media for horticultural success. There are over 80 nurseries on Hawai'i Island that benefit from this product, making its continued availability crucial to the island's economy.

The State of Hawai'i has previously recognized the economic importance of black cinder for the horticultural and nursery industries. Sanford's Service Center is one of the few remaining dependable suppliers of this vital resource. Allowing the continued use and measured expansion of Leilani Quarry will ensure the long-term sustainability of these industries, benefiting not only Hawai'i Island but the entire state.

As a business serving West Hawai'i nurseries since 1989, Soil Plus understands firsthand the importance of black cinder. Our nursery customers depend exclusively on the cinder from Sanford's Leilani Quarry. Without it, the agricultural industry in Hawai'i would face serious challenges in meeting its production needs.

For these reasons, I urge your favorable consideration of the Proposed Action to secure the future availability of black cinder and support the economic growth and stability of our agricultural sector.

Thank you for your attention to this matter.

Mark Jernigan VP
Big Island Hauling Inc.,dba Soil Plus

THE MIRANDA GROUP INC

Brandon Miranda
President
The Miranda Group Inc.
P.O. Box 1416
Kilauea, HI 96754
(808) 651-2058
office@themirandagroupinc.com

January 23, 2025

Mark Kawika McKeague
Group 70
111 S. King St., Suite 170
Honolulu, HI 96813

Subject: Support for Sanford's Service Center Leilani Quarry

Dear Mr. McKeague,

I appreciate the opportunity to express our support for the Proposed Action regarding Sanford's Service Center Leilani Quarry. This letter underscores our endorsement of the Quarry's ongoing operations and its potential for responsible expansion.

Sanford's Service Center is a vital local business within the Puna community, providing employment to residents and supporting working families. The cinder produced at Leilani Quarry is a low-density, black cinder that is highly sought after by the nursery industry. Sanford's Service Center plays a crucial role in supplying this specialized cinder to the 80 nurseries located on Hawai'i Island as well as landscapers and nurseries on the other islands. Beyond directly employing local workers, the black cinder supports various local businesses and contributes significantly to the East Hawai'i economy.

The State has recognized the economic significance of black cinder for the horticultural and nursery sectors. Sanford's Service Center is among the few dependable sources of this essential resource. Therefore, the continued use and potential expansion of Leilani Quarry is vital for the sustainability of the horticultural and nursery industries, further aiding the economic development of both Hawai'i Island and the broader State.

Sincerely,

Brandon Miranda
President
The Miranda Group Inc.

Scoping Comment Reproductions

INDIVIDUAL

Irene Nichols-Ferguson

From: BB <protvcom@gmail.com>
Sent: Monday, January 13, 2025 12:23 PM
To: 224055-01 Puna Quarry EIS
Subject: Regarding alowing a quarry Lailani Estates

I object to the operation of a quarry near my home in Lailani Estates. This will destroy the quiet enjoyment of my home. This type operation should not be allowed next to a residential area.
Brent Branley

Appendix J

ElSPN Public Scoping Meeting Materials

Appendix J
Public Scoping Meeting Materials

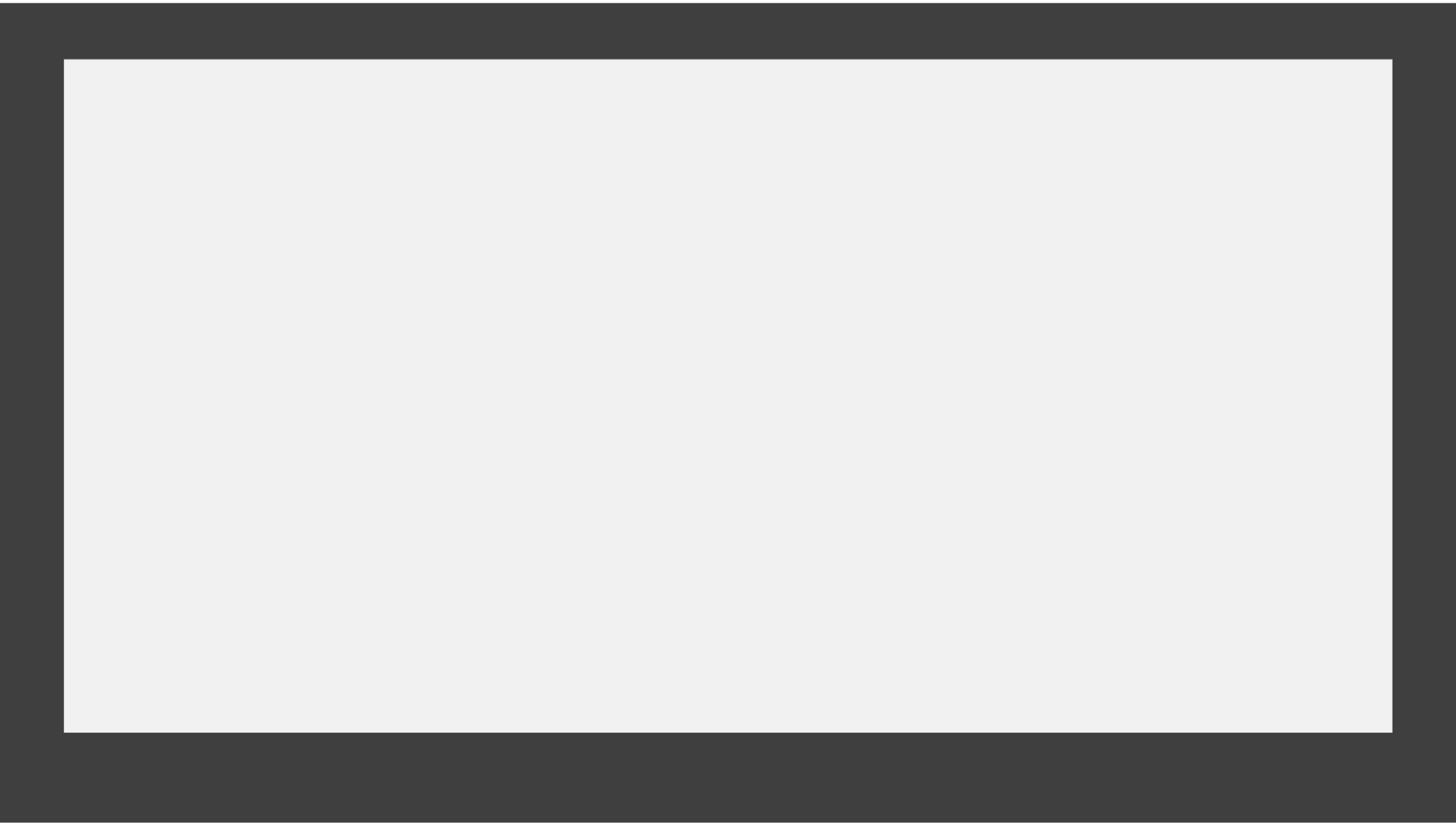


Sanford's Service Center Leilani Quarry EIS Scoping Meeting

March 3, 2025

Procedures

- Please hold your comments throughout the presentation
- There is a comment section at the end of the presentation for those who wish to speak
- Please remain muted throughout the presentation
- This meeting is being recorded per HAR §11-200.1



EIS Process

EIS process requires public scoping meeting (*HAR 11-200.1-23)*

The purpose of the public scoping meeting is to attain public feedback on:

- The Proposed Action
- Alternatives to be analyzed in the EIS
- Impacts to focus on in the EIS.

Publishing of Second EISPN

A first EISPN was previously published

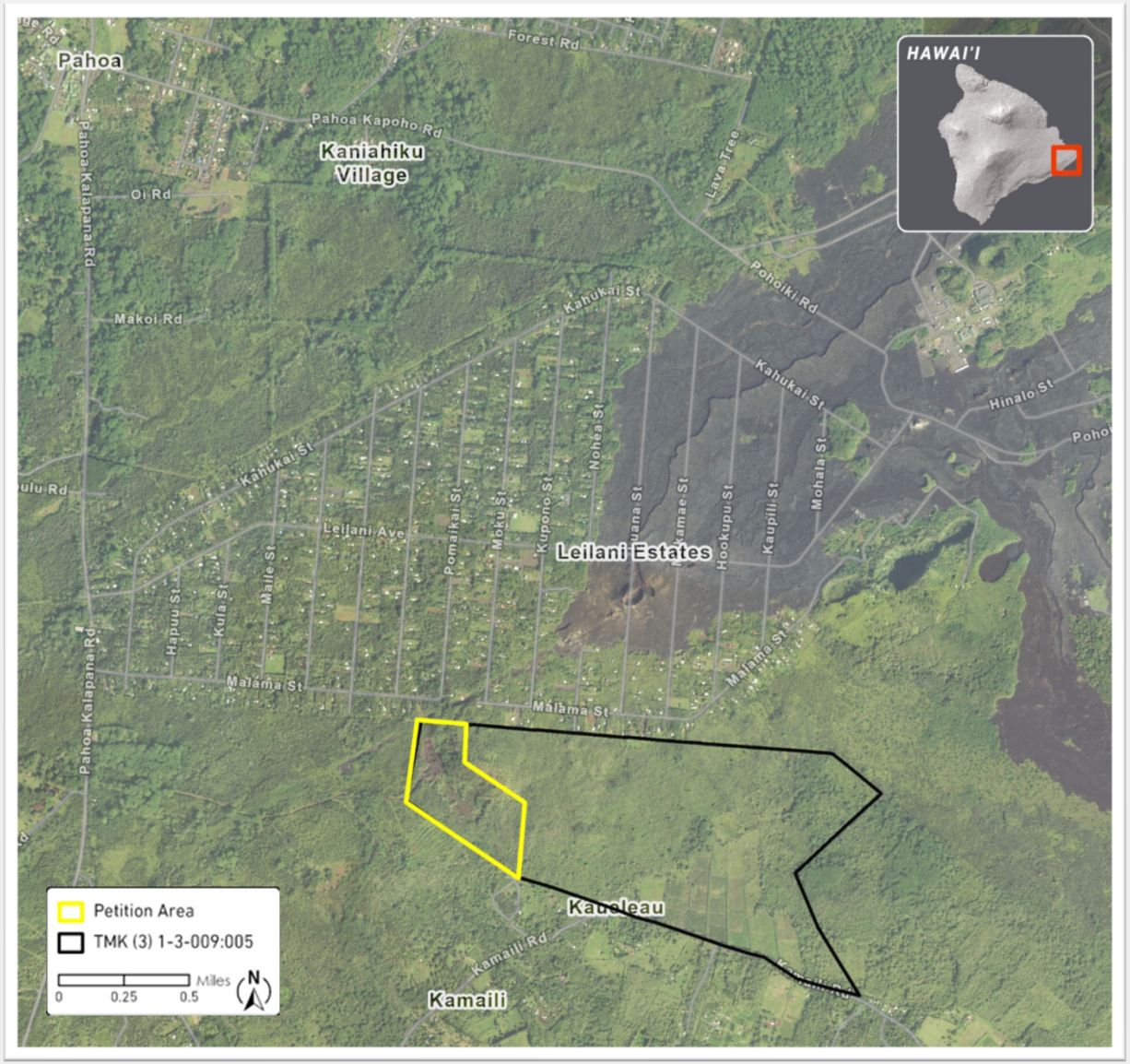
- EISPN published July 23, 2019 for the same Proposed Action
- Amendments to HAR Chapter 11-200 effective August 9, 2019
- HAR §11-200.1-4

  Actions or Projects begun under the previous rules may continue to follow older rules if completed within five years of the new rules' effective date
- Draft EIS never completed for the original EISPN
- Second EISPN published under the new rules HAR Chapter 11-200.1

Sanford's Service Center Background

Conducts mining and quarrying operations on a 30-acre portion of the Petition Area (Leilani Quarry).

- Employs 25-30 people
- Operates on privately owned land
- A multi-generational family business in operation since 1977
- Leilani Quarry produces low-density type of black-colored "popcorn" cinders
  - Essential to the nursery industry as a growing medium
  - County of Hawai‘i total value of crops in 2022 (w/ nursery crops) = $514.5 million
- Contributes to important industry in the County and State of Hawai‘i.


HAWAI'I
Pahoa
Forest Rd
Pahoa Kapoho Rd
Kaniahiku Village
Oi Rd
Lava Tree
Pahoa Kalapana Rd
Makoi Rd
Kahukai St
Pohoiki Rd
Hinalo St
Nohea St
Kupono St
Pomaikai St
Moku St
Leilani Ave
Leilani Estates
Hookupu St
Kaupili St
Mohala St
Maile St
Hapuu St
Kula St
Malama St
Kaueleau
Kamaili Rd
Kamaili
Petition Area
TMK (3) 1-3-009:005
Miles
0
0.25
0.5
N

Sanford's Service Center Operations

- Cinder is excavated & filtered through screens
- No blasting is performed
- No rock crusher is used
- No increase of heavy machinery
- Six gravel trucks remove cinder from quarry
- Number of trucks will not increase




HITACHI







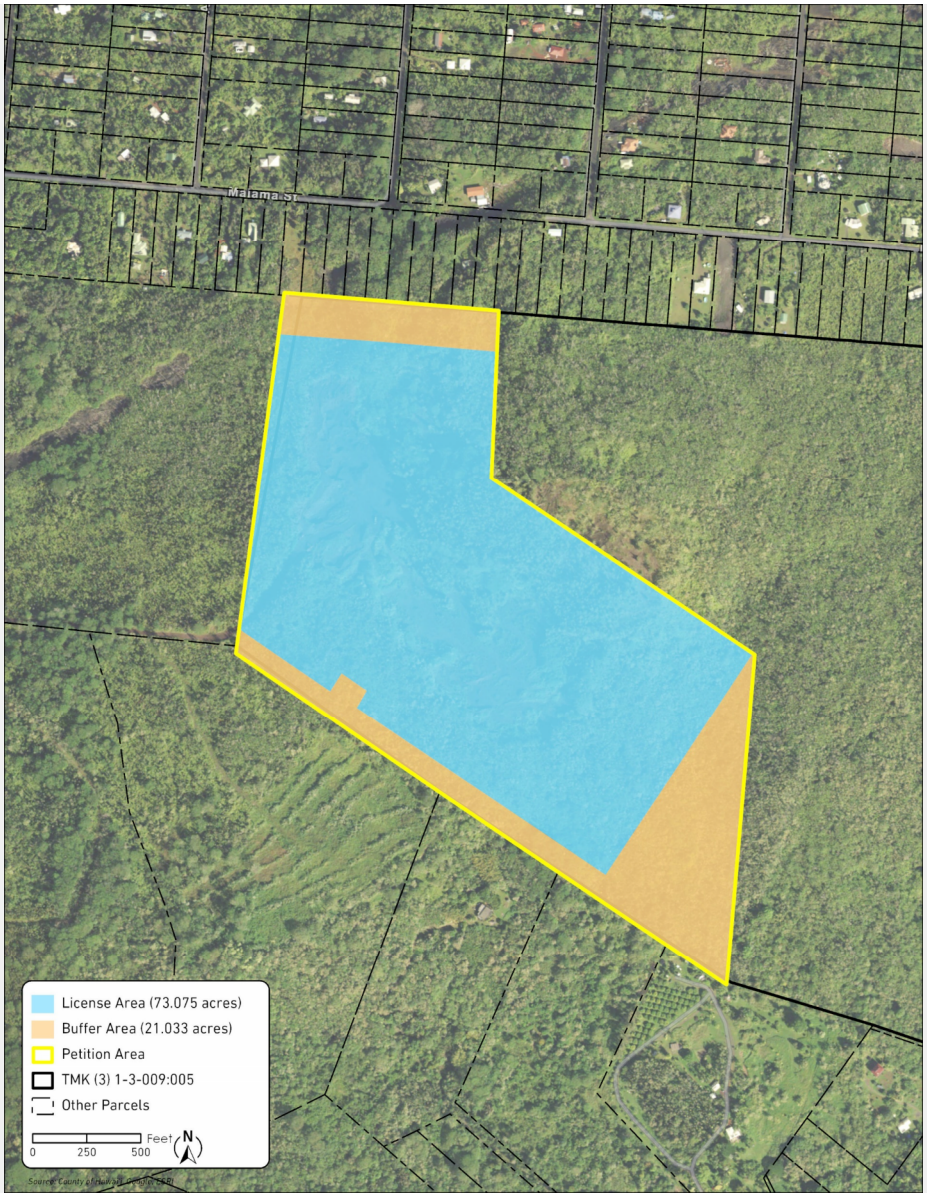


The Proposed Action

Allow expansion of cinder mining with the approval of Special Permit from the State Land Use Commission (LUC).

- Proposed Action: Change from Conservation to Agricultural District
  - State Land Use District Boundary Amendment
  - Four State Land Use Districts (Urban, Rural, Agricultural, and Conservation)
- Allows continued and expanded mining and quarrying
- Supports essential economy of Puna and East Hawai‘i
- Expansion from 30 acres to 73 acres

PETITION AREA OF THE PROPOSED ACTION
SANFORD'S SERVICE CENTER LEILANI QUARRY



Environmental Analysis for the Draft EIS

The Draft EIS will address existing conditions, potential impacts & mitigation measures.

- Geology and Geohazards
- Hydrology and Water Resources
- Biological Resources
- Air Quality and Noise
- Hazardous Substances
- Economics
- Historic and Cultural Resources
- Archaeological Resources
- Public Facilities, Infrastructure, and Utilities
- Land Use

Technical Studies for the Draft EIS

Includes technical studies to analyze project area resources, potential impacts, and mitigation.

- Biological Survey – Geometrician Associates, LLC
  - Terry, Ron, and Patrick J. Hart. *Biological Survey, Pu‘u Kali‘u.* 2013.
- Botanical Survey – Rathbun and Johansen
  - Rathbun, J., and J. Johansen. *Botanical Survey of Pu‘u Kali‘u.* 2019.
- Natural Resources Assessment – LeGrande Biological Surveys Inc
  - LeGrande, M. *A Natural Resources Assessment for the Pu‘u Kali‘u Quarry Expansion Area, Puna Hawai‘i Island.* 2024.

Technical Studies for the Draft EIS, cont.

- Cultural Impact Assessment – Orr and Haun
  - Orr, M., and Haun, A. *Cultural Impact Assessment for Sanford Service Center, Inc. Expansion Ahupuaʻa of Kauaea, Moku of Puna Hawaiʻi Island.* 2015.
- Archaeological Inventory Survey – Haun and Henry
  - Haun, A., and Henry, D. *Final Archaeological Inventory Survey TMK: (3) 1-3-09:POR. Kauaea Ahupuaʻa Puna District, Island of Hawaiʻi.* 2013.
- Archaeological Site Preservation Plan – Haun and Henry
  - Haun, A., and Henry, D. *Archaeological Site Preservation Plan Site 50-10-55-29723 Kauaea Ahupuaʻa Puna District, Island of Hawaiʻi TMK: (3) 1-3-09:POR. 005.* 2013.

Alternatives to the Proposed Action

EIS required to analyze alternatives to the Proposed Action

- Alternative 1: Land Use District Boundary Amendment (Proposed Action)
- Alternative 2: Conservation District Subzone Reclassification
- No Action Alternative

Consistent with State and County Policies/Plans

State:

- Hawai‘i State Land Use Law
- Hawai‘i State Plan
- Hawai‘i State Functional Plans
- Hawai‘i Coastal Zone Mgmt. Program

County:

- County of Hawai‘i Special Permit
- County of Hawai‘i General Plan

How to Comment on EISPN ?

Comments on the EISPN must be sent by March 7, 2025

Mail Letter to:

G70

Attn: Mark Kawika McKeague

111 S. King Street, Suite 170

Honolulu, HI 96813

*Take screenshot of this slide, if necessary

Or send Email:

LeilaniQuarryProject@g70.design

Or provide oral comments:

Please provide tonight…

Link to EISPN:

https://files.hawaii.gov/dbedt/erp/Doc_Library/2025-01-08-HA-2nd-EISPN-Sanfords-Service-Center-Leilani-Quarry.pdf

Guidance for Scoping Comments

- Compliance with *HAR Ch. 11-200.1*
- For participants to comment on the scope of the Draft EIS
- Provide oral comments pertaining to the scope of study for Draft EIS

How to provide a comment:

- Please enter your name in chat to speak
- We will call your name in order received
- Un-mute yourself when speaking
- State your name & hometown

Please be concise with your remarks.

Mahalo

Thank you for participating in the environmental review process

Appendix K

Permit Conditions of CDUP HA-1957

1 **Table K- 1 Permit Conditions of CDUP HA-1957**

Condition	Response
1. The Applicant shall comply with all applicable statutes, ordinances, rules, and regulations of the Federal, State, and County governments and applicable parts of Section 13-2-21, HAR, as amended;	Acknowledged
2. The Applicant, it successors and assigns, shall indemnify and hold the State of Hawai'i harmless from and against any loss, liability, claim, or demand for property damage, personal injury, and death arising out of any act or omission of the Applicant, its successors, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit;	Acknowledged.
3. The State of Hawai'i shall not be responsible for any loss, liability, claim, or demand for property damage, property loss, or personal injury, including death caused by or resulting from any act or omission of the Applicant or its contractor in connection with its exercise of the privileges herein granted;	Acknowledged.
4. An archaeological reconnaissance survey shall be done for areas of the cinder cone that have not been disturbed by prior quarry activity.	As discussed in **Section 3.9** an archaeological inventory survey has been performed for the Petition Area, and a Site Preservation Plan has been approved by SHPD.
5. If any unanticipated sites or remains of historic or prehistoric interest (e.g., shell, bone, or charcoal deposits, human burials, rock or coral alignments, paving, or walls) are encountered during construction, the Applicant shall stop work and contact the Historic Preservation Office at 548-7460 or 548-6408 immediately.	Sanford Service Center is compliant with this condition.
6. A grading plan of the proposed quarry shall be submitted to this Department indicating the existing depth and width and the amount of material to be processed. The plan shall indicate the possible successive increments, plans for storage, and parking;	A Grading and Landscaping Plan was prepared and approved by OCCL on November 29, 1991 which describes planting ironwoods (*casuarina spp.*) on and around the summit of Pu'u Kali'u , as well as planting both ironwoods and cypress trees in formerly quarried areas. The areas designated for planting in the Grading and Landscaping Plan are to be avoided as per

	license conditions with the landowner, which stipulate that the summit and slopes of Puʻu Kaliʻu are to be left alone. These areas are, in fact, already vegetated and not subject to erosion. Therefore, the Grading and Landscaping Plan, while showing compliance, requires updating, which is recommended as a mitigation measure, and a proposed landscaping plan is attached as **Appendix D**.
7. The triangulation station on Puʻu Kaliʻu shall not be disturbed by any quarrying or exploration activity, and prior approval shall be obtained by the Applicant from the Department of Accounting and General Services' (DAGS) Survey Division regarding the area in the vicinity of the station. No grading (earth moving) shall take place within 50 feet of the triangulation station.	Quarry activities do not and will not impact the summit area of Puʻu Kaliʻu. No grading will take place within 50-feet of the triangulation station.
8. At the completion of quarrying operations for this 15-acre site, the excavation area shall be graded to an adequate angle of repose so as not to present a hazard to persons near or at the site. This will preclude leaving vertical or near-vertical sides, which can collapse;	The Applicant will prepare an updated Grading and Landscaping Plan that will include closure of part and all of the Leilani Quarry.
9. The Applicant shall be responsible for keeping the road intersection (where the access road meets the public highway) clean and clear of all dirt, mud, cinder, rocks, and other debris resulting from truck and equipment traffic exiting from the access road;	The Applicant is compliant with this condition.
10. Trucks hauling cinder material shall have their loads completely covered to prevent spillage onto the highway;	The Applicant is compliant with this condition.
11. The hours of operation shall be from 6:00 a.m. to 6:00 p.m. or less;	The Applicant is compliant with this condition.
12. The effects of these 15 acres of excavation/quarrying shall be assessed, and future extensions or permits shall be based on the end results of this initial operation;	Acknowledged.
13. Upon termination of the use, the area shall be restored to a suitable condition, satisfactory to this Department. All exposed areas shall be revegetated;	The Applicant will comply with this condition through the update of the Landscaping and Grading Plan, which will include plans for

	revegetation after all or part of the Quarry is closed.
14. Prior to the alteration of any land surface or vegetation removal for the purpose of vehicular access, a plan indicating the proposed route to be used and the amount of land surface alteration and vegetation removal shall be submitted to the Department for approval;	The Applicant has no plans to alter the access road route.
15. The Applicant shall hire a qualified botanist to conduct a one-day botanical survey of the proposed access road alignments and recommend any adjustments in the alignment deemed necessary; and	The Petition Area has been thoroughly surveyed by qualified botanists. No changes in access road alignment are planned.
16. Other terms and conditions as prescribed by the Chairperson.	Acknowledged.

Table K- 2 Permit Conditions of CDUP HA-1957A

1. The Applicant shall comply with all applicable statutes, ordinances, rules and regulations of the Federal, State, and County governments and applicable parts of Section 13-2-21, HAR, as amended.	Acknowledged
2. The Applicant, its successors, and assigns shall indemnify and hold the State of Hawai'i harmless from and against any loss, liability, claim, or demand for any property damage, personal injury, and death arising from any act or omission of the Applicant, its successors, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit.	Acknowledged.
3. If historic remains, such as stone platforms or skeletal remains, are found during construction, the Applicant shall stop work in the immediate area and contact the Historic Preservation Program at 548-7470; that office will assess the situation and make recommendations for mitigative action if needed.	The Applicant is compliant with this condition.
4. The Applicant shall comply with all applicable Department of Health Administrative Rules and recommendations (regarding noise, etc.)	The Applicant is compliant with this condition.

implemented before or during the period of this authorized use.	
5. The Applicant shall provide documentation (i.e., book and page number) that this approval has been placed in recordable form as part of the deed instrument prior to submission for approval of subsequent construction plans for approval (see Condition Number 8 below).	The approval was recorded in the Bureau of Conveyances on October 8, 1990 as Document No. 90-156413.
6. Any work or construction to be done on the 15-acre expansion area shall run concurrent with the Bishop Estate Mining Lease; the Board must approve any assignment or sale of your operations or that Mining Lease.	The Board of Land and Natural Resources approved the continuation of cinder removal on April 4, 2008.
7. The Applicant is authorized to use only such landscaping as may be acceptable by this Department and by the County, including the use of large trees, ground covers, and retaining walls to prevent erosion on a long-term basis, to be installed according to a landscaping plan submitted to the Department for approval (see Condition Number 8).	A Grading and Landscaping Plan was approved in 1991. The Applicant will prepare an updated Grading and Landscaping plan. (Appendix D)
8. Before proceeding with any expansion authorized by the Board, the Applicant shall submit four (4) copies of grading and landscaping plans to the Chairperson or his authorized representative for approval, for consistency with the conditions of the permit and the declarations set forth in the permit application; three (3) of the approved copies will be returned to the Applicant (plan approval by the Chairperson, or representative, not to imply approval required of other agencies). That grading plan for the proposed quarry expansion shall be submitted to this Department indicating the length and width of material to be removed; the plan shall also indicate possible successive increments, plans for storage of quarried cinders materials, and parking.	The Applicant has prepared a Grading and Landscaping Plan approved by the OCCL. This Plan has information including the length and width of material to be removed, with plans for storage of cinders material and parking.
9. The triangulation station on Puʻu Kaliʻu shall not be disturbed by any quarrying or exploration activity, and prior approval shall be obtained by the Applicant from the DAGS Survey Division regarding the area in the vicinity of the station;	The Applicant is compliant with this condition.

no grading (earth moving) shall take place within 50 feet of the triangulation station.	
10. At the completion of quarrying operations for these two 15-acre sites, the excavation areas shall be graded so as not to present a hazard to persons near or at the site; this precludes leaving vertical or near-vertical sides that can collapse.	The Applicant will prepare an updated Grading and Landscaping Plan that will include requirements for slope stabilization (Appendix D).
11. The Applicant shall be responsible for keeping the road intersection (where the access road meets the public highway) clean and clear of all dirt, mud, cinder, rocks, and other debris.	The Applicant is compliant with this condition.
12. Trucks hauling cinder material shall have their loads completely covered to prevent dust blowing and cinder spillage onto the highway.	The Applicant is compliant with this condition.
13. The hours of operation shall be 6:00 a.m. to 6:00 p.m. or less; days of operation shall be limited to Monday through Saturday, excluding State and Federal holidays, in both the expansion area and in the existing original "Phase I" area. The Applicant shall reduce the hours of operation in the existing "Phase I" area to the hours of 7:00 a.m. to 5:00 p.m. within thirty (30) days of the date of the Board's letter of authorization or within sixty (60) days of the Board's decision, whichever is sooner.	The Applicant is compliant with this condition.
14. The results of this 15-acre extension of excavation/quarrying shall be assessed, and any future expansions or permits shall be based on the results of initial operations and this expansion.	Acknowledged.
15. Upon termination of the use, the area shall be restored to a suitable condition, satisfactory to this Department; all exposed areas shall be revegetated.	The Applicant will comply with this condition.
16. Prior to any further alteration of any land surface or vegetation removal for the purpose of vehicular access, a plan indicating the proposed route to be used and the amount of land surface	The Applicant does not intend to modify the access road route but will comply if such a change is proposed.

alteration and vegetation removal shall be submitted to the Department for approval.	
17. As indicated in the original submittal approved by the Board, the Applicant shall maintain the existing buffer zone of at least one-quarter of a mile between existing and proposed quarry activities and existing dwellings.	Inspection of Hawai'i County property tax records shows that there are three permitted dwellings located within ¼ mile of the active portion of the Leilani Quarry. It is not known whether or not these structures are currently occupied. An examination of the quarries located in Panaewa near Hilo shows multiple dwellings located within ¼ mile of some of these quarries. Thus, this permit condition may have been inconsistently applied to the Leilani Quarry.
18. The Applicant shall submit a new CDUA for any other use, including the commercial harvesting of hapu [sic] tree ferns or their sale.	The Applicant does not use the license area for any other commercial use.
19. Any materials resulting from land clearing and/or grading shall be disposed of in a manner and at a site acceptable to the Department of Health; open burning is prohibited.	Green waste remaining on-site is not classified as solid waste. The Applicant does not burn solid waste.
20. Failure to comply with any of these conditions shall render void the Board's approval of this Conservation District Use Application; and	Acknowledged
21. Approval is subject to other terms and conditions as may be prescribed by the Chairperson.	Acknowledged.

Table K- 3 Permit Conditions of 2008 Continuation of HA-1957 and HA-1957A

1. The Applicant shall comply with all applicable statutes, ordinances, rules, regulations, and conditions of the Federal, State, and County Governments;	Acknowledged.
2. The Applicant, its successors, and assigns, shall indemnify and hold the State of Hawai'i harmless from and against any loss, liability, claim, or demand for property damage, personal injury, or death arising out of any act or omission of the Applicant, its successors, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit;	Acknowledged.

3. The Applicant shall comply with all applicable Department of Health administrative rules. Particular attention should be paid to HAR Section 11-60.1-33, "Fugitive dust," and to Chapter 11-46, "Community Noise Control," if applicable;	The Applicant is compliant with this condition.
4. When Sanford Cinder ceases to mine cinder on the subject parcel, it will restore the mined area within six months of the date of termination; Sanford Cinder will submit to the OCCL a Landscape Plan, comprised of native tree and shrub species related to the subject area;	The Applicant will prepare and submit an updated Grading and Landscaping Plan in coordination of the appropriate agency (Appendix D).
5. The hours of operation are restricted to 7 a.m. to 6 p.m. or less, Monday through Friday, excluding State and Federal holidays;	The Applicant is compliant with this condition.
6. The Applicant will provide the department with a status report of the mining operation as well as an expectation of completion date within two years of this approval;	According to their records, the Applicant provided a status report on September 25, 2013.
7. The Applicant shall provide documentation (i.e., book and page or document number) that this approval has been placed in recordable form as a part of the deed instrument, prior to submission for approval of subsequent construction plans;	The Applicant is compliant with this condition.
8. The Applicant understands and agrees that this letter does not convey any vested rights or exclusive privilege;	Acknowledged.
9. In issuing this letter, the Department and Board have relied on the information and data that the Applicant has provided in connection with this letter application. If, subsequent to the issuance of this letter, such information and data prove to be false, incomplete, or inaccurate, this letter may be modified, suspended, or revoked, in whole or in part, and/or the Department may, in addition, institute appropriate legal proceedings;	Acknowledged.
10. Where any interference, nuisance, or harm may be caused or hazard established by the use, the Applicant shall be required to take measures	The Applicant is compliant with this condition.

to minimize or eliminate the interference, nuisance, hard, or hazard;	
11. The Applicant acknowledges that the approved work shall not hamper, impede, or otherwise limit the exercise of traditional, customary, or religious practices in the immediate area, to the extent such practices are provided by the Constitution of the State of Hawai'i and by Hawai'i statutory and case law;	The Applicant is compliant with this condition.
12. Other terms and conditions, as may be prescribed by the Chairperson; and	Acknowledged.
13. Failure to comply with any of these conditions shall render this approval null and void.	Acknowledged.

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