LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
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HAWAIIAN HOMES COMMISSION

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EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

May 26, 2005

To: The Honorable Genevieve Salmonson, Director
Office of Environmental Quality Control

From: Micah A. Kane, Chairman
Hawaiian Homes Commission

Subject: Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision, Final Environmental Assessment and Finding of No Significant Impact (FONSI), Popoki & Halona, Puna, Island of Hawaii, Hawaii

The Department of Hawaiian Home Lands (DHHL) has reviewed the comments received during the Draft Environmental Assessment (EA) 30-day public comment period for the subject project that began on March 8, 2005. Based on this review, DHHL has determined that the project will not have significant environmental effects and has issued a Finding of No Significant Impact (FONSI).

The Hawaiian Homes Commission approved this determination at its May 24, 2005 meeting.

Please publish a notice of availability for the Final Environmental Assessment (EA) in the next edition of the Office of Environmental Quality Control's *The Environmental Notice*.

We have enclosed a completed OEQC *The Environmental Notice* Publication Form, four copies of the Final EA, a copy of the Final EA Distribution List, and a hard copy of the project summary. The electronic data file of the project summary will be forwarded directly to your office by our consultant, Ms. Ida Namur of Environet, Inc.

The following information is provided in accordance with the requirements for a Notice of Determination:

Identification of Applicant: Department of Hawaiian Home Lands

Identification of Accepting Agency: Department of Hawaiian Home Lands

Determination: Finding of No Significant Impact (FONSI)

Reasons Supporting Determination: This determination is based on the significance criteria listed in Section 11-200-12 of the Environmental Impact Statement Rules:

(1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resources.

Development of the project will involve the irrevocable loss of certain environmental resources. However, developing additional lots with improved infrastructure will benefit Hawaiian beneficiaries by providing residential lots to those on the waiting list. The County of Hawaii will benefit in terms of additional consumer spending on construction materials, home furnishings, and appliances and associated tax revenues.

(2) Curtails the range of beneficial uses of the environment.

The project will not curtail the range of beneficial uses of the environment. Rocky substrates render most of the project area unsuitable for agricultural uses and the area of the proposed project is currently undeveloped vacant land. The surrounding areas are sparsely developed for single-family residential use including other existing DHHL homesteads.

(3) Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS; and any revisions thereof and amendments thereto, court decisions, or executive orders;

The project would be in conformance to the Chapter 344, HRS, State Environmental Policy, to enhance the quality of life. It is the long-term goal of the project to foster a Hawaiian lifestyle. The neighborhood that would result from this project would reflect the culture and values of the past Hawaiian communities.

(4) Substantially affects the economic or social welfare of the community or state;

The proposed low-density homestead development is not anticipated to have significant effects on the economic or social welfare of the community or the state.

(5) Substantially affects public health;

The proposed low-density project is not anticipated to have substantial effects on public health. Short-term impacts associated with construction are generally unavoidable and would be mitigated according to the measures described in Chapter 4.0 of the EA. DHHL will improve existing facilities and provide infrastructure necessary to support the proposed development. The development of basic support infrastructure such as drainage, individual wastewater systems, water and communication and electrical utilities, will be done in accordance with county standards and integrated with existing systems.

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

The proposed homestead development will result in some secondary impacts however the proposed project is not expected to place enough of a demand to result in the need to increase the level of current facilities and services in the project area. In addition, area will be set aside for future development of a park to provide both future residents of the development and the surrounding community with additional recreational opportunities.

(7) Involves a substantial degradation of environmental quality;

The proposed project is not anticipated to involve a substantial degradation of environmental quality. The project site is currently undeveloped vacant land that is covered by an increasingly greater percentage of introduced, invasive species.

(8) Is individually limited but cumulatively has considerable effect on the environment, or involves a commitment for larger actions;

The proposed low-density development is not anticipated to result in cumulative effects therefore it would not involve a commitment to larger actions.

(9) Substantially affects a rare, threatened or endangered species or its habitat;

The proposed project is not anticipated to have substantial effects on a rare, threatened, or endangered species, or its habitat. The botanical survey conducted in November 2004 did not find any flora listed or proposed for listing as Threatened or Endangered. No Threatened or Endangered fauna were seen or heard during a recent survey also conducted in November 2004.

(10) Detrimentally affects air or water quality or ambient noise levels;

No significant impacts on the area's long-term air or water quality or ambient noise levels are anticipated to result from the project. There will be some short-term impacts on the air quality and noise levels as a result of construction. Adequate mitigation measures will be implemented as described in Section 4.0 of the EA.

(11) Affects or is likely to suffer damage by being located in an environmentally sensitive area, such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters;

The project is not anticipated to affect environmentally sensitive areas. However, the Puna area has been subject to natural hazards in the past including volcanic activity and earthquakes. The potential threat of these natural hazards to the project site is discussed in Section 4.0 of the EA.

(12) Substantially affects scenic vistas and view planes identified in county or state plans or studies;

The proposed low-density development will not significantly affect the area's visual resources including scenic vistas or view planes.

(13) Requires substantial energy consumption.

The proposed project will not require substantial energy consumption relative to other similar projects.

Should you have any questions regarding the contents or preparation of the FEA, please contact Ms. Colette Sakoda or Ms. Ida Namur of Environet, Inc. at 833-2225.

Should you have any questions regarding the project itself, please call William Makanui of our Land Development Division at 587-6449.

Enc.

c: Engineers Surveyors Hawaii, Inc. (w/o encl.)
Environet, Inc. (w/o encl.)

2005-06-08 FONSI
MAKU'U-HALONA SUBDIVISION & MAKU'U-POPOKI RESIDENTIAL SUBDIVISION

JUN - 8 2005

Final Environmental Assessment

Maku'u-Halona Subdivision and Maku'u-Popoki Residential Subdivision
Pahoa, Puna, Hawai'i
TMKs: (3) 1 - 5 - 08: 03 and (3) 1- 5 - 119: 10 through 21

May 2005

This Document is prepared pursuant to Chapter 343, Hawai'i Revised Statutes

The Applicant:
The Department of Hawaiian Home Lands

Accepting Authority:
The Department of Hawaiian Home Lands

Final Environmental Assessment

Maku'u-Halona Subdivision and Maku'u-Popoki Residential Subdivision
Pahoa, Puna, Hawai'i

TMKs: (3) 1 - 5 - 08: 03 and (3) 1- 5 - 119: 10 through 21

Applicant:

The Department of Hawaiian Home Lands

Accepting Authority:

The Department of Hawaiian Home Lands
c/o
Office of Environmental Quality Control
236 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

May 2005

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Acronyms and Abbreviations

AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ADT	Average Daily Traffic
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWRM	Commission on Water Resource Management
CZM	Coastal Zone Management
dB	Decibel
DBEDT	Department of Business, Economic Development and Tourism
DHHL	Department of Hawaiian Home Lands
DLNR	Department of Land and Natural Resources
DOH	Department of Health
DOT	Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESH	Engineers Surveyors Hawaii, Incorporated
FEMA	Federal Emergency Management Agency
FHWA	U.S. Federal Highway Administration
FONSI	Finding of No Significant Impact
HAR	Hawaii Administrative Rules
HEPA	Hawaii Environmental Policy Act
HMC	Hilo Medical Center
HRS	Hawaii Revised Statutes
HTM	hazardous and toxic materials
HUD	U.S. Department of Housing and Urban Development
IWS	Individual Wastewater System
km	kilometer
LOS	Level of Service
LUC	Land Use Commission
LUPAG	General Plan Land Use Designation Maps
MOA	Memorandum of Agreement
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
OEQC	Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
rLW	Pahoehoe Lava Flow
SHPD	State Historic Preservation Division
SMA	Special Management Area
TIAR	Traffic Impact Analysis Report
TMDL	Total Maximum Daily Load
TMK	Tax Map Key
UIC	Underground Injection Control

U.S.	United States of America
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordnance

1.0 INTRODUCTION AND SUMMARY

1.1 Scope and Authority

This Environmental Assessment (EA) is prepared pursuant to Chapter 343, Hawaii Revised Statutes (HRS) and associated Title 11, Chapter 200, Hawaii Administrative Rules (HAR). The intent of the document is to ensure that systematic consideration is given to the environmental consequences of the proposed action. The action that triggers this assessment is the use of State of Hawaii funds and State of Hawaii lands. A *Finding of No Significant Impact* (FONSI) has been determined for this project.

1.2 Project Information.

Project Name:	Maku'u-Halona Subdivision and Maku'u-Popoki Residential Subdivision, Pahoa, Puna, Hawai'i
Applicant:	The State of Hawaii, Department of Hawaiian Home Lands P.O. Box 1879 Honolulu, HI 96805 Contact: William Makanui (808) 587-6449
Agent:	Environet, Inc. 2850 Paa Street, Suite 212 Honolulu, HI 96819 Contact: Colette Sakoda (808) 833-2225
Accepting Authority:	State of Hawaii, Department of Hawaiian Home Lands c/o Office of Environmental Quality Control 236 South Beretania Street, Suite 702 Honolulu, Hawaii 96813
Project Location:	Island of Hawaii, Puna District
Tax Map Keys:	3rd Division, Zone 1, Section 5, Plat 008: Parcel 003 or (3) 1-5-008:003 and 3rd Division, Zone 1, Section 5, Plat 119: Parcels 010 through 021 or (3) 1-5-119:010 through 021[1]
Total Affected Area:	284 acres

[1] The Draft EA was published in the Environmental Notice of the Office of Environmental Quality Control on March 8, 2005. Six comment letters were received. The letters and the responses to them are attached as Appendix J-1. Substantive changes to the EA based on these comment letters are indicated in the Final EA by underlined text, as in this paragraph.

Existing Land Use:	Vacant
State Land Use District:	Agricultural
Department of Hawaiian Home Lands Designation:	Residential, minimum lot size 15,000 square feet (RS-15)
County Zoning Designation:	Agricultural (A-20a)

2.0 PROJECT DESCRIPTION

2.1 Purpose and Need

The primary *purpose* of the project is to prepare the property for residential and subsistence agriculture development. The Department of Hawaiian Home Lands (DHHL) *needs* to develop and distribute homestead lots to qualified native Hawaiian beneficiaries on its waiting list. The project proposed by DHHL is consistent with the Hawaiian Homes Commission Act, as amended. DHHL is a state agency that is eligible to use State of Hawaii funds for improvement projects to achieve the settlement of native Hawaiians on State of Hawaii lands.[2]

At project completion, DHHL would be able to award up to 375 residential and subsistence agricultural lots to native Hawaiians. DHHL administers the Hawaiian Homes Commission Act by providing benefits to native Hawaiians in the form of 99-year homestead leases at a nominal annual rental.[3] The objective of the homesteading program is to increase the economic self-sufficiency of native Hawaiians through the provision of land.[4] Since 1921, DHHL has provided 7,260 homestead awards to native Hawaiians. The *Hawaii Island Plan* (DHHL 2002: 21) recommends the Makuu area for residential homestead, subsistence agriculture, community and cultural uses.[5]

2.2 Project Location and Setting

The property where project actions will occur is located in the Makuu, Halona and Popoki ahupuaa in the Puna District on the east side of the Island of Hawaii (see Figure 2-1). The project site is approximately 2 miles north of Pahoa and located in the vicinity of other DHHL subdivisions including the Makuu Farm Lots and Makuu Agricultural Lots in Pahoa, Hawaii (Figure 2-2). The project site consists of a portion of a parcel of land identified as Tax Map Key (TMK) number: (3) 1-5-008:003. The project site encompasses approximately 240 acres of the 524.433-acre parcel. The project site also includes 12 existing 2 acre farm lots identified as TMK numbers (3) 1-5-119 parcels 10 through 21, which leads to a total project area of 284 acres.

The project site consists of vacant land owned by DHHL that is overgrown with a relatively dense cover of native and non-native vegetation. Historically, the project site has remained undeveloped and vacant with the exception of a small area previously used as pastureland and the twelve 2 acre farm lots. The site abuts the Makuu

[2] R.M. Towill Corporation 1997: pg. 1-1.[3] Engineers Surveyors Hawaii, Inc. 1985a: pg. 5 and Engineers Surveyors Hawaii, Inc. 1985b: pg. 5.
[4] Ibid.
[5] Geometrician Associates and Engineers Surveyors, Hawaii, Inc. 2004: 1-1.[6] Holcomb 1987.

Agricultural Lots Subdivision along its northeastern to southeastern borders. Existing roadways within this subdivision include Niaulani Street, Kipika Place, and Kauhaenae Place. Streetlights and electrical easements have been installed along these existing roads. A dirt road continues along the southeastern property boundary from Kauhaenae Place. Figure 2-3 shows the layout of the currently proposed development on the property. The surrounding area is sparsely populated and characterized by low-density rural residences, small farms, and lands utilized for agriculture.

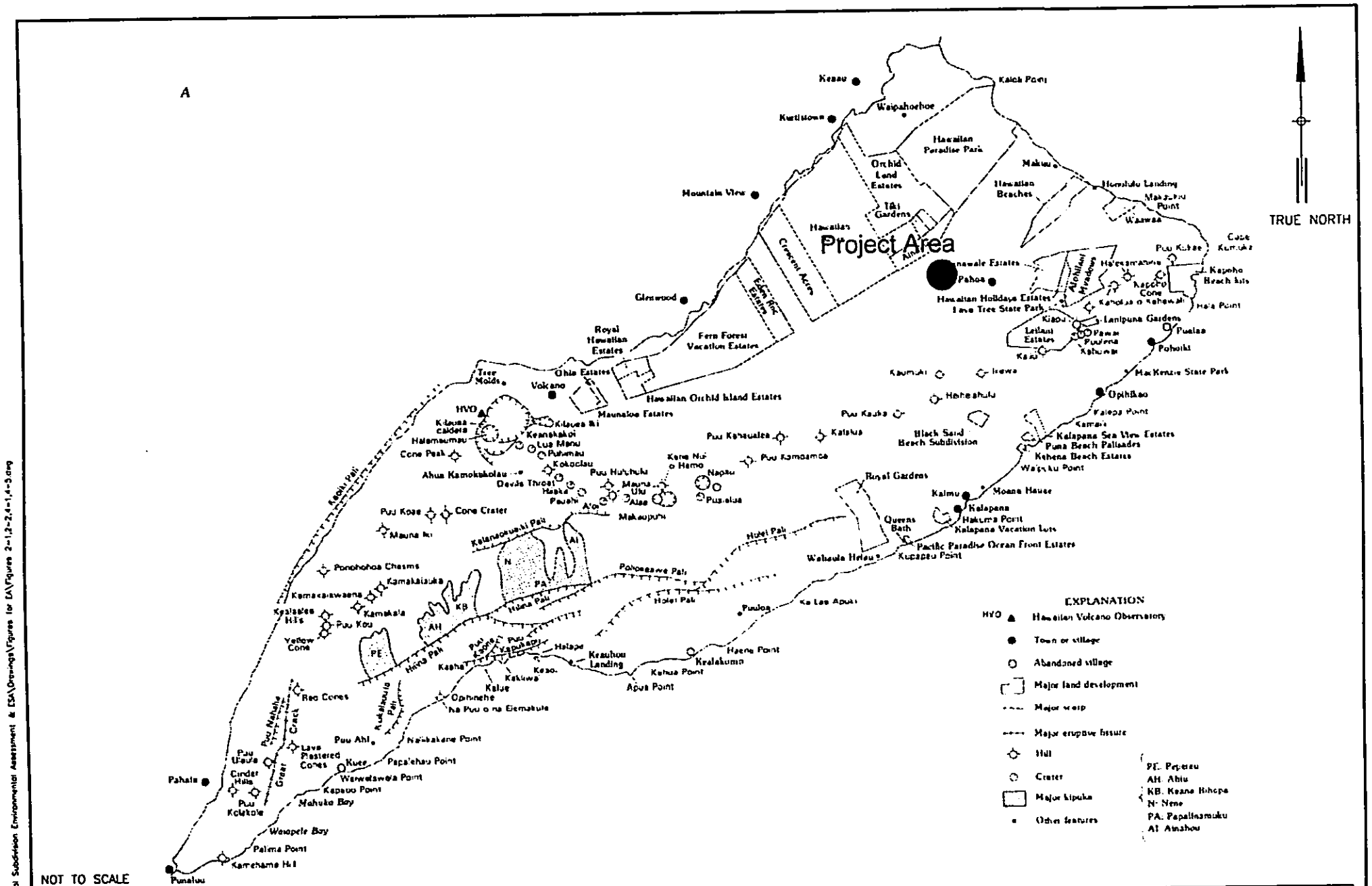
2.3 Project Features and Relevant Considerations.

DHHL plans to develop 365 to 375 residential and subsistence agricultural lots as well as set aside 12.7 acres for a park site in the Makuu ahupuaa. The Makuu-Haiona Subdivision and Makuu-Popoki Residential Subdivision project will develop approximately 240 acres of TMK number (3) 1-5-08, parcel 03 into approximately 361 residential lots which will be about 20,000 square feet each and 13 agricultural lots which will range in size from 1.0 to 3.42 acres. Site improvements are to include roadways, drainage system, water system, overhead electric and road lighting systems, and underground telecommunications systems. The development also includes consolidation of 12 existing 2-acre farm lots (TMK (3) 1-5-119: 10 through 21) and re-subdivision into residential lots.

Development of the proposed project would include all work necessary to prepare the land for residential and subsistence agricultural awards to beneficiaries. The project would include site improvements for roadways, drainage systems, water systems, overhead electric and road lighting systems, and underground telecommunications. The proposed project would involve clearing and limited grading of the area to facilitate construction of roadways, drainage systems, and electrical/telecommunications/water systems that would service the development. In addition, the portion of individual residential lots occupied by the footprint of individual houses and driveways will also be cleared and graded. Individual wastewater systems (IWS) will be installed on individual home lots.

2.4 Construction and Estimated Cost

The budget for the project, which is funded by DHHL, is estimated to be $8.3 million for the Makuu-Halona Subdivision and $7.5 million for the Makuu-Popoki Residential Subdivision. This estimate would be refined during the final design process. The design of this residential development would be finished and construction would be initiated after completion and acceptance of this EA. Construction on this project is currently planned to begin in the first quarter of 2006 and the development is expected to be completed and fully occupied by 2015.



NOT TO SCALE

ENVIRONET, INC.
PRESERVING EARTH'S RESOURCES FOR THE FUTURE

MAKUU–HALONA SUBDIVISION AND MAKUU–POPOKI RESIDENTIAL SUBDIVISION EA

PROPOSED PROJECT LOCATION IN RELATION TO MAJOR GEOGRAPHIC FEATURES AND DEVELOPMENTS

FIGURE 2–1

Y:\FY04\404-007 Makuu Residential Subdivision Environmental Assessment & EIA\Drawings\Figures for EA\Figures 2-1,2-2,4-1,4-3.dwg
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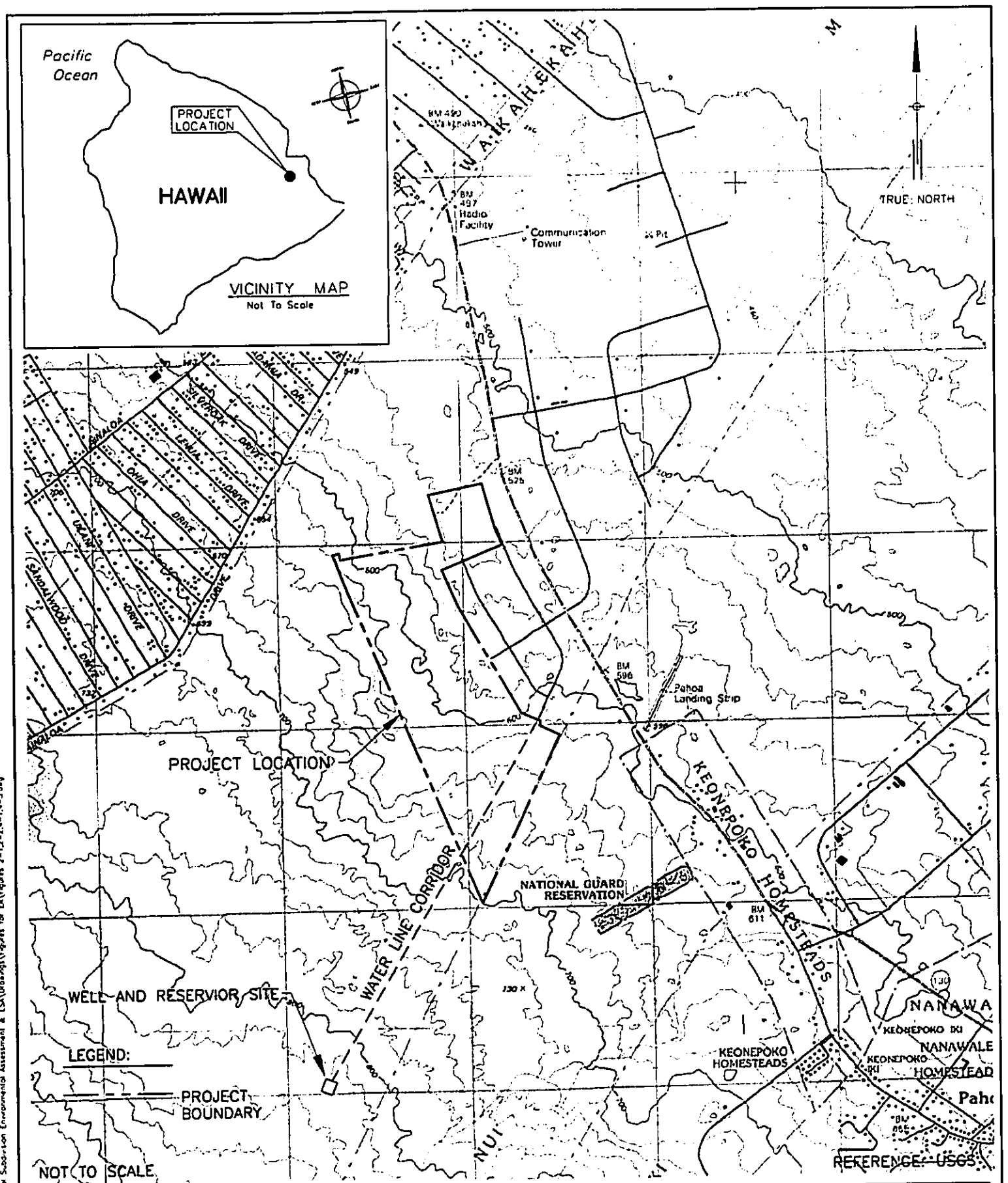
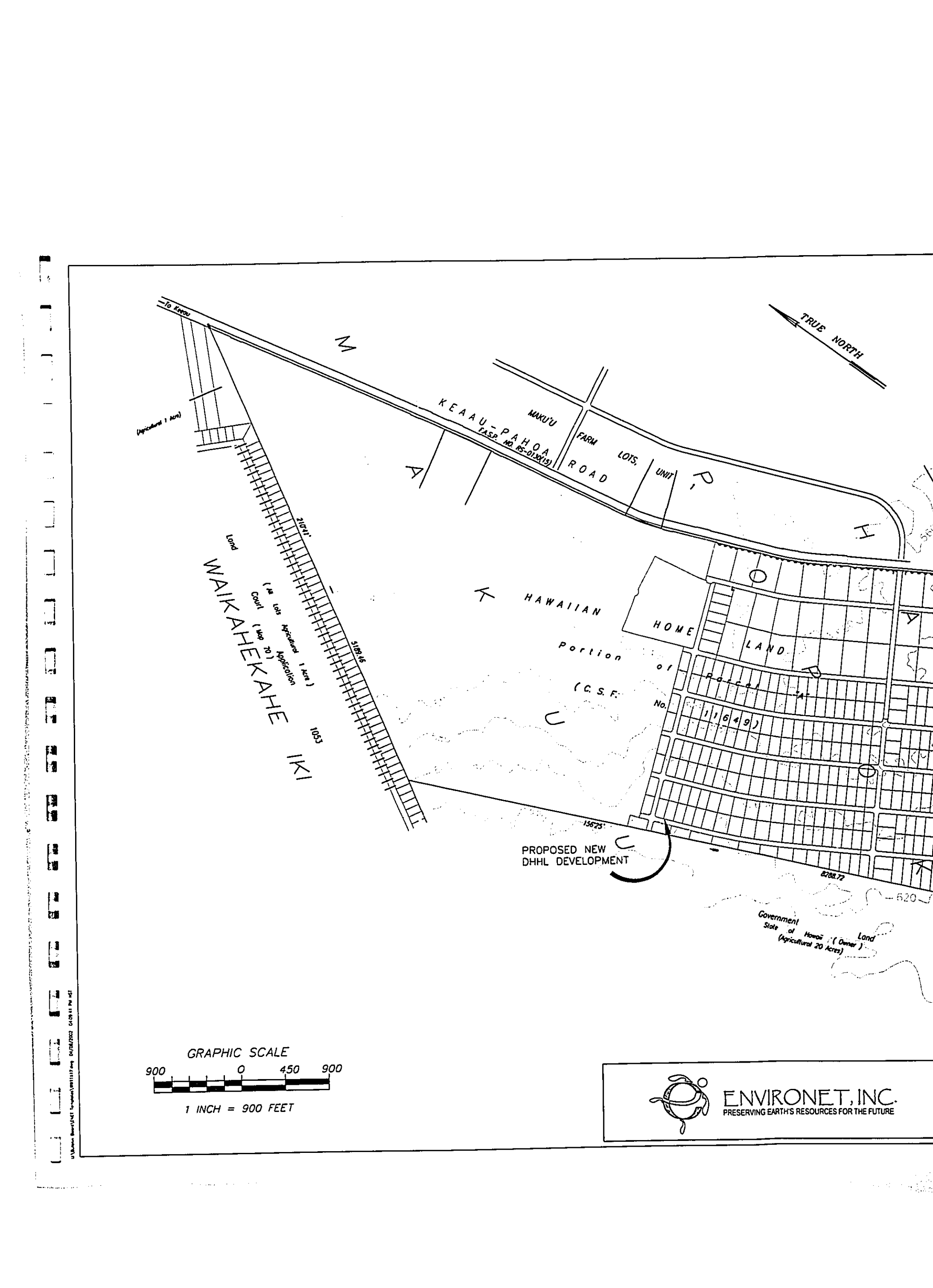
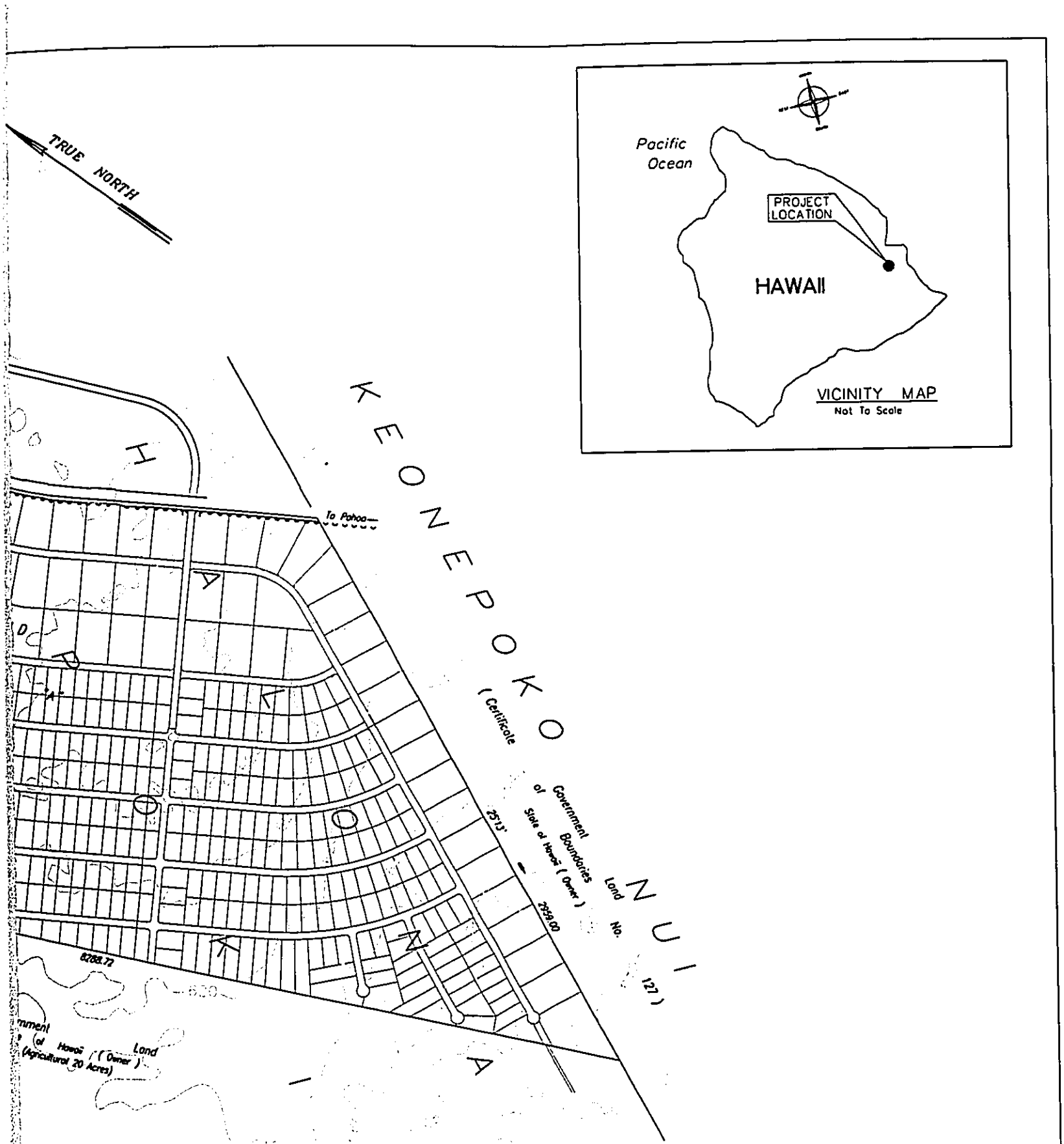


ENVIRONET, INC.	MAKUU–HALONA SUBDIVISION AND MAKUU–POPOKI RESIDENTIAL SUBDIVISION EA	
	LOCATION MAP PAHOA, HAWAII	FIGURE 2–2


TRUE NORTH
To Kapolei
(Agricultural 1 Acre)
KEAAU-PAHOA
T.A.S.P. NO. 85-013(19)
MAKU'U
FARM LOTS, UNIT
ROAD
MAKAI
PUUHONUA
HAWAIIAN HOME LANDS
Portion of Parcel "A" (C.S.F. No. 11649)
WAIKAKAHE IKI
Land Court (All Lots Agricultural 1 Acre Application Map 70)
1053
2101.41'
5189.16'
15675'
8288.72'
620'
PROPOSED NEW DHHL DEVELOPMENT
Government Land
State of Hawaii (Owner)
(Agricultural 20 Acres)
GRAPHIC SCALE
900 0 450 900
1 INCH = 900 FEET
ENVIRONET, INC.
PRESERVING EARTH'S RESOURCES FOR THE FUTURE



RONET, INC. TH'S RESOURCES FOR THE FUTURE	DRAWN BY: I.K.N.	MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION EA
	CHECKED BY: R.S.Y.	SITE LAYOUT HILO, HAWAII — FIGURE 2-3
	REF: ESH, Inc.	

3.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

3.1 The Proposed Action: Residential Subdivision Development

The parcel of land that includes the Makuu-Halona Subdivision and the Makuu-Popoki Residential Subdivision consists of 524.433 acres, but only a portion, consisting of approximately 240 acres, will be developed in this project. The 240 acres will be divided into 365 to 375 residential/agricultural lots and an approximately 12.7 acre site will be set aside for future park development. A portion of the development also includes consolidation of 12 existing 2-acre farm lots and re-subdivision into residential lots with minimum area of 20,000 square feet. Site improvements will include roadways, drainage system, water system, overhead electric and road lighting systems and an underground telecommunications system. Improvements will be designed in accordance with the applicable standards of DHHL, Hawaii County, State of Hawaii, and the U.S. Government.

Selection of this option is expected to help DHHL meet the demand for affordable housing for qualified Native Hawaiians on its waiting list in east Hawaii.

3.2 Alternative A: Mixed Use Development

This development scenario would include a mix of land uses on the project site by incorporating commercial parcels as well as residential and recreational uses. DHHL's evaluation of a mixed use development alternative found that commercial land uses would not be warranted at this time because residential demand was greater in Makuu.

Therefore, a mixed use development scenario would not be acceptable at this time.

3.3 Alternative B: Lower Density Residential Development

Consideration was given to developing this phase as two-acre agricultural lots thereby creating a lower density residential development. However, DHHL found that a lower density development of 2-acre lots would not be warranted for two reasons:

1. The need/demand for housing on the east side (Puna district) is greater; and
2. the density of 20,000 square foot lots would be desirable in order to fund the costs of developing the offsite water system for the Makuu residential lots development.

3.4 No Action

In this scenario the site would be left vacant and undeveloped. As a consequence, environmental conditions would remain unchanged and no potentially adverse impacts such as additional traffic, noise and degradation of air quality would result. However, beneficiaries on DHHL's waiting list would be denied the opportunity to gain access to housing opportunities in Makuu. The No-Action scenario would not enable DHHL to achieve its goals and objectives for Makuu to provide residential opportunities to its beneficiaries.

The No Action alternative would contribute to a further backlog and waiting period for qualified Native Hawaiian beneficiaries waiting to receive their awards. Some applicants have been waiting as long as 30 years to receive a lot on DHHL land. Others have since passed on before given an opportunity to receive a land award. Thus the No Action position would further aggravate the situation and would not meet the objectives of the Hawaiian Homes Act.

Therefore, the No Action alternative is considered less favorable than the proposed action and is hereby dismissed from further consideration.

4.0 ENVIRONMENTAL SETTING AND IMPACTS

The physical and social environmental setting of the project site and the probable impacts of the Proposed Action are described in this section of the report. The potential impacts described in this section relate to the Build Alternatives only since the No Action Alternative would result in no impact to existing conditions at the site.

4.1 Physical Environment

4.1.1 Topography

The project site is located on the northern flank of Kilauea volcano. The surface slope on this flank of the volcano decreases from 1.6° in inland areas to 1.0° in the seaward area.[6] In the vicinity of the project site, the young volcanic flow units form a hummocky terrain that generally dips to the northeast. The elevation in the 284-acre project site ranges from roughly 530 to 700 feet above mean sea level.

Potential Impacts and Mitigation
The project site exhibits no unique topographical features. Clearing, grading and grubbing would occur, but not to the extent that would significantly alter the general topography of the area. Grading activities are not expected to be extensive for the development of roads and infrastructure for the subdivision. The proposed project is not anticipated to have any adverse impact on the underlying topography of the area. No mitigation is required.

4.1.2 Geology and Soils

The project site is located on the island of Hawaii, which is the largest island in the Hawaiian Chain. The island of Hawaii was formed from the eruption of five separate volcanoes, Kilauea, Mauna Loa, Hualalai, Mauna Kea and Kohala. The ages of the emergence of these five volcanoes have been determined using radioactive dating techniques on the oldest accessible rocks with Kohala, the oldest, dated at 700,000 years. Hualalai has been dated at 120,000 years, Mauna Kea at 375,000 years, Mauna Loa at 540,000 years, and Kilauea, the youngest, is about 25,000 years old.[7]

The project site is located on the lower northern slope of Kilauea volcano, roughly 20 miles to the northeast of the summit crater. The surface soil in the vicinity of the project site is classified primarily as Pahoehoe Lava Flow (rLW). Pahoehoe lava flows can vary from a relatively smooth billowy surface to a rough hummocky surface created by pressure domes.[8] Little soil is present at the project site due to the young age of the

[7] Mink and Lau 1993.
[8] Sato et al. 1973.

surface lava flows. The surface lava flow that covers the project site is part of the 'Aila'au flow which has been dated as being roughly 350 years old, based upon radiocarbon dating results.[9] Figure 4-1 shows the range in ages of surface lava flows on Kilauea volcano and in the area surrounding the project site. No historic volcanic eruptions have occurred in the vicinity of the project area. For at least the last few millennia, this region has passively accumulated lava that originated largely from tube-fed flows from the summit region of Kilauea.[10]

The Pahoa Cave lies roughly one mile to the southwest of the project site. This lava tube cave is important in terms of its geological value, as well as for associated historic sites, burials, and rare plants growing in its skylights.[11] The location of the cave was significant to the site selection of the project's offsite water system, but neither to the Makuu-Halona Subdivision nor the Makuu-Popoki Residential Subdivision location. It was determined that no other caves appear to be present in the vicinity of the project site.

Potential Impacts and Mitigation

The geologic conditions at the project site impose no overriding constraints on the project. Nevertheless, most of the surface of the Big Island is subject to eventual lava inundation, and all settlements and infrastructure face some degree of risk. No mitigation measures are expected to be required, but construction contract documents will stipulate that DHHL will implement an appropriate contingency plan in coordination with the State Historic Preservation Division (SHPD) if a previously undetected lava tube is breached during construction.

Potential erosion impacts could occur as a result of construction activities (e.g., clearing, grading, grubbing, excavation and trenching) that disturb the earth and soils. Exposed soils are susceptible to erosion, especially if it rains heavily during site work periods. Wind erosion may cause some unavoidable soil loss, but the greater concern is silt runoff. Adverse impacts would be minimized or avoided as a result of both temporary and permanent erosion and sedimentation control measures that shall be implemented during the development of roads and infrastructure for the subdivision. Proposed work shall comply with State and County erosion control standards and requirements including, but not limited to, preparation of a County approved erosion control plan.

4.1.3 Geologic Hazard

The island of Hawaii experiences thousands of earthquakes each year; most are so small that they can only be detected by instruments, but some are strong enough to be felt, and a few have caused minor-to-moderate damage. Most of Hawaii's earthquakes are directly related to volcanic activity and are caused by magma moving beneath the

[9] Rubin et al 1987.
[10] Holcomb 1987.
[11] Geometrician Associates and Engineers Surveyors Hawaii, Inc. 2004.

earth's surface. Earthquakes may occur before or during an eruption, or they may result from the underground movement of magma that comes close to the surface but does not erupt. A few of the island's earthquakes are less directly related to volcanism; these earthquakes originate in zones of structural weakness at the base of the volcano or deep within the earth beneath the island.

Strong earthquakes endanger people and property by shaking structures and by causing ground cracks, ground settling, and landslides. Strong earthquakes in Hawaii's past have destroyed buildings, water tanks, and bridges, and have disrupted water, sewer, and utility lines. The size of an earthquake is commonly expressed by its magnitude on the Richter scale, which is a measure of the relative size of the earthquake wave recorded on seismographs. Figure 4-2 shows the epicenter and magnitude of earthquakes that have occurred on the island of Hawaii between 1929 and 1994. As a result of the numerous historic earthquakes that have occurred in the region, the entire island of Hawaii is rated a Zone 4 Seismic Probability Rating (Uniform Building Code, Appendix Chapter 25, Section 2518). Areas located in Zone 4 are at risk from major earthquake damage, especially to structures that are poorly designed or built. The project site is located in Zone 4.

The project site is located roughly five miles north of the active east rift zone of Kilauea Volcano. The project site and surrounding areas are covered predominately by lava flows that erupted within the past five hundred years (Figure 4-1). As a result, the project site is located within lava flow hazard zone number three established by the United States Geological Survey (Figure 4-3). Between 1 to 5% of the land area within Hazard Zone 3 areas are covered by lava erupted since 1800 while between 15 to 75% of these areas are covered with lava erupted in the last 750 years.

Potential Impacts and Mitigation
Earthquakes are unpredictable natural events, which have the potential to affect property and buildings. The project site is located in an area of on-going volcanic activity. The threat from geologic hazards will always exist because humans have little control over the frequency and intensity of a natural event. Proposed activities for the development of roads and infrastructure for the subdivision shall be accomplished in accordance with accepted building and construction standards. No mitigation is required.

4.1.4 Flora

A botanical field survey of the project site was performed on January 14 and 15, 2005. The full report by LeGrande Biological Surveys, Inc. (2005) is presented in Appendix A. The primary objectives of the botanical field study were to:

- provide a general description of the vegetation on the 284-acre project site;
- inventory the flora;

- search for threatened and endangered species as well as species of concern; and
- identify areas for potential environmental problems or concerns and propose appropriate mitigation measures.

A prior biological inventory of the general area in which the project is located described the area as an `Ohi`a/Uluhe Lowland Wet Forest comprised of 57 total plant species, of which 43% were native and 56% were non-native.[12] The biological inventory conducted for this study in January 2005 identified a total of 72 plant species, with native species making up only 25% of the population. These numbers point to a rapid influx of weedy plant species to the area and a continual loss of native vegetation. Alien vegetation dominated portions of the borders and along dirt roads within the project area.

The `ohi`a/uluhe lowland wet forest present on the subject area is dominated by `ohi` lehua (*Metrosideros polymorpha* var. *polymorpha*) and uluhe (*Dicranopteris linearis* f. *linearis*). The occasional hapu`u or tree fern (*Cibotium glaucum*) was also observed growing up to 6 or 7 feet tall, and in wetter areas the kopiko (*Psychotria hawaiiensis* var. *hawaiiensis*) was observed growing as medium sized trees up to 25 feet in height.

According to the botanical surveyor, there were no wetlands observed within the proposed development site. The site has areas that could potentially support a wetland habitat, but no wetlands were observed at the time of the survey.

Since areas within the survey site that could potentially be wetlands did not have standing water, it is preliminarily concluded that the survey site itself is not likely to harbor potential wetlands. Even though the plant species list notes wetland species, in order for a wetland to be designated, it must have the plant species and must also meet the requirements with regard to number of days with standing water and type of substrate present.

Potential Impacts and Mitigation Measures

The project site is not known to contain any threatened, endangered, or candidate plant species; therefore, no adverse impacts are anticipated. None of the plants that occur on the project site are classified as a species of concern such that no special protection measures are warranted or proposed. No wetlands were observed within the project site during the survey. In light of these considerations, no mitigation is required during the development of roads and infrastructure on the project site. Nevertheless, the following measures are recommended for implementation during the future development of the site to further reduce potential impacts associated with clearing existing vegetation on the project site:

- Clearing of the project site should be done in a manner that minimizes the introduction of additional invasive plant species that have the potential to spread

[12] HHP 1993.

into adjacent native forest areas. For instance, the noxious weed miconia (*Miconia calvescens*) is easily spread to new areas when this plant's small seeds are carried by machinery used for grading and excavation work from infested areas. Care should be taken to clean the machinery as well as possible before beginning work in a new area.

- Individual trees of `ohi`a lehua (*Metrsideros polymorpha*) should be retained as landscaping for the subdivision, if possible.
- The patch of hala (*Pandanus tectorius*) trees located near the end of Kipika Place could be preserved along with archeological site 24231.

4.1.5 Fauna

An ornithological and mammalian survey of the proposed development was completed by Rana Productions, LTD. (2004). The full report can be found in Appendix B. The primary purpose of the survey was to determine if there were any federally listed endangered, threatened, proposed, or candidate avian or mammalian species on, or in the immediate vicinity of the proposed development site.

A field survey of the subject property was conducted on September 10 and 11, 2004. The survey of mammals was limited to visual and auditory detection, and by searching for animal tracks. No mammals were encountered during this survey, though several domestic dogs were heard barking from within the existing Makuu farm lots, Unit 1 located to the east and south of the proposed subdivision. The findings of this mammalian survey are consistent with the results of other surveys conducted within the lowland areas of the South Hilo, and Puna districts within the recent past. Although no Hawaiian hoary bats were recorded during the course of this survey, it is likely that bats do use resources within the general area. In addition, it is likely that roof rats, Norway rats, European house mice and possibly Polynesian rats are present within the project site.

A total of eleven count stations were established on the property for the survey of avian species in the area. Nine alien avian species, representing seven separate families, were recorded during station counts. No species either currently listed, or proposed for listing under either the U.S. Fish and Wildlife Service and the State of Hawaii's endangered species programs was detected during the course of this survey.

Potential Impacts and Mitigation Measures
The project site is not known to contain any threatened, endangered, or candidate avian or mammalian species; therefore, no adverse impacts are anticipated. In light of these considerations, no mitigation is required during the development of roads and infrastructure on the project site.

Although wildlife surveys conducted did not detect the Hawaiian hawk (*Buteo solitarius*) and Hawaiian hoary bat (*Lasiurus cinereus semotus*) within the project area, both

species could possibly exist in the vicinity of the project area. The Hawaiian hawk and Hawaiian hoary bat are federally listed endangered species[13].

As a consideration for minimizing impacts to these species, if a Hawaiian hawk or hoary bat is sighted perched within the project area, the contractor shall temporarily suspend work activities in the immediate proximity of the animal until the hawk or bat moves on their own accord.

During the months of June through August, Hawaiian hoary bats could potentially be breeding in the vicinity of the project area. Young bats, which are unable to fly, cling to trees and possibly bushes and shrubs and could potentially be injured or killed by tree felling and vegetation clearing[14]. DHHL will consider scheduling the start of the project and the majority of the initial clearing and grubbing period to fall outside of the bat breeding season between June and August, as much as possible, in order to minimize the potential of harming young bats. If bats are inadvertently encountered during construction, adequate mitigation measures as defined by Section 7 of the Endangered Species Act will be implemented.

It is likely that small numbers of the endangered endemic Hawaiian Petrel and threatened Newell's Shearwater overfly the project site between the months of May and October. In order to reduce the potential for interactions between nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures, it is recommended that any external lighting planned in conjunction with this development be shielded. No work will be conducted at night during the construction phase of the project in order to prevent potential collision injury with nocturnal avian species.

4.1.6 Water Resources

The project site overlies the Pahoa aquifer system, which consists of an unconfined, basal, flank aquifer system.[15] The water in the Pahoa aquifer is fresh and is considered to be irreplaceable and has a high vulnerability to contamination. The surface boundaries of the aquifer are defined as the surficial contact between Kilauea and Mauna Loa flows and the east rift zone of Kilauea volcano. Median annual rainfall over the aquifer ranges from 75 inches at the coast near Cape Kumukahi to 190 inches near Mountain View.

The average annual rainfall at the project site is around 120 inches.[16] Cracks and fractures make the lava highly permeable which enables a significant fraction of rainfall in the area to contribute to the underlying groundwater supply. The most recent (year 2002) annual water quality report available for the wells tapping the Pahoa system

[13] E-mail memorandum, USFWS 04/08/2005
[14] Ibid.
[15] Mink and Lau 1993.
[16] Giambelluca et al. 1986.

indicate that the system was compliant with all current State of Hawaii and the United States Environmental Protection Agency (EPA) drinking water standards.[17]

The aquifer is currently being used as a drinking water source and has an installed well capacity of roughly 4 million gallons per day (mgd). In 1998, a total of 1.23 mgd was pumped from this aquifer. The Commission on Water Resource Management (CWRM) estimates the sustainable yield of the Pahoa aquifer system to be 435 mgd (CWRM, 1990). The State of Hawaii plans to build wells, storage facilities and transmission lines to deliver up to 1.47 mgd of irrigation water to the Makuu Farm and Agricultural lots to meet the needs of agricultural users, sometime during the 2010-2020 period. After installation of these additional wells, the total volume of water that will be extracted from the aquifer will still be well less than 1 percent of the sustainable yield estimate for the system.[18]

Surface runoff from the project site occurs by overland sheet flow to the north-northeast with the majority of the site having moderate slopes. The ground cover generally consists of a dense vegetative canopy.

Potential Impacts and Mitigation Measures
The proposed project could potentially contribute to pollutant loads by way of runoff during construction and increased impermeable surfaces. In addition, the proposed project would add impervious surface areas to a presently undeveloped site, thereby increasing surface runoff volume and velocity within the project area. In an effort to mitigate such impacts, storm drain systems will be designed in accordance with the Total Maximum Daily Load (TMDL) objectives and guidelines established by the DOH. Other pollutant load reduction practices will be addressed during the construction phase of the proposed project through the National Pollutant Discharge Elimination System (NPDES) permit process and consultation with permitting agencies.

4.1.7 Flood Hazard

Surface water flow within the project area is minimal owing to the high permeability of the young, surface lava flow units. These lava units are generally well drained with only occasional boggy pockets present in localized areas where small amounts of soil have accumulated. Small amounts of surface runoff may occur over short distances in paved or compacted portions of the project area, with the resultant overland sheet flow generally moving in a northeasterly direction. The project site does not lie within either the 100-year or the 500-year flood zone, as defined by the Federal Emergency Management Agency.

Potential Impacts and Mitigation Measures
No adverse impacts are anticipated from flood hazards. No mitigation is required.

[17] Geometrician Associates and Engineers Surveyors Hawaii, Inc. 2004.
[18] Ibid.

4.1.8 Hazardous and Toxic Materials Considerations

The project site has never been developed and as a result no known hazardous substances are believed to exist on the property. No evidence of hazardous waste was observed on the property during two separate site visits performed in conjunction with separate environmental site assessments performed on the subject property conducted on August 20 and November 29, 2004 by Myounghee Noh & Associates (2004) and Environet (2004), respectively. A discarded refrigerator was observed near the entrance to the property from Niaulani Street during the Environet site visit in November. The Phase I environmental site assessment conducted by Environet is included in Appendix C.

A Phase I Site Assessment prepared in March 1999 by J.R. Herold and Associates, Environmental Professionals suggests that there are no significant problems associated with hazardous and toxic materials (HTM) at the project site. During their investigation, J.R. Herold and Associates reported no observation of underground storage tanks and no fluid filled transformers or capacitors.

A site survey commissioned by the United States Army Corps of Engineers in 1991 discovered ordnance on DHHL property located roughly two miles to the northeast of the project site.[19] Two types of unexploded practice bombs were discovered in this area, known as the Popoki Target range. The area was used by the U.S. Navy during World War II as a target range. The ordnance discovered consisted of 4-pound mk 23 practice bombs with a mk 4 spotting charge and 100-pound water/sand practice bombs.

Unexploded ordnance has not been encountered during construction and occupancy of previous development projects in the area.

Potential Impacts and Mitigation Measures

The U.S. Army Corps of Engineers are currently in the process of conducting a Remedial Investigation/Feasibility Study for cleanup of the Popoki Target range. Conclusion of cleanup is estimated in mid-June of 2006. Meanwhile, the Popoki Target range is located at a distance away from the project site as to not warrant any concerns regarding encountering unexploded ordnance during project construction or during occupancy by residents living in the area. The U.S. Army Corps of Engineers confirmed this for DHHL and the Makuu Farmers Association in a presentation on April 14, 2005.

As a conservative measure, however, construction contract documents will stipulate that inadvertent discoveries of unexploded ordnance (UXO) will be reported by calling 911. UXO will not be handled or moved.

[19] USACE 1991.

4.1.9 Climate and Air Quality

An air quality study was completed by B.D. Neal & Associates (2004) in conjunction with this EA. The full report is presented in Appendix D.

The regional and local climate together with the amount and type of human activity generally dictate the air quality of a given location. The climate of the project area is affected by its near coastal situation and by the presence of nearby mountains. Winds are predominantly light and variable, although storms generate occasional strong winds from the south or southwest during winter. Temperatures in the project area are generally very consistent and moderate with average daily temperatures ranging from about 65°F to 85°F. The extreme minimum temperature recorded in nearby Hilo is 53°F, while the extreme maximum temperature is 94°F. Average annual rainfall in the area amounts to about 144 inches. Except for periodic impacts from volcanic emissions (vog) and occasional localized impacts from traffic congestion, the present air quality of the project area is believed to be relatively good. The limited air quality data that is available for the area from the Department of Health (DOH) indicate that concentrations are well within state and national air quality standards, despite the occasional presence of vog.

Potential Impacts and Mitigation Measures
The major potential short-term air quality impact of the project will occur from the emission of fugitive dust during construction. Uncontrolled fugitive dust emissions from construction activities are estimated to roughly amount to about 1.2 tons per acre per month under conditions of "medium" activity.[20] An effective dust control plan will need to be implemented in order to eliminate emissions of fugitive dust from future construction activities at the property line in order to comply with State of Hawaii Air Pollution Control regulations.

In order to control dust, active work areas and any temporary unpaved work roads should be watered at least twice daily on days without rainfall. Use of wind screens and/or limiting the area that is disturbed at any given time will also help to contain fugitive dust emissions. Wind erosion of inactive areas of the site that have been disturbed could be controlled by mulching or by the use of chemical soil stabilizers. Dirt-hauling trucks will be covered when traveling on roadways to prevent dust generation during transport. A routine road cleaning and/or tire washing program will also help reduce fugitive dust emissions that may occur as a result of trucks tracking dirt onto paved roadways in the project area. Paving of parking areas and establishment of landscaping early in the construction schedule will also help control dust. Monitoring dust at the project boundary during the period of construction could be considered as a means to evaluate the effectiveness of the project dust control program and to adjust the program if necessary.

[20] EPA 1995.

During construction phases, emissions from engine exhausts (primarily consisting of carbon monoxide and nitrogen oxides) will also occur both from on-site construction equipment and from vehicles used by construction workers and from trucks traveling to and from the project site. Increased vehicular emissions due to disruption of traffic by construction equipment and/ or commuting construction workers can be alleviated by moving equipment and personnel to the site during off-peak traffic hours.

After the proposed project is completed, any long term impacts on air quality in the project area due to emissions from project-related motor vehicle traffic should be small. The maximum one-hour average carbon monoxide concentration resulting from development of the site (year 2015 scenario) was estimated using two EPA computer models, MOBILE6 and CAL3QHC (EPA, 1992; 2002). Maximum one-hour concentrations of 4.1 mg/m^3 and 2.5 mg/m^3 were calculated for the intersection at Niaulani Street and Keaau-Pahoa Road for signalized and unsignalized scenarios, respectively. The simulated worst-case 1-hour concentrations for both scenarios were well within the national ambient air quality standard (AAQS) of 40 mg/m^3 and the more stringent state standard of 10 mg/m^3. Implementing any air quality mitigation measures for long-term, traffic-related impacts is probably unnecessary and unwarranted.

Any long term impacts on air quality due to indirect emissions created from supplying the project with electricity and from the disposal of waste materials generated by the project will likely be small based on the relatively small magnitudes of these emissions. Nevertheless, indirect emissions from project electrical demand could likely be reduced somewhat by incorporating energy-saving features into project design requirements. This might include the use of solar water heaters; designing building space so that window positions maximize indoor light without unduly increasing indoor heat; using landscaping where feasible to provide afternoon shade to cut down on the use of air conditioning; installation of insulation and double glazed doors to reduce the effects of the sun and heat; providing movable, controlled openings for ventilation at opportune times; and possibly installing automated room occupancy sensors.

Solid waste related air pollution would be reduced somewhat by the promotion of conservation and recycling programs within the proposed development. This would reduce solid waste volumes, which would in turn reduce any related air pollution emissions proportionately.[21]

4.1.10 Noise

An environmental noise study was completed in conjunction with this EA by D.L. Adams Associates, LTD. (2004). The full report is presented in Appendix E.

The dominant background ambient noise source in the vicinity of the project site is motor vehicle traffic along Keaau-Pahoa Road (Highway 130). Continuous ambient

[21] B.D. Neal & Associates 2004.

noise levels were measured near the closest residential lot to the highway. The results show a maximum Equivalent Sound Level, Leq, of 62 dBA during peak hour traffic, which is within acceptable federal and state noise level criteria for residential areas.

Potential Impacts and Mitigation Measures
Projected noise levels in the year 2015 under fully occupied project conditions were estimated. The results show a maximum Equivalent Sound Level, L_{eq}, of 62 dBA during peak hour traffic. Projected noise levels in the year 2015, including a fully occupied project, and increases in traffic independent of the project were calculated to be L_{eq} = 64 dBA, a 2 dB increase over the existing conditions. Both the existing conditions and future projections are within the U.S. Federal Highway Administration (FHWA) and State Department of Transportation (DOT) maximum noise criteria of L_{eq} = 67 dBA.

Based on the noise measurements, the Day-Night Level, L_{dn}, was estimated to be 57 dBA. Therefore, the HUD "Acceptable" maximum noise criteria of L 65 dBA is satisfied.

During the construction phase of the project, typical construction noise would be audible in the area in the immediate vicinity of construction work sites. Noise from construction activities must comply with the DOH noise regulations as specified for construction related activities. Such regulations include the use of properly muffled construction equipment, maintaining hours during which construction is permitted, and ensuring that noise levels fall within permitted levels during those hours. According to DOH regulations, noisy construction activities are not allowed during the nighttime hours or on Sundays and holidays. Use of curfew periods during the construction phase should help to minimize risks of adverse noise impacts.

After construction is complete, noise generated from stationary mechanical equipment on the project site must meet the State Department of Health noise regulations, which allow adjustments for existing ambient noise levels.

Noise from vehicular traffic in the area due to the project is not expected to significantly increase over the existing ambient noise levels. The increase in project generated traffic noise was calculated to be less than 1 dB.

4.2 Social Environment

4.2.1 Land Use Considerations

The project site encompasses approximately 240 acres of the 540-acre parcel identified as TMK (3) 1-5-008: 003 and twelve 2-acre farm lots with the TMK numbers (3) 1-5-119: 010 through 021. The parcels are located between Pahoa town and the Ainaloa subdivision adjacent to the existing Makuu Farm Lots Subdivision. The affected parcels are approximately 2 miles north of Pahoa. Ownership history is from historical records maintained by the City and County of Honolulu Real Property Tax Division and the

County of Hawaii Real Property Tax Office. Existing records indicate that the affected parcels has been owned by the State of Hawaii, Department of Hawaiian Home Lands since their establishment[22]. Real property records dating back to 1948 indicate that portions of the project site have been leased primarily for pasture and farming purposes.[23]

The earliest available aerial photograph from 1958 shows the project site as undeveloped vacant land.[24] Subsequent aerial photographs from 1961, 1965, and 2004 show that the project site has continued to remained vacant and undeveloped.[25] A majority of the project site is overgrown with trees, shrubs, and grasses. A few roads are present to the northeast of the project site and a dirt road runs along the southeastern property boundary.

Photographs taken along the boundaries of the project site during site reconnaissance on November 29, 2004 are provided in Figure 4-4.[26] The existing Makuu Farm Lots are present across Keaau-Pahoa Road to the northeast of the project site. Surrounding land uses are mostly undeveloped and vacant land with the exception of the residential area of Ainaloa, which is located roughly 1.5 miles north of the project site. The existing Makuu Agricultural Lots Subdivision along the northeastern border of the site appears to be mostly vacant and undeveloped with the exception of Niailani Street, Kauhaenae Place and Kipika Place and at least one residential home off Niaulani Street. The area surrounding the project site is sparsely populated and characterized by low-density rural residences, small farms, and lands utilized for agriculture (Figure 4-5).

The project site falls within the State Land Use Agricultural District. The County Zoning is Agricultural, minimum lot size 20 acres (Ag-20). It is designated on the County General Plan Land Use Designation Maps (LUPAG) as Rural (Figure 4-5).

The Memorandum of Agreement (MOA) executed between the County of Hawaii and DHHL, dated December 27, 2002 clarifies the respective roles of each party with regards to land use planning, infrastructure maintenance, enforcement of laws, and collection of taxes and fees on Hawaiian home lands. The MOA is presented in Appendix F. The following guiding principles from the MOA pertain to land use:

II.A. The Hawaiian Homes Commission is responsible for determining land use on Hawaiian home lands. The County may not use its land use and zoning powers to prevent the Hawaiian Homes Commission from controlling the use of Hawaiian home lands.

II.B. The County and DHHL share common goals in planning for the use of Hawaiian home lands: both support the orderly development of those lands

[22] Environet, Inc. 2004: pg. 4-10.
[23] Ibid.
[24] Environet, Inc. 2004: pg. 4-6.
[25] Ibid.
[26] Refer to Figure 5-1 in Environet, Inc. 2004.

for the benefit of native Hawaiians and both are committed to the integration of planning by DHHL and Hawaii County.

Potential Impacts and Mitigation Measures
The development of roads and infrastructure on the project site for the purpose of allowing DHHL to distribute Hawaiian homestead lots to eligible beneficiaries is considered to be consistent with surrounding land uses and long-term land-use planning objectives. No adverse impacts are anticipated and no mitigation is required in light of Section III of the MOA between the County of Hawaii and DHHL, which relates to planning and land use:

III.A. DHHL will implement its Planning System which includes plans with DHHL land use designations such as the Hawaii Island Plan, various Development and Subdivision Plans, and Homestead Community Plans. In the formulation, updating, and amendment of these plans, DHHL will consult with the relevant County departments, and shall give due consideration and weight to their comments, and to the Hawaii County General Plan, and other officially adopted plans such as Community Development Plans. All land uses on DHHL property will be placed according to the applicable DHHL plans.

III.B. The County will consult with DHHL over the appropriate designations of DHHL property in the Hawaii County General Plan LUPAG maps, and shall give due weight and consideration to the comments of DHHL, and to officially adopted DHHL plans.

III.C. Based on its plans and DHHL land use designations, DHHL will determine the appropriate County zoning districts that shall apply to the property in question. DHHL will communicate these zoning districts to the County.

III.D. All normal land use controls will be applied by Hawaii County to DHHL property according to the zoning district selected by DHHL. Except as specifically provided in the Agreement, DHHL will follow all normal land use procedures, regulations, and standards applicable to the zoning district.

III.E. All land use permit applications on Hawaiian home lands must be accompanied by written consent from DHHL before the County can begin processing those applications.

III.F. The standards of the various zoning districts selected will apply to DHHL property. DHHL and its lessees will go through normal County administrative variance procedures if they seek exemption from standards.

III.G. For uses allowed in the various zoning districts that require special permits or use permits, DHHL and its lessees will go through the applicable County permit procedures. At some time in the future, DHHL may implement its own use permit procedure for Hawaiian home lands. If DHHL grants use permits, it will not be responsible for enforcing violations of those permits. The County will be notified when DHHL has formulated its use permit system.

III.H. The County will advise DHHL of all violations by its lessees. The County will enforce land use codes and regulations on Hawaiian home lands in the same manner as with other landowners. DHHL will cooperate with the County in

enforcing the terms of its lessees requiring conformity to applicable laws and regulations, if requested by the County. Ongoing violations and failure to comply will be referred to DHHL after the County has exhausted all remedies short of pursuing legal action to address the violation. DHHL may institute lease enforcement proceedings in advance of, or in lieu of, County enforcement actions.

4.2.2 Historic and Cultural Resources

A. Historical and Archaeological Considerations

Two archaeological sites were recorded on the project site. One is a so-called enclosure complex and the other is a small retained terrace of "ambiguous antiquity and function."[27] The full report, Archaeological Survey of the DHHL Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision (TMK: 3-1-5-08:03) (2004) by Rechtman Consulting, LLC, is provided in Appendix G.

The enclosure complex consists of several connected features including a large enclosure, a constructed mound, a wall, and a platform. The site is located in the eastern side of a moderately high basalt outcrop in the northern portion of the project area and has an area of approximately 10 square meters.[28] During the archaeological survey, five test units were excavated at the site. The findings indicated that the construction methods and overall design of the site points to a traditional Hawaiian cultural affiliation. The archeologists found that the functionality of the site appeared somewhat ambiguous. The site location and design indicate that that the site functioned as either a residence or for ceremonial purposes, however, test excavation within the enclosure produced no evidence of habitation. Findings encountered at the site suggest a ceremonial function is more probable.[29] As this site is interpreted by the archeologists to have been a location of Native Hawaiian ceremonial activity, the site is significant under Criterion d and considered eligible for listing in the National Register of Historic Places.

The small retained terrace is located near the top of an outcrop in the northern portion of the project area. According to the archaeologists, this feature is considered "temporally and functionally ambiguous", and it is more likely a modern feature or a natural collection of rocks. This site is therefore evaluated to not be eligible for listing in the National Register of Historic Places.

Potential Impacts and Mitigation Measures

The development of roads and infrastructure on the project site has the potential to affect a known archaeological site that may be eligible for listing in the National Register of Historic Places. The establishment of a sufficiently large buffer zone around the site

[27] Rechtman Consulting 2004.
[28] Ibid.
[29] Ibid.

would allow its preservation so as to render a no adverse effects determination. DHHL in consultation with the Hawaii State Historic Preservation Division (SHPD) and other consulted parties will prepare an agreement document that specifies the condition of preservation assuring the no adverse effects determination.[30]

The terrace feature is most likely ineligible for listing as Historic Property; therefore, the proposed project will have no effect on the site.[31] No mitigation is required.

In the event that cultural artifacts or human remains are inadvertently encountered during the development of roads and infrastructure on the project site, all operations in the vicinity of the discovery will immediately cease. The discovery and its surrounding area will be secured and protected from further damage. The State Historic Preservation Division (SHPD) will be notified of the discovery, and immediate consultation with the Hawaii Island Burial Council will be sought before commencement of construction activities.

B. Cultural Resources, Practices Consultation

A Cultural Impacts Assessment was conducted by Rechtman Consulting, LLC (January 2005) pursuant to Act 50, approved by the Governor on April 26, 2000, and in accordance with the Office of Environmental Quality Control *Guidelines for Assessing Cultural Impact*, adopted by the Environmental Council in 1997. The full report is in Appendix H.

The Office of Hawaiian Affairs (Ululani Sherlock), the Makuu Farmers Association (Paula Kekahuna along with several other members), and Kepa Maly (Kumu Pono Associates) were contacted in an effort to obtain information about any potential traditional cultural properties that might be present in upper Makuu, Halona, and Popoki ahupuaa. None of the organizations/individuals contacted had any information relative to the existence of traditional cultural properties in the immediate vicinity of the project area, nor did they provide any information indicating current use of the area for traditional and customary practices.

As a result of the current assessment only one significant cultural resource has been identified, the enclosure complex located in the northern portion of the project area discussed in Section 4.2.2.A Historical and Archaeological Considerations above. Although it appears unlikely that other resources may be identified during land clearing activities, archaeological monitoring will occur during initial grubbing to ensure an appropriate and timely response to any unanticipated discoveries. A monitoring plan has been prepared and submitted to the Department of Land and Natural Resources (DLNR)-State Historic Preservation Division (SHPD) by the project's consulting archaeologist prior to issuance of a county grubbing/grading permit.

Potential Impacts and Mitigation Measures

[30] Ibid.
[31] Ibid.

As discussed in the previous section (Section 4.2.2.A), DHHL will ensure proper protection of the enclosure complex through an approved monitoring and permanent preservation plan that will be reviewed and approved by the Hawaii State Historic Preservation Officer. Until such time that the in place preservation plan is implemented, the site will be protected against damage by a protective barrier (construction fencing) erected around the site at a distance determined by consultation with the SHPD.

Execution of the above described mitigation measures will help to ensure that no cultural practices and beliefs or associated cultural resources will be adversely affected by the proposed DHHL Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision development.

4.2.3 Circulation and Traffic

Keaau-Pahoa Road (Highway 130) is a minor arterial roadway that serves as the main access route for the *makai* or seaward Puna area. The posted speed limit on Keaau-Pahoa Road in the vicinity of the project site is 55 miles per hour.

Vehicular access to the project site is from Niaulani Street to the northeast, off Keaau-Pahoa Road. Niaulani Street serves the existing Makuu Agricultural Lots located *mauka* or inland of Keaau-Pahoa Road and along the northeastern border of the project site. Kauhaenae Place and Kipika Place are additional roads that run perpendicular to Niaulani Street through the majority of the subdivision. Kipika Place turns south near its end at the southeastern boundary of the existing Makuu Agricultural Lots Subdivision. Kaluahine Road (which is roughly opposite Nialani Street) and Ka Ohuwalu Street facilitate access to the Makuu Farm Lots *makai* of Keaau-Pahoa Road. Stop signs on Niaulani Street and Kaluahine Road control the approaches that intersect with Keaau-Pahoa Road. Both Niaulani Street and Kaluahine Road convey very little traffic because the existing Makuu Farm and Agricultural Lots Subdivision in the vicinity of the project site are mostly vacant.

Potential Impacts and Mitigation Measures

The traffic impact analysis report (TIAR) that was prepared in conjunction with this EA is included as Appendix I. Traffic in the project area is expected to increase as the Makuu subdivisions are occupied over a period of several years. The TIAR estimates an annual growth rate of 2.35 percent.[32] A lower growth rate would imply that the traffic volumes would occur later, whereas a higher growth rate would indicate that the traffic volumes would be reached sooner. Project traffic was assumed to exhibit typical suburban characteristics including higher volumes during weekday peak hours for work or school trips. It was estimated that 70 percent of project traffic would travel to or from the north, 29 percent would travel to or from the south, and 1 percent would flow across the highway[33] (Figure 4-6)

[32] Ng 2004: pg. 2.
[33] Ng 2004: pg. 3.

A Level of Service (LOS) analysis was performed to qualitatively measure the traffic flow in the vicinity of the proposed project. LOS is measured by grades A through F, with A representing the best conditions and F being the worst. LOS C describes average delays and is considered desirable for rural areas and LOS D is considered acceptable.

From a regional perspective, full occupancy of the 363 new residences would represent an increase of less than 5 percent of the 7,860 existing dwellings in the *makai* Puna area.[34] The project could increase the rate of growth of traffic volumes on Keaau-Pahoa Road.[35]

The proposed project will increase traffic volumes on Niaulani Street. The LOS analysis from the TIAR indicates that the unsignalized intersection of Niaulani Street with Keaau-Pahoa Road has inadequate capacity for eastbound left turn movements from Niaulani Street onto Keaau-Pahoa Road and through movements across the highway.[36] The existing northbound left lane from Keaau-Pahoa Road to Niaulani Street would also be inadequate for the project turn volume.[37] Poor peak hour conditions are expected to occur as the lots are built upon and homes occupied if the intersection remains unsignalized. The replacement of the existing stop sign control with a traffic signal at the intersection of Niaulani Street and Keaau-Pahoa Road may eventually be needed to allow for safe turns from Niaulani Street onto the highway.[38] The existing northbound left turn lane from the highway should be lengthened to provide for adequate deceleration length plus storage for three cars (75 feet).[39] These improvements may be needed only after 200 dwelling units are built and occupied.

DHHL will coordinate any requirements for intersection improvements if warranted. If such improvements are deemed to be required later, the plans will be submitted to the appropriate agencies and the costs will be included as off-site costs for developing the property.

4.2.4 Social Factors and Community Identity

The project site is located within a region identified by the U.S. Census Bureau as the Pahoa-Kalapana area. In comparison to the island as a whole, the Pahoa-Kalapana area has a somewhat greater portion of residents born outside the State, and an ethnic makeup that has a greater proportion of both whites and Hawaiians than Hawaii County as a whole.[40] The project area has more children as well as more elderly than the

[34] Townscape, Inc. in Ng 2004: pg. 7.
[35] Ng 2004: pg. 7.
[36] Ng 2004: pg. 4.
[37] Ibid.
[38] Ng 2004: pg. 7.
[39] Ibid.
[40] Geometrician Associates and Engineers Surveyors Hawaii, Inc. 2004: pg. 3-15.

County average, but has a median age that is roughly the same.[41] Pahoa-Kalapana also has lower median incomes, a greater proportion of residents living in poverty, and a greater proportion of adults younger than age 64 with a disability.[42]

Potential Impacts and Mitigation Measures

No residences, businesses, community facilities, farms, or other activities would be displaced as a result of the proposed project because the site is currently undeveloped and vacant. It is the long-term goal of the project to foster a Hawaiian lifestyle. No adverse impacts are anticipated and no mitigation is required. The resulting settlement of the area by native Hawaiians may be regarded as a benefit of the proposed project since the goal of the homesteading program is to increase the economic self-sufficiency of native Hawaiians through the provision of land. The resulting neighborhood that would result from the proposed project would reflect the culture and values of the past Hawaiian communities.

4.2.5 Recreational and Public Facilities

The project area is located in a relatively rural portion of the island of Hawai'i. As a result, many of the existing recreational and public facilities are located a relatively great distance from the project site. County parks and playgrounds in the Puna area are under the jurisdiction of the County of Hawai'i, Parks and Recreation Division. The only county parks that exist within the Puna district are located along the ocean shoreline at the Ahalanui Beach Park and the Issac Hale Beach Park. There are two existing state parks in the Puna district, Lava Tree State Monument and MacKenzie State Recreation Area. These state park areas are located roughly 5 and 10 miles away from the project area, respectively.

The public school system in Puna is under the jurisdiction of the state Department of Education. The project area is serviced by Pahoa Elementary and Pahoa Intermediate & High Schools, which are located roughly 3 miles from the project site. In September 2002, the enrollment at Pahoa Elementary was 442 students while Pahoa Intermediate & High School had 827 students.[43]

The only hospital in the vicinity of the project area is the Hilo Medical Center (HMC), which was established in 1897. The HMC provides comprehensive health care services, including medical, surgical, ambulatory care, home care, psychiatry, and an extended care facility. In the year 2002, the HMC had a total bed capacity of 142 for acute care and 134 beds for long-term care. This hospital is located approximately 20 miles to the northwest of the project area.

[41] Ibid.
[42] Ibid.
[43] County of Hawaii 2003.

The nearest police station to the proposed project site is the Keaau station located roughly 10 miles to the northwest of the project area. The nearest fire station is located approximately 2 to 3 miles southeast of the project site in Pahoa. The present level of public facilities and services provides adequate services to handle the current demand.

Potential Impacts and Mitigation Measures
No recreational and public facilities would be displaced as a result of the development of roads and infrastructure on the project site. The proposed project includes setting aside about 12.7 acres for future development of a park, which would benefit the surrounding community.

Nevertheless, the local public school population could grow by approximately 30 percent over year 2002 levels by the year 2015 (or an average growth rate of approximately 2 percent per year) if one child lives on each of the 365 developed homestead lots and attends public school. In general, the proposed project is not expected to place enough of a demand to result in the need to increase the level of current facilities and services in the project area. No mitigation is required.

4.2.6 Visual and Aesthetic Resources

Views from along the project site boundaries are of the sparsely populated surrounding area. Low-density rural residences, small farms, and lands utilized for agriculture contribute to the overall aesthetic quality of the project area.

Potential Impacts and Mitigation Measures
The proposed project to develop roads and infrastructure on the project site would not significantly impact important visual and aesthetic resources of the project site and surrounding area such as *mauka-makai* view corridors, views of significant landmarks or natural resources, or ridge line views from outside or within the project boundaries. The proposed project would further the establishment of residential and subsistence agriculture homesteads that would be consistent with the visual characteristics of the surrounding area. No mitigation is required.

4.2.7 Infrastructure Systems and Utilities

The following guiding principles from the MOA executed between the County of Hawaii and DHHL, dated December 27, 2002 pertain to infrastructure systems:

III.C. The County should manage and maintain all infrastructure built to County standards.

The project site is currently vacant and undeveloped; therefore, there are no existing infrastructure or utility systems within the 284-acre area that is proposed for residential

and subsistence agriculture homesteads. There is no demand for potable water, wastewater conveyance, drainage, or solid waste collection while the project site remains vacant. Similarly, there is no demand for utility services such as electricity, telephone, or cable television at the undeveloped project site.

Potential Impacts and Mitigation Measures
The proposed project to provide the necessary infrastructure and utilities for homestead development would be accomplished in accordance with County of Hawaii standards. All infrastructure and utilities would be integrated with existing systems.

DHHL addressed the development of a well and supporting utilities for its existing Maku'u Farm and Agricultural Lots Subdivisions as well as the Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision in the *Final Environmental Assessment and Finding of No Significant Impact for the Maku'u Offsite Water System Phase 2, Maku'u, Island of Hawai'i, State of Hawai'i* (Geometrician Associates and Engineers Surveyors Hawaii, Inc. 2004). The development of the production well with its appurtenances is expected to provide adequate supply to Hawaiian homesteads in the project area.

Wastewater conveyance for the project site would be accomplished by the use of individual wastewater systems. DHHL's application for a variance to allow the use of individual wastewater systems for its Makuu Residential Subdivision was filed on May 4, 2004 and approved by the Department of Health on July 14, 2004.

The Proposed Action to develop the project site for Hawaiian homestead lots is considered to be consistent with long-term planning objectives pertaining to infrastructure. No adverse impacts are anticipated and no mitigation is required in light of Section IV of the MOA between the County of Hawaii and DHHL, which relates to public facilities and infrastructure serving Hawaiian Home Lands:

IV.A. In the development of future projects, DHHL will construct public facilities in accordance with County standards. Where departures from County standards are desired, DHHL will pursue exemptions and other administrative variances from the appropriate County department, in accordance with procedures established for all property owners. Should DHHL choose not to construct infrastructure in accordance with County standards, the County may view such improvements as private facilities for repair and maintenance purposes.

IV.B. The County will accept operation, repair, and maintenance of all future DHHL infrastructure constructed according to County standards.

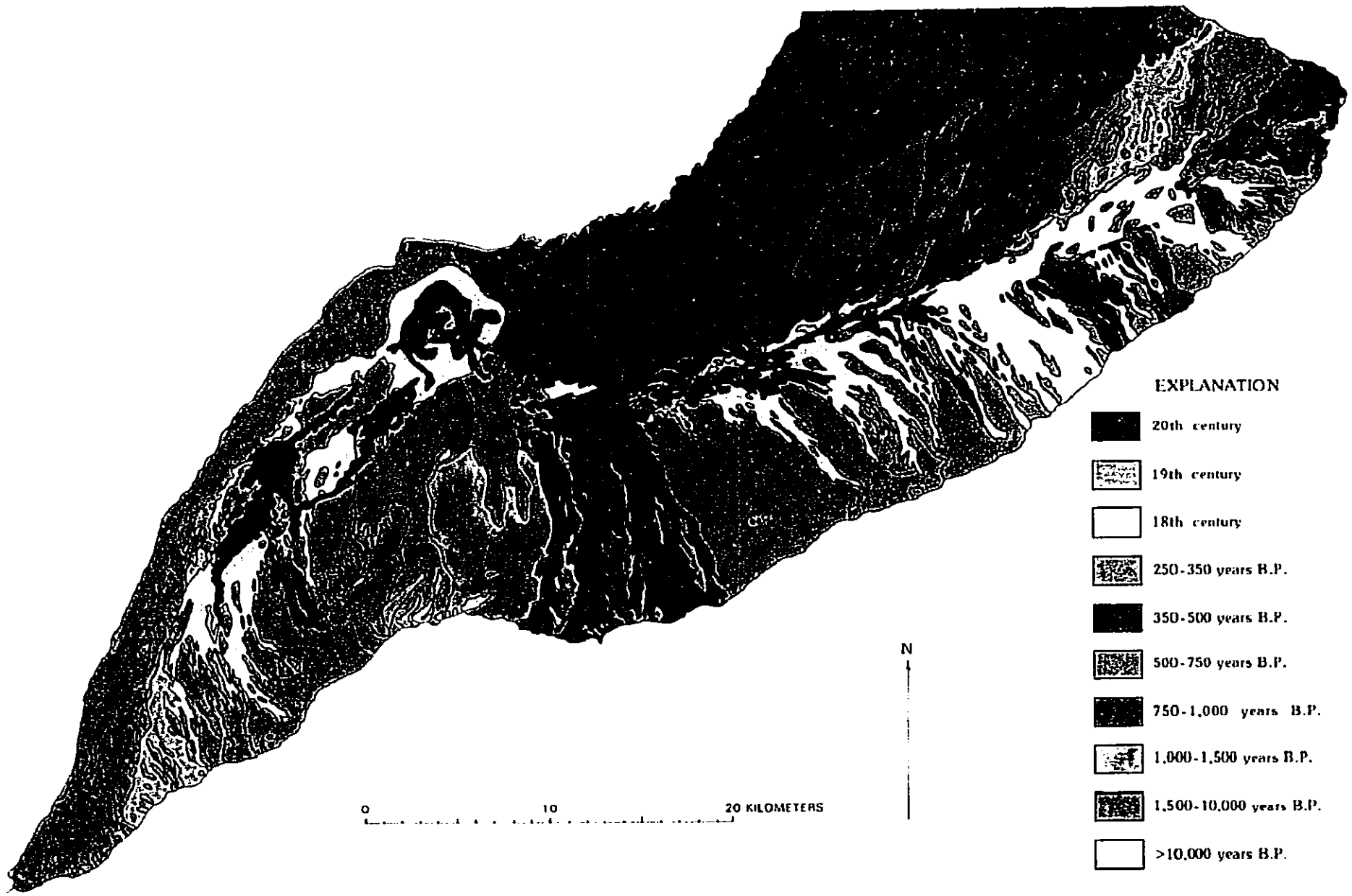
IV.C. Existing infrastructure shall be subject to County inspection prior to being accepted by the County for operation, repair and maintenance. The County may require DHHL to repair any damage such as leaks, holes, sags, or deterioration affecting the operation of the existing infrastructure, identified as a result of the inspection.

IV.D. In the case of existing infrastructure that is not constructed to County standards, the County and DHHL will work to establish minimum standards for residential, agricultural, and pastoral subdivisions. Existing projects will be evaluated based on these new standards. The County may require DHHL to upgrade the infrastructure to the minimum standards prior to being accepted by the County for operations, repair, and maintenance.

IV.E. The County will maintain infrastructure according to its own standards, resources and schedules. Any decisions as to upgrades or rehabilitation will be at the County's discretion.

IV.F. Should DHHL elect to convert its land to a more intensive lands use, DHHL will be responsible for upgrading the onsite infrastructure to accommodate the new use, and will consult with the County regarding the need to upgrade offsite infrastructure. DHHL and the County shall negotiate the extent to which DHHL will be responsible for any such offsite improvements requested by the County. DHHL shall be responsible for project-related offsite improvements to the extent that these would be required of other developers with similar projects. If offsite improvements benefit other property, DHHL and the County shall cooperate so that DHHL bears only its fair share of these improvement costs.

IV.G. The County will treat DHHL lessees in the same manner as other property owners with respect to conformity with laws, ordinances, and regulations. The County will advise DHHL of violations, and will refer cases of ongoing violation to DHHL after the County has exhausted all remedies short of pursuing legal action to address the violation. DHHL reserves the right to institute lease enforcement proceedings in advance of, or in lieu of, County enforcement actions.



REFERENCE: USGS

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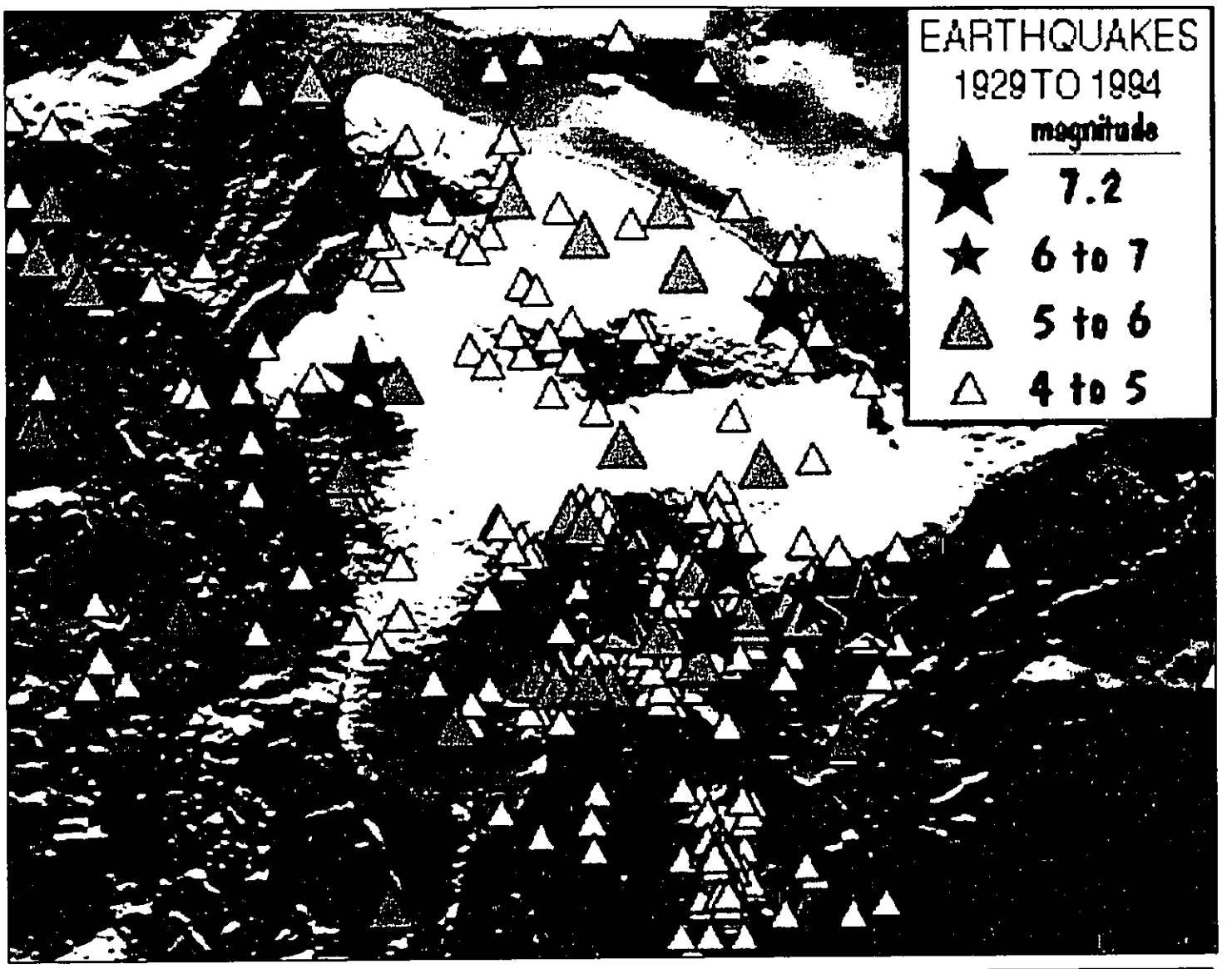
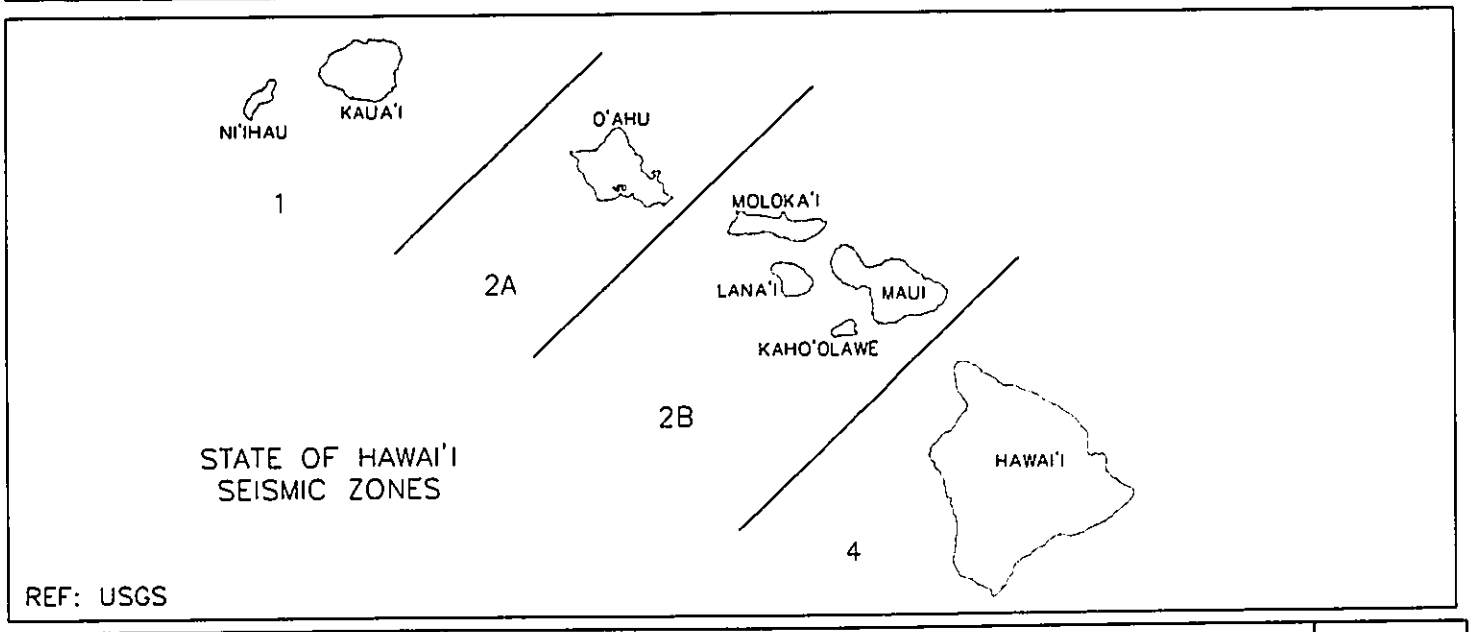
MAKUU–HALONA SUBDIVISION AND MAKUU–POPOKI RESIDENTIAL SUBDIVISION EA

AGE OF SURFICIAL LAVA FLOWS OF KILAUEA

FIGURE 4–1





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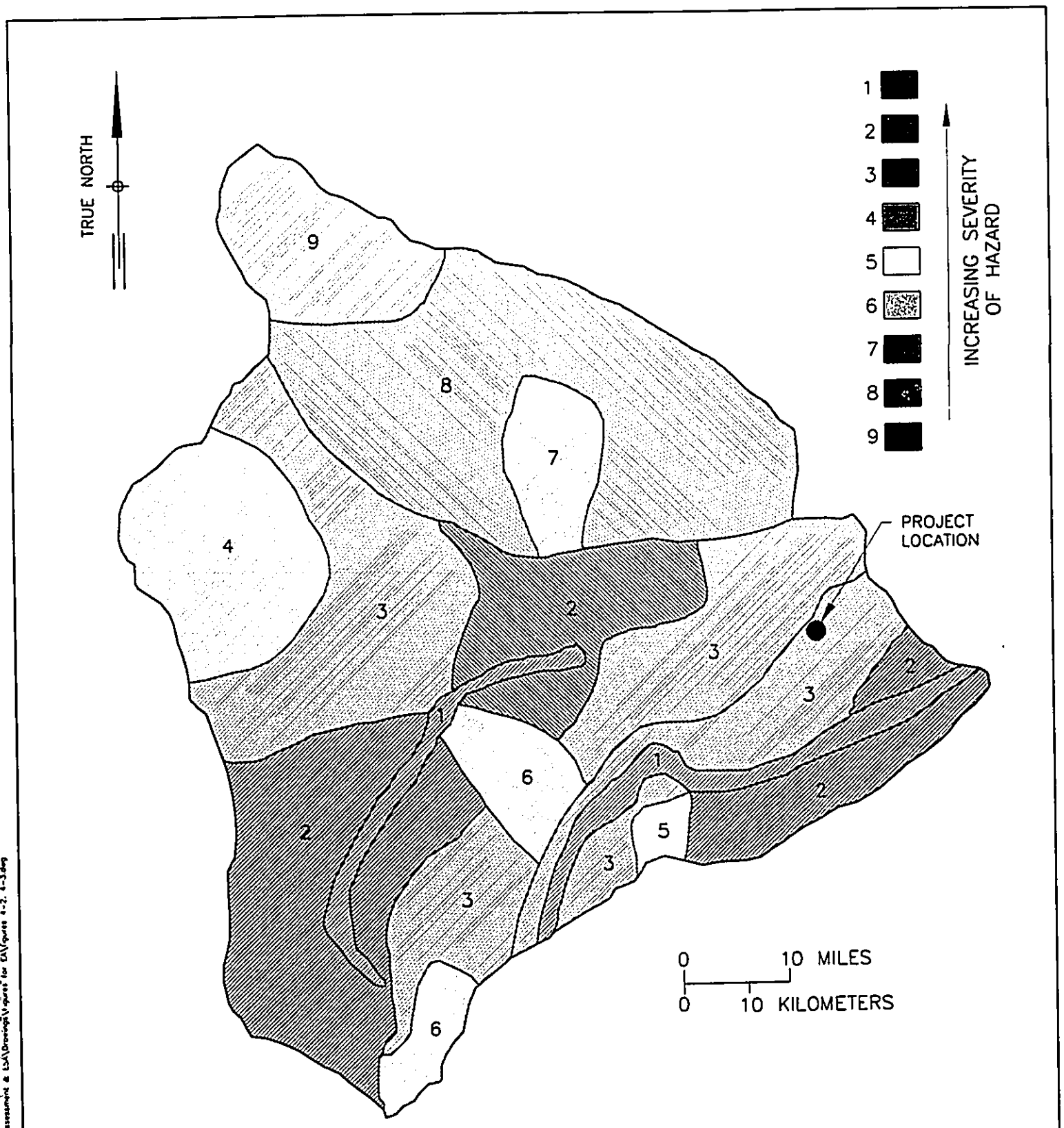
EARTHQUAKE INTENSITY AND HAZARD ZONE MAP

FIGURE 4-2



REF: USGS

ENVIRONET, INC.
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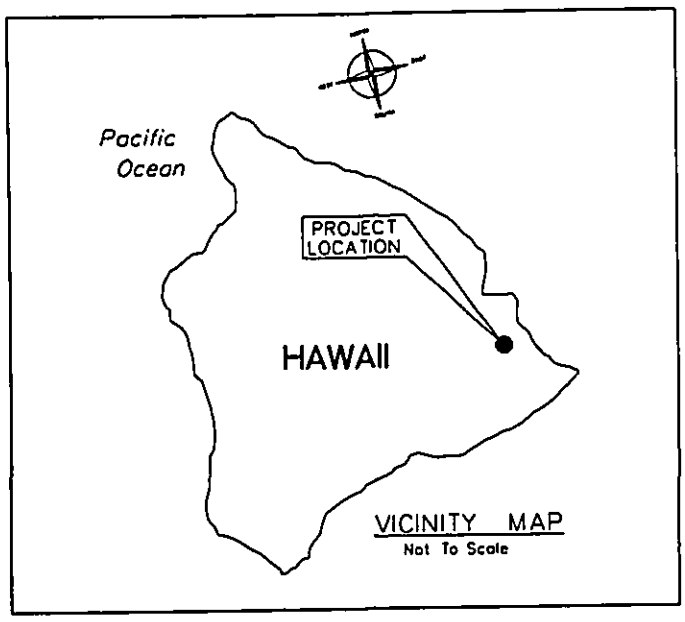
MAKUU–HALONA SUBDIVISION AND MAKUU–POPOKI RESIDENTIAL SUBDIVISION EA

LAVA FLOW HAZARD ZONE MAP

FIGURE 4–3

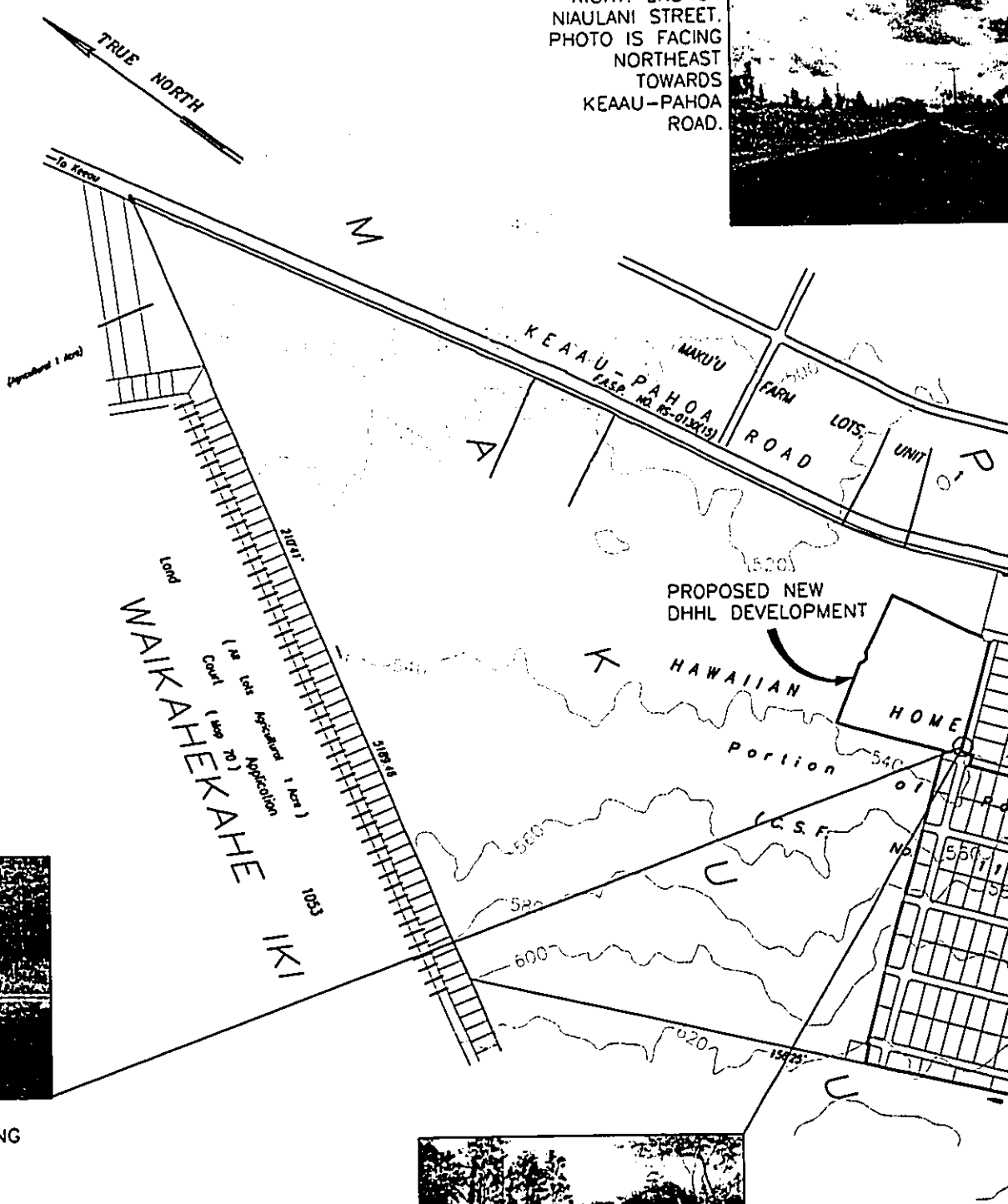


VICINITY MAP
Not To Scale

RIGHT: END OF NIAULANI STREET. PHOTO IS FACING NORTHEAST TOWARDS KEAAU–PAHOA ROAD.

NORTHWEST PROPERTY BOUNDARY. PHOTO IS FACING NORTH–NORTHWEST.

NORTHWEST PROPERTY BOUNDARY. PHOTO IS FACING SOUTHEAST.



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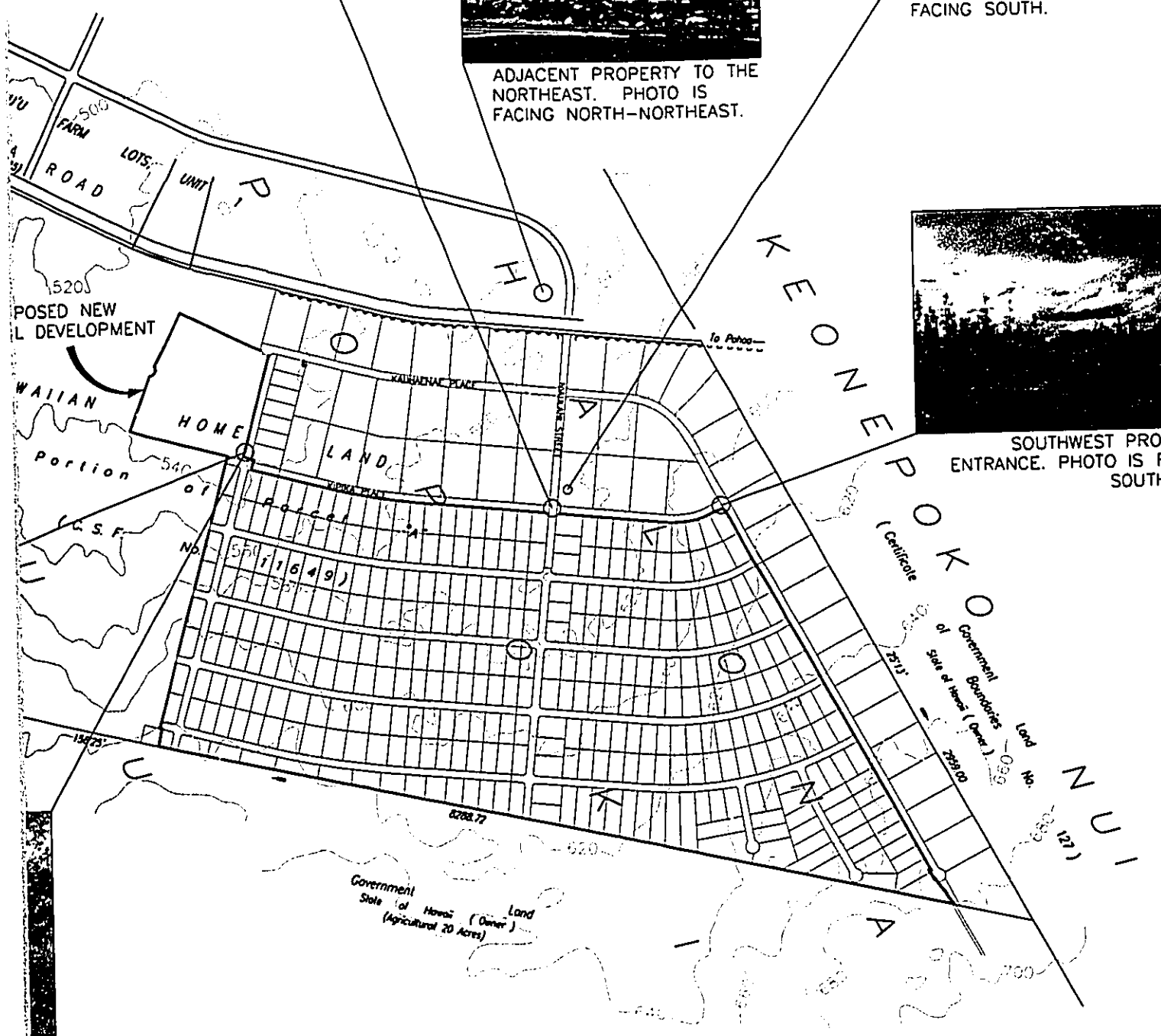
NOT TO SCALE

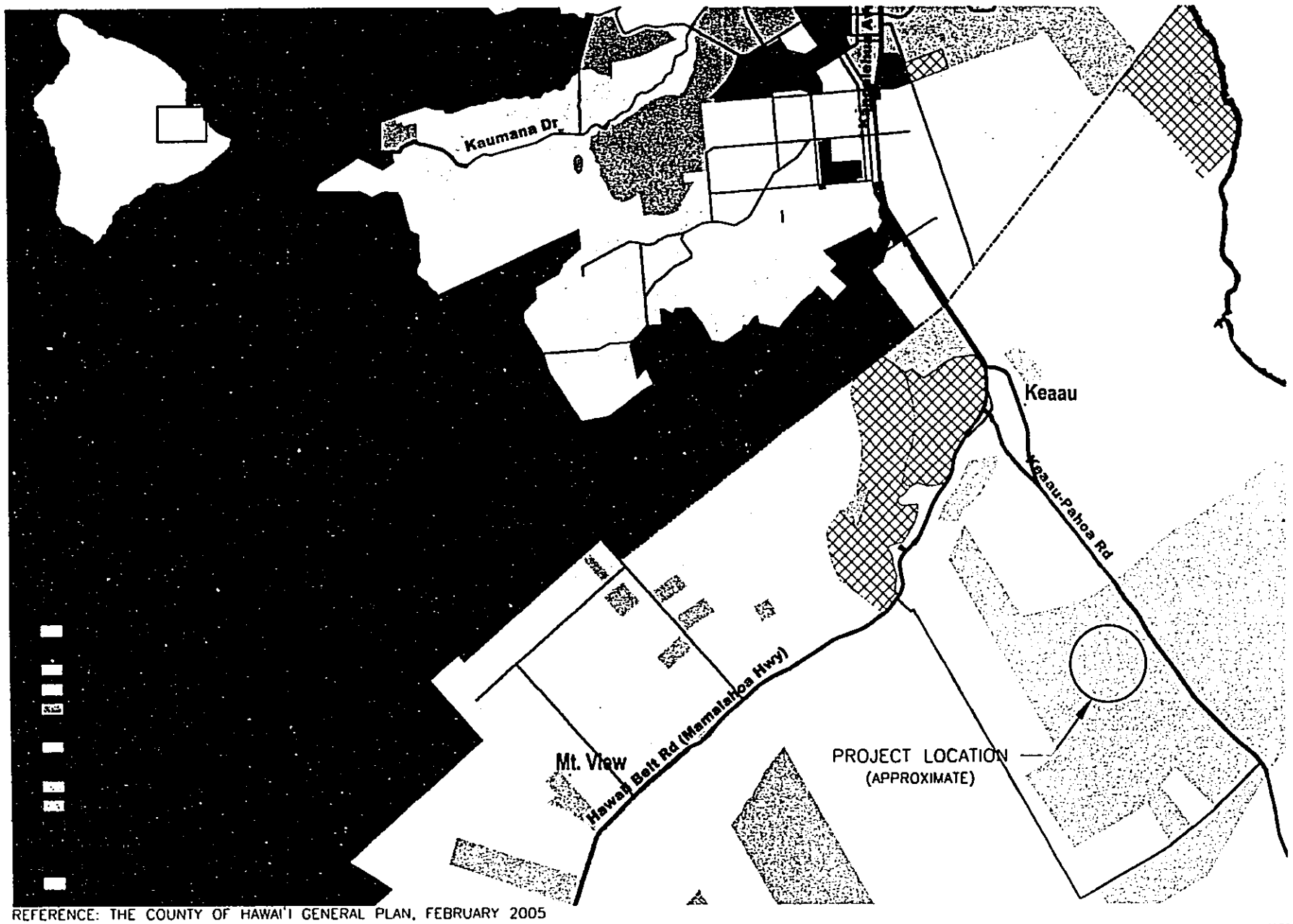
ADJACENT PROPERTY TO THE NORTHEAST. PHOTO IS FACING NORTH-NORTHEAST.

DISCARDED REFRIGERATOR OFF NIAULANI STREET. PHOTO IS FACING SOUTH.

SOUTHWEST PROPERTY ENTRANCE. PHOTO IS FACING SOUTHWEST.



RONET, INC. RTH'S RESOURCES FOR THE FUTURE	DRAWN BY: I.K.N.	MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION EA
	CHECKED BY: R.S.Y.	SITE RECONNAISSANCE PHOTOS PAHOA, HAWAII — FIGURE 4-4
	REF: ESH, Inc.	



REFERENCE: THE COUNTY OF HAWAI'I GENERAL PLAN, FEBRUARY 2005

ENVIRONET, INC.
PRESERVING EARTH'S RESOURCES FOR THE FUTURE

MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION EA

LAND USE PATTERNS IN THE VICINITY OF PROJECT AREA

FIGURE 4-5

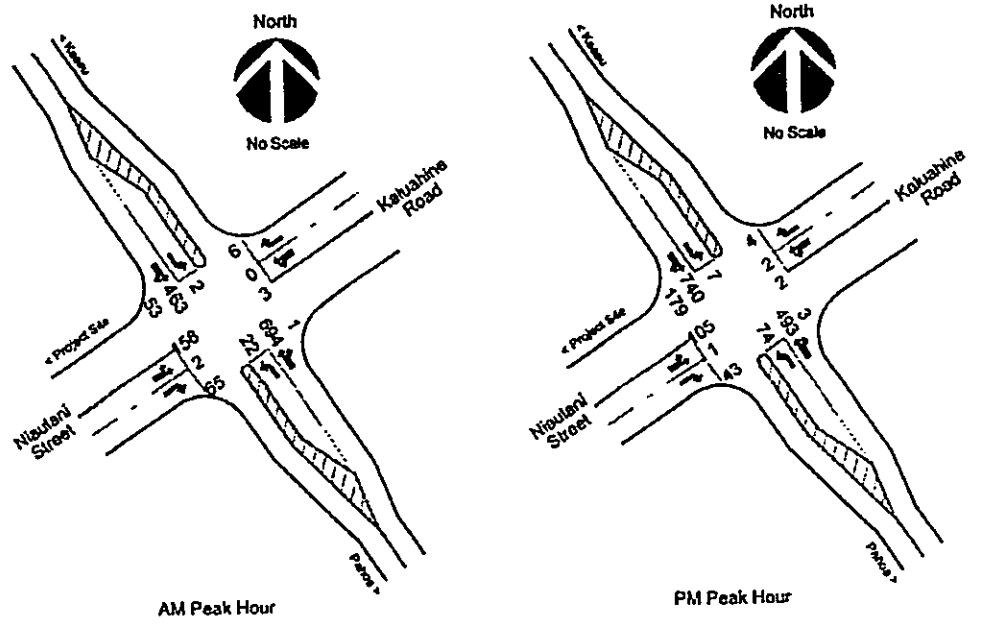


Figure 2 – Traffic Assignments, Project Fully Occupied

Table 3 – Unsignalized Intersection Conditions
(project traffic at full development)

	AM Peak Hour			PM Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Northbound left turn from highway	0.02	8.7	A	0.12	10.9	B
Southbound left turn from highway	0.00	9.2	A	0.01	8.5	A
Westbound left turn/through movement	0.03	40.6	E	0.06	59.5	F
If northbound left turn lane is used *	0.01	21.2	C	0.03	29.2	D
Westbound right turn	0.01	14.0	B	0.01	11.7	B
Eastbound left turn/through movement	1.38	279.6	F	1.58	>300	F
If southbound left turn lane is used *	0.69	46.9	E	0.60	48.9	E
Eastbound right turn	0.13	12.6	B	0.14	17.6	C

V/C = volume/capacity ratio ADPV = average delay per vehicle, in seconds LOS = Level of Service
* as refuge lane before merging (see text)

Table 4 – Signalized Intersection Levels of Service
Project Fully Occupied

	AM Peak Hour			PM Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Overall Intersection	0.63	14.8	B	0.72	16.4	B
Westbound left turn/through	0.01	17.9	B	0.01	27.3	C
Westbound right turn	0.02	18.0	B	0.01	27.4	C
Eastbound left turn/through	0.45	24.4	C	0.39	33.5	C
Eastbound right turn	0.16	19.5	B	0.14	28.9	C
Southbound left turn	0.01	6.5	A	0.02	5.1	A
Southbound through/right turn	0.54	11.3	B	0.84	18.4	B
Northbound left turn	0.06	7.0	A	0.47	16.2	B
Northbound through/right turn	0.72	15.1	B	0.44	8.2	A

V/C = volume/capacity ratio ADPV = average delay per vehicle, in seconds
LOS = Level of Service

REFERENCE: NG, 2004

ENVIRONET, INC.
PRESERVING EARTH'S RESOURCES FOR THE FUTURE

MAKUU–HALONA SUBDIVISION AND MAKUU–POPOKI RESIDENTIAL SUBDIVISION EA

PROJECT TRAFFIC ANALYSES
TRAFFIC IMPACT ANALYSIS REPORT
PAHOA, HAWAII

FIGURE
4–6

N:\YDA\404-007 Makuu Residential Subdivision Environmental Assessment & EIS\Drawings\Figures for EA\Traffic figures (4-6).dwg

5.0 RELATIONSHIP TO PLANS, POLICIES, AND CONTROLS

5.1 State Land Use Plans and Policies

Hawaii State Plan. The Hawaii State Plan, Chapter 226, HRS was developed as a guideline for the future growth of the State of Hawaii. The State Plan identifies goals, objectives, policies, and priorities for the development and growth of the State. It provides a basis for prioritizing and allocating the limited resources such as public funds, services, human resources, land, energy, and water. The State Plan establishes a system for the formulation and program coordination of State and County plans, policies, programs, projects, and regulatory activities. The State Plan also facilitates the integration of all major State and county activities.

The proposed project would be in conformance to the State Plan's objectives and policies for socio-cultural advancement of the Hawaiian people. The proposed development will foster safe, sanitary and decent homes. By allowing the beneficiaries who are Hawaiian in ethnicity the opportunity to use the property as residential lots with the necessary infrastructure improvement, beneficiaries will be able to develop a community that fosters increased knowledge and understanding of the Hawaiian culture and lifestyle.

The project would also conform to the State Plan's policy to promote housing for the Hawaiian lifestyle. It is the long-term goal of the project to foster such a lifestyle. The neighborhood that would result from this project would reflect the culture and past Hawaiian communities.

State Functional Plan. The twelve State Functional Plans were adopted by the State Legislature in April 1984. These plans were formulated to specify in greater detail the policies, guidelines and priorities set forth in the Hawaii State Plan. The twelve functional plans include; Energy, Transportation, Water Resources, Historic Preservation, Health, Education, Housing, Conservation Lands, Higher Education, Agriculture, and Tourism.

The project is consistent with the policies and objectives of the State Functional Plans. This project provides the needed housing and infrastructure requirements for the people of Hawaiian ancestry and returns them to their land.

State of Hawaii Land Use Law. Chapter 205, HRS promulgates the State Land Use Law. This law is intended to preserve, protect, and encourage the development of lands in the State of Hawaii for uses that are best suited to the public health and welfare of its people. The State of Hawaii Land Use Commission (LUC) classifies all land into four districts: Urban, Conservation, Agriculture, and Rural. The project area is designated within the State Agricultural District. Uses proposed under the development would be consistent

with objectives and policies of the State Land Use Law. Hawaiian Home Lands are exempt from land classification requirements for homestead development.

Coastal Zone Management (CZM) Program. The CZM Program is promulgated by Chapter 205A, HRS. The objectives and policies of the program are administered by the Office of State Planning. Through the CZM Program, each county is required to establish Special Management Areas (SMAs) and shoreline setbacks within which permits are required for development (see section 5.2 below).

5.2 County Land Use Plans and Policies

Hawaii County General Plan. The General Plan for the County of Hawaii is a policy document that expresses the broad goals and policies for the long-range development of the island of Hawaii. The plan was adopted by ordnance in 1989. The General Plan is organized into thirteen elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts comprising the County of Hawaii. Sections of the Plan that relate to project actions are presented in the following paragraphs.

SECTION 4 - GOALS, POLICIES AND STANDARDS

(A) ECONOMIC: GOALS:

- *Provide residents with opportunities to improve their quality of life.*

SECTION 5 - COURSES OF ACTION

(A) PUNA: (3) HOUSING: COURSES OF ACTION:

- *Aid and encourage the development of a wide variety housing choice for this area.*

(A) PUNA: (6) RECREATION: COURSES OF ACTION:

- *As population increases and need arises, neighborhood parks in large subdivisions between Kaau and Pahoa should be provided and improved.*

(A) PUNA: (8) LAND USE: SINGLE-FAMILY RESIDENTIAL: COURSES OF ACTION:

- *Improve and develop roadways, water and sewerage systems, and other basic facilities necessary to encourage development of lands suitable for residential use.*

Zoning. Zoning is a method by which the County of Hawaii regulates land use in accordance with the adopted land use policies mentioned above. In a letter from DHHL to the County of Hawaii Planning Department dated October 22, 2004, DHHL revised the project standards from the previous Ag-20a designation to RS-15 Single-Family Residential lots, or 15,000 square feet zoning standards. While the zoning is being redesignated, the improvements required to subdivide the parcel under RS-15 zoning will be identical to those that would normally be

required to subdivide the parcel under RS-20 zoning standards (DHHL, October 2004).

Special Management Area. The CZM Program, as previously mentioned, promulgates the creation of SMAs. SMAs are specially designated areas governed by specific county guidelines. Any development within an SMA requires a SMA permit from the appropriate county. An accepted EA fulfills a portion of the information necessary to apply for an SMA permit. The project site is located outside of the SMA that extends primarily along all shoreline areas; therefore, no SMA Use Permit is required for project actions.

5.3 Other Relevant Plans and Policies

DHHL Hawaii Island Plan. The *Hawaii Island Plan* (DHHL 2002: 21) recommends the Makuu *mauka* area for residential homestead, subsistence agriculture, community and cultural uses.[44] The proposed project is consistent with this plan.

Puna Community Development Plan. The *Puna Community Development Plan* (Community Management Associates, Inc. 1995) provides goals and objectives for the long range vision of the Puna District with regard to retention of Puna's rural character, lifestyle and environmental preservation. The proposed project is consistent with this plan.

5.4 Necessary Permits and Approvals

Several permits and approvals would be required prior to construction of the project. Application for most of these permits cannot be made until the environmental review process (HRS Chapter 343) is completed. They are listed here under their granting agencies.

State

Department of Health

Safe Drinking Water Branch

- Underground Injection Control (UIC) Permit

Clean Water Branch

- National Pollutant Discharge Elimination System Permits for hydrotesting and grading

Noise, Radiation and Indoor Air Quality Branch

- Noise Variance

County of Hawaii

Department of Public Works

- Grading Permit
- Building Permits for all proposed house construction work

[44] Geometrician Associates 2004: 1-1.

6.0 FINDINGS AND DETERMINATIONS

In accordance with the provisions set forth in Chapter 343, Hawaii Revised Statutes, this EA has determined that the project will not have significant adverse impacts on the environment. DHHL is considering the issuance of a Finding of No Significant Impact (FONSI). Anticipated impacts will be temporary and will not adversely impact the environmental quality of the area. Therefore, it is recommended that an Environmental Impact Statement (EIS) not be required.

A review of the "Significance Criteria" used as a basis for the above determination is presented below. An action is determined to have a significant impact on the environment if it meets any one of the thirteen (13) criteria.

(1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resources.

Development of the project will involve the irrevocable loss of certain environmental resources. However, the development of additional lots with improved infrastructure will benefit the Hawaiian beneficiaries of the State of Hawaii by providing residential lots to those on the waiting list. The County of Hawaii will benefit in terms of additional consumer spending on construction materials, home furnishings, and appliances and associated tax revenues.

(2) Curtails the range of beneficial uses of the environment.

The project will not curtail the range of beneficial uses of the environment. Due to rocky substrates most of the project area is not suitable for agricultural uses. All properties proposed for this project are currently undeveloped vacant lands. The surrounding areas are sparsely developed for single-family residential use including other DHHL homesteads.

(3) Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS; and any revisions thereof and amendments thereto, court decisions, or executive orders;

The project would be in conformance to the Chapter 344, HRS, State Environmental Policy, to enhance the quality of life. It is the long-term goal of the project to foster a Hawaiian lifestyle. The neighborhood that would result from this project would reflect the culture and values of the past Hawaiian communities.

(4) Substantially affects the economic or social welfare of the community or state;

The proposed low-density homestead development is not anticipated to have significant effects on the economic or social welfare of the community or the state.

(5) Substantially affects public health;

The proposed low-density project is not anticipated to have substantial effects on public health. Short-term impacts associated with construction are generally unavoidable and would be mitigated according to the measures described in Chapter 4.0 of this EA. DHHL will improve existing facilities and provide infrastructure necessary to support the proposed development. The development of basic support infrastructure such as drainage, IWS, water and communication and electrical utilities, will be done in accordance with county standards and integrated with existing systems.

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

The proposed homestead development will result in some secondary impacts; however, the proposed project is not expected to place enough of a demand to result in the need to increase the level of current facilities and services in the project area. In addition, area will be set aside for future development of a park to provide both future residents of the development and the surrounding community with additional recreational opportunities.

(7) Involves a substantial degradation of environmental quality;

The proposed project is not anticipated to involve a substantial degradation of environmental quality. The project site is currently undeveloped vacant land that is covered by an increasing greater percentage of introduced, invasive species.

(8) Is individually limited but cumulatively has considerable effect on the environment, or involves a commitment for larger actions;

The proposed low-density development is not anticipated to result in cumulative effects; therefore, it would not involve a commitment to larger actions.

(9) Substantially affects a rare, threatened or endangered species or its habitat;

The proposed project is not anticipated to have substantial effects on a rare, threatened, or endangered species, or its habitat. The botanical survey conducted in November 2004 did not find any flora listed or proposed for listing as Threatened or Endangered. No Threatened or Endangered fauna was seen or heard during a recent survey also conducted in November 2004.

(10) Detrimentally affects air or water quality or ambient noise levels;

No significant impacts on the area's long-term air or water quality or ambient noise levels are anticipated to result from the project. There will be some short-term impacts on the air quality and noise levels as a result of project construction. Adequate mitigation measures will be implemented as described in Section 4.0 of this EA.

(11) Affects or is likely to suffer damage by being located in an environmentally sensitive area, such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters;

The project is not anticipated to affect environmentally sensitive areas. However, the Puna area has been subject to natural hazards in the past including volcanic activity and earthquakes. The potential threat of these natural hazards to the project site is discussed in Section 4.0 of this EA.

(12) Substantially affects scenic vistas and view planes identified in county or state plans or studies;

The proposed low-density development will not significantly affect the area's visual resources including scenic vistas or view planes.

(13) Requires substantial energy consumption.

The proposed project will not require substantial energy consumption relative to other similar projects.

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8.0 AGENCIES AND ORGANIZATIONS CONSULTED

	Consulted Agency or Group	Response Received
Federal Agencies	U.S. Army Corps of Engineers	✓
	U.S. Fish and Wildlife Service	✓
	U.S. Geological Survey	
State Agencies	Department of Health	✓
	Department of Land and Natural Resources	✓
	Department of Transportation	✓
County of Hawaii	Planning Department	✓
	Department of Parks and Recreation	
	Department of Public Works	
	Department of Research and Development	
	Department of Water Supply	✓
Individuals and Groups	Sierra Club	
	Hawaii Council Chairman James Arakaki	
	Hawaii Electric Light Company	✓
	Verizon Hawaii	✓
	Office of Hawaiian Affairs	✓
	Hui Malama	
	Makuu Farmers Association	
	Hui Kako'o Aina Ho'opulapula	
	Dr. Fred Stone, Hawaii Community College	

Individuals

Collins, Sarah, State Historic Preservation Officer, SHPD
Jones, Timothy, Chairperson and State Historic Preservation Officer, SHPD
Kaya, Maurice, Energy, Resources, and Technology Program Officer, DBEDT
Salmonson, Genevieve, Director, OEQC

Agencies

State of Hawaii
- Department of Accounting and General Services
- Department of Budget and Finance
- Department of Business, Economic Development and Tourism
- Department of Health
- Department of Transportation
- Energy, Resources and Technology Division

Health and Human Services Division
Department of Land and Natural Resources
Office of Environmental Quality Control
Office of Hawaiian Affairs
Office of Planning
Office of the Lieutenant Governor
State Foundation on Culture and the Arts
State Historic Preservation Division

County of Hawaii
Department of Public Works
Fire Department
Police Department

Organizations
Historic Hawaii Foundation

APPENDIX A
BOTANICAL SURVEY

BOTANICAL RESOURCES ASSESSMENT FOR THE PROPOSED DHHL MAKU'U RESIDENTIAL SUBDIVISION, FHASE 1 PUNA DISTRICT, HAWAI'I

DRAFT

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INTRODUCTION

This report was prepared for use in an Environmental Assessment of land owned by the Department of Hawaiian Home Lands (DHHL), identified as TMK: (3) 1-5-08:03 in the Maku'u/Popoki/Halona ahupua'a, in the Puna District, Island of Hawai'i. LeGrande Biological Surveys, Inc. carried out a botanical field survey of the above location on January 14th and 15th 2005 for Environet, Inc. The primary objectives of the field studies were to:

1) provide a general description of the vegetation on the 241-acre project site;
2) inventory the flora;
3) search for threatened and endangered species as well as species of concern;
4) identify areas for potential environmental problems or concerns and propose appropriate mitigation measures.

Federal and State of Hawai'i listed species status follows Federal Registers (1999a and 1999b, 2002, and 2004) and the Hawaiian Islands Plants: Updated June 15, 2004; Listed and Candidate Species, As Designated Under the U.S. Endangered Species Act.

GENERAL SITE DESCRIPTION

The Maku'u Parcel consists of approximately 241-acres, located 2 miles north of Pahoa Town, along the Kea'au-Pahoa road (Highway 130). The parcel is located to the west or mauka of the Kea'au-Pahoa Road, bordered by Kapika Street to the east and Kauakahi Street and the dozed road extending from the end of Kauakahi to the south. A strip of 363 feet to the south-east of the dozed road was included in the reconnaissance . The survey area slopes gently to the northeast with a maximum elevation of 680 feet in the south-west corner to approximately 520 ft in the north-east corner ("Park Site").

Substrate within the survey area consists mostly of a'a lava originating from Kilauea Volcano. The flows range in age from 750 to 200 years old (USGS 1997), providing enough time for rocky soils to develop in some areas.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Information from the Hawai'i Natural Heritage Program database was reviewed as well as the The Nature Conservancy of Hawaii Biological Reconnaissance of the area in 1993 (Hawaii Heritage Program, 1993). Topographic maps were examined to determine terrain characteristics, access, boundaries, and reference points.

A walk-through survey method was used. Transects included walking along all boundaries of the survey area and running north-south along 50 meter long transects into the project area from the Kauakahi Street boundary every 200 feet on both sides of the dozed road. Notes were made on plant associations and distribution, disturbances, topography, substrate types, exposure, drainage, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium, and for comparison with the recent taxonomic literature.

DESCRIPTION OF THE VEGETATION

The 1993 Nature Conservancy biological inventory of Maku'u (HHP, 1993) described the area as an 'Ohi'a/Uluhe Lowland Wet Forest with areas of alien vegetation. The recent survey showed that the project area contains the same habitat types described in the TNC report, but numerous additional weedy species have become established. In 1993, there were a total of 57 plant species noted with 43% native and 56% non-native. The present study observed 72 plant species with native species making up only 25% of the population. These numbers point to a rapid influx of weedy plant species to the area and a continual loss of native vegetation.

In this study, two vegetation types are recognized on the 241-acre project site; Alien Vegetation and 'Ohi'a/ Uluhe Lowland Wet Forest. Alien Vegetation dominates along roads or borders of the survey area. Alien vegetation can be found intruding into the native forest in the project site quite far in some areas. The interface between the two vegetation types is mixed with native and alien plants, until one type becomes dominate. For example, a transect from the roadside into the interior of the parcel would begin with nearly 100% cover of alien vegetation at the road, as the survey moved along the transect line, within 20 ft native plant species would begin to mix with the aliens and gradually outnumber the non-native plants until there was near 100% native vegetation at the end of the 100 ft transect. In general, the western border of the survey area extending into the interior of the site is composed of native forest with alien plants dominating at the borders and sometimes well into the project site.

An inventory of all the plants observed within the two vegetation types is presented in the species list at the end of the report.

Alien Vegetation

The alien vegetation forms mosaics composed of groundcovers, tall shrubs, and trees, most prevalent along roads and disturbed areas in the survey site. Along the road sides, grasses and small groundcovers dominate, grasses such as (*Axonopus fissifolius*), (*Melinis repens*), and Dallis grass (*Pasalum dilatatum*), mix with weedy groundcovers made up of maile honohono (*Ageratum conyzoides*), hairy spurge (*Chamaesyce hirta*), Pterolepis (*Pterolepis glomerata*), and milkwort (*Polygala paniculata*).

The taller shrubs and trees are found growing just off the road sides mixed in with the native fern, uluhe (*Dicranopteris linearis* f. *linearis*), creating a thick shrubby vegetation around four to five feet tall. The dominant species in this area include Melastoma (*Melastoma candidum*), broomsedge (*Andropogon virginicus*), common guava (*Psidium guajava*), strawberry guava (*P. cattlelanum*), and two invasive orchids, bamboo orchid (*Arundina graminifolia*) and Malaysian ground orchid (*Spathoglottis plicata*). Some of

the taller tree species include, Melochia (*Melochia umbellata*), gunpowder tree (*Trema orientalis*), trumpet tree (*Cecropia obtusifolia*), and paperbark (*Melaleuca quinquenervia*). Less common tree species, but obvious due to their extensive height, are siris tree (*Albizia lebbeck*) and Chinese banyan (*Ficus microcarpa*).

'Ohi'a/Uluhe Lowland Wet Forest

The native forest extant on the survey site is a lowland wet forest dominated by 'ohi'a lehua (*Metrosideros polymorpha* var. *polymorpha*) and uluhe (*Dicranopteris linearis* f. *linearis*). 'Ohi'a trees of 20 to 30 feet tall tower over an understory of ferns and shrubs 4 to 6 feet tall. The forest is patchy in areas where pahoehoe substrate creates bare patches with little more than lichens and grasses growing on the open ground. The homogeneous forest has few other native components. Small ferns and grasses can be found in the understory or epiphytic on trees and uncommonly tree species such as kopiko (*Psychotria hawaiiensis* var. *hawaiiensis*) and hala (*Pandanus tectorius*) can be found on the site.

At the north end of Kapika Place, where the road dead ends, a small community of hala trees and kopiko trees form a canopy with an understory of uluhe and strawberry guava patches. This area is near the archeological site 24231 (Desilets and Rechtman, 2004). This forest represents an interesting change to the monotypic 'ohi'a/uluhe forest found on the rest of the site.

The native forest is being invaded by alien vegetation. At the perimeters of the study site, weedy plants dominate and are steadily moving into the remaining native patches of forest. Melastoma (*Melastoma candidum*), an exceptional weedy species in Hawaii, can be found in areas of the site where it appears to be mostly native. This species has the ability to invade undisturbed natural habitats and outcompete native vegetation.

DISCUSSION AND RECOMMENDATIONS

Two vegetation types are recognized on the 241-acre Maku'u Residential Subdivision project site; Alien Vegetation and 'Oh'a/Uuhe Lowland Wet Forest. Although, Alien Vegetation is most abundant along roadsides and in disturbed areas, several of the more invasive weedy species can be found spreading into the native stands of vegetation. The 'ohi'a/uluhe lowland wet forest is dominated by 'ohi' lehua (*Metrosideros polymorpha* var. *polymorpha*) and uluhe (*Dicranopteris linearis* f. *linearis*). A small number of other native plant species are associated with the native forest. The occasional hapu'u or tree fern (*Cibotium glaucum*) can be found growing up to 6 or 7 feet tall, and in wetter areas the kopiko (*Psychotria hawaiiensis* var. *hawaiiensis*) can be found growing as medium sized trees up to 15 feet in height.

None of the plants which occur on the project site is a threatened and endangered species or a species of concern (U.S. Fish and Wildlife Service, 1999a, 1999b, 2004; Wagner et. al., 1999). The native 'Ohi'a/Uluhe Lowland Wet Forest is one of the most widespread types of native forest. In the Puna area of Hawai'i, the forest type covers vast areas and can support native bird species by providing food and habitat. This forest type may also harbor rare and endangered plant species. Although no endangered or threatened plant species were found during the survey of the project site, care should be taken while clearing the project site to limit the introduction of additional invasive plant species that have the potential to spread into adjacent native forest areas. The noxious weed miconia (*Miconia calvescens*) has already become establish in the Hilo and Puna areas of Hawai'i. The plant is easily spread to new areas when the small seeds are carried from infested areas by machinery used for grading and excavation work. Care should be taken to clean the machinery as well as possible before beginning work in a new area.

It is recommended that, if possible, individual trees of 'ohi'a lehua (*Metrsideros polymorpha*) be kept as landscaping for the subdivision. This will assist native forest birds by keeping a corridor of habitat between remaining forested areas and the developed land. Additionally, the patch of hala (*Pandanus tectorius*) trees near the end of Kapika Place could be preserved along with the archeological site 24231. The 'park site', located in the north-east corner, has the lowest elevation of the project site. Proper drainage plans should be in place for the 12.7 acre parcel, especially if the natural vegetation is removed from the site.

The proposed DHHL Maku'u Residential Subdivision is not expected to have significant negative impacts on the botanical resources of the site or the general region. A thorough two-day field survey was carried out for this project site. Transects were used to get an overall idea of the vegetation and species composition. Although no rare or endangered plant species were found during the survey, there is always a possibility that the survey team's transects did not coincide with a rare plant extant on the site.

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PLANTS SPECIES LIST -- Maku'u, Puna District, Hawai'i

The following checklist is an inventory of all the plant species observed on the 241-acre Maku'u Parcel. The plant names are arranged alphabetically by family and then by species into each of three groups: Ferns and Fern Allies, Monocots, and Dicots. The taxonomy and nomenclature of the Ferns and Fern Allies follow Palmer (2002), while the flowering plants, Monocots and Dicots, are in accordance with Wagner *et al.* (1990) and Wagner and Herbst (1999). Recent name changes are those recorded in the Hawaii Biological Survey series (Evehuis and Eldredge, eds., 1999-2002).

For each species, the following name is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
   E= endemic= native only to the Hawaiian Islands.
   I= indigenous= native to the Hawaiian Islands and elsewhere.
   I?= questionably indigenous= data not clear if dispersal to the islands by natural or human-related mechanisms, but weight of evidence suggests probably indigenous.
   P=species that were introduced by the Polynesian migration to Hawaii, either intentionally or unintentionally, and are now naturalized.
   X=introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, that is Cook's arrival in the islands in 1778.
   X?= questionably introduced = date of introduction unclear or very soon after Western contact; may be indigenous or of Polynesian introduction.

MAKU`U PLANT SPECIES LIST
JANUARY 2005

SCIENTIFIC NAME	COMMON NAME	STATUS
Pteridophytes		
DICKSONIACEAE		
Cibotium glaucum (Sm.) Hook. & Arn.	hapu`u, hapu`u pulu	E
ELAPHOGLOSSACEAE		
Elaphoglossum crassifolium (Gaud.) W.R. Anderson & Crosby	hoe a Maui, `ekaha	E
GLEICHENIACEAE		
Dicranopteris linearis (Burm. f.) Underw. f. *linearis*	uluhe, unuhe	I
GRAMMITIDACEAE		
Adenophorus tamariscinus (Kaulf.) Hook. & Grev.	wahine noho mauna	E
LINDSAEACEAE		
Sphenomeris chinensis (L.) Maxon	pala`a,	I
LYCOPODIACEAE		
Lycopodiella cernua (L.) Pic. Serm.	wawae`iole, hulu `iole	I
NEPHROLEPIDACEAE		
Nephrolepis exaltata (L.) Schott subsp. *hawaiiensis* W.H. Wagner	ni`ani`au, `okupukupu, pamoho	E
Nephrolepis multiflora (Roxb.) F.M. Jarrett ex C.V. Morton		X
POLYPODIACEAE		
Lepisorus thunbergianus (Kaulf.) Ching	pakahakaha, `ekaha, `akolea	I
Phymatosorus grossus (Langsdorff & Fischer) Brownlie	laua`e, maile-scented fern	X
PSILOTACEAE		
Psilotum nudum (L.) P. Beauv.	moa, moa nahele	I
PTERIDACEAE		
Pityrogramma austroamericana Domin	gold fern, goldback fern	X
Pityrogramma calomelanos (L.) Link	silver fern, silverback fern	X
Pteris cretica L.	`oali, Cretan brake	I

Angiosperms--Monocots		
AGAVACEAE		
Cordyline fruticosa (L.) A. Chev.	ti, ki	P
CYPERACEAE		
Cyperus compressus L.		X
Cyperus haspan L.		X
Eleocharis obtusa (Willd.) Schult.	spikerush, kohekohe	I
Machaerina mariscoides (Gaud.) J. Kern subsp. *meyenii* (Kunth) T. Koyama	`ahaniu, `uki	E
Rhynchospora caduca Elliott	beakrush	X
Scleria testacea Nees	nutgrass	I
ORCHIDACEAE		
Arundina graminifolia (D. Don) Hochr.	bamboo orchid	X
Spathoglottis plicata Blume	Malaysian ground orchid	X
PANDANACEAE		
Pandanus tectorius S. Parkinson ex Z.	hala	I
POACEAE		
Andropogon virginicus L.	broomesedge, yellow bluestem	X
Axonopus fissifolius (Raddi) Kuhlm.	Carpecgrass	X
Eragrostis ciliianensis (All.) Link	stinkgrass	X
Melinis minutiflora P. Beauv.	molasses grass	X
Melinis repens (Willd.) Zizka	natal redtop	X
Paspalum dilatatum Poir.	dallis grass	X
Pennisetum clandestinum Chiov.	Kikuyu grass	X
Sacciolepis indica (L.) Chase	Glenwood grass	X
Dicots		
AMARANTHACEAE		
Gomphrena globosa L.	globe amaranth, bozu	X
ASCLEPIADACEAE		
Asclepias physocarpa (E. Mey.) Schlechter	balloon plant	X
ASTERACEAE		
Ageratum conyzoides L.	maile honohono	X
Conyza bonariensis (L.) Cronq.	hairy horseweed	X
Crassocephalum crepidioides (Benth.) S. Moore		X

Cyanthillium cinereum (L.) H. Rob.		X
Emilia fosbergii Nicolson	pualele	X
Emilia sonchifolia (L.) DC var. *sonchifolia*	Flora's paintbrush	X
Erechtites valerianifolia (Wolf) DC	fireweed	X
Pluchea carolinensis (Jacq.) G. Don	sourbush	X
BUDDLEJACEAE		
Buddleia asiatica Lour.	dog tail	X
CECROPIACEAE		
Cecropia obtusifolia Bertol.	guarumo, trumpet tree	X
ERICACEAE		
Vaccinium reticulatum Sm.	`ohelo, `ohelo `ai	E
EUPHORBIACEAE		
Chamaesyce hirta (L.) Millsp.	hairy spurge, garden spurge	X
Phyllanthus debilis Klein ex Willd.	niruri	X
FABACEAE		
Albizia lebbeck (L.) Benth.	siris tree, woman's tongue	X
Chamaecrista nictitans (L.) Moench var. *glabrata* (DC ex Collad.) H. Irwin & Barneby	partridge pea	X
Desmodium triflorum (L.) DC	tick clover	X
Mimosa pudica L. var. *unijuga* (Duchass. & Walp.) Griseb.	sensitive plant, sleeping grass	X
LAMIACEAE		
Hyptis pectinata (L.) Poit.	comb hyptis	X
Salvia occidentalis Sw.	west Indian sage	X
LYTHRACEAE		
Cuphea carthagenensis (Jacq.) Macbr.	tarweed, Colombian cuphea	X
MELASTOMATACEAE		
Clidemia hirta (L.) D. Don var. *hirta*	Koster's curse	X
Melastoma candidum D. Don	melastoma	X
Pterolepis glomerata (Rottb.) Miq.		X
MORACEAE		
Ficus microcarpa L. fil.	Chinese or Malayan banyan	X

MYRTACEAE		
Melaleuca quinquenervia (Cav.) S.T. Blake	Paperbark	X
Metrosideros polymorpha Gaud. var. *polymorpha*	`ohi`a, `ohi`a lehua	E
Psidium cattleianum Sabine	Strawberry guava, waiwi `ula`ula	X
Psidium guajava L.	Common guava,	X
Syzygium cumini (L.) Skeels	Java plum	X
OLEACEAE		
Fraxinus uhdei (wenzig) Lingelsh.	tropical ash	X
POLYGALACEAE		
Polygala paniculata L.	milkwort	X
RUBIACEAE		
Psychotria hawaiiensis (A. Gray) Fosb. var. *hawaiiensis*	Kopiko `ula, `opiko	E
Spermacoce assurgens Ruiz & Pav.	buttonweed	X
SCROPHULARIACEAE		
Castileja arvensis Cham. & Schltdk.	Indian paintbrush	X
STERCULIACEAE		
Melochia umbellata (Houtt.) Stapf		X
Waltheria indica L.	`uhaloa	I
ULMACEAE		
Trema orientalis (L.) Blume	gunpowder tree	X
VERBENACEAE		
Stachytarpheta jamaicensis (L.) Vahl	Jamaican vervain	X

APPENDIX B

FAUNAL STUDY

A Survey of Avian and Terrestrial Mammalian Species for the Proposed DHHL Maku'u Residential Subdivision, Phase 1, Increments 1-A and 1-B, TMK: (3) 1-5-08:3, Puna District, Hawai'i.

DRAFT

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September 2004

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Figures & Tables

Introduction

This report summarizes the findings of an ornithological and mammalian survey of an approximately 241-acre parcel of land identified as TMK: (3) 1-5-08:03 located to west of the existing Kea'au–Pāhoa Road in the Maku'u, Pōpōkī and Hālona *ahupua'a*, in the Puna District, Island Hawai'i. The State Department of Hawaiian Homes (DHHL) is proposing to develop a 365 lot residential subdivision on this parcel. Fieldwork was conducted on September 10th and 11th 2004.

The primary purpose of the survey was to determine if there were any federally listed endangered, threatened, proposed, or candidate avian or mammalian species on, or in the immediate vicinity of, the proposed development site. Federal and State of Hawai'i listed species status follows species detailed in the following referenced documents (DLNR, 1998, Federal Register, 1999a, 1999b, 2001, 2002, 2004).

Avian phylogenetic order and nomenclature follows *The American Ornithologists' Union Checklist of North American Birds 7th Edition* (American Ornithologists' Union 1998), and the 42nd through the 45th supplements to *Check-list of North American Birds* (American Ornithologists' Union 2000; Banks et al. 2002, 2003, 2004). Mammal scientific names follow *Mammals in Hawaii* (Tomich 1986). Plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner et al. 1990). Place names follow *Place Names of Hawaii* (Pukui et al. 1974).

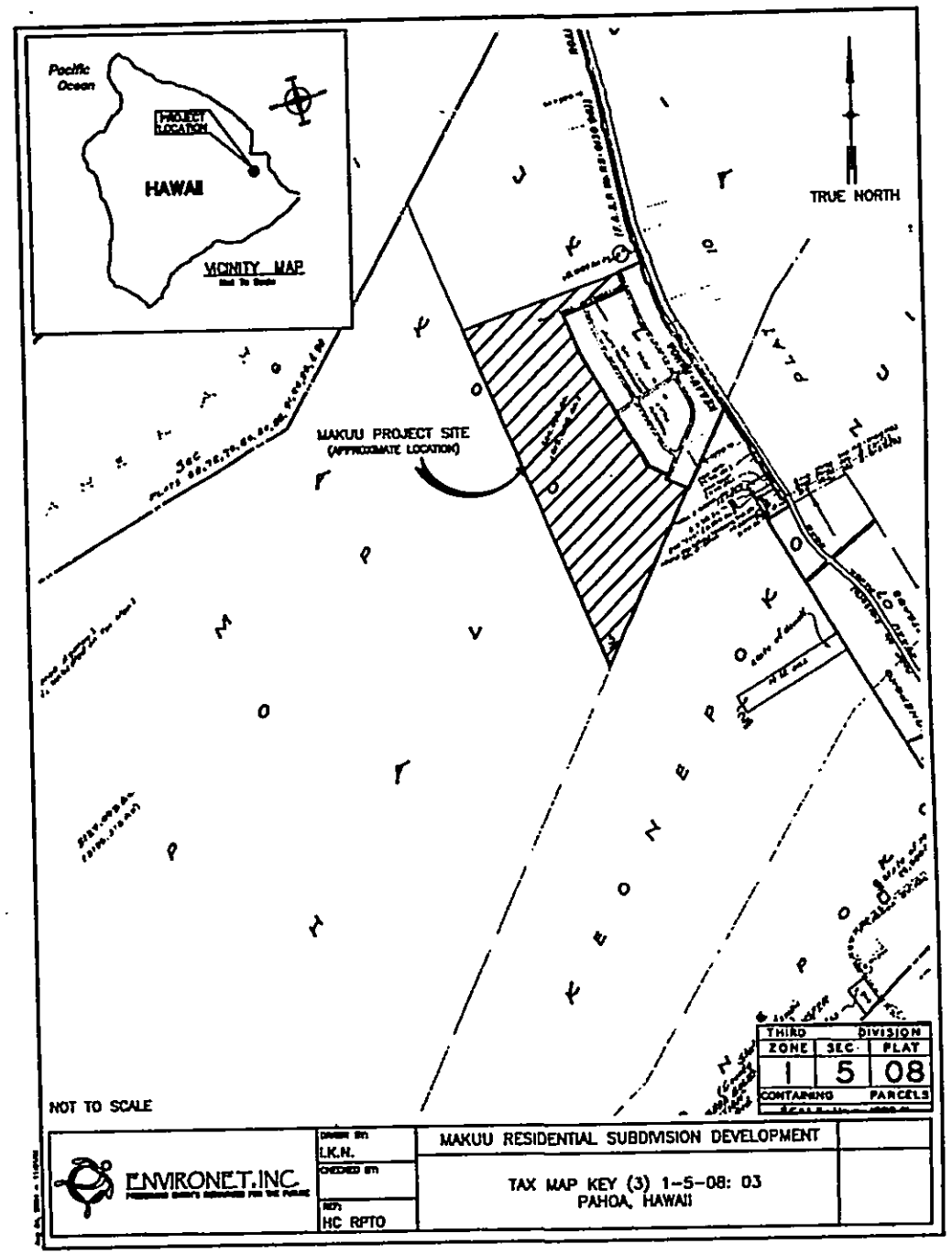
Hawaiian and scientific names are italicized in the text. A glossary of technical terms and acronyms used in the document which may be unfamiliar to the reader are included at the end of the narrative text on (Page 10).

General Site Description

The approximately 241-acre parcel of land is bound to the east by the existing Kapika Street, located approximately 400-meters west of the Kea'au–Pāhoa Road, north of the town of Pāhoa (Figure 1). The area surveyed gently slopes from south to north from a maximum elevation of 680-feet above mean sea level (MSL) down to approximately 525-feet MSL in the northern corner of the parcel (USGS 1997).

The terrain within the project site is composed of predominately a'a lava flows formed by Kilauea Volcano within historic times. The older flows were formed between 400 and 750 years ago, a large portion of which as been overlain by newer flows formed between 200-400 years ago (USGS 1997; Wolfe and Morris 1996).

The vegetation on the bulk of the site can best be classified as a Lowland Wet *'Ōhi'a / Uluhe* (*Metrosideros / Dicranopteris*) Fern Forest (Gagne and Cuddihy, *in*:Wagner et al. 1990). This early successional forest is characterized by a deeply matted understory of



uluhe (*Dicranopteris linearis)* and emergent low stature scrubby *'ōhi'a* (*Metrosideros polymorpha*). In this particular instance the indigenous and endemic floristic components have almost been overrun by numerous alien species including gunpowder tree (*Trema orientalis*), octopus tree (*Schefflera actinophylla*), Chinese or Malayan banyan (*Ficus microcarpa*), sourbush (*Pluchea indica*), castor bean (*Ricinus communis*), *ti* (*Cordyline fruticosa*), bamboo orchid (*Arundina gramifolia*), Malayan or Philippine ground orchid (*Spathoglottis plicata*), broomsedge (*Andropogon virginicus*) and two very aggressive invasive species, melastoma (*Melastoma candidum*), and Koster's curse (*Clidemia hirta*) as well a numerous alien grasses and weedy species.

Mammalian Survey Methods

All observations of mammalian species were of an incidental nature. With the exception of the endemic endangered Hawaiian hoary bat, or *'ōpe'ape'a*, as it is known locally, all terrestrial mammals currently found on the island of Hawai'i are alien species. Most are ubiquitous; no trapping program was proposed or undertaken to quantify the use of the study site by alien mammalian species. The survey of mammals was limited to visual and auditory detection, and by searching for animal tracks and sign. Additionally, visual scans were made for bats on the evening of the10th, and for two hours on the morning of the 11th of September 2004.

Avian Survey Methods

Eleven count stations were established along two parallel linear transects which traversed the length of the site from north-to-south (Figure 1). Six-minute variable circular plot counts were made at each station (Reynolds et al. 1980). Each station was counted once. Field observations were made with the aid of Leitz 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated during the early morning hours, traditionally the peak of daily bird activity. An additional two hours were spent on site on the evenings of the 10th and two hours in the early morning of the 11th of September 2004, in an attempt to detect nocturnally flying seabirds and owls overflying the area. Time not spent counting stations was used to search the site and the surrounding area for species and habitats not detected during count sessions.

Mammalian Survey Results

No mammals were encountered during this survey, though several domestic dogs (*Canis f. familiaris*) were heard barking from within the existing Maku'u farm lots, Unit 1 located to the east and south of the proposed subdivision (Figure 1).

Avian Survey Results

Nine alien avian species, representing seven separate families were recorded during station

counts (Table 1). No species either currently listed, or proposed for listing under either the U.S. Fish and Wildlife Service (USFWS) and the State of Hawai'i 's endangered species programs was detected during the course of this survey (DLNR 1998; Federal Register 1999a, 1999b, 2001, 2002, 2004).

Avian diversity and densities were extremely low. Two species, Japanese White-eye (*Zosterops japonicus*) and House Finch (*Carpodacus mexicanus frontalis*) accounted for 81% of the total number of all birds recorded during station counts. An average of 17 birds were recorded per station count. No additional species were detected as incidental observations while transiting the site.

Table 1

Avian Species Detected During Station Counts
Maku'u Site

Common Name	*Scientific Name*	*ST*	*RA*
PHEASANTS & ALLIES – Phasianidae			
Red Junglefowl	*Gallus gallus*	A	0.09
PIGEONS & DOVES – Columbidae			
Spotted Dove	*Streptopelia chinensis*	A	0.18
Zebra Dove	*Geopelia striata*	A	0.27
BABBLERS – Timalidae			
Hwamei	*Garrulax canorus*	A	1.18
SILVEREYES – Zosteropidae			
Japanese White-Eye	*Zosterops japonicus*	A	10.18
STARLINGS – Sturnidae			
Common Myna	*Acridotheres tristis*	A	0.27
SALTATORS, CARDINALS & ALLIES – Cardinalidae			
Northern Cardinal	*Cardinalis cardinalis*	A	0.91
CARDULINE FINCHES & ALLIES – Fringillidae			
House Finch	*Carpodacus mexicanus frontalis*	A	3.73
Yellow-fronted Canary	*Serinus mozambicus*	A	0.27

KEY TO TABLE 1

ST Status
A Alien Species
RA Relative Abundance = number of birds detected divided by number of stations counted (11)

Discussion

A one-time survey can not provide a total picture of the wildlife utilizing any given area. Certain species will not be detected for one reason or another. Seasonal variations in populations coupled with seasonal usage and availability of resources will cause different usage patterns throughout a year or, in fact, over a number of years.

The findings of the mammalian survey are consistent with the results of other surveys conducted within the lowland areas of the South Hilo, and Puna Districts within the recent past (David 1992, 1995, 1997, 1999a, 1999b, 2000. 2001a, 2001b, 2003a, 2003b). Although no Hawaiian hoary bats were recorded during the course of the survey, it is likely that bats do use resources within the general area. Bats are regularly seen in and around Hilo, as well as along the coastline from Puna to North Hilo (David 1992, 1995, 1997, 1998 a, 1998b, 1998c, 1999a, 1999b, 2000, 2001a, 2001b, 2003a, 2003b; Cooper and David 1995; Menard 2001).

Unlike nocturnally flying seabirds, which often collide with man-made structures, bats are uniquely adapted to avoid collision with obstacles, man-made and natural. They navigate and locate their prey using ultrasonic echolocation, which is sensitive enough to allow them to locate and capture small volent insects at night.

Although no rodents were detected during the course of this survey, it is likely that roof rats (*Rattus r. rattus*), Norway rats (*Rattus norvegicus*), European house mice (*Mus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use various resources found within the project site. Without conducting a trapping program, it is difficult to assess the population densities of these often hard-to-see commensal mammals.

The findings of the avian survey are consistent with the findings of other recent surveys conducted within the lowland areas of the South Hilo, and Puna Districts within the recent past (David 1992, 1995, 1997, 1999a, 1999b, 2000. 2001a, 2001b, 2003a, 2003b). All nine of the avian species detected during the course of this survey are alien species commonly found in lowland areas in the Puna District.

It is likely that small numbers of the endangered endemic Hawaiian Petrel (*Pterodroma sandwichensis*)[1], or *ua'u*, and the threatened Newell's Shearwater (*Puffinus auricularis newelli*), or *'a'o*, overfly the project site between the months of May and October (Banko

[1] The Hawaiian endemic endangered sub-species of the Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*) has been elevated to a full species, based on the differences in vocalizations, and morphology between it, and the nominate Galapagos species (*Pterodroma p. phaeopygia*). The new common and scientific names for the Hawai'i breeding species are Hawaiian Petrel (*Pterodroma sandwichensis*) (Banks et al. 2002)

1980a, 1980b; Harrison 1990; Day et al. 2003a, 2003b). Recent radar surveys at the U.S. Coast Guard tower in Pāhoa have recorded Newell's Shearwaters and possibly Hawaiian Petrels over-flying similar habitat close to this site (Day et al. 2002, 2003b, 2004)

Hawaiian Petrels were formerly common on the Island of Hawai'i (Wilson and Evans 1890–1899). This pelagic seabird reportedly nested in large numbers on the slopes of Mauna Loa and in the saddle area between Mauna Loa and Mauna Kea (Henshaw 1902), as well as at the mid to high elevations of Mount Hualalai. It has, within recent historic times, been reduced to relict breeding colonies located at high elevations on Mauna Loa and, possibly, Mount Hualalai (Banko 1980a, Banko et al. 2001, Cooper and David 1995, Cooper et al. 1995, David, Unpublished Field Notes 1986–1995, 1999, Harrison 1990, Hue et al. 2001). Newell's Shearwaters were formerly common on the Island of Hawai'i (Wilson and Evans 1890–1899). This species breeds on Kaua'i, Hawai'i and Moloka'i in extremely small numbers. Newell's Shearwater populations have dropped precipitously since the 1880s (Banko 1980b, Day et al. 2003c). This pelagic species nests high in the mountains in burrows excavated under thick vegetation, especially *uluhe* fern.

The primary cause of mortality in both these species is thought to be predation by alien mammalian species at the nesting colonies (Ainley et al. 2001, Cooper and Day 1995, 1998, Day and Cooper 1997, Hue et al. 2001). Collision with man-made structures is considered to be the second most significant cause of mortality of these seabird species in Hawai'i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds often collide with mammade structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals (Ainley et al. 1995, 1997, 2001, Cooper and Day 1995, 1998, Day and Cooper 1997, Day et al. 2003c). There is no suitable nesting habitat for either of these listed seabird species within or close to the project site.

The principal potential impact that development of the project site poses to Hawaiian Petrels and Newell's Shearwaters is the increased threat that birds will be downed after becoming disoriented by exterior lighting such as street lights which many be a component of the new subdivision.

Recommendation

To reduce the potential for interactions between nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures, it is recommended that any external lighting planned in conjunction with this development be shielded (Reed *et al.* 1985; Telfer et al., 1987). This mitigation would serve the dual purpose of minimizing the threat of disorientation and downing of Hawaiian Petrels, and Newell's Shearwaters, while at the same time complying with the Hawaii County Code § 14 – 50 *et seq.* which requires

the shielding of exterior lights, so as to lower the ambient glare caused by unshielded lighting to the astronomical observatories located on Mauna Kea.

Glossary:

Ahupua'a – Traditional Hawaiian land division, usually extending from the uplands to the sea.
Alien - Introduced to Hawai'i by humans.
Commensal – Animals that share humans food such as rats and mice
Endemic – Native and unique to the Hawaiian Islands
Indigenous - Native to the Hawaiian Islands, but also found elsewhere naturally.
Volant – Flying, capable of flight - as in flying insect.

DLNR – Hawaii State Department of Land & Natural resources.
ESA - Federal Endangered Species Act of 1973, as amended.
VCP – Variable Circular Plot, method of censusing birds.

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APPENDIX C

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Phase I Environmental Site Assessment
Makuu-Halona Subdivision and
Makuu-Popoki Residential Subdivision

Pahoa, Big Island, Hawai`i

Prepared for:
Department of Hawaiian Home Lands
1099 Alakea Street, Suite 1230
Honolulu, Hawaii 96813

Prepared by:
Environet Inc.,
2850 Pa`a Street, Suite 212
Honolulu, Hawai`i 96819

Under Subcontract to:
Engineers Surveyors Hawaii, Inc.
900 Halekauwila Street
Honolulu, Hawaii 96814

December 2004

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List of Acronyms

ASTM	American Society of Testing and Materials
CCH	City and County of Honolulu
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CHRPTO	County of Hawaii Real Property Tax Office
CORRACTS	Corrective Action Report
DHHL	Department of Hawaiian Home Lands
DOD	Department of Defense
DOH	State of Hawaii Department of Health
EDR	Environmental Data Resources
EI	Environet, Incorporated
EPA	United States Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
ESH	Engineers Surveyors Hawaii, Inc.
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FINDS	Facility Index System/Facility Identification Initiative
HEER	Hazard Evaluation and Emergency Response
HCFD	Hawaii County Fire Department
HEPCRA	Hawaii Emergency Planning Community Right-to-Know Act
HMIRS	Hazardous Material Information Reporting System
LEPC	Local Emergency Planning Committee
LUST	Leaking Underground Storage Tank
LQG	Large Quantity Generator
MLTS	Material Licensing Tracking System
NPL	Federal National Priorities List
PCB	Polychlorinated Biphenyls
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
ROD	Record of Decision
RPTD	Real Property Tax Division
SHWS	State Hazardous Waste Sites
SPILLS	State Release Notifications
SQG	Small Quantity Generator
SWLF	State Permitted Solid Waste Landfills, Incinerators, or Transfer Stations
TMK	Tax Map Key
TRIS	Toxic Chemical Release Inventory System
TRPH	Total Recoverable Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers

USGS	United States Geological Survey
UST	Underground Storage Tank

Section 1 Introduction

1.1 Project Background

Environet, Incorporated (EI) was subcontracted by Engineers Surveyors Hawaii, Inc. (ESH) to conduct a Phase I Environmental Site Assessment (ESA) for a property located in Pahoa, Big Island, Hawai'i. The project site consists of vacant land located adjacent to the existing Makuu Farm lots and consists of a portion of Tax Map Key (TMK) number (3) 1-5-08, parcel 03 (heretofore referred to as the Property). This Phase I ESA was performed in accordance with the scope of services agreed upon on June 1, 2004. We understand that the ESA is being undertaken because the Department of Hawaiian Home Lands (DHHL) plans to develop about 240 acres of the existing parcel. The developments will be called the Makuu-Halona Subdivision and the Makuu-Popoki Residential Subdivision and will include creation of subsistence-agricultural and residential lots as well as a park site.

1.2 Project Objective

The objective of the ESA was to identify "recognized environmental conditions" that may exist on the Property. The American Society of Testing and Materials (ASTM) Practice E 1527-00, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, defines recognized environmental conditions as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property." The extent of research to identify recognized environmental conditions is limited by the scope of services.

Section 2 Scope of Services

The scope of services conducted for this Phase I ESA consisted of the following tasks:

- **Site Reconnaissance** - EI staff experienced in conducting hazardous material surveys and environmental assessments performed a visual reconnaissance of the Property and surrounding areas. Environmental conditions and current activities on the Property and adjoining properties were observed. Visual observations were made to establish an inventory of potential contaminant sources on and adjoining the Property. Photographs were taken to document observed conditions.
- **Records Review** - Reasonably ascertainable information and public records about the Property and surrounding areas were requested or obtained from federal, state and local government agencies. This information was used to assess whether current or past usage of the Property or the immediate surrounding areas may have caused or increased the potential for environmental contamination. The records review was based on ASTM Practice E 1527-00.

  EI also conducted a search for historic aerial photographs, United States Geological Survey (USGS) topographic maps, military photomaps, ownership/lease and land use records, and local street maps and directories.

  Requests were made to the Hawaii County Fire Department (HCFD) and Hawaii Local Emergency Planning Committee (LEPC) for hazardous materials spill incident records and reporting records to identify past releases and potential future release concerns on or near the Property.

  Public agency staff and other knowledgeable persons were interviewed regarding past and present site, and adjoining property usages in order to supplement the record review.
- **Evaluation, Analysis and Report** - Information collected during the above activities was evaluated and analyzed.

This ESA report summarizes our findings and presents our conclusions. The ESA was performed in accordance with ASTM Practice E 1527-00; no exceptions to or deletions from the Practice were made.

Section 3 Site Description

3.1 Location and Topography

The project site is located adjacent to the existing Makuu Farm Lots, Pahoa, Hawaii (Figure 3-1). The Property consists of a portion of an approximately 540 acre parcel of land, identified as TMK number (3) 1-5-008:003 (Figure 3-2). The Property encompasses approximately 240 acres of the parcel.

The topography within the project site slopes gently downward to the north, with hummocky topography and elevations ranging from 550 to 700 feet above mean sea level.

3.2 Site Improvements

The majority of the Property is currently undeveloped. A few roads are present to the north east of the Property and a dirt road runs along the southeastern property boundary. The majority of the Property has never been developed.

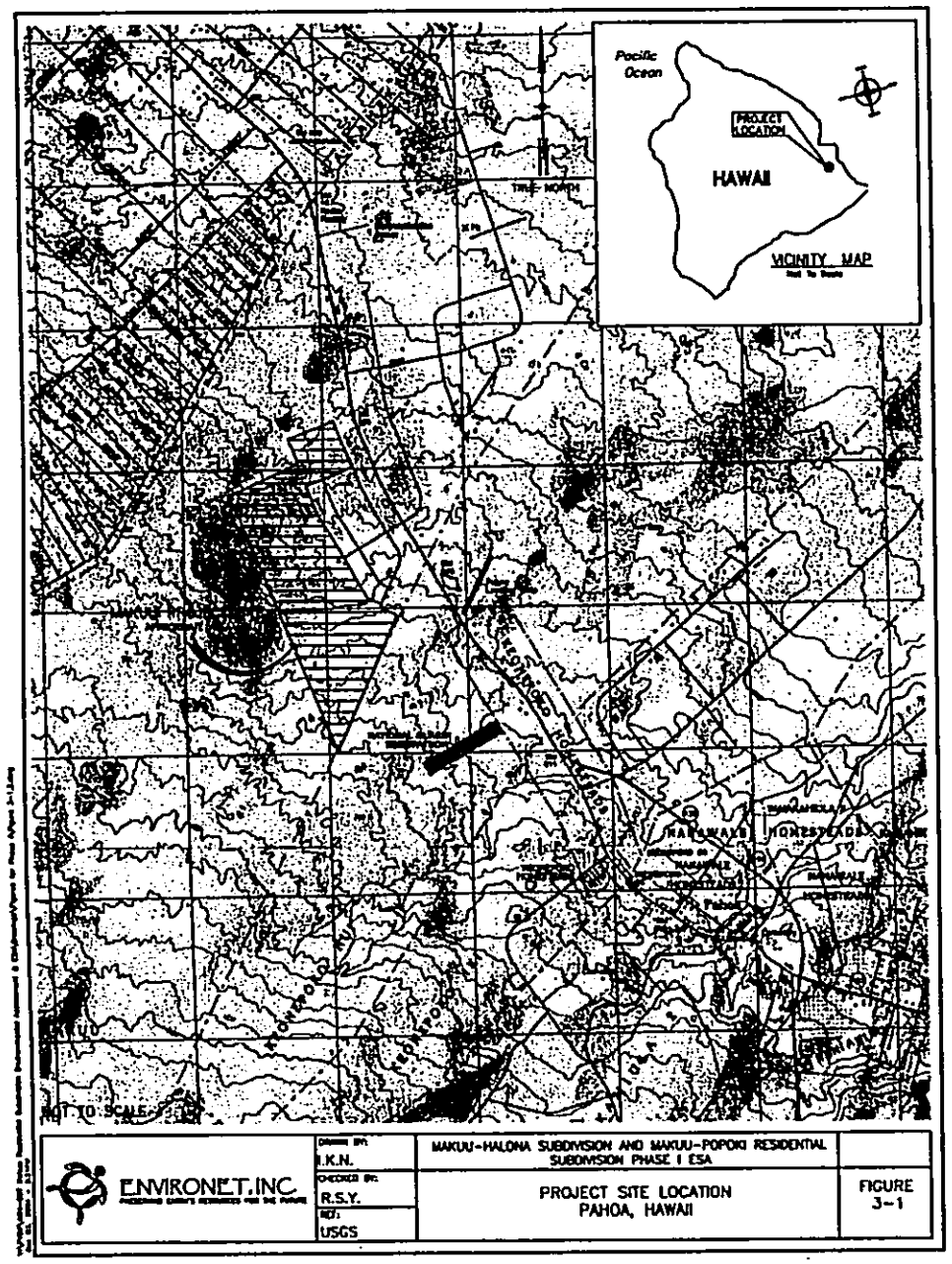
3.3 Environmental Setting

3.3.1 Geology

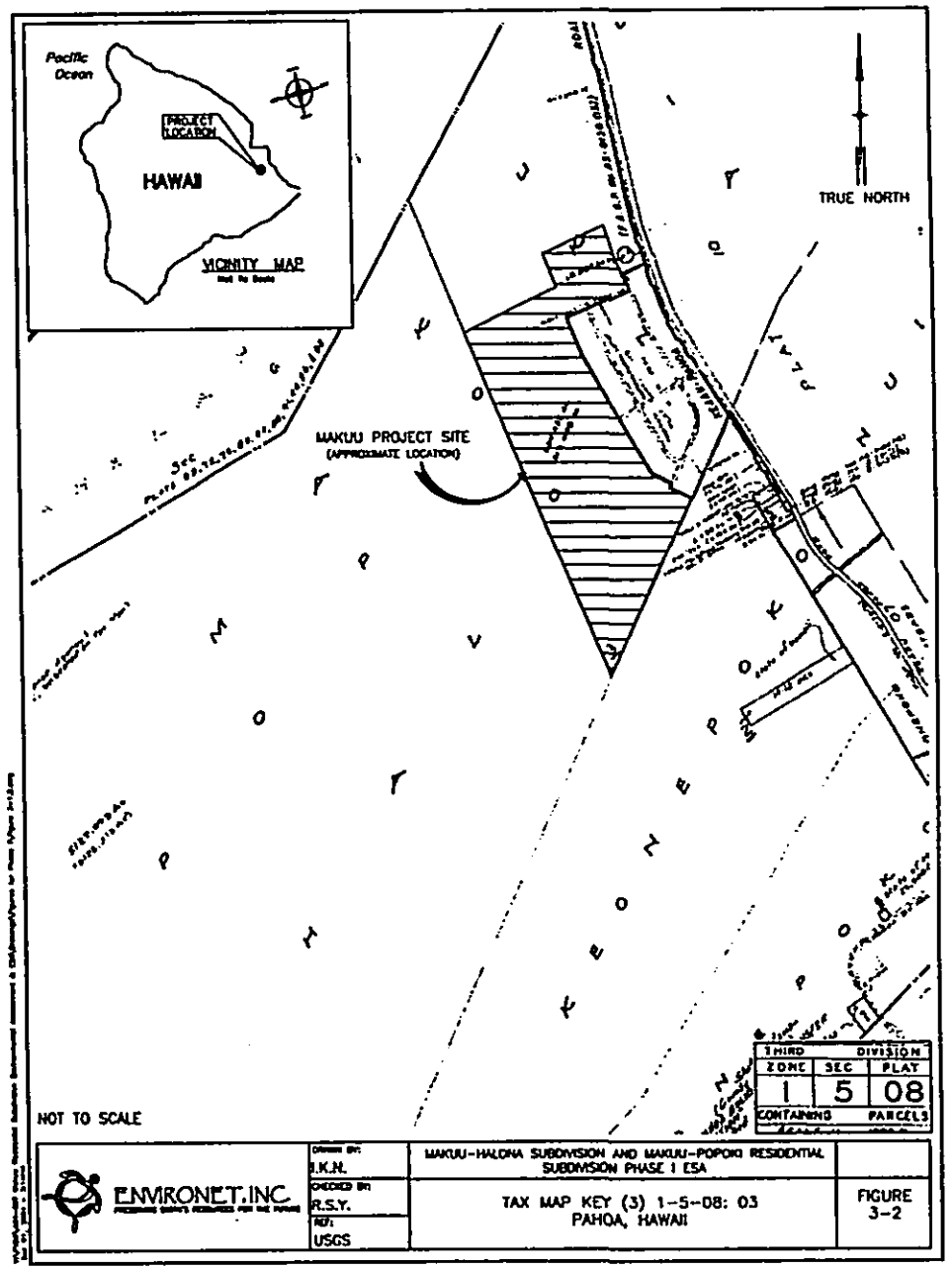
The Hawaiian Archipelago is a chain of seamounts and islands in the North Pacific extending 2,600 kilometers (km) west by northwest from the largest island of Hawaii. Volcanic rocks are the dominant rock type and consist of basaltic flows, caldera and dike complexes, and pyroclastics. Sediments include limestone reefs and dunes, beach and dune sands, and alluvium deposited near present day and ancient shorelines, typical of tropical to subtropical atoll cycles. Some ancient limestone reefs and dunes are found inland due to climatic and sea level fluctuations.

The island of Hawaii, the largest of the Hawaiian chain, was formed by five volcanoes, Mauna Loa, Kilauea, Hualalai, Mauna Kea, and Kohala. The ages of the volcanoes have been determined by radioactive dating with Kohala, the oldest, dated at 700,000 years. Hualalai has been dated at 120,000 years, Mauna Kea at 375,000 years, Mauna Loa at 540,000 years, and Kilauea, the youngest, is about 25,000 years old (Mink and Lau 1993).

The northern most volcano, Kohala, was formed from a northwest rift, a southeast rift, and a poorly developed southwest rift. Much of the south slope is buried under lava flows from Mauna



ENVIRONET, INC.	Drawn By: I.K.N. / Checked By: R.S.Y. / Ref: USGS	MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION PHASE I ESA PROJECT SITE LOCATION PAHOA, HAWAII
		FIGURE 3-1



ENVIRONET, INC.	Drawn By: I.K.N. / Checked By: R.S.Y. / Ref: USGS	MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION PHASE I ESA TAX MAP KEY (3) 1-5-08: 03 PAHOA, HAWAII
		FIGURE 3-2

Kea. The rocks of the Kohala formation are subdivided into two volcanic series. The older Pololu series is composed of thin-bedded tholeiitic basalts with alkalic basalts at the top in most places. The younger Hawi series is composed largely of mugearites, a few soda trachytes, and one Hawaiite flow.

The northwestern volcano, Hualalai, was formed over a northwest rift, a poorly developed northeast rift, and a southeast rift. Hualalai rocks have been divided into prehistoric, historic, and Waawaa members of the Hualalai volcanic series. The Waawaa volcanics consist of Puu Waawaa, a trachyte cone, and the lava flow that originated from it. The rocks of the Hualalai volcanic series are chiefly olivine basalts with an incomplete veneer of olivine-rich basalts carrying augite phenocrysts.

Mauna Loa, the most massive of the Hawaiian volcanoes, was formed over a northeast rift, a southwest rift, and a weakly developed north rift. The southern and southeastern sides of Mauna Loa are broken up by a series of echelon faults that are arranged in two patterns. The first and most common is distinguished by the northeasterly strike of the faults. The second pattern of radial faults occurs and is best developed in the southwest rift zone. The volcanics of Mauna Loa are divided into three units that are all composed of tholeiitic basalts. The oldest is the Ninole series which forms the core of the mountain. The Kahuku series, which reaches a thickness of up to 600 feet, is separated from the Ninole series by a steep angular erosional unconformity. The Kau series overlies the Kahuku series and the two are separated by a layer of Pahala ash ranging from approximately 5 to 50 feet thick. The Kau series is comprised of fairly fresh lavas that are rarely more than 25 feet thick, with the exception of the upper part of Mauna Loa (Stearns 1985).

The Project site is located on the lower eastern slope of Kilauea volcano. Kilauea volcano is situated on the southeast slope of Mauna Loa, from which lava flows have passed over the slopes of Kilauea. Kilauea has a summit caldera 2.93 miles long and 1.95 miles wide. The Halemaumau pit crater within the caldera is active and can contain a lava lake for years at a time. The southern coast is lined with high echelon fault escarpments, a chain of pit craters runs along the southeast rift zone, and long cracks run along the southwest rift zone.

Kilauea has produced at least 11 different ash eruptions that can be recognized in surficial deposits. Both phreatic and phreatomagmatic explosions can occur. The lava flows that Kilauea produces can range from several inches to 15 feet in thickness with the average around 8 feet, except those that pool in depressions (Stearns 1985).

The rocks of the Kilauea volcano are divided into the older Hilina volcanic series and the younger Puna volcanic series, both of which are tholeiitic basalt. The Hilina series is comprised

of lava flows and pyroclastic rocks laid down by Kilauea prior to the deposition of up to 30 feet Pahala ash. The Puna series covers most of Kilauea and was erupted during the Holocene and latest Pleistocene periods. The rocks are correlative with the Kau volcanic series on Mauna Loa, as both series overlie Pahala ash. Some of the flows have poured out of the caldera while others have come from flank fissures. About 60 cinder and splatter cones on the east rift and 40 along the southwest rift gave vent to flank flows. Ten littoral cones exist where flows ran into the sea and exploded and pit craters are numerous. The thick ash deposits that are present around the caldera belong to the Puna series (Stearns 1985).

The Property is situated on lava flows that are between 350 and 500 years old. The flows were fed by vents located near Kilauea Iki around twenty miles to the west. The Pahoa Cave lies southwest of the Property (Hazlett and Hyndman 1996).

3.3.2 Hydrogeology

The principal reservoirs of groundwater in Hawaii are in basaltic lava flows that were extruded above sea level. Lava extruded above water is generally thinly bedded, highly clinkery, and highly permeable. In contrast, flows extruded in water are likely to be more massive, less clinkery, and less permeable. The regional permeability of lava, whether high or low initially, is significantly reduced when intruded by dikes. The reduction in permeability is a function of the number and volume of the dike intrusions and the geometry of the dikes (Takasaki and Mink, 1985). Pyroclastic deposits are commonly granular and the permeability of the deposits depends on grain size and degree of sorting. Coarse deposits, such as cinder, are generally more permeable than fine ash (Oki 1999). Groundwater in Hawaii is found as perched water, water impounded by dikes, or basal water. Surface water in Hawaii is minimal. The island has a recent geological history so the impact of erosion on the volcanic shields is small except in the case of the Kohala volcano. Perennial streams are absent, except in Kohala and along the high rainfall region on the Hamakua coast north of Hilo (Mink and Lau 1993).

The Property overlies the Pahoa aquifer system, which consists of an unconfined, basal, flank aquifer system (Mink and Lau 1993). The aquifer is currently being used as a drinking water source. The water is fresh and is considered to be irreplaceable and has a high vulnerability to contamination. The primary source of recharge to this volcanic aquifer is from infiltration of rainwater. The average annual rainfall is around 120 inches (Mink and Lau 1993).

The State of Hawaii Department of Health established the Underground Injection Control (UIC) line to regulate the injection of wastewater into the ground in order to protect Hawaii's underground drinking waters from contamination. Restrictions on injection wells differ,

depending on whether the area is inland (mauka) or seaward (makai) of the UIC line. The UIC line is used to determine the level of protectiveness afforded an aquifer as reflected by water quality standard criteria. In general, wastewater injection is prohibited mauka of the UIC line, but is allowed makai of the UIC line. Therefore, for sites located above the UIC line, the more restrictive drinking water standards are used as the basis for protectiveness. For sites located below the UIC line, the saltwater quality standards are used as a basis for protectiveness (State of Hawaii DOH, 1992). The Property lies mauka of and is thus above the UIC line.

3.3.3 *Surface Hydrology*

Surface runoff from the Property occurs by overland sheet flow to the north-northeast with the majority of the site having moderate slopes. The ground cover generally consists of a dense vegetative canopy.

3.3.4 *Soils*

The surface in the vicinity of the Property is classified primarily as Pahoehoe Lava Flow (rLW). The pahoehoe lava flows can vary from a relatively smooth billowy surface to a rough hummocky surface created by pressure domes. Soil in the vicinity of the Property is classified as Keaukaha series and consists of well-drained, thin organic soils overlying the pahoehoe lava bedrock. These soils occupy the low areas of Mauna Loa. They are at an elevation ranging from near sea level to 1,000 feet and receive from 90 inches to more than 150 inches of rainfall annually. Their mean annual soil temperature is between 72° and 74° F. The natural vegetation consists of ohia, tree fern, uluhe fern, and guava (Sato et. al. 2004).

3.3.5 *Climate*

The climate in the region of Makuu is warm with moderate to high rainfall. Rainfall varies from approximately 7 inches per month in June, to 15 inches per month in November. Mean annual rainfall at the Property is approximately 120 inches (WRCC 2004). The average daily minimum temperature in March is 63 degrees Fahrenheit (°F) and the average daily maximum temperature in September is 84 °F. The mean annual temperature is approximately 74 °F.

Section 4 History of Site Uses

Investigation into the history of the Property and adjoining properties was accomplished by reviewing historical aerial photographs, topographic maps, and ownership and land use records. The following summarizes the site history and findings of each available record search.

4.1 Topographic Maps

U.S. Geological Survey (USGS) topographic maps dated 1965, 1966, 1981, 1992 and 1997; A USGS Orthophotographic map dated 1977; and a Hawaiian Territorial Survey dated 1921-1930 were reviewed for indication of topographic and land use changes leading to potential environmental impact on the project site and its surrounding areas.

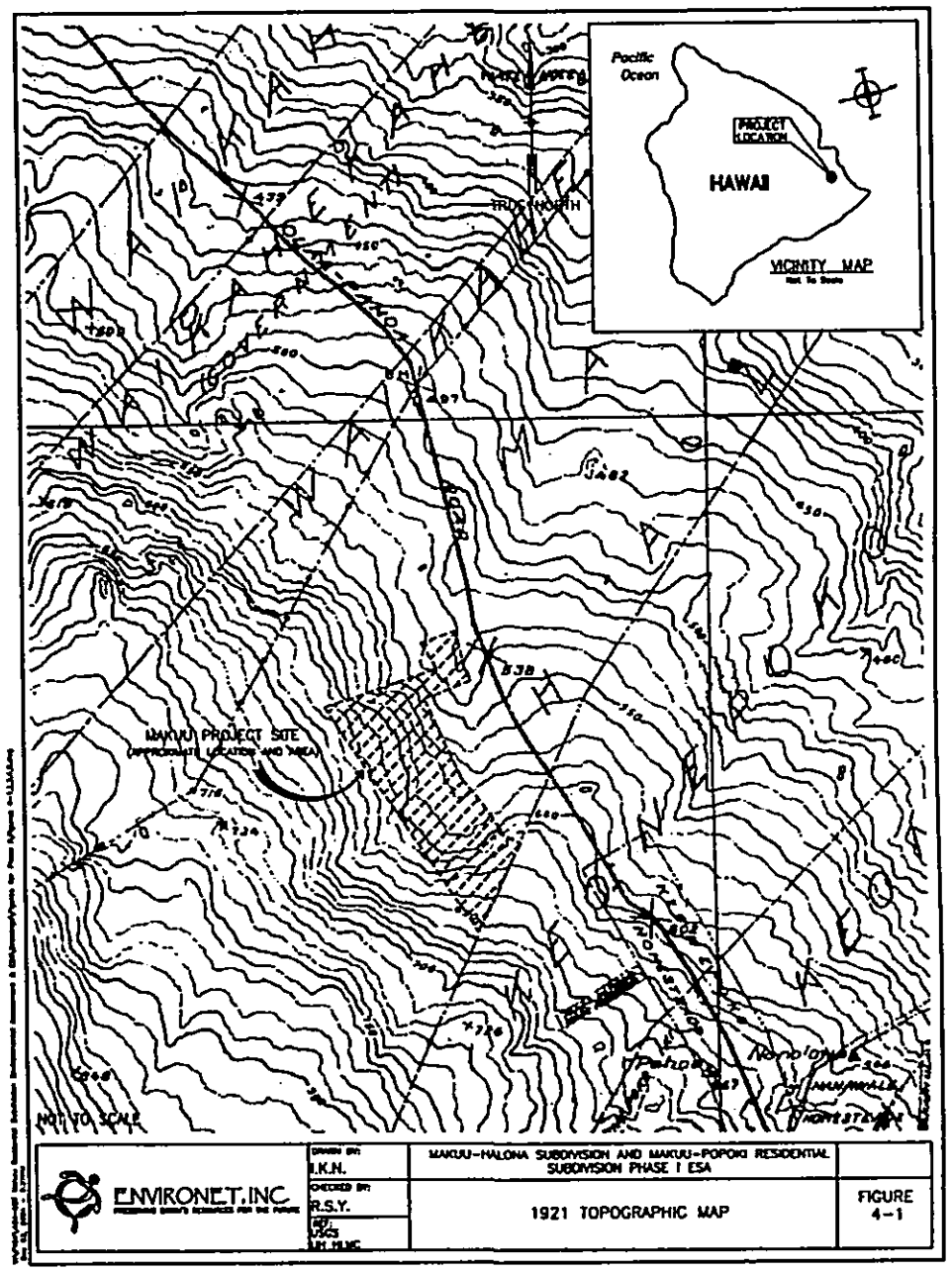
The earliest available map (USGS 1921-1930) indicates that the Property was undeveloped and vacant (Figure 4-1). What is now known as Keaau-Pahoa Road (130) is shown as Olaa-Pahoa Road. Keonepoko Homesteads is present southeast of the Property. Pahoa National Guard Reservation is present adjacent to Keonepoko Homesteads. Nanawale Homesteads is present further southeast of the Property and Pahoa town is visible south of Nanawale Homesteads.

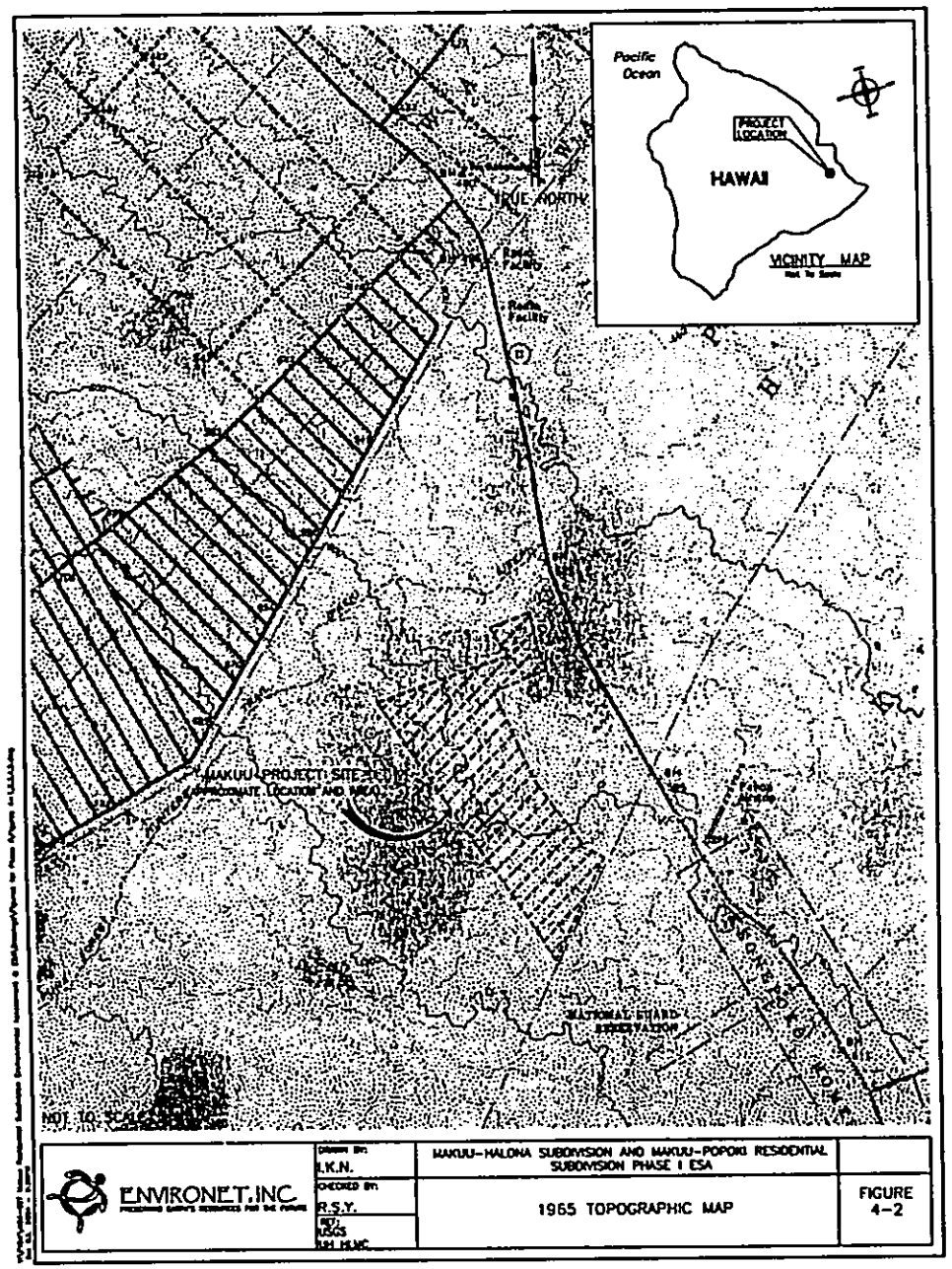
Further development is evident in the vicinity of the Property by the 1960's (Figure 4-2) (USGS 1965, 1966). No development is present on the Property. The road later identified as Keaau-Pahoa Road is now named "13". Pahoa Airstrip is present to the east-southeast of the Property. Puna Forest Hunters Trail is present north-northwest of the Property. Several roads are visible to the northwest of the Property, (USGS 1965) and by the end of the 1970's, the roads appear to be complete and several houses exist on most of the streets (USGS 1977). Further development is visible within Keonepoko and Nanawale Homesteads as well as in Pahoa town (USGS 1965, 1977).

By 1981, it appears the development located northwest of the Property has been further expanded (USGS 1981). This area is later identified as the Ainaloa residential subdivision. No development is present on or immediately adjacent to the Property. A radio tower and radio facility is present to the north of the Property.

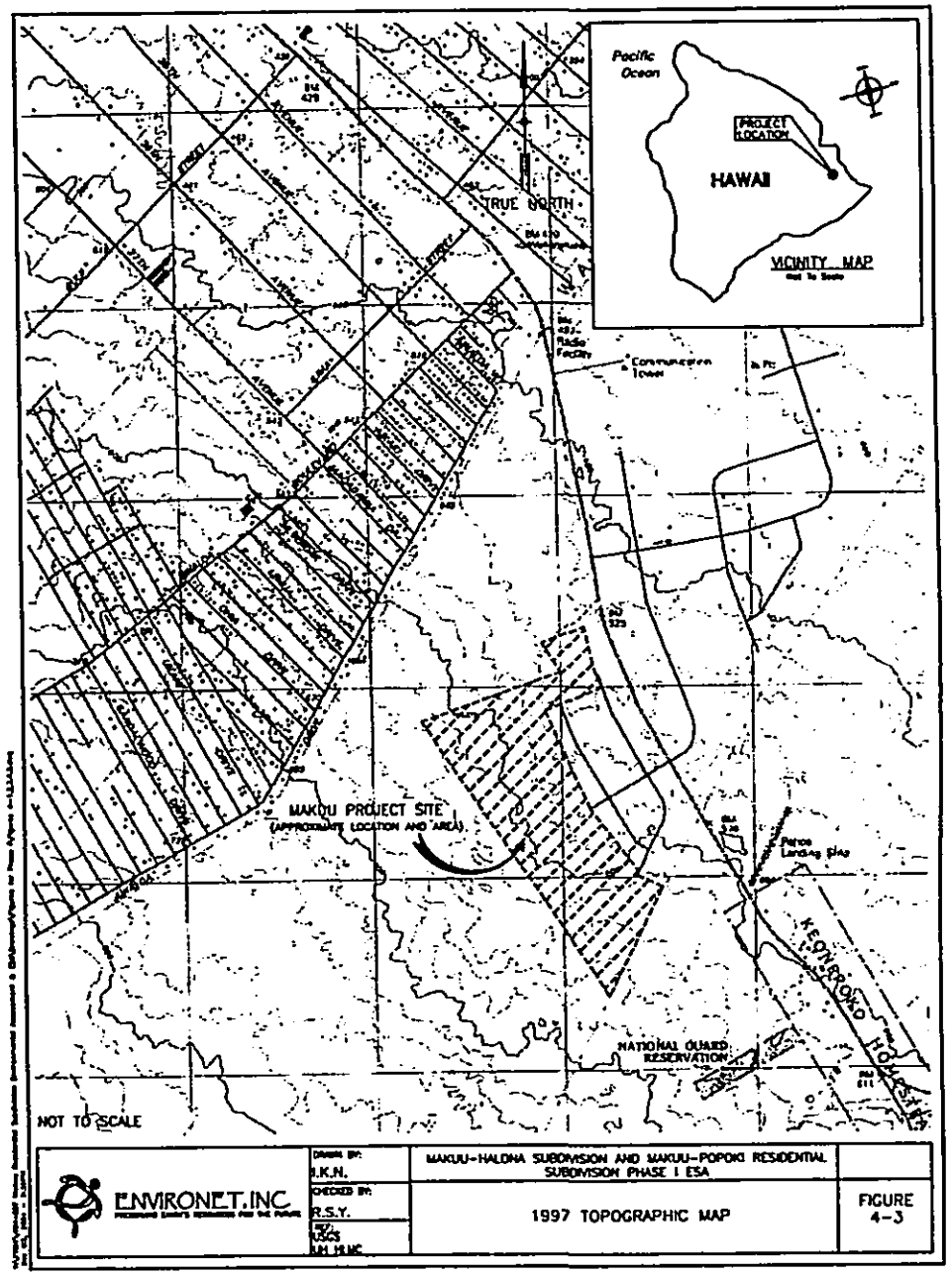
Topographic maps from the 1990's show the development of roads surrounding the existing Makuu farm lots located adjacent to the Property and east of Pahoa Road (Figure 4-3) (USGS 1992, 1997). It appears the new roads are a part of the development to the northwest of the Property.

The topographic maps did not show any significant change in the ground elevation in the region or any indication of potential environmental issues.





ENVIRONET,INC	Drawn By: I.K.N.	MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION PHASE I ESA	
	Checked By: R.S.Y.	1965 TOPOGRAPHIC MAP	FIGURE 4-2
	Ref.: USGS MH MMC		

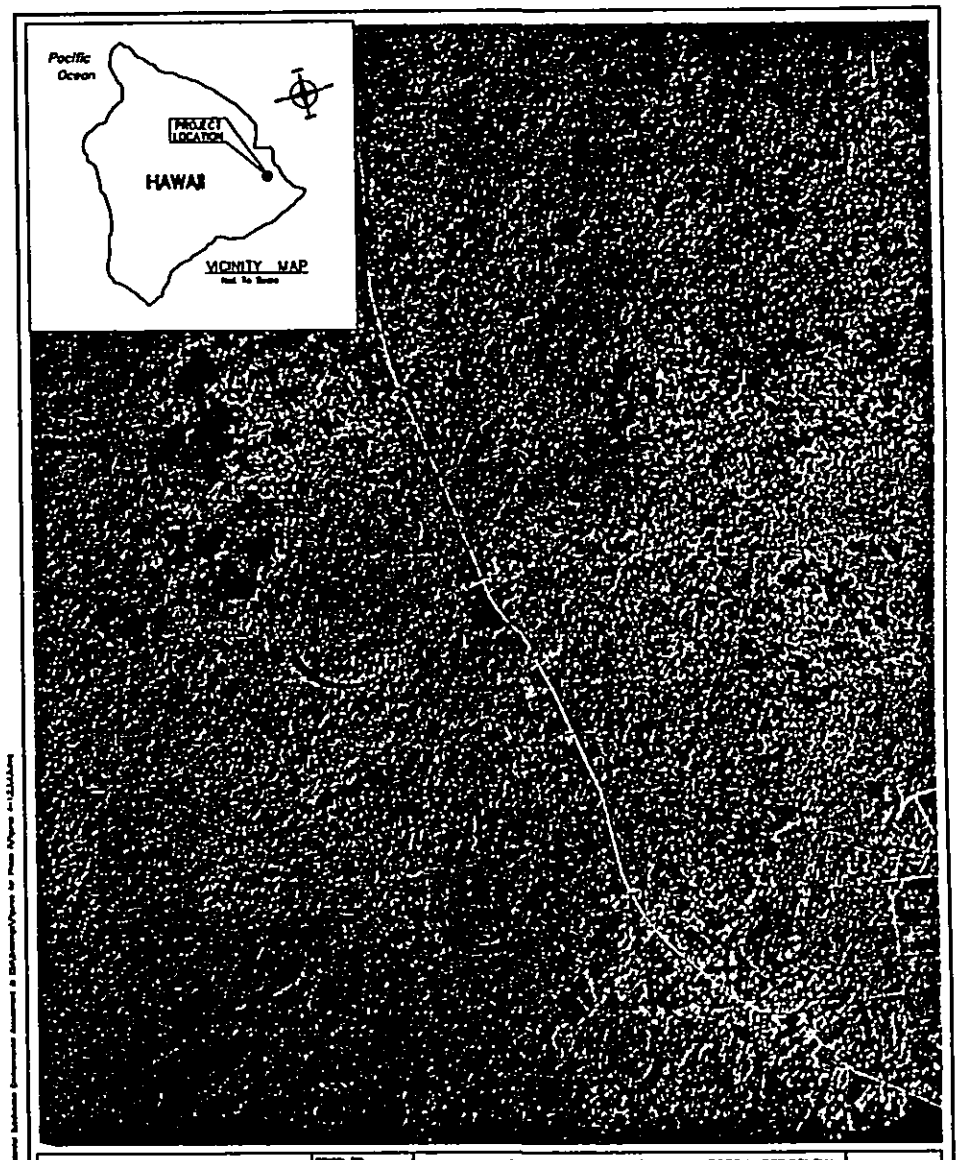


ENVIRONET,INC	Drawn By: I.K.N.	MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION PHASE I ESA	
	Checked By: R.S.Y.	1997 TOPOGRAPHIC MAP	FIGURE 4-3
	Ref.: USGS MH MMC		

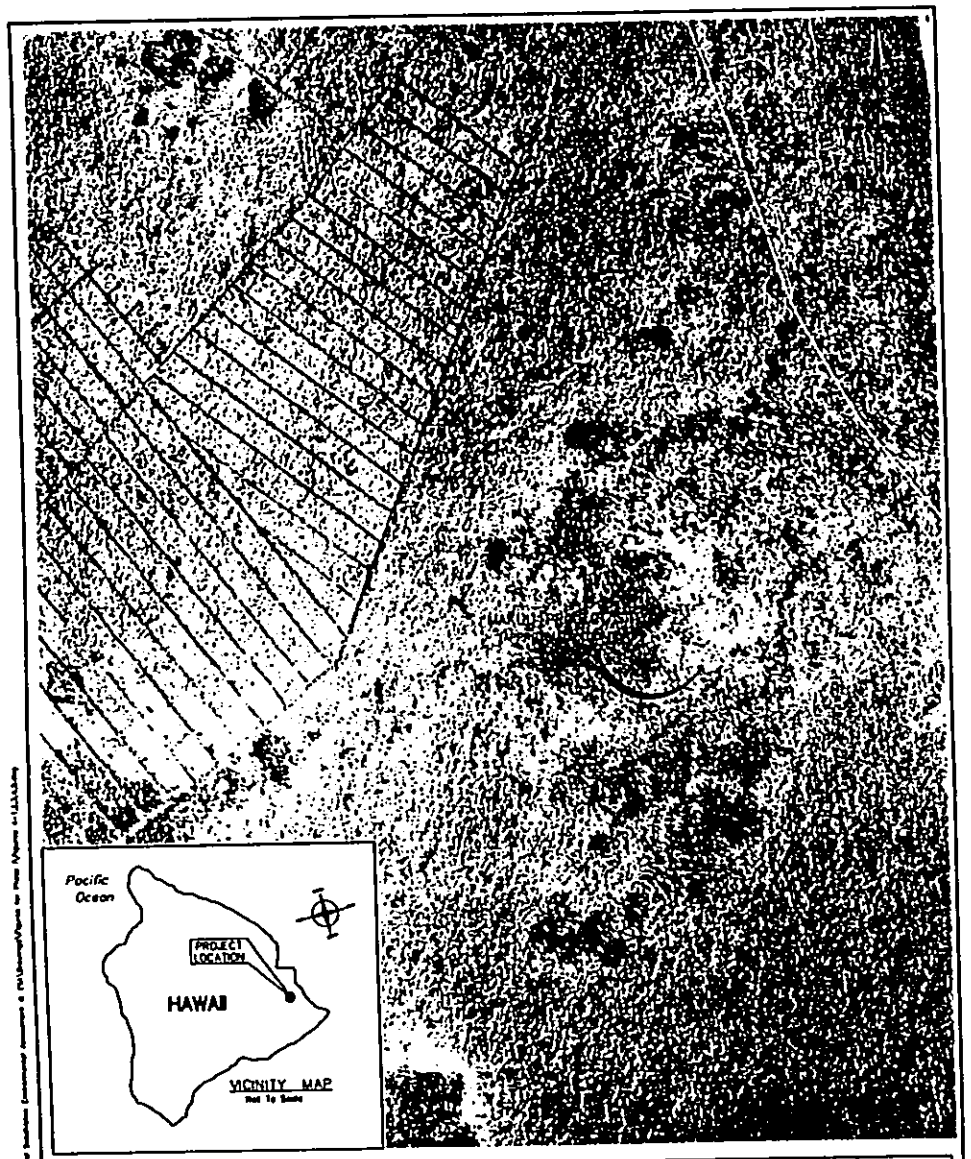
4.2 Aerial Photographs

Readily available aerial photographs were reviewed at the University of Hawaii, Hamilton Library Map Room for historical and present land use patterns on the Property and in the vicinity of the Property. Recent aerial photographs taken in connection with the current DHHL development project were also reviewed. These photos were obtained from ESH (ESH, 2004). Aerial photographs from 1958, 1961, 1965 and 2004 were available for examination. The aerial photographs available generally reflected the changes observed in the topographic maps (Section 4.1). A summary of the findings is provided below.

- The earliest available aerial photograph, from 1958, (Figure 4-4) shows the Property to be undeveloped vacant land. It appears there is a different vegetative cover in the vicinity of the Property compared to the surrounding area. Keaau-Pahoa road is visible to the east of the Property. Some development is visible to the south-southeast of the Property, possibly in Pahoa town. Scattered development is also present at the locations of Keonepoko and Nanawale Homesteads. Pahoa Air strip is present to the east-southeast of the Property.
- The aerial photograph from 1961 shows little change since 1958. The Property remains vacant and undeveloped. Developments in the vicinity of the Property remain unchanged.
- The aerial photograph from 1965 (Figure 4-5) shows that the Property remains much the same as in 1958. Several roads are visible to the northwest of the Property, reflecting the development seen in topographic maps of the area (Section 4.1).
- The aerial photographs from 2004 (Figure 4-6) shows that the Property remains vacant and undeveloped. Three roads are in place just northeast of the project site and it appears that at least two residences or other buildings are present off the roads.



ENVIRONET, INC.	DRAWN BY: I.K.N.	MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION PHASE I ESA	
	CHECKED BY: R.S.Y.	1961 AERIAL PHOTOGRAPH	FIGURE 4-4
	REF: UH HLMC		



ENVIRONET, INC. PRESERVING EARTH'S RESOURCES FOR THE FUTURE	DRAWN BY: I.K.N.	MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION PHASE I ESA	
	CHECKED BY: R.S.Y.	1965 AERIAL PHOTOGRAPH	FIGURE 4-5
	REF: USGS DH HLMC		

NOT TO SCALE

ENVIRONET, INC. PRESERVING EARTH'S RESOURCES FOR THE FUTURE	DRAWN BY: I.K.N.	MAKUU-HALONA SUBDIVISION AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION PHASE I ESA	
	CHECKED BY: R.S.Y.	2004 AERIAL PHOTOGRAPHS	FIGURE 4-6
	REF: ESH, INC		

4.3 Sanborn Fire Insurance Maps

The Sanborn Map® Collection consists of a uniform series of large-scale detailed maps, dating from 1867 through 1969 and depicting the commercial, industrial, and residential sections of cities. The maps were designed by surveyor D.A. Sanborn in 1866 to assist fire insurance agents in determining the degree of hazard associated with a particular property. Sanborn Maps® illustrate in outline form the site, size, shape, construction and building material of dwellings, commercial buildings, and factories. Details of buildings include fire walls, the location and number of windows and doors, style and composition of roofs, wall thickness, cracks in exterior walls, and makes of elevators. The maps also indicate building use, sidewalk and street widths, layout and names, property boundaries, distance between buildings, house and block numbers, location of water mains, hydrants, piping, wells, cisterns, and fuel storage tanks.

Environmental Data Resources, Inc. was subcontracted to conduct a review of a complete collection of Sanborn fire insurance maps. Since there are no indications that buildings have ever been present on the Property, no coverage for the Property was found.

4.4 Ownership and Land Use Records

Ownership history for the Property was obtained from historical records maintained by the City and County of Honolulu Real Property Tax Division (CCH RPTD) and the County of Hawaii Real Property Tax Office (CHRPTO). The Property occupies approximately 240 acres of a total of 540-acre parcel of land identified as TMK Island 3 Zone 1 Section 5 Plat 008 Parcel 003 ((3) 1-5-008:003). Real property records dating from back to 1948 are kept at the CHRPTO. The CCH RPTD also keep some outer-island records. All records indicate that the Property has been owned by the State of Hawaii, Department of Hawaiian Home Lands since its establishment. Portions of the Property have been leased primarily for pasture and farming purposes as far back as the first documented records.

Copies of the real property records obtained are provided in Appendix B of this report.

Section 5 Site Reconnaissance

EI staff conducted a site reconnaissance of the subject parcel and surrounding areas on November 29, 2004 to observe current site uses and to identify potential sources of environmental concern. The site reconnaissance consisted of a visual survey of the site and adjacent properties. Photographs taken during the site reconnaissance are provided in Figure 5-1.

5.1 Observations

Entrance to the Property is from Niaulani Street to the northeast, off Keaau-Pahoa Road (Highway 130). Two additional roads are present to the northeast of the Property. Kipika Place runs along the northeastern property boundary, perpendicular to Niaulani Street. Kauhaenae Place runs parallel to Kipika Place and crosses Niaulani Street before turning south and ending at the southeastern property boundary. Along all the roads are streetlights and electrical easements. A dirt road continues along the southeastern property boundary from Kauhaenae. The topography of the Property slopes moderately from the southwest to the northeast. The majority of the Property is overgrown with trees, shrubs, and grasses. Due to the dense vegetation, the exact property boundaries could not be discerned in the field (Figure 5-1).

One discarded refrigerator was observed near the entrance to the Property from Niaulani Street (Figure 5-1). No other evidence of environmental concerns were observed on or in the immediate vicinity of the Property.

5.2 Adjacent Properties

The Property is bordered on all sides by mostly undeveloped and vacant land with the exception of the residential area of Ainaloa to the northwest of the Property. The area immediately northeast of the Property appeared to be mostly vacant with the exception of Niailani Street, Kauhaenae Place and Kipika Place and at least one residential home off Niaulani Street.

The existing Makuu farm lots are present across highway 130 to the northeast of the Property. On one of the lots there were several trucks, some abandoned vehicles, three tents and a propane tank. Various construction equipment and two portable lavatories were also observed in the area.

There was no visual evidence of environmental concerns on adjacent properties that would affect the Property.

Section 6 Records Review

Research for available environmental documents and records included utilizing the services of a commercial database research company, submitting written requests for public information to government agencies, telephone interviews with regulatory agency personnel, and reviewing databases and listings maintained by regulatory agencies on government websites.

The purpose of the records review was to assess the potential presence of environmental contamination or future release of hazardous materials or substances on the Property as a result of activities conducted on and around the Property. The record search was limited to information readily available from public sources and EI's previous project experiences. The public records are updated regularly by the individual agencies but may not be completely up to date.

Records reviewed during this ESA include those maintained by the following agencies:

- United States Environmental Protection Agency (EPA)
- State of Hawaii Department of Health (DOH)
- County of Hawaii Real Property Tax Office (CHRPTO)
- City and County of Honolulu Real Property Tax Division (CCH RPAD)
- County of Hawaii Fire Department (CHFD)
- Local Emergency Planning Committee (LEPC)

Environmental Data Resources, Inc. (EDR), an independent environmental information service provider, was subcontracted to conduct a search of government records for the project site and surrounding areas within specified search radii (Table 6-1). The EDR report dated July 13, 2004 is provided in Appendix A of this report. A summary of the results of the records search and review is provided in Table 6-1 and the discussion that follows.

EI staff also conducted research of property records at the County of Hawaii Real Property Tax Office and the City and County of Honolulu Real Property Tax Division. Discussions of the record-search results are provided in Sections 4.4 and 6.3. Copies of property records are provided in Appendix B.

Written requests for information about the Property were submitted to State of Hawaii Department of Health, County of Hawaii Fire Department and the Local Emergency Planning Committee. Discussions of search results are provided in Sections 6.2, 6.4 and 6.5 respectively. Copies of the request letters submitted to the various agencies and their responses are provided in Appendix C.

6.1 U.S. Environmental Protection Agency

U.S. EPA database and records reviewed include:

- The National Priority List (NPL), which identifies sites that pose the greatest immediate threat to human health or the environment under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or "Superfund")
- CERCLIS (CERCLA Information System), which lists sites that are under consideration for listing on the NPL
- Resource Conservation and Recovery Act (RCRA) Corrective Action sites and associated permitted treatment, storage, and disposal (TSD) facilities (CORRACTS)
- RCRA permitted treatment, storage, and disposal facilities (TSD)
- RCRA registered (RCRIS) small (SQG) or large (LQG) quantity hazardous waste generators
- The Emergency Response Notification System (ERNS) of spills

The following are Federal ASTM supplemental records also reviewed by EDR:

- CERCLA Consent Decree sites
- CERCLA Record of Decision (ROD) sites
- De-listed NPL sites
- Facility Index System/Facility Identification Initiative Program Summary Report (FINDS)
- Hazardous Materials Information Reporting System (HMIRS)
- Material Licensing Tracking System (MLTS)
- Mines Master Index File
- Federal Superfund Liens
- Polychlorinated biphenyl (PCB) Activity Database System (PADS)
- Department of Defense (DOD) List
- RCRA Administrative Action Tracking System
- Toxic Chemical Release Inventory System (TRIS)

- Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA)/ Toxic Substances Control Act (TSCA) Tracking System (FFTS)
- Section 7 Tracking System

The Property was not listed in any of the Federal databases searched. No neighboring sites were identified in the Federal databases within the designated search radii. A summary of the database search is provided in Table 6-1. A copy of the EDR report is provided in Appendix A.

6.2 *Hawaii Department of Health Records*

Hawaii DOH database and records reviewed include:

- State permitted solid waste landfills, incinerators, or transfer stations (SWLF)
- State Hazardous Waste Sites (SHWS), the State's equivalent to CERCLIS
- Release Notification Report (State SPILLS list) compiled by the Hazard Evaluation and Emergency Response Office (HEER)
- Environmental Management Division, which includes the following Branches:
  - Clean Air
  - Clean Water
  - Safe Drinking Water
  - Wastewater
  - Solid and Hazardous Waste (including Underground Storage Tank Section)

The Property was not listed in any of the databases searched by EDR (EDR, 2004). In a response to a written inquiry, DOH HEER indicated that there are no reports of potential hazardous material release or other violations on the Property or within the required radii. A copy of the DOH HEER response is included in Appendix C.

Table 6-1
Sites Identified on State and Federal Hazardous Materials Listings and Databases

Federal EPA National Priorities List (NPL) and Proposed NPL	0	0	0	0
Federal EPA Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) and CERCLIS No Further Remedial Action Planned (CERC-NFRAP)	0	0	0	0
Federal EPA RCRA Corrective Actions (CORRACTS) and associated TSD	0	0	0	-
Federal EPA RCRA Permitted Treatment, Storage, and Disposal (TSD) Facilities	0	0	0	-
Federal EPA RCRA Registered Large Generators of Hazardous Waste (LQG)	0	0	-	-
Federal EPA RCRA Registered Small Generators of Hazardous Waste (SQG)	0	0	-	-
Federal EPA Emergency Response Notification System (ERNS) of Spills	-	-	-	-
State Hazardous Waste Sites (SHWS)	0	0	0	0
State DOH Permitted Solid Waste Landfills, Incinerators, or Transfer Stations (SWLF)	0	0	0	-
State DOH Hazard Evaluation and Emergency Response Office (HEER) Release Notification Report (State spills list)	0	-	-	-
Hawaii Emergency Planning and Community Right-to-Know (HEPCRA) list of facilities	0	-	-	-
State DOH Solid and Hazardous Waste Branch records	0	-	-	-
State DOH Leaking Underground Storage Tanks (LUST)	0	0	0	-
State DOH Registered Underground Storage Tanks (UST)	0	0	-	-

Note: "-" means this distance is not within search criteria for the specific database.

6.3 Real Property Tax Division

The CHRPTO and CCH RPTD maintains real property ownership records for the Property. Information regarding property ownership reviewed is presented in Section 4.4.

6.4 County of Hawaii Fire Department

A written request was made to the County of Hawaii Fire Department for fire and hazardous material spill incident reports. No response has been given to date. When a response is received, EI will immediately notify DHHL.

6.5 Local Emergency Planning Committee

A written request was made to the Hawaii County Local Emergency Planning Committee (LEPC) for Tier 2 reports. Tier 2 reports contain information on facilities that store, use, or generate hazardous materials/substances on their premises. In a written response the LEPC informed EI that there are no records for the Property. A copy of the LEPC response is included in Appendix C.

Section 7 Findings and Conclusions

The findings and conclusions presented below are based on the site reconnaissance and review of reasonably available public records conducted for this study.

7.1 Findings

A review of historical records revealed the following:

- The majority of the Property area has historically never been developed. Portions of the Property may have been used as pasture and/or farm land.
- The Property and adjacent properties were not found on any of the Federal or State database listings.

An inspection of the site revealed the following:

- The majority of the Property is overgrown with trees, shrubs, and grasses.
- At least one private residence was observed in the vicinity of the Property, off Niaulani Street.
- One discarded refrigerator was observed close to the Niaulani Street property entrance.

7.2 Conclusions

We have performed a Phase I ESA of the Property identified as Hawaii TMK (3) 1-5-08, Parcel 003, the Property, in conformance with the scope and limitations of ASTM Practice E 1527-00.

The findings do not indicate any environmental concern the roughly 240-acre subject parcel.

Section 8 Limitations

We have performed our services for this project in accordance with our Agreement, and with ASTM Practice E 1527-00 for ESA investigations; no guarantees are either expressed or implied.

The record search was limited to information that is reasonably ascertainable from public sources; this information is changing continually and is frequently incomplete. Unless we have actual knowledge to the contrary, information obtained from interviews or provided to us has been assumed to be correct and complete. We do not assume any liability for information that has been misrepresented to us or for items not visible, accessible, or present on the Property at the time of the site visit.

There is no investigation that is thorough enough to preclude the presence of materials on the Property, which presently, or in the future, may be considered hazardous. Because regulatory evaluation criteria are constantly changing, concentrations of contaminants present and considered to be acceptable may, in the future, become subject to different regulatory standards and require remediation.

Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions. Unless site conditions change, this document and the information contained herein are valid for a period of 180 days according to the ASTM Practice, and have been prepared solely for the use of the Department of Hawaiian Home Lands. No third party shall have the right to rely on Environet, Inc. opinions rendered in connection with the services or in this document without Environet's written consent and the third party's agreement to be bound to the same conditions and limitations as the client.

Section 9 References

City & County of Honolulu, Real Property Assessment Division. Tax Map and property ownership history.

County of Hawaii, Real Property Tax Assessment Division. Tax Map and property ownership history.

Engineers Surveyors Hawaii, Inc. Aerial Photographs dated 2004.

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University of Hawaii Hamilton Library, Map Collection, Aerial Photographs dated 1958, 1961 and 1965.

University of Hawaii Hamilton Library, Map Collection, Maps reviewed: *USGS, Hawaiian Territorial Survey, Island and County of Hawaii, Pahoa Junction Quadrangle, 1921-1930; USGS Topographic maps, Pahoa North and Pahoa South Quadrangles dated 1965, 1966, 1981, 1997, 1992, USGS/DLNR Orthophotoquad, Pahoa North Quad, 1977.*

WRRC, Western Regional Climate Center, Hawaii Climate Summaries. Temperature and rainfall data tables. Obtained from www.wrcc.dri.edu/summary/climsmhi.htms, July 2004

Appendix A
Environmental Data Resources, Inc.
- *EDR Radius Map with GeoCheck*
- *EDR Sanborn Map Search*

The EDR Radius Map
with GeoCheck®

Makuu Phase I
Keaau-Pahoa Road
Pahoa, HI 96778

Inquiry Number: 01229490.1r

July 13, 2004

EDR™ Environmental Data Resources Inc

The Standard in Environmental Risk Management Information

440 Wheelers Farms Road
Milford, Connecticut 06460

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances are per ASTM standard or custom distances requested by the user.

TARGET PROPERTY INFORMATION

ADDRESS

KEAAU-PAHOA ROAD
PAHOA, HI 96778

COORDINATES

Latitude (North):	19.517250 - 19° 31' 2.1"
Longitude (West):	154.980300 - 154° 58' 49.1"
Universal Tranverse Mercator:	Zone 5
UTM X (Meters):	292190.6
UTM Y (Meters):	2159133.0
Elevation:	665 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	19154-E8 PAHOA NORTH, HI
Source:	USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

FEDERAL ASTM STANDARD

NPL	National Priority List
Proposed NPL	Proposed National Priority List Sites
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP	CERCLIS No Further Remedial Action Planned
CORRACTS	Corrective Action Report
RCRIS-TSD	Resource Conservation and Recovery Information System
RCRIS-LQG	Resource Conservation and Recovery Information System
RCRIS-SQG	Resource Conservation and Recovery Information System
ERNS	Emergency Response Notification System

STATE ASTM STANDARD

SHWS	Sites List

SWF/LF..... Permitted Landfills in the State of Hawaii
LUST..... Leaking Underground Storage Tank Database
UST..... Underground Storage Tank Database
VCP..... Voluntary Response Program Sites

FEDERAL ASTM SUPPLEMENTAL

CONSENT..... Superfund (CERCLA) Consent Decrees
ROD..... Records Of Decision
Delisted NPL..... National Priority List Deletions
FINDS..... Facility Index System/Facility Identification Initiative Program Summary Report
HMIRS..... Hazardous Materials Information Reporting System
MLTS..... Material Licensing Tracking System
MINES..... Mines Master Index File
NPL Liens..... Federal Superfund Liens
PADS..... PCB Activity Database System
UMTRA..... Uranium Mill Tailings Sites
FUDS..... Formerly Used Defense Sites
INDIAN RESERV..... Indian Reservations
US BROWNFIELDS..... A Listing of Brownfields Sites
DOD..... Department of Defense Sites
RAATS..... RCRA Administrative Action Tracking System
TRIS..... Toxic Chemical Release Inventory System
TSCA..... Toxic Substances Control Act
SSTS..... Section 7 Tracking Systems
FTTS INSP..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

STATE OR LOCAL ASTM SUPPLEMENTAL

SPILLS..... Release Notifications

EDR PROPRIETARY HISTORICAL DATABASES

Coal Gas..... Former Manufactured Gas (Coal Gas) Sites

BROWNFIELDS DATABASES

US BROWNFIELDS..... A Listing of Brownfields Sites
BROWNFIELDS..... Brownfields Sites
VCP..... Voluntary Response Program Sites

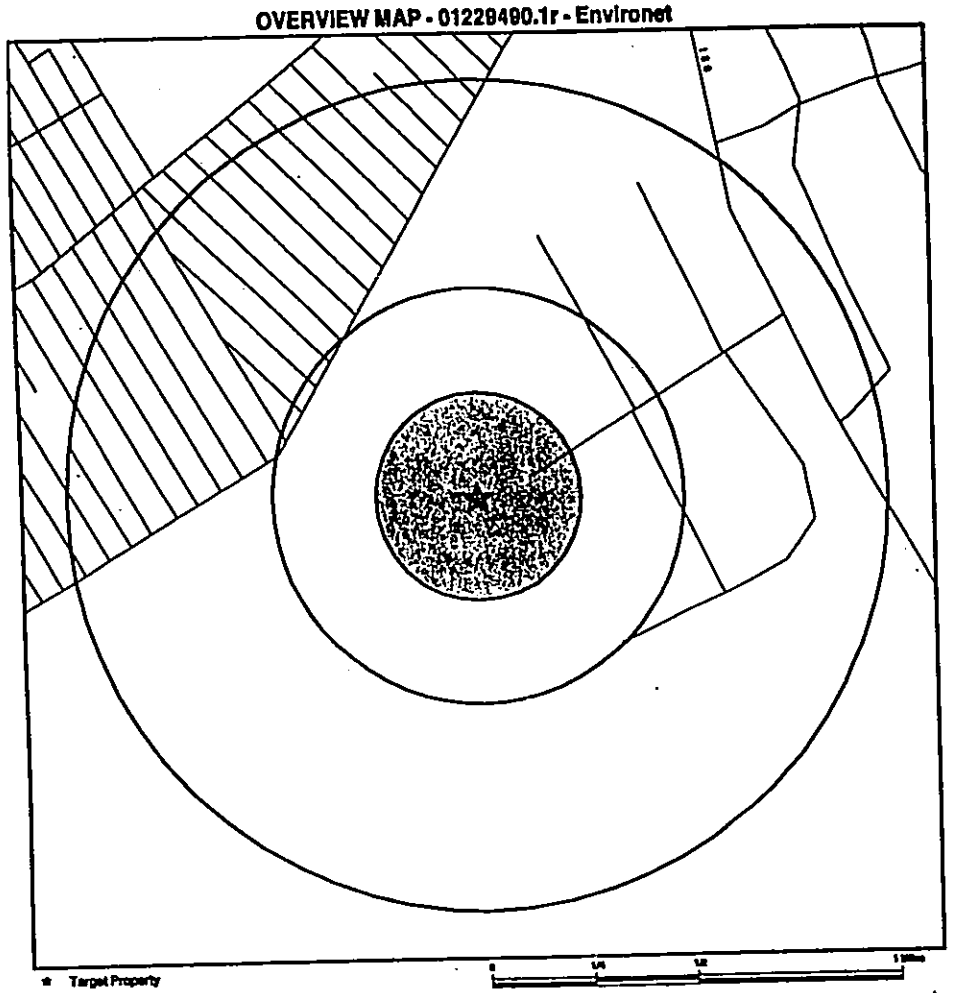
SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were not identified.

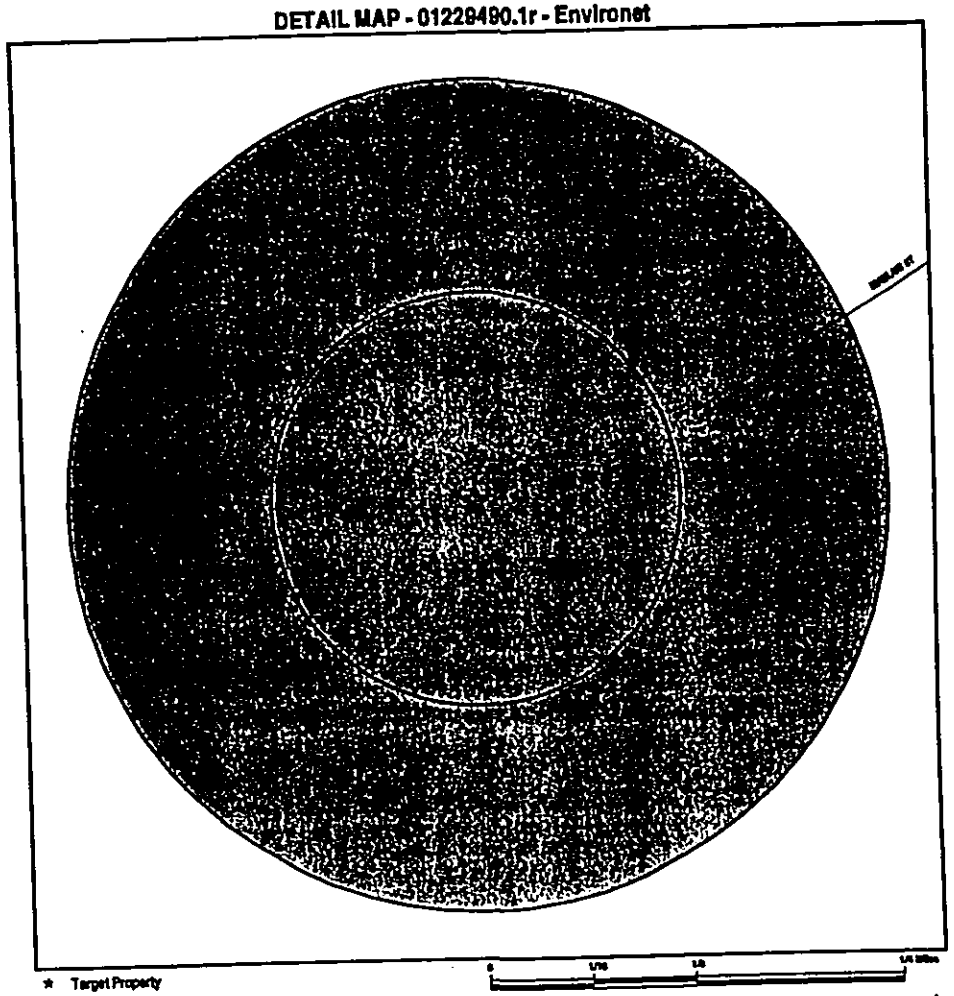
Unmappable (orphan) sites are not considered in the foregoing analysis.

Due to poor or inadequate address information, the following sites were not mapped:
There were no unmapped sites in this report.

OVERVIEW MAP - 01229490.1r - Environet



DETAIL MAP - 01229490.1r - Environet



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Coal Gasification Sites
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone

TARGET PROPERTY:	Makuu Phase I
ADDRESS:	Keaau-Pahoa Road
CITY/STATE/ZIP:	Pahoa HI 96778
LAT/LONG:	19.5173 / 154.9803
CUSTOMER:	Environet
CONTACT:	Ida Knutsen Namur
INQUIRY #:	01229490.1r
DATE:	July 13, 2004 10:34 am

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Coal Gasification Sites
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone

TARGET PROPERTY:	Makuu Phase I
ADDRESS:	Keaau-Pahoa Road
CITY/STATE/ZIP:	Pahoa HI 96778
LAT/LONG:	19.5173 / 154.9803
CUSTOMER:	Environet
CONTACT:	Ida Knutsen Namur
INQUIRY #:	01229490.1r
DATE:	July 13, 2004 10:34 am

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL ASTM STANDARD								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.250	0	0	NR	NR	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.250	0	0	NR	NR	NR	0
RCRIS Sm. Quan. Gen.		0.250	0	0	NR	NR	NR	0
ERNS		TP	NR	NR	NR	NR	NR	0
STATE ASTM STANDARD								
SHWS		1.000	0	0	0	0	NR	0
State Landfill		0.500	0	0	0	NR	NR	0
LUST		0.500	0	0	0	NR	NR	0
UST		0.250	0	0	NR	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0
FEDERAL ASTM SUPPLEMENTAL								
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
HMIRS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
NPL Liens		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
UMTRA		0.500	0	0	0	NR	NR	0
FUDS		1.000	0	0	0	0	NR	0
INDIAN RESERV		1.000	0	0	0	0	NR	0
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
STATE OR LOCAL ASTM SUPPLEMENTAL								
SPILLS		TP	NR	NR	NR	NR	NR	0
EDR PROPRIETARY HISTORICAL DATABASES								
Coal Gas		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
BROWNFIELDS DATABASES								
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
BROWNFIELDS		0.500	0	0	0	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0

NOTES:

AQUIFLOW - see EDR Physical Setting Source Addendum

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Map ID
Direction
Distance
Distance (ft.)
Elevation | Site | Database(s) | EDR ID Number | EPA ID Number

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

NO SITES FOUND

ORPHAN SUMMARY

City | EDR ID | Site Name | Site Address | Zip | Database(s)

NO SITES FOUND

GOVERNMENT RECORDS SEARCHED/DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List
Source: EPA
Telephone: N/A
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 04/27/04
Date Made Active at EDR: 05/21/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/04/04
Elapsed ASTM days: 17
Date of Last EDR Contact: 05/04/04

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone: 214-655-6659

EPA Region 8
Telephone: 303-312-6774

Proposed NPL: Proposed National Priority List Sites
Source: EPA
Telephone: N/A

Date of Government Version: 04/27/04
Date Made Active at EDR: 05/21/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/04/04
Elapsed ASTM days: 17
Date of Last EDR Contact: 05/04/04

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Source: EPA
Telephone: 703-413-0223
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/26/04
Date Made Active at EDR: 04/02/04
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 03/22/04
Elapsed ASTM days: 11
Date of Last EDR Contact: 06/23/04

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Source: EPA
Telephone: 703-413-0223
As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

GOVERNMENT RECORDS SEARCHED/DATA CURRENCY TRACKING

Date of Government Version: 02/26/04
Date Made Active at EDR: 04/02/04
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 03/22/04
Elapsed ASTM days: 11
Date of Last EDR Contact: 06/23/04

CORRACTS: Corrective Action Report
Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/15/04
Date Made Active at EDR: 04/15/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 03/25/04
Elapsed ASTM days: 21
Date of Last EDR Contact: 06/07/04

RCRIS: Resource Conservation and Recovery Information System
Source: EPA
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs): generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs): generate between 100 kg and 1,000 kg of hazardous waste per month. Large quantity generators (LQGs): generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month. Transporters are individuals or entities that move hazardous waste from the generator off-site to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 04/13/04
Date Made Active at EDR: 05/13/04
Database Release Frequency: Varies

Date of Data Arrival at EDR: 04/20/04
Elapsed ASTM days: 23
Date of Last EDR Contact: 06/23/04

ERNS: Emergency Response Notification System
Source: National Response Center, United States Coast Guard
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/03
Date Made Active at EDR: 03/12/04
Database Release Frequency: Annually

Date of Data Arrival at EDR: 01/26/04
Elapsed ASTM days: 46
Date of Last EDR Contact: 04/26/04

FEDERAL ASTM SUPPLEMENTAL RECORDS

BRS: Biennial Reporting System
Source: EPA/NTIS
Telephone: 800-424-9346
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/01/01
Database Release Frequency: Biennially

Date of Last EDR Contact: 06/22/04
Date of Next Scheduled EDR Contact: 09/13/04

CONSENT: Superfund (CERCLA) Consent Decrees
Source: EPA Regional Offices
Telephone: Varies
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: N/A
Database Release Frequency: Varies

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

ROD: Records Of Decision
Source: EPA
Telephone: 703-416-0223
Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 04/08/04
Database Release Frequency: Annually

Date of Last EDR Contact: 04/05/04
Date of Next Scheduled EDR Contact: 07/05/04

DELISTED NPL: National Priority List Deletions
Source: EPA
Telephone: N/A
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 04/27/04
Database Release Frequency: Quarterly

Date of Last EDR Contact: 05/04/04
Date of Next Scheduled EDR Contact: 08/02/04

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report
Source: EPA
Telephone: N/A
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/08/04
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/08/04
Date of Next Scheduled EDR Contact: 10/04/04

HMIRS: Hazardous Materials Information Reporting System
Source: U.S. Department of Transportation
Telephone: 202-366-4555
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 02/17/04
Database Release Frequency: Annually

Date of Last EDR Contact: 04/20/04
Date of Next Scheduled EDR Contact: 07/19/04

MLTS: Material Licensing Tracking System
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/19/04
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/06/04
Date of Next Scheduled EDR Contact: 10/04/04

MINES: Mines Master Index File
Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959

Date of Government Version: 03/05/04
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 06/30/04
Date of Next Scheduled EDR Contact: 09/27/04

NPL LIENS: Federal Superfund Liens
Source: EPA
Telephone: 202-564-4267
Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/91
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 05/24/04
Date of Next Scheduled EDR Contact: 08/23/04

PADS: PCB Activity Database System
Source: EPA
Telephone: 202-564-3887
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 03/30/04
Database Release Frequency: Annually

Date of Last EDR Contact: 05/12/04
Date of Next Scheduled EDR Contact: 08/09/04

DOD: Department of Defense Sites
Source: USGS
Telephone: 703-692-8801
This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 10/01/03
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 05/14/04
Date of Next Scheduled EDR Contact: 08/09/04

STORMWATER: Storm Water General Permits
Source: Environmental Protection Agency
Telephone: 202 564-0748
A listing of all facilities with Storm Water General Permits.

Date of Government Version: N/A
Database Release Frequency: Quarterly

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

INDIAN RESERV: Indian Reservations
Source: USGS
Telephone: 202-208-3710
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 10/01/03
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 05/14/04
Date of Next Scheduled EDR Contact: 08/09/04

US BROWNFIELDS: A Listing of Brownfields Sites
Source: Environmental Protection Agency
Telephone: 202-566-2777
Included in the listing are brownfields properties addressed by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become BCRLF cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 04/14/04
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 05/14/04
Date of Next Scheduled EDR Contact: 08/13/04

RMP: Risk Management Plans
Source: Environmental Protection Agency
Telephone: 202-564-8600
When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: N/A
Database Release Frequency: N/A

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

FUDS: Formerly Used Defense Sites
Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 10/01/03
Database Release Frequency: Varies

Date of Last EDR Contact: 07/05/04
Date of Next Scheduled EDR Contact: 10/04/04

UMTRA: Uranium Mill Tailings Sites
Source: Department of Energy
Telephone: 505-845-0011
Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized. In 1978, 24 inactive uranium mill tailings sites in Oregon, Idaho, Wyoming, Utah, Colorado, New Mexico, Texas, North Dakota, South Dakota, Pennsylvania, and on Navajo and Hopi tribal lands, were targeted for cleanup by the Department of Energy.

Date of Government Version: 04/22/04
Database Release Frequency: Varies

Date of Last EDR Contact: 06/21/04
Date of Next Scheduled EDR Contact: 09/20/04

RAATS: RCRA Administrative Action Tracking System
Source: EPA
Telephone: 202-564-4104
RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 06/07/04
Date of Next Scheduled EDR Contact: 09/06/04

TRIS: Toxic Chemical Release Inventory System
Source: EPA
Telephone: 202-566-0250
Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/01
Database Release Frequency: Annually

Date of Last EDR Contact: 06/22/04
Date of Next Scheduled EDR Contact: 09/20/04

TSCA: Toxic Substances Control Act
Source: EPA
Telephone: 202-260-5521
Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/02
Database Release Frequency: Every 4 Years

Date of Last EDR Contact: 06/07/04
Date of Next Scheduled EDR Contact: 09/06/04

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA
Telephone: 202-564-2501

Date of Government Version: 04/13/04
Database Release Frequency: Quarterly

Date of Last EDR Contact: 06/21/04
Date of Next Scheduled EDR Contact: 09/20/04

SSTS: Section 7 Tracking Systems
Source: EPA
Telephone: 202-564-5008
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/01
Database Release Frequency: Annually

Date of Last EDR Contact: 04/19/04
Date of Next Scheduled EDR Contact: 07/19/04

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-564-2501
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/13/04
Database Release Frequency: Quarterly

Date of Last EDR Contact: 06/21/04
Date of Next Scheduled EDR Contact: 09/20/04

STATE OF HAWAII ASTM STANDARD RECORDS

SHWS: Sites List
Source: Department of Health
Telephone: 808-586-4249
Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 07/12/01
Date Made Active at EDR: 10/15/01
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 09/24/01
Elapsed ASTM days: 22
Date of Last EDR Contact: 06/23/04

SWF/LF: Permitted Landfills in the State of Hawaii
Source: Department of Health
Telephone: 808-586-4245
Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/19/04
Date Made Active at EDR: 06/22/04
Database Release Frequency: Varies

Date of Data Arrival at EDR: 05/20/04
Elapsed ASTM days: 33
Date of Last EDR Contact: 04/26/04

LUST: Leaking Underground Storage Tank Database
Source: Department of Health
Telephone: 808-586-4228
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 09/01/03
Date Made Active at EDR: 09/17/03
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 09/02/03
Elapsed ASTM days: 15
Date of Last EDR Contact: 06/30/04

UST: Underground Storage Tank Database
Source: Department of Health
Telephone: 808-586-4226
Registered Underground Storage Tanks. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 06/01/03
Date Made Active at EDR: 09/11/03
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 09/02/03
Elapsed ASTM days: 9
Date of Last EDR Contact: 09/30/04

VCP: Voluntary Response Program Sites
Source: Department of Health
Telephone: 808-586-4249

Date of Government Version: 10/10/03
Date Made Active at EDR: 10/21/03
Database Release Frequency: Varies

Date of Data Arrival at EDR: 10/13/03
Elapsed ASTM days: 8
Date of Last EDR Contact: 09/25/04

STATE OF HAWAII ASTM SUPPLEMENTAL RECORDS

SPILLS: Release Notifications
Source: Department of Health
Telephone: 808-586-4249
Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 09/01/00
Database Release Frequency: Varies

Date of Last EDR Contact: 09/23/04
Date of Next Scheduled EDR Contact: 09/20/04

EDR PROPRIETARY HISTORICAL DATABASES

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. ©Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

Disclaimer Provided by Real Property Scan, Inc.

The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

BROWNFIELDS DATABASES

BROWNFIELDS: Brownfields Sites
Source: Department of Health
Telephone: 808-586-4249

Date of Government Version: 10/10/03
Database Release Frequency: Varies

Date of Last EDR Contact: 09/25/04
Date of Next Scheduled EDR Contact: 09/20/04

VCP: Voluntary Response Program Sites
Source: Department of Health
Telephone: 808-586-4249

Date of Government Version: 10/04/03
Database Release Frequency: Varies

Date of Last EDR Contact: 09/25/04
Date of Next Scheduled EDR Contact: 09/20/04

US BROWNFIELDS: A Listing of Brownfields Sites
Source: Environmental Protection Agency
Telephone: 202-566-2777
Included in the listing are brownfields properties addressed by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become BCRLF cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: N/A
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: PennWell Corporation
Telephone: (800) 823-6277
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

GOVERNMENT RECORDS SEARCHED/DATA CURRENCY TRACKING

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

GEOCHECK - PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

MAKUU PHASE I
KEAAU-PAHOA ROAD
PAHOA, HI 96778

TARGET PROPERTY COORDINATES

Latitude (North):	19.517250 - 19° 31' 2.1"
Longitude (West):	154.980301 - 154° 58' 49.1"
Universal Tranverse Mercator:	Zone 5
UTM X (Meters):	292190.6
UTM Y (Meters):	2159133.0
Elevation:	665 ft. above sea level

EDR's GeoCheck Physical Setting Source Addendum has been developed to assist the environmental professional with the collection of physical setting source information in accordance with ASTM 1527-00, Section 7.2.3. Section 7.2.3 requires that a current USGS 7.5 Minute Topographic Map (or equivalent, such as the USGS Digital Elevation Model) be reviewed. It also requires that one or more additional physical setting sources be sought when (1) conditions have been identified in which hazardous substances or petroleum products are likely to migrate to or from the property, and (2) more information than is provided in the current USGS 7.5 Minute Topographic Map (or equivalent) is generally obtained, pursuant to local good commercial or customary practice, to assess the impact of migration of recognized environmental conditions in connection with the property. Such additional physical setting sources generally include information about the topographic, hydrologic, hydrogeologic, and geologic characteristics of a site, and wells in the area.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata. EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

GEOCHECK - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

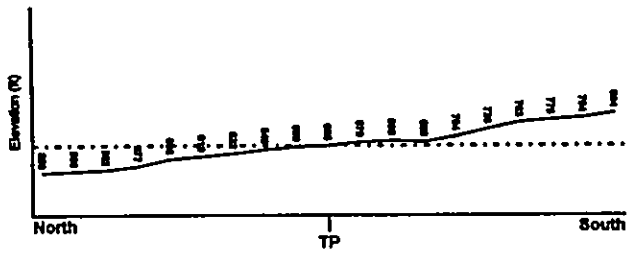
TOPOGRAPHIC INFORMATION

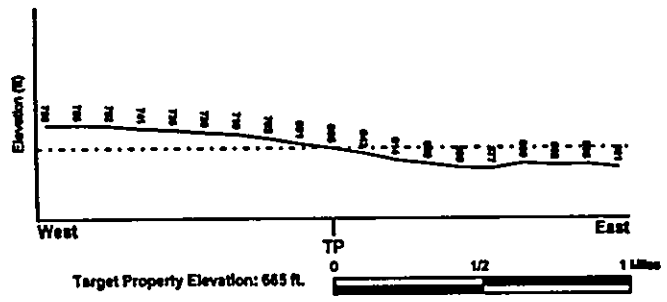
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

USGS Topographic Map:	19154-E8 PAHOA NORTH, HI
General Topographic Gradient:	General ENE
Source:	USGS 7.5 min quad index

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
HAWAII, HI	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 1551861150C

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
PAHOA NORTH	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the data of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era: -
System: -
Series: -
Code: N/A *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: -

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name: LAVA FLOWS

Soil Surface Texture: unweathered bedrock

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Not reported

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Bedrock Max: > 0 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	60 inches	unweathered bedrock	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00

GEOCHECK - PHYSICAL SETTING SOURCE SUMMARY

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: fragmental material
extremely stony - silty clay loam
cinders
fine sandy loam

Surficial Soil Types: fragmental material
extremely stony - silty clay loam
cinders
fine sandy loam

Shallow Soil Types: No Other Soil Types

Deeper Soil Types: fragmental material
weathered bedrock
cinders

ADDITIONAL ENVIRONMENTAL RECORD SOURCES

According to ASTM E 1527-00, Section 7.2.2, "one or more additional state or local sources of environmental records may be checked, in the discretion of the environmental professional, to enhance and supplement federal and state sources... Factors to consider in determining which local or additional state records, if any, should be checked include (1) whether they are reasonably ascertainable, (2) whether they are sufficiently useful, accurate, and complete in light of the objective of the records review (see 7.1.1), and (3) whether they are obtained, pursuant to local, good commercial or customary practice." One of the record sources listed in Section 7.2.2 is water well information. Water well information can be used to assist the environmental professional in assessing sources that may impact groundwater flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

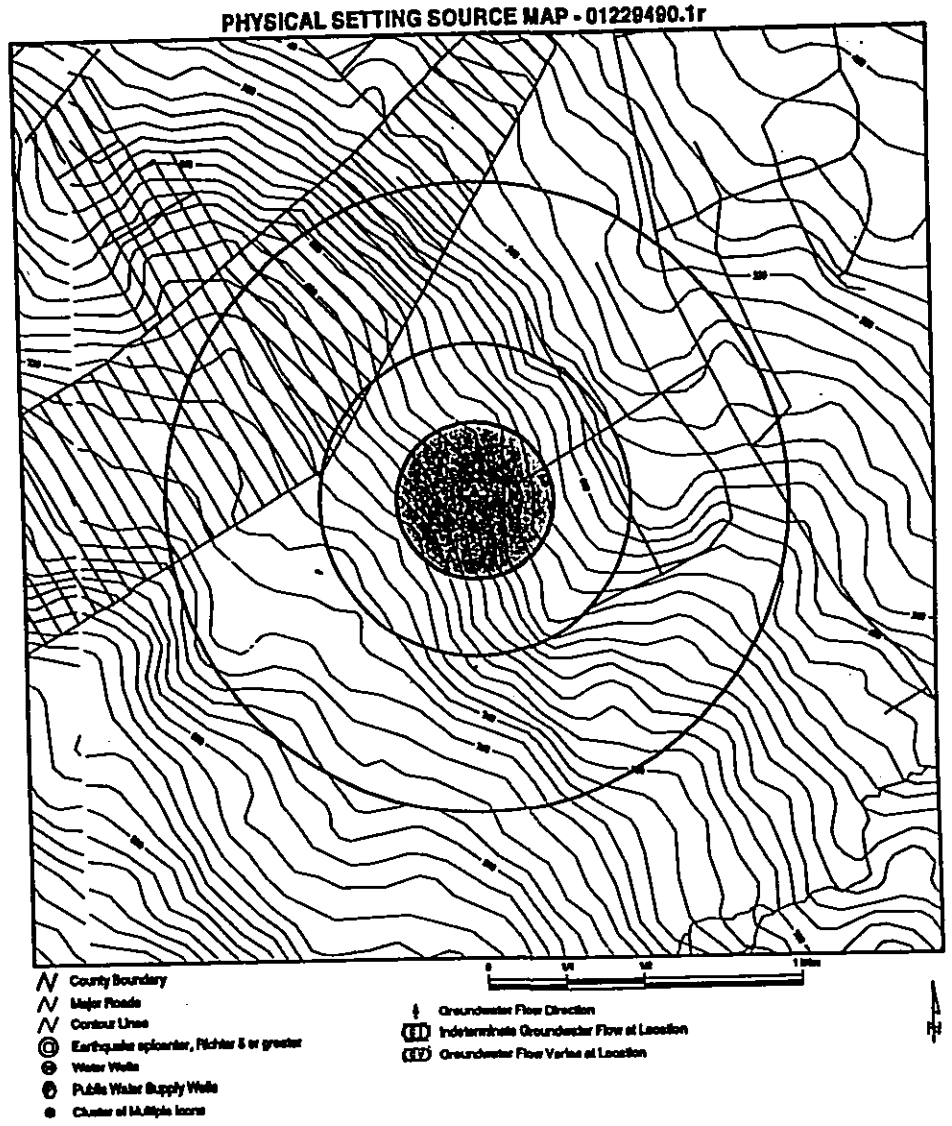
Note: PWS System location is not always the same as well location.

GEOCHECK - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 01229490.1r



TARGET PROPERTY:	Makuu Phase I	CUSTOMER:	Environet
ADDRESS:	Keaau-Pahoa Road	CONTACT:	Ida Knutsen Namur
CITY/STATE/ZIP:	Pahoa HI 96778	INQUIRY #:	01229490.1r
LAT/LONG:	19.5173 / 154.9803	DATE:	July 13, 2004 10:34 am

GEOCHECK - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for HAWAII County: 3

Note: Zone 1 Indoor average level > 4 pCi/L.
: Zone 2 Indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 Indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 96778

Number of sites tested: 4

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.200 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	-0.400 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002. 7.5-Minute DEMs correspond to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW® Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the data of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

ADDITIONAL ENVIRONMENTAL RECORD SOURCES

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STATE RECORDS

Ground Water Wells
Source: Department of Land and Natural Resources
Telephone: 808-587-0242

RADON

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a completion of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1985 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

EDR™ Environmental Data Resources Inc

"Linking Technology with Tradition"

Sanborn® Map Report

Ship To: Ida Knutsen Namur
Environet
2850 Paa Street
Honolulu, HI 96819

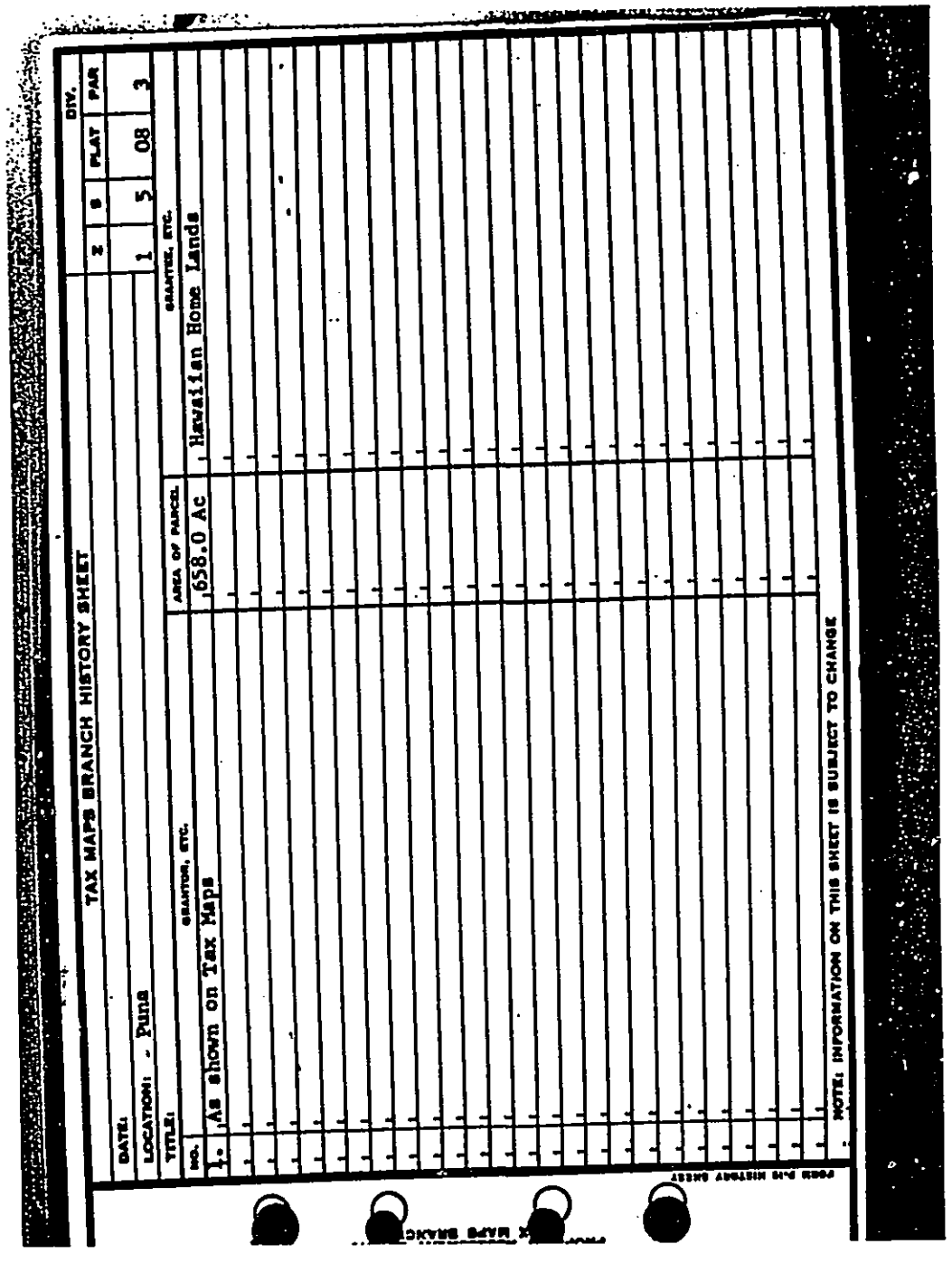
Order Date: 7/7/2004 **Completion Date:** 7/8/2004
Inquiry #: 1226404.3s
P.O. #: NA
Site Name: Makuu Phase I
Address: Keaau-Pahoa Road
City/State: PAHOA, HI 96778
Cross Streets:

Customer Project: 404-007
3012783MER 808-239-6803

This document reports that the largest and most complete collection of Sanborn fire insurance maps has been reviewed based on client supplied information, and fire insurance maps depicting the target property at the specified address were not identified.

NO COVERAGE

Appendix B
Real Property Assessment Division Records



Appendix C
Request for Public Information

REQUEST FOR PUBLIC RECORDS

Date: July 7, 2004

To: State of Hawaii
Department of Health
Hazard Evaluation & Emergency Response Office
919 Ala Moana Boulevard, Rm. 206
Honolulu, Hawaii 96814

Phone: (808) 586-4304 Fax: (808) 586-7537

From:

Name of Requestor: Ida Knutsen Namur

Signature

Company: Environet, Inc.

Address: 2850 Paa Street, Suite 212, Honolulu, HI 96819

Telephone: (808) 833-2225

Fax: (808) 833-2231

We are requesting a search for any past or pending environmental permits, licenses, citations, or other information pertaining to the sites described below.

SITE INFORMATION:

Tax Map Key No: The property is part of TMK (3) 1-5-08: 3

Address: Keaau-Pahoa Road
Pahoa, HI 96778

Current Owner: Department of Hawaiian Homelands

Owner Address: n/a

Type of Property: Undeveloped/vacant

Other Information:

REQUEST TO ACCESS A GOVERNMENT RECORD

DATE:

TO: Hazard Evaluation & Emergency Response Office (Fax: 586-7537)

FROM: Ida Knutsen Namur
Environet, Inc.
2850 Paa St, Suite 212
Honolulu, HI 96819
Tel: 833-2225
Fax: 833-2231

Although you are not required to provide any personal information, you should provide enough information to allow the agency to contact you about this request. The processing of this request may be stopped if the agency is unable to contact you. Therefore, please provide any information that will allow the agency to contact you (name or alias, telephone or fax number, mailing address, e-mail address, etc.).

I WOULD LIKE THE FOLLOWING GOVERNMENT RECORD

Describe the government record as specifically as possible so that it can be located. Try to provide a record name, subject matter, date, location, purpose, or name of persons to whom the record refers, or other information that could help the agency identify the record. A complete and accurate description of the government record you request will prevent delays in locating the record. Attach a second page if needed.

Makuu Residential Subdivision, part of TMK (3) 1-5-08: 3.
Please see previous page for more information

I WOULD LIKE : (please check one or more of the options below)

- x To inspect the government record.
- ☐ A copy of the government record: (Please check one of the options below.) See the back of this page for information about fees that you may be required to pay for agency services to process your record request.

Note: Copying and transmission charges may also apply to certain options.

- ☐ Pick up at agency (date and time):
- ☐ Mail
- ☐ Fax (toll free and only if available)
- ☐ Other, if available (please specify):

☐ If the agency maintains the records in a form other than paper, please advise in which format you would prefer to have the record.

x Electronic ☐Audio ☐Other (please specify):.

☐ Check this box if you are attaching a request for waiver of fees in the public interest (see waiver information on back).

SEE BACK FOR IMPORTANT INFORMATION

OFFICIAL USE ONLY:

Office Manager Date

Environet, Inc.

PRESERVING EARTH'S RESOURCES FOR THE FUTURE

TELEPHONE MEMORANDUM

Project No.:	**404-003**
Project:	**Keokea/Waiohuli Phase I ESA**
Call Made By:	**Zena, DOH HEER office**
Call Made To:	**Ida K. Namur, EI**
Date:	**7/9/04**
Time:	**12:15 PM**
Re:	**Request for Public Information**

Conversation:

Zena from DOH HEER office called Ms. Knutsen in response to a letter inquiring about available public records for the Makuu Residential Subdivision in Pahoa, HI 96778. Zena informed EI that there were no available records for the Property.

Recorded by: I.K.N

Environet, Inc.

PRESERVING EARTH'S RESOURCES FOR THE FUTURE

July 8, 2004

Hawaii County Fire Department
25 Aupuni St. Room 103,
Hilo, HI 96720

Attention: Darryl J. Oliveira, Fire Chief

Subject: Request for Records on Reported Hazardous Material Spill Events

Dear Mr. Oliveira:

Environet, Inc., (EI) is conducting an environmental site assessment project for a property located west off Keaau-Pahoa Road, Pahoa, HI 96778. The property is part of TMK (3) 1-5-08: 3.

The site assessment includes the identification of facilities on the site or adjacent to it which use or generate hazardous substances on their premises. It is our understanding that the Hawaii County Fire Department has maintained files containing such information. We would be interested in any information regarding unauthorized hazardous material spills/releases, violations (including safety violations), or aboveground tank registrations for any facility located at or within a ¼ mile radius of the subject property. If no such records exist, a negative response would be appreciated. The information will be used in a Phase I – Environmental Site Assessment. It would be greatly appreciated if you could respond as soon as possible.

Should you have any questions regarding this request, please contact me at 833-2225 or 864-3971 (cell).

Thank you very much,

Sincerely,

Ida Knutsen Namur
Environmental Scientist
ENVIRONET, Inc.

2850 Pua Street, Suite 212•Honolulu, Hawaii 96819•Ph (808) 833-2225 Fax (808) 833-2251

Environet, Inc.
PRESERVING EARTH'S RESOURCES FOR THE FUTURE

July 8, 2004

Hawaii County Local Emergency Planning Committee
c/o Hawaii Civil Defense Agency
200 South High Street
Wailuku, HI 96793

Attention: Mr. John Bowen, LEPC Chair

Subject: Request for SARA Title III Tier 2 Reports

Dear Mr. Bowen:

Environet, Inc., (EI) is conducting an environmental site assessment project for a property located west of Keaau-Pahoa Road. The property is part of TMK (3) 1-5-08: 3.

The site assessment includes the identification of facilities on the site or adjacent to it which store, use, or generate hazardous materials/substances on their premises. It is our understanding that the County of Hawaii Local Emergency Planning Committee (LEPC) has maintained Tier 2 Reports under the Superfund Amendments and Reauthorization Act (SARA) Title III containing such information. We would be interested in receiving Tier 2 Reports for any such property or facility. If no such records exist, a negative response would be appreciated. The information will be used in a Phase I – Environmental Site Assessment.

Should you have any questions or need more information, please do not hesitate to contact me at 833-2225 (office) or at 864-3971 (cell).

Your help and prompt response is greatly appreciated.

Thank you,

Sincerely,

Ida Knutsen Namur
Environmental Scientist
ENVIRONET, Inc.

2850 Pua Street, Suite 212•Honolulu, Hawaii 96819•Ph (808) 833-2225 Fax (808) 833-2231

Environet, Inc.
PRESERVING EARTH'S RESOURCES FOR THE FUTURE

E-MAIL MEMORANDUM

Project No.:	**404-003**
Project:	**Keokea/Waiohuli Phase I ESA**
From:	**John Bowen, Hawaii County LEPC**
To:	**Ida K. Namur, EI**
Date:	**7/8/04**
Time:	**3:00 PM**
Re:	**Request for Public Information**

E-mail content:

Ms. Knutsen, the Hawaii County Local Emergency Planning Committee has no Tier II reports for the TMK that you provided.

John Bowen

Recorded by: I.K.N.

APPENDIX D
AIR QUALITY STUDY

DRAFT

AIR QUALITY STUDY

FOR THE PROPOSED

MAKU'U-HALONA AND MAKU'U-POPOKI RESIDENTIAL SUBDIVISION PROJECT

PAHOA, PUNA, HAWAII

Prepared for:

Environet, Inc.

November 2004

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1.0 SUMMARY

The Department of Hawaiian Home Lands is proposing to develop the Makuu-Halona and Makuu-Popoki Residential Subdivision Project on 240 acres of vacant land located in the Puna District on the island of Hawaii. The proposed project will consist of 365 to 375 residential and subsistence agricultural lots, a new park site and other related facilities and site improvements. Development of the project is expected to be completed and fully occupied by 2015. This study examines the potential short- and long-term air quality impacts that could occur as a result of construction and use of the proposed facilities and suggests mitigative measures to reduce any potential air quality impacts where possible and appropriate.

Both federal and state standards have been established to maintain ambient air quality. At the present time, seven parameters are regulated including: particulate matter, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, carbon monoxide, ozone and lead. Hawaii air quality standards are more stringent than the comparable national standards except for those pertaining to sulfur dioxide and particulate matter.

Regional and local climate together with the amount and type of human activity generally dictate the air quality of a given location. The climate of the project area is very much affected by its near coastal situation and by nearby mountains. Winds are predominantly light and variable, although storms generate occasional strong winds from the south or southwest during winter. Temperatures in the project area are generally very consistent and moderate with average daily temperatures ranging from about 65°F to

85°F. The extreme minimum temperature recorded at nearby Hilo is 53°F, while the extreme maximum temperature is 94°F. Average annual rainfall in the area amounts to about 144 inches.

Except for periodic impacts from volcanic emissions (vog) and possibly occasional localized impacts from traffic congestion, the present air quality of the project area is believed to be relatively good. The limited air quality data that are available for the area from the Department of Health indicate that (despite the occasional vog) concentrations are well within state and national air quality standards.

If the proposed project is given the necessary approvals to proceed, it is inevitable that some short- and long-term impacts on air quality will occur either directly or indirectly as a consequence of project construction and use. Short-term impacts from fugitive dust will likely occur during the project construction phase. To a lesser extent, exhaust emissions from stationary and mobile construction equipment, from the disruption of traffic, and from workers' vehicles may also affect air quality during the period of construction. State air pollution control regulations require that there be no visible fugitive dust emissions at the property line. Hence, an effective dust control plan must be implemented to ensure compliance with state regulations. Fugitive dust emissions can be controlled to a large extent by watering of active work areas, using wind screens, keeping adjacent paved roads clean, and by covering of open-bodied trucks. Other dust control measures could include limiting the area that can be disturbed at any given time and/or mulching or chemically stabilizing inactive areas that have been worked. Paving and

landscaping of project areas early in the construction schedule will also reduce dust emissions. Monitoring dust at the project boundary during the period of construction could be considered as a means to evaluate the effectiveness of the project dust control program. Exhaust emissions can be mitigated by moving construction equipment and workers to and from the project site during off-peak traffic hours.

After construction, motor vehicles coming to and from the proposed development will result in a long-term increase in air pollution emissions in the project area. To assess the impact of emissions from these vehicles, an air quality modeling study was undertaken to estimate maximum ambient concentrations of carbon monoxide near the intersection of Niaulani Street and Keaau-Pahoa Road for the year 2015. Scenarios were examined both with and without a traffic signal at this intersection. During worst-case conditions, model results indicated that future 1-hour and 8-hour carbon monoxide concentrations with the project will be well within both the state and the national ambient air quality standards. This would be true with or without a signal at this location. Implementing mitigation measures for traffic-related air quality impacts is probably unnecessary and unwarranted.

Depending on the demand levels, long-term impacts on air quality are also possible due to indirect emissions associated with a development's electrical power and solid waste disposal requirements. Quantitative estimates of these potential impacts were not made, but based on the estimated demand levels and emission rates involved, any significant impacts are unlikely. Nevertheless, incorporating energy conservation design features and promoting conservation and recycling programs within the

proposed development could serve to further reduce any associated impacts and conserve the island's resources.

2.0 INTRODUCTION

The Department of Hawaiian Home Lands (DHHL) plans to develop 365 to 375 residential and subsistence agricultural lots as well as a park site in the Makuu ahupuaa in the Puna District on the east side of the island of Hawaii. As indicated in Figure 1, the project site is located along State Highway 130 (Keaau-Pahoa Road) near Pahoa. The Makuu-Halona and Makuu-Popoki Residential Subdivision project as it is called will develop approximately 240 acres of Tax Map Key (TMK) number (3) 1-5-08, parcel 03 into approximately 361 residential lots which will be about 20,000 square feet each and 13 agricultural lots which will range in size from 1.0 to 3.42 acres. Site improvements are to include roadways, drainage system, water system, overhead electric and road lighting systems, and underground telecommunications systems. The project site consists of vacant land owned by DHHL and is located adjacent to the existing Makuu Farm lots. The development also includes consolidation of 12 existing 2-acre farm lots and re-subdivision into residential lots. Full development and occupancy of the project is expected to be completed by 2015.

The purpose of this study is to describe existing air quality in the project area and to assess the potential short- and long-term direct and indirect air quality impacts that could result from construction and use of the proposed facilities as planned. Measures to mitigate impacts either by the project or on the project are suggested where possible and appropriate.

3.0 AMBIENT AIR QUALITY STANDARDS

Ambient concentrations of air pollution are regulated by both national and state ambient air quality standards (AAQS). National AAQS are specified in Section 40, Part 50 of the Code of Federal Regulations (CFR), while State of Hawaii AAQS are defined in Chapter 11-59 of the Hawaii Administrative Rules. Table 1 summarizes both the national and the state AAQS that are specified in the cited documents. As indicated in the table, national and state AAQS have been established for particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone and lead. The state has also set a standard for hydrogen sulfide. National AAQS are stated in terms of both primary and secondary standards for most of the regulated air pollutants. National primary standards are designed to protect the public health with an "adequate margin of safety". National secondary standards, on the other hand, define levels of air quality necessary to protect the public welfare from "any known or anticipated adverse effects of a pollutant". Secondary public welfare impacts may include such effects as decreased visibility, diminished comfort levels, or other potential injury to the natural or man-made environment, e.g., soiling of materials, damage to vegetation or other economic damage. In contrast to the national AAQS, Hawaii State AAQS are given in terms of a single standard that is designed "to protect public health and welfare and to prevent the significant deterioration of air quality".

Each of the regulated air pollutants has the potential to create or exacerbate some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration for prolonged periods of time. The AAQS specify a

maximum allowable concentration for a given air pollutant for one or more averaging times to prevent harmful effects. Averaging times vary from one hour to one year depending on the pollutant and type of exposure necessary to cause adverse effects. In the case of the short-term (i.e., 1- to 24-hour) AAQS, both national and state standards allow a specified number of exceedances each year.

The Hawaii AAQS are in some cases considerably more stringent than the comparable national AAQS. In particular, the Hawaii 1-hour AAQS for carbon monoxide is four times more stringent than the comparable national limit, and the state 1-hour limit for ozone is more than two times as stringent as the national 1-hour standard. The U.S. Environmental Protection Agency (EPA) is currently working on a plan to phase out the national 1-hour ozone standard in favor of the new (and more stringent) 8-hour standard.

The Hawaii AAQS for sulfur dioxide were relaxed in 1986 to make the state standards essentially the same as the national limits. In 1993, the state also revised its particulate standards to follow those set by the federal government. During 1997, the federal government again revised its standards for particulate, but the new standards were challenged in federal court. A Supreme Court ruling was issued during February 2001, and at this time, it is expected that the new standards for particulate will be implemented by 2005. To date, the Hawaii Department of Health has not updated the state particulate standards.

4.0 REGIONAL AND LOCAL CLIMATOLOGY

Regional and local climatology significantly affect the air quality of a given location. Wind, temperature, atmospheric turbulence, mixing height and rainfall all influence air quality. Although the climate of Hawaii is relatively moderate throughout most of the state, significant differences in these parameters may occur from one location to another. Most differences in regional and local climates within the state are caused by the mountainous topography.

The entire state of Hawaii lies well within the belt of northeasterly trade winds generated by the semi-permanent Pacific high pressure cell to the north and east of the islands. Areas along the eastern coasts of the islands are particularly affected by the trade winds and are usually well-ventilated nearly year round. Although the project site is situated along the eastern coast of Hawaii Island, the high mountains of Mauna Loa and Mauna Kea significantly modify the trade wind influence. The nearest long-term wind data available for the project area are collected at the Hilo Airport located about 20 miles to the north. These data are probably at least semi-representative of the project corridor. Mean annual wind speed at the airport is about 8 mph, which is lower than many windward locations in the state, and wind directions are bimodal showing either a northeast or southwest preference [1]. Northeast trade winds typically occur during the daytime, while winds from the southwest typically occur during the nighttime due to cold air drainage from the mountains. Winds from the south or southwest also occur occasionally in association with winter storms.

Air pollution emissions from motor vehicles, the formation of photochemical smog and smoke plume rise all depend in part on air temperature. Colder temperatures tend to result in higher emissions of contaminants from automobiles but lower concentrations of photochemical smog and ground-level concentrations of air pollution from stack sources. In Hawaii, the annual and daily variation of temperature depends to a large degree on elevation above sea level, distance inland and exposure to the trade winds. Average temperatures at locations near sea level generally are warmer than those at higher elevations. Areas exposed to the trade winds tend to have the least temperature variation, while inland and leeward areas often have the most. At Hilo Airport, average annual daily minimum and maximum temperatures are 66°F and 82°F, respectively. The extreme minimum temperature on record is 53°F, and the extreme maximum is 94°F [2].

Small scale, random motions in the atmosphere (turbulence) cause air pollutants to be dispersed as a function of distance or time from the point of emission. Turbulence is caused by both mechanical and thermal forces in the atmosphere. It is often measured and described in terms of Pasquill-Gifford stability class. Stability class 1 is the most turbulent and class 6 the least. Thus, air pollution dissipates the best during stability class 1 conditions and the worst when stability class 6 prevails. In the Hilo area, stability classes 5 or 6 occasionally occur, developing during clear, calm nighttime or early morning hours when temperature inversions form due to radiational cooling or to drainage flow from the mountainous interior of the island. Stability classes 1 through 4 occur during the daytime, depending

mainly on the amount of cloud cover and incoming solar radiation and the onset and extent of the sea breeze.

Mixing height is defined as the height above the surface through which relatively vigorous vertical mixing occurs. Low mixing heights can result in high ground-level air pollution concentrations because contaminants emitted from or near the surface can become trapped within the mixing layer. In Hawaii, minimum mixing heights tend to be high because of mechanical mixing caused by the trade winds and because of the temperature moderating effect of the surrounding ocean. Low mixing heights may sometimes occur, however, at inland locations and even at times along coastal areas early in the morning following a clear, cool, windless night. Coastal areas also may experience low mixing levels during sea breeze conditions when cooler ocean air rushes in over warmer land. Mixing heights in Hawaii typically are above 3000 feet (1000 meters).

Rainfall can have a beneficial affect on the air quality of an area in that it helps to suppress fugitive dust emissions, and it also may "washout" gaseous contaminants that are water soluble. Rainfall in Hawaii is highly variable depending on elevation and on location with respect to the trade wind. The project area has a wet climate. Normal annual rainfall for Hilo Airport is about 129 inches [2], while at nearby Pahoa, the normal annual rainfall is about 144 inches [3]. This is distributed fairly evenly throughout the year, although the summer months are slightly drier.

5.0 PRESENT AIR QUALITY

Present air quality in the project area is mostly affected by air pollutants from vehicular, industrial, natural and/or agricultural sources. Table 2 presents an air pollutant emission summary for the island of Hawaii for calendar year 1993. The emissions rates shown in the table pertain to manmade emissions only, i.e., emissions from natural sources are not included. As suggested in the table, much of the manmade particulate emissions on Hawaii originate from area sources, such as the mineral products industry and agriculture. Manmade sulfur oxides are emitted almost exclusively by point sources, such as power plants and other fuel-burning industries. Nitrogen oxides emissions emanate predominantly from area sources (mostly motor vehicle traffic), although industrial point sources contribute a significant share. The majority of carbon monoxide emissions occur from area sources (motor vehicle traffic), while hydrocarbons are emitted mainly from point sources.

It should be noted that Hawaii Island is unique from the other islands in the state in terms of the natural volcanic air pollution emissions that occur. Volcanic emissions periodically plague the project area. This is especially so since the latest eruption phase of the Kilauea Volcano began in 1983. Air pollution emissions from the Hawaiian volcanoes consist primarily of sulfur dioxide. After entering the atmosphere, these sulfur dioxide emissions are carried away by the wind and either washed out as acid rain or gradually transformed into particulate sulfates or acid aerosols. Emissions from Kilauea are vented to the atmosphere relatively close by (about 20 miles west of the project site), but the prevailing wind patterns carry the emissions away from the project area much of the time. On

occasions when the winds are from the west or south, relatively high concentrations of sulfur dioxide may occur at the project site and volcanic haze (vog) can impact the area.

The nearest major industrial sources of air pollution in the project vicinity are Hawaii Electric Light Company power plants located in Keaau and Hilo. Air pollution emissions from these sources consist mostly of sulfur dioxide and oxides of nitrogen. Hydrogen sulfide emissions are also emitted from Puna Geothermal Venture's geothermal power plant located a few miles to the southeast of Pahoa.

Highway 130 (Keaau-Pahoa Road), which passes through the area just to the east of the project site, is the region's major arterial roadway. Daytime winds from the northeast will tend to carry emissions from motor vehicles traversing this roadway toward the project area, while nighttime mountain drainage winds from the southwest will carry emissions away from the project site.

The State Department of Health operates a network of air quality monitoring stations at various locations around the state. Unfortunately, very limited data are available for Hawaii Island, and none are available for the Pahoa area specifically. Specialized monitoring stations are located a few miles away near Puna Geothermal Venture, but these stations monitor hydrogen sulfide only. Sulfur dioxide and particulate are monitored at a station located in Hilo. Table 3 summarizes the data from the Hilo monitoring station for the four-year period from 2000 to 2003. Measurements of sulfur dioxide concentrations at Hilo during the 2000-2003 monitoring period were consistently low in

terms of the annual average concentrations which ranged from 4 to 8 $\mu g/m^3$ only. This represents about 10 percent of the state and national standard. The highest annual second-highest 3-hour and 24-hour concentrations (which are most relevant to the standards) for these four years were 520 and 104 $\mu g/m^3$, respectively; these are about 30 to 40 percent of the applicable standards. The higher short-term concentrations reflect periodic episodes of vog in the Hilo area. While these concentrations are relatively high compared to most other locations in the state, no exceedances of the state/national 3-hour and 24-hour AAQS for sulfur dioxide were recorded.

The annual average particulate concentration in Hilo for 2000-2003 was 10 to 12 $\mu g/m^3$, which equates to about 25 percent of the state/national standard. The second-highest 24-hour concentration of particulate matter for this period, 20 $\mu g/m^3$, is about 13 percent of the state/national standard, and there were no violations of the state/national AAQS.

At this time, there are no reported measurements of lead, ozone, nitrogen dioxide or carbon monoxide in the project vicinity. These are primarily motor vehicle related air pollutants. Lead, ozone and nitrogen dioxide typically are regional scale problems. Concentrations of lead and nitrogen dioxide generally have not been found to exceed AAQS elsewhere in the state. Ozone concentrations, on the other hand, have been found to exceed the state standard at times at Sand Island on Oahu. Carbon monoxide air pollution typically is a microscale problem caused by congested motor vehicular traffic. In traffic congested areas such as urban Honolulu, carbon monoxide concentrations have been

found to occasionally exceed the state AAQS. Concentrations of carbon monoxide in the project area are estimated later in this study based on computer modeling of project-related motor vehicle emissions.

6.0 SHORT-TERM IMPACTS OF PROJECT

Short-term direct and indirect impacts on air quality could potentially occur due to project construction. For a project of this nature, there are two potential types of air pollution emissions that could directly result in short-term air quality impacts during project construction: (1) fugitive dust from vehicle movement and soil excavation; and (2) exhaust emissions from on-site construction equipment. Indirectly, there also could be short-term impacts from slow-moving construction equipment traveling to and from the project sites, from a temporary increase in local traffic caused by commuting construction workers, and from the disruption of normal traffic flow caused by lane closures of adjacent roadways.

Fugitive dust emissions may arise from the grading and dirt-moving activities associated with site clearing and preparation work. The emission rate for fugitive dust emissions from construction activities is difficult to estimate accurately. This is because of its elusive nature of emission and because the potential for its generation varies greatly depending upon the type of soil at the construction site, the amount and type of dirt-disturbing activity taking place, the moisture content of exposed soil in work areas, and the wind speed. The EPA [4] has provided a rough estimate for uncontrolled fugitive dust emissions from construction activity of 1.2 tons per acre per month under

conditions of "medium" activity, moderate soil silt content (30%), and precipitation/evaporation (P/E) index of 50. Uncontrolled fugitive dust emissions at the project site would likely be somewhere near that level, depending on the amount of rainfall that occurs. In any case, State of Hawaii Air Pollution Control Regulations [5] prohibit visible emissions of fugitive dust from construction activities at the property line. Thus, an effective dust control plan for the project construction phase is essential.

Adequate fugitive dust control can usually be accomplished by the establishment of a frequent watering program to keep bare-dirt surfaces in construction areas from becoming significant sources of dust. In dust-prone or dust-sensitive areas, other control measures such as limiting the area that can be disturbed at any given time, applying chemical soil stabilizers, mulching and/or using wind screens may be necessary. Control regulations further stipulate that open-bodied trucks be covered at all times when in motion if they are transporting materials that could be blown away. Haul trucks tracking dirt onto paved streets from unpaved areas is often a significant source of dust in construction areas. Some means to alleviate this problem, such as road cleaning or tire washing, may be appropriate. Paving of parking areas and/or establishment of landscaping as early in the construction schedule as possible can also lower the potential for fugitive dust emissions. Monitoring dust at the project property line could be considered to quantify and document the effectiveness of dust control measures.

On-site mobile and stationary construction equipment also will emit air pollutants from engine exhausts. The largest of this equipment is usually diesel-powered. Nitrogen oxides emissions

from diesel engines can be relatively high compared to gasoline-powered equipment, but the standard for nitrogen dioxide is set on an annual basis and is not likely to be violated by short-term construction equipment emissions. Carbon monoxide emissions from diesel engines, on the other hand, are low and should be relatively insignificant compared to vehicular emissions on nearby roadways.

Project construction activities will also likely obstruct the normal flow of traffic at times to such an extent that overall vehicular emissions in the project area will temporarily increase. The only means to alleviate this problem will be to attempt to keep roadways open during peak traffic hours and to move heavy construction equipment and workers to and from construction areas during periods of low traffic volume. Thus, most potential short-term air quality impacts from project construction can be mitigated.

7.0 LONG-TERM IMPACTS OF PROJECT

7.1 Roadway Traffic

After construction is completed, use of the proposed facilities will result in increased motor vehicle traffic in the project area, potentially causing long-term impacts on ambient air quality. Motor vehicles with gasoline-powered engines are significant sources of carbon monoxide. They also emit nitrogen oxides and other contaminates.

Federal air pollution control regulations require that new motor vehicles be equipped with emission control devices that reduce emissions significantly compared to a few years ago. In 1990, the President signed into law the Clean Air Act Amendments. This legislation requires further emission reductions, which have been phased in since 1994. More recently, additional restrictions were signed into law during the Clinton administration, which will begin to take effect during the next decade. The added restrictions on emissions from new motor vehicles will lower average emissions each year as more and more older vehicles leave the state's roadways. It is estimated that carbon monoxide emissions, for example, will go down by an average of about 30 to 40 percent per vehicle during the next 10 years due to the replacement of older vehicles with newer models.

To evaluate the potential long-term indirect ambient air quality impact of increased roadway traffic associated with a project such as this, computerized emission and atmospheric dispersion models can be used to estimate ambient carbon monoxide concentrations along roadways leading to and from the project. Carbon monoxide is selected for modeling because it is both the most stable and the most abundant of the pollutants generated by motor vehicles. Furthermore, carbon monoxide air pollution is generally considered to be a microscale problem that can be addressed locally to some extent, whereas nitrogen oxides air pollution most often is a regional issue that cannot be addressed by a single new development.

With carbon monoxide, roadway intersections are the primary concern because of traffic congestion and because of the increase in vehicular emissions associated with traffic queuing. For this project, two future scenarios with the project were selected for

the carbon monoxide modeling study. One scenario assumed an unsignalized intersection at Niaulani Street and Keaau-Pahoa Road, and the other assumed that this intersection would be signalized. Both scenarios were evaluated for the year 2015, which is when full development and occupancy is expected to be achieved. The traffic impact assessment report for the project [6] describes the projected future traffic conditions and laneage configuration of this intersection in detail.

The main objective of the modeling study was to estimate maximum 1-hour average carbon monoxide concentrations for each of the two scenarios studied. To evaluate the significance of the estimated concentrations, a comparison of the predicted values for each scenario can be made. Comparison of the estimated values to the national and state AAQS was also used to provide another measure of significance.

Maximum carbon monoxide concentrations typically coincide with peak traffic periods. The traffic impact assessment report evaluated morning and afternoon peak traffic periods. These same periods were evaluated in the air quality impact assessment.

The EPA computer model MOBILE6 [7] was used to calculate vehicular carbon monoxide emissions for each year studied. One of the key inputs to MOBILE6 is vehicle mix. Unless very detailed information is available, national average values are typically assumed, which is what was used for the present study. Based on national average vehicle mix figures, the present vehicle mix in the project area for the year 2015 was estimated to be 30.7% light-duty gasoline-powered automobiles, 56.4% light-duty

gasoline-powered trucks and vans, 3.6% heavy-duty gasoline-powered vehicles, 0.2% light-duty diesel-powered vehicles, 8.6% heavy-duty diesel-powered trucks and buses, and 0.5% motorcycles.

Ambient temperatures of 59 and 68 degrees F were used for morning and afternoon peak-hour emission computations, respectively. These are conservative assumptions since morning/afternoon ambient temperatures will generally be warmer than this, and emission estimates given by MOBILE6 generally have an inverse relationship to the ambient temperature.

After computing vehicular carbon monoxide emissions through the use of MOBILE6, these data were then input to an atmospheric dispersion model. EPA air quality modeling guidelines [8] currently recommend that the computer model CAL3QHC [9] be used to assess carbon monoxide concentrations at roadway intersections, or in areas where its use has previously been established, CALINE4 [10] may be used. Until a few years ago, CALINE4 was used extensively in Hawaii to assess air quality impacts at roadway intersections. In December 1997, the California Department of Transportation recommended that the intersection mode of CALINE4 no longer be used because it was thought the model has become outdated. Studies have shown that CALINE4 may tend to over-predict maximum concentrations in some situations. Therefore, CAL3QHC was used for the subject analysis.

CAL3QHC was developed for the U.S. EPA to simulate vehicular movement, vehicle queuing and atmospheric dispersion of vehicular emissions near roadway intersections. It is designed to predict

1-hour average pollutant concentrations near roadway intersections based on input traffic and emission data, roadway/receptor geometry and meteorological conditions.

Input peak-hour traffic data were obtained from the traffic study cited previously. This included vehicle approach volumes, saturation capacity estimates, intersection laneage and signal timings. All emission factors that were input to CAL3QHC for free-flow traffic on roadways were obtained from MOBILE6 based on assumed free-flow vehicle speeds corresponding to the posted speed limits.

Model roadways were set up to reflect roadway geometry, physical dimensions and operating characteristics. Concentrations predicted by air quality models generally are not considered valid within the roadway-mixing zone. The roadway-mixing zone is usually taken to include 3 meters on either side of the traveled portion of the roadway and the turbulent area within 10 meters of a cross street. Model receptor sites were thus located at the edges of the mixing zones near all intersections that were studied for all three scenarios. This implies that pedestrian sidewalks either already exist or are assumed to exist in the future. All receptor heights were placed at 1.5 meters above ground to simulate levels within the normal human breathing zone.

Input meteorological conditions for this study were defined to provide "worst-case" results. One of the key meteorological inputs is atmospheric stability category. For these analyses, atmospheric stability category 6 was assumed for the morning cases, while atmospheric stability category 4 was assumed for the

afternoon cases. These are the most conservative stability categories that are generally used for estimating worst-case pollutant dispersion within suburban areas for these periods. A surface roughness length of 100 cm and a mixing height of 1000 meters were used in all cases. Worst-case wind conditions were defined as a wind speed of 1 meter per second with a wind direction resulting in the highest predicted concentration. Concentration estimates were calculated at wind directions of every 5 degrees.

Existing background concentrations of carbon monoxide in the project vicinity are believed to be at low levels and this was assumed to persist for the next several years. Thus, background contributions of carbon monoxide from sources or roadways not directly considered in the analysis were accounted for by adding a background concentration of 0.5 ppm to all predicted concentrations.

Predicted Worst-Case 1-Hour Concentrations

Table 4 summarizes the results of the modeling study in the form of the estimated worst-case 1-hour morning and afternoon ambient carbon monoxide concentrations. These results can be compared directly to the state and the national AAQS. Estimated worst-case carbon monoxide concentrations are presented in the table for two scenarios: year 2015 with the project and assuming an unsignalized intersection at Niaulani Street and Keaau-Pahoa Road, and year 2015 with the project and assuming a signalized intersection at this location. The receptor locations of these estimated worst-case 1-hour concentrations all occurred at or very near the roadway intersection.

As indicated in the table, the projected highest 1-hour concentration occurred with the signalized intersection scenario during the afternoon peak traffic hour. A maximum concentration of 4.1 mg/m^3 was projected to occur. In the unsignalized scenario, a worst-case concentration of only 2.5 mg/m^3 was estimated for the afternoon period. During the morning peak traffic hour, a worst-case concentration of 3.3 mg/m^3 was predicted to occur with or without signalization. Predicted worst-case 1-hour concentrations for both scenarios were well within the national AAQS of 40 mg/m^3 and the more stringent state standard of 10 mg/m^3.

Predicted Worst-Case 8-Hour Concentrations

Worst-case 8-hour carbon monoxide concentrations were estimated by multiplying the worst-case 1-hour values by a persistence factor of 0.5. This accounts for two factors: (1) traffic volumes averaged over eight hours are lower than peak 1-hour values, and (2) meteorological conditions are more variable (and hence more favorable for dispersion) over an 8-hour period than they are for a single hour. Based on monitoring data, 1-hour to 8-hour persistence factors for most locations generally vary from 0.4 to 0.8 with 0.6 being the most typical. One study based on modeling [11] concluded that 1-hour to 8-hour persistence factors could typically be expected to range from 0.4 to 0.5. EPA guidelines [12] recommend using a value of 0.7 unless a locally derived persistence factor is available. Recent monitoring data for locations on Oahu reported by the Department of Health [13] suggest that this factor may range between about 0.2 and 0.6 depending on location and traffic variability. Considering the location of the project and the traffic pattern for the area, a

1-hour to 8-hour persistence factor of 0.5 will likely yield reasonable estimates of worst-case 8-hour concentrations.

The resulting estimated worst-case 8-hour concentrations are indicated in Table 5. For a 2015 scenario with or without a signal at the intersection of Niaulani Street and Keaau-Pahoa Road, the estimated worst-case 8-hour carbon monoxide concentration was 2.0 mg/m^3 or less. This is well within both the state standard of 5 mg/m^3 and the national limit of 10 mg/m^3.

Conservativeness of Estimates

The results of this study reflect several assumptions that were made concerning both traffic movement and worst-case meteorological conditions. One such assumption concerning worst-case meteorological conditions is that a wind speed of 1 meter per second with a steady direction for 1 hour will occur. A steady wind of 1 meter per second blowing from a single direction for an hour is extremely unlikely and may occur only once a year or less. With wind speeds of 2 meters per second, for example, computed carbon monoxide concentrations would be only about half the values given above. The 8-hour estimates are also conservative in that it is unlikely that anyone would occupy the assumed receptor sites (within 3 m of the roadways) for a period of 8 hours.

7.2 Electrical Demand

The proposed project also will cause indirect air pollution emissions from power generating facilities as a consequence of electrical power usage. The electrical demand of the project

when fully developed is expected to reach about 3.6 million kilowatt-hours per year [14]. Electrical power for the project will most probably be provided mainly by oil-fired generating facilities, but some of the project power may also be derived from geothermal energy, wind power or other sources. In order to meet the electrical power needs of the proposed project, power generating facilities will likely be required to burn more fuel and hence more air pollution will be emitted at these facilities. Given in Table 6 are estimates of the indirect air pollution emissions that would result from the project electrical demand assuming all power is provided by burning more fuel oil at local power plants. These values can be compared to the island-wide emission estimates for 1993 given in Table 2. The estimated indirect emissions from project electrical demand amount to less than 1 percent of the present air pollution emissions occurring on Hawaii Island even if all power is assumed to be derived from oil.

7.3 Solid Waste Disposal

Solid waste generated by the proposed development when fully completed and occupied is not expected to exceed about 1000 tons per year [15]. Currently, all solid waste on the island is buried at solid waste landfills. Thus, assuming this continues to be the method for solid waste disposal, the only associated air pollution emissions that will occur will be from trucking the waste to the landfill and burying it. These emissions should be relatively minor.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The major potential short-term air quality impact of the project will occur from the emission of fugitive dust during construction. Uncontrolled fugitive dust emissions from construction activities are estimated to amount to about 1.2 tons per acre per month, depending on rainfall. To control dust, active work areas and any temporary unpaved work roads should be watered at least twice daily on days without rainfall. Use of wind screens and/or limiting the area that is disturbed at any given time will also help to contain fugitive dust emissions. Wind erosion of inactive areas of the site that have been disturbed could be controlled by mulching or by the use of chemical soil stabilizers. Dirt-hauling trucks should be covered when traveling on roadways to prevent windage. A routine road cleaning and/or tire washing program will also help to reduce fugitive dust emissions that may occur as a result of trucks tracking dirt onto paved roadways in the project area. Paving of parking areas and establishment of landscaping early in the construction schedule will also help to control dust. Monitoring dust at the project boundary during the period of construction could be considered as a means to evaluate the effectiveness of the project dust control program and to adjust the program if necessary.

During construction phases, emissions from engine exhausts (primarily consisting of carbon monoxide and nitrogen oxides) will also occur both from on-site construction equipment and from vehicles used by construction workers and from trucks traveling to and from the project. Increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction workers can be alleviated by moving equipment and personnel to the site during off-peak traffic hours.

After the proposed project is completed, any long-term impacts on air quality in the project area due to emissions from project-related motor vehicle traffic should be small. Worst-case concentrations of carbon monoxide should remain within both the state and the national ambient air quality standards. Implementing any air quality mitigation measures for long-term traffic-related impacts is probably unnecessary and unwarranted.

Any long-term impacts on air quality due to indirect emissions from supplying the project with electricity and from the disposal of waste materials generated by the project will likely be small based on the relatively small magnitudes of these emissions. Nevertheless, indirect emissions from project electrical demand could likely be reduced somewhat by incorporating energy-saving features into project design requirements. This might include the use of solar water heaters; designing building space so that window positions maximize indoor light without unduly increasing indoor heat; using landscaping where feasible to provide afternoon shade to cut down on the use of air conditioning; installation of insulation and double-glazed doors to reduce the effects of the sun and heat; providing movable, controlled openings for ventilation at opportune times; and possibly installing automated room occupancy sensors. Solid waste related air pollution could likely be reduced somewhat by the promotion of conservation and recycling programs within the proposed development. This could reduce solid waste volumes, which would in turn reduce any related air pollution emissions proportionately.

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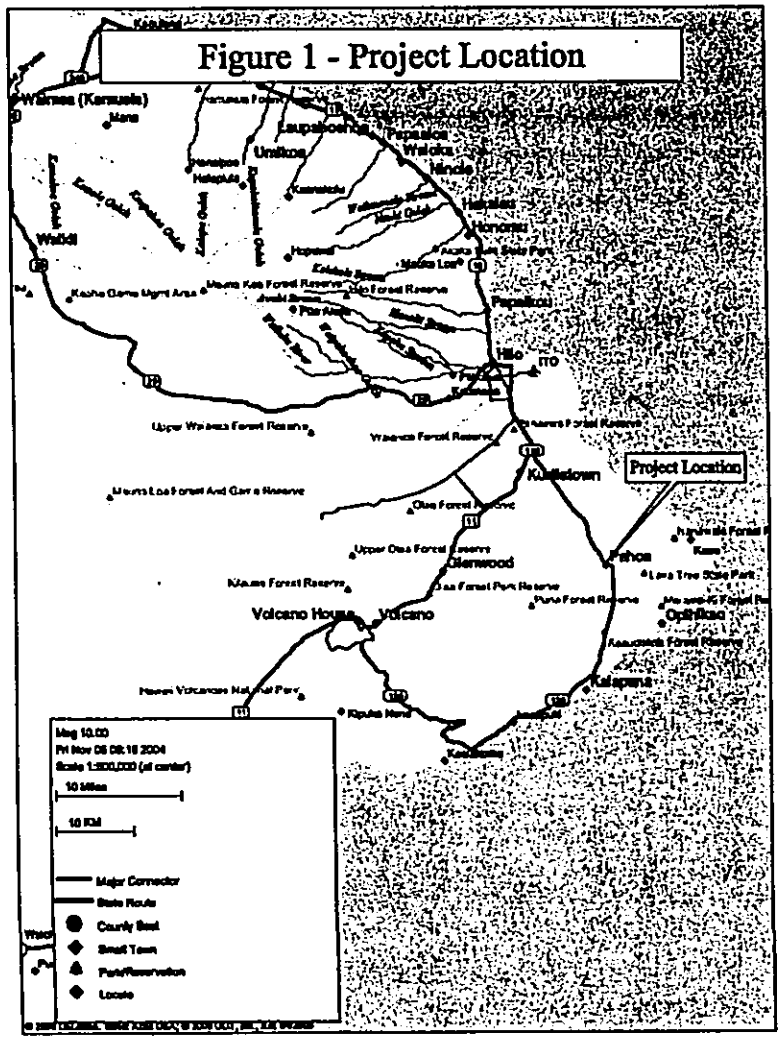

Table 1

SUMMARY OF STATE OF HAWAII AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Unit	Time	[illegible]	[illegible]	[illegible]
Particulate Matter (<10 microns)	µg/m³	Annual 24 Hours	50[a] 150[b]	50[a] 150[b]	50 150[c]
Particulate Matter (<2.5 microns)	µg/m³	Annual 24 Hours	15[a] 65[d]	15[a] 65[d]	- -
Sulfur Dioxide	µg/m³	Annual 24 Hours 3 Hours	80 365[c] -	- - 1300[c]	80 365[c] 1300[c]
Nitrogen Dioxide	µg/m³	Annual	100	100	70
Carbon Monoxide	mg/m³	8 Hours 1 Hour	10[c] 40[c]	- -	5[c] 10[c]
Ozone	µg/m³	8 Hours 1 Hour	157[e] 235[f]	157[e] 235[f]	- 100[c]
Lead	µg/m³	Calendar Quarter	1.5	1.5	1.5
Hydrogen Sulfide	µg/m³	1 Hour	-	-	35[c]

[a] Three-year average of annual arithmetic mean.
[b] 99th percentile value averaged over three years.
[c] Not to be exceeded more than once per year.
[d] 98th percentile value averaged over three years.
[e] Three-year average of fourth-highest daily 8-hour maximum.
[f] Standard is attained when the expected number of exceedances is less than or equal to 1.

Table 2

AIR POLLUTION EMISSIONS INVENTORY FOR
ISLAND OF HAWAII, 1993

Particulate	30,311	9,157	39,468
Sulfur Oxides	9,345	nil	9,345
Nitrogen Oxides	4,054	8,858	12,912
Carbon Monoxide	3,357	23,934	27,291
Hydrocarbons	1,477	203	1,680

Source: Final Report, "Review, Revise and Update of the Hawaii Emissions Inventory Systems for the State of Hawaii", prepared for Hawaii Department of Health by J.L. Shoemaker & Associates, Inc., 1996

Table 3

ANNUAL SUMMARIES OF AIR QUALITY MEASUREMENTS FOR
MONITORING STATIONS NEAREST
MAKUU-HALONA AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION PROJECT

Sulfur Dioxide / Hilo				
Period of Sampling (months)	12	12	12	12
3-Hour Averaging Period:				
No. of Samples	2277	2876	2816	2870
Highest Concentration ($\mu g/m^3$)	438	461	430	574
2nd Highest Concentration ($\mu g/m^3$)	301	348	376	520
No. of State AAQS Exceedances	0	0	0	0
24-Hour Averaging Period:				
No. of Samples	284	363	355	361
Highest Concentration ($\mu g/m^3$)	94	101	95	112
2nd Highest Concentration ($\mu g/m^3$)	73	89	92	104
No. of State AAQS Exceedances	0	0	0	0
Annual Average Concentration ($\mu g/m^3$)	4	6	8	8
Particulate (PM-10) / Hilo				
Period of Sampling (months)	12	12	12	12
24-Hour Averaging Period:				
No. of Samples	41	61	59	61
Highest Concentration ($\mu g/m^3$)	18	20	23	20
2nd Highest Concentration ($\mu g/m^3$)	16	19	18	20
No. of State AAQS Exceedances	0	0	0	0
Annual Average Concentration ($\mu g/m^3$)	11	12	10	12

Source: State of Hawaii Department of Health, "Annual Summary, Hawaii Air Quality Data, 2000, 2001, 2002 and 2003"

Table 4

ESTIMATED WORST-CASE 1-HOUR CARBON MONOXIDE CONCENTRATIONS
ALONG ROADWAYS NEAR MAKUU-HALONA AND MAKUU-POPOKI RESIDENTIAL
SUBDIVISION PROJECT
(milligrams per cubic meter)

Niaulani Street at Keaau-Pahoa Road	3.3	2.5	3.3	4.1

Hawaii State AAQS: 10
National AAQS: 40

Table 5

ESTIMATED WORST-CASE 8-HOUR CARBON MONOXIDE CONCENTRATIONS
ALONG ROADWAYS NEAR MAKUU-HALONA AND MAKUU-POPOKI RESIDENTIAL
SUBDIVISION PROJECT
(milligrams per cubic meter)

Niaulani Street at Keaau-Pahoa Road	1.6	2.0

Hawaii State AAQS: 5
National AAQS: 10

Table 6

ESTIMATED INDIRECT AIR POLLUTION EMISSIONS FROM MAKUU-HALONA AND MAKUU-POPOKI RESIDENTIAL SUBDIVISION PROJECT ELECTRICAL DEMAND[a]

Particulate	1
Sulfur Dioxide	9
Carbon Monoxide	1
Volatile Organics	<1
Nitrogen Oxides	4

[a]Based on U.S. EPA emission factors for utility boilers [4]. Assumes electrical demand of 3.6 million kw-hrs per year. Estimated emission rates assume low-sulfur oil used to generate power.

APPENDIX E
NOISE

D. L. ADAMS ASSOCIATES, LTD.
Consultants in Acoustics and Performing Arts Technologies

Project No. 04-53

ENVIRONMENTAL NOISE ASSESSMENT REPORT
MAKU'U-POPOKI RESIDENTIAL SUBDIVISION
HONOLULU, O'AHU, HAWAII

November 2004

Prepared for
Environet, Inc.
Honolulu, Hawaii

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CONTENTS

1.0 EXECUTIVE SUMMARY

1.1 The Maku'u-Popoki Residential Subdivision project is proposed to offer approximately 365 residential lots near Pahoa. The new residential lots will consist of mostly 20,000 square foot lots, with the exception of eleven (11) two acre lots. The existing site is undeveloped land.

1.2 Continuous ambient noise levels were measured near the closest residential lot to Highway 130, the dominant noise source. The results show a maximum Equivalent Sound Level, L_{eq}, of 62 dBA during peak hour traffic. Projected noise levels in the year 2015, including a fully occupied project, and increases in traffic independent of the project were calculated to be L_{eq} = 64 dBA, a 2 dB increase over the existing conditions. Both the existing conditions and future projections are within the FHWA and State DOT maximum noise criteria of L_{eq} = 67 dBA.

1.3 Based on the noise measurements, the Day-Night Level, L_{dn}, was estimated to be 57 dBA. Therefore, the HUD "Acceptable" maximum noise criteria of L_{dn} 65 dBA is satisfied.

1.4 During the construction phase of the project, typical construction noises will be audible in the area. Noise from construction activities must comply with State Department of Health noise regulations as specified for construction related activities.

1.5 After construction is complete, noise generated from stationary mechanical equipment on the project site must meet the State Department of Health noise regulations, which allow adjustments for existing ambient noise levels.

1.6 Noise from vehicular traffic in the area due to the project is not expected to significantly increase over the existing ambient noise levels. The increase in project generated traffic noise was calculated to be less than 1 dB.

2.0 PROJECT DESCRIPTION

The Maku'u Residential Subdivision project proposes to add approximately 365 residential lots in the Puna District on the Island of Hawaii. Most of the new residential lots are 20,000 square feet in size, however, eleven (11) lots will be 2 acres in size. The residential subdivision is near Pahoa on the Big Island of Hawaii and in proximity to Highway 130 (Keaau-Pahoa Road). Commercial or retail shops are not included in the design.

During construction, the project site will be closed to the public. Typical construction equipment will be on-site throughout the construction of the new residential subdivision.

3.0 NOISE STANDARDS

Various local and federal agencies have established guidelines and standards for assessing environmental noise impacts and set noise limits as a function of land use. A brief description of common acoustic terminology used in these guidelines and standards is presented in Appendix A.

3.1 State of Hawaii, Department of Health (DOH), Community Noise Control

The State of Hawaii Department of Health Community Noise Control Statute [Reference 1] defines three classes of zoning districts and specifies corresponding maximum permissible sound levels due to stationary noise sources such as air-conditioning units, exhaust systems, generators, compressors, pumps, etc., and equipment related to agricultural, construction, and industrial activities. These levels are enforced by the State Department of Health (DOH) for any location at or beyond the property line and shall not be exceeded for more than 10% of the time during any 20-minute period. The specified noise limits which apply are a function of the zoning and time of day as shown in Figure 1. With respect to mixed zoning districts, the statute specifies that the primary land use designation shall be used to determine the applicable zoning district class and the maximum permissible sound level.

For special conditions where the ambient sound level is greater than the maximum permissible sound level, the DOH allows for an adjustment of the maximum level. The DOH will consider the ambient noise level as the maximum permissible sound level.

3.2 U.S. Environmental Protection Agency (EPA)

The U.S. EPA has identified a range of yearly day-night equivalent sound levels, L_{dn}, sufficient to protect public health and welfare from the effects of environmental noise [Reference 2]. The EPA has established a goal to reduce exterior environmental noise to an L_{dn} not exceeding 65 dBA and a future goal to further reduce exterior environmental noise to an L_{dn} not exceeding 55 dBA. Additionally, the EPA states that these goals are not intended as regulations as it has no authority to regulate noise levels, but rather they are intended to be viewed as levels below which the general population will not be at risk from any of the identified effects of noise.

3.3 U.S. Federal Highway Administration (FHWA)

The FHWA defines four land use categories and assigns corresponding maximum hourly equivalent sound levels, L_{eq}, for traffic noise exposure [Reference 3], which are listed in Figure 2. For example, Category B, defined as picnic and recreation areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals, has a corresponding maximum exterior L_{eq} of 67dBA and a maximum interior L_{eq} of 52 dBA. These limits are viewed as design goals, and all projects meeting these limits are deemed in conformance with FHWA noise standards. Calculation of traffic noise levels should be conducted using the Federal Highway Administration's Traffic Noise Model, 1978 [Reference 4].

3.4 Hawaii Department of Transportation (HDOT)

The HDOT has adopted FHWA's design goals for traffic noise exposure in its noise analysis and abatement policy [Reference 5]. According to the policy, a traffic noise impact occurs when the predicted traffic noise levels "approach" or exceed FHWA's design goals or when the predicted traffic noise levels "substantially exceed the existing noise levels." The policy also states that "approach" means at least 1 dB less than FHWA's design goals and "substantially exceed the existing noise levels" means an increase of at least 15 dB.

3.5 U.S. Department of Housing and Urban Development (HUD)

HUD's environmental noise criteria and standards in 24 CFR 51 [Reference 6] were established for determining housing project site acceptability. These standards are based on day-night equivalent sound levels, L_{dn}, and are not limited to traffic noise exposure. However, for project sites in the vicinity of highways, the L_{dn} may be estimated to be equal to the design hour $L_{eq(h)}$, provided "heavy trucks (vehicles with three or more axles) do not exceed 10 percent of the total traffic flow in vehicles per 24 hours and the traffic flow between 10:00 p.m. and 7:00 a.m. does not exceed 15 percent of the average daily traffic flow in vehicles

per 24 hours." For these same conditions, L_{dn}, may also be estimated as 3 dB less than the design hour L_{1h}.

HUD site acceptability criteria rank sites as Acceptable, Normally Unacceptable, or Unacceptable. "Acceptable" sites are those where exterior noise levels do not exceed an L_{dn} of 65 dBA. Proposed housing projects on "Acceptable" sites do not require additional noise attenuation other than that provided by customary building techniques. "Normally Unacceptable" sites are those where the L_{dn} is above 65 dBA, but does not exceed 75 dBA. Housing on "Normally Unacceptable" sites requires some form of noise abatement, either at the property line or in the building construction, to ensure the interior noise levels are acceptable. "Unacceptable" sites are those where the L_{dn} is 75 dBA or higher. The term "Unacceptable" does not necessarily mean that housing cannot be built on those sites, however, more elaborate sound attenuation will likely be needed.

4.0 EXISTING ACOUSTICAL ENVIRONMENT

Continuous ambient noise level measurements were conducted at one location (Loc 1, Figure 3) from November 9, 2004 to November 10, 2004. In addition, short term noise measurements and traffic counts were conducted at one location (Loc 2, Figure 3) on November 10, 2004. The purpose of the short term measurements and traffic counts was to calibrate the traffic noise model prediction software.

The measurement locations are shown in Figure 3. Loc 1 is at the end of the existing Kuahaenae Place (approximately 2000' north of the centerline of Niaulani Street) near the centerline of the road. Loc 2 is approximately 70' west of the centerline of Highway 130 and approximately 35' south of Niaulani Street. At each location the microphone was mounted on a tripod, approximately 5' above grade. For the continuous measurement, the sound level meter was secured in a weather resistant case.

Loc 1: Continuous, hourly, equivalent sound levels, L_{eq}, were recorded during the measurement period. The measurement was taken using a Larson-Davis Laboratories, Model 820, Type-1 Sound Level Meter together with a Larson-Davis, Model 2560 Type-1 Microphone. Calibration was checked before and after the measurements with a Larson-Davis Model CAL200 calibrator. Both the sound level meter and the calibrator have been certified by the manufacturer within the recommended calibration period.

Loc 2: Continuous, equivalent sound levels, L_{eq}, were recorded during the measurement period (approximately 30 minute duration). The measurement was taken using a Larson-Davis Laboratories, Model 824, Type-1 Sound Level Meter together with a Larson-Davis, Model 2541 Type-1 Microphone. Calibration was checked before and after the measurements with a Larson-Davis Model CAL200 calibrator. Both the sound level meter and the calibrator have been certified by the manufacturer within the recommended calibration period.

The results from the continuous long term measurements are graphically presented in Figure 4, which shows the measured equivalent sound levels, L_{eq}, in A-weighted decibels (dBA). The sound levels generally ranged between 45 dBA during the nighttime or early morning hours to 60 dBA during the daytime and high traffic times. Although a complete 24 hour noise measurement was not taken, we estimate that the L_{dn} is approximately 57 dBA at the measurement location. Since most of the residential properties are located further away from Highway 130 (the primary noise source), the noise level at the residential properties is estimated to be well below L_{dn} 57 dBA. The L_{dn} (day-night level) is a 24 hour measurement that assigns a 10 dB penalty for noises during the nighttime hours (10:00 p.m. to 7:00 a.m.).

Presently, the dominant sources of noise include vehicular traffic on Highway 130, and an occasional aircraft flyover. Other noise sources include wind, birds, and other rural environment activities.

5.0 POTENTIAL NOISE IMPACTS DUE TO THE PROJECT

5.1 Project Construction Noise & On-Site Equipment

Development of project areas will involve excavation, grading, and other typical construction activities during construction of the new residential subdivision. The various construction phases of the project may generate significant amounts of noise. The surrounding residences may be impacted by the construction noise due to their proximity to the project. The actual noise levels produced during construction will be a function of the methods employed during each stage of the construction process. Typical ranges of construction equipment noise are shown in Figure 5.

5.2 Noise Generated by the new Residential Subdivision

The new residential subdivision will incorporate stationary mechanical equipment that is typical for residential housing. Expected mechanical equipment may include air handling equipment, condensing units, etc. Noise from this mechanical equipment and other equipment must meet the Department of Health noise rules and regulations, which states maximum permissible noise limits at the property line. These noise limits are 55 dBA during the daytime hours (7:00 am to 10:00 pm) and 45 dBA during the nighttime hours (10:00 pm to 7:00 am).

5.3 Compliance with FHWA Land Use Noise Limits and HUD Noise Guidelines

Noise from vehicular traffic on Highway 130 is the primary noise source in the vicinity of the new residential subdivision. A noise measurement taken near the edge of the closest property to Highway 130 shows a maximum daytime L_{eq} of 62 dBA, and an estimated L_{dn} of 57 dBA. Although the addition of residents to the

area will increase traffic on Highway 130, this increase in overall traffic volume is minimal. The increase in noise level due to increased project generated traffic is less than 1 dB. Vehicular traffic noise was calculated in general accordance with the Federal Highway Administration's Traffic Noise Model, 1978 [Reference 4].

The FHWA and State DOT land use noise limit for a residential area is $L_{eq} = 67$ dBA, and the HUD guidelines noise limit for a residential area is $L_{dn} = 65$ for an "acceptable" rating. Therefore, both the FHWA and HUD noise criterion are satisfied.

5.4 Impact of Project Generated Vehicular Traffic Noise

The Maku'u-Popoki Residential Subdivision project will provide housing for many residents. Although the project will attract more people and residents to the area, vehicular traffic in the area is not anticipated to significantly increase. Therefore, noise due to project generated vehicular traffic in the area should not significantly increase. We calculated noise levels at the nearest resident to Highway 130, using peak hour traffic volumes for a fully occupied project in the year 2015. The results show a predicted L_{eq} of 64 dBA. The increase in noise level from project generated vehicular traffic noise was calculated to be less than 2 dB over the existing noise levels.

6.0 NOISE IMPACT MITIGATION

6.1 Mitigation of Construction Noise

In cases where construction noise exceeds, or is expected to exceed the State's "maximum permissible" property line noise levels [Reference 1], a permit must be obtained from the State DOH to allow the operation of vehicles, cranes, construction equipment, power tools, etc., which emit noise levels in excess of the "maximum permissible" levels.

In order for the State DOH to issue a construction noise permit, the Contractor must submit a noise permit application to the DOH, which describes the construction activities for the project. Prior to issuing the noise permit, the State DOH may require action by the Contractor to incorporate noise mitigation into the construction plan. The DOH may also require the Contractor to conduct noise monitoring or community meetings inviting the neighboring residents and business owners to discuss construction noise. The Contractor should use reasonable and standard practices to mitigate noise, such as using mufflers on diesel and gasoline engine machines, using properly tuned and balanced machines, etc. However, the State DOH may require additional noise mitigation, such as temporary noise barriers, or time of day usage limits for certain kinds of construction activities.

Specific permit restrictions for construction activities [Reference 1] are:

> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels ... before 7:00 a.m. and after 6:00 p.m. of the same day, Monday through Friday."
>
> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels... before 9:00 a.m. and after 6:00 p.m. on Saturday."
>
> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays."

The use of hoe rams and jack hammers 25 lbs. or larger, high pressure sprayers, chain saws, and pile drivers must be restricted to 9:00 a.m. to 5:30 p.m., Monday through Friday.

The DOH noise permit does not limit the noise *level* generated at the construction site, but rather the *times* at which noisy construction can take place. Therefore, noise mitigation for construction activities should be addressed using project management, such that the time restrictions within the DOH permit are followed.

Most construction equipment falls under the terms and conditions of the Hawaii DOH issued noise permit. This permit allows noisy construction activities to take place during the daytime hours (see the specific hours reference above). However, any activities that require overnight operation or operation outside of the permit hours, such as a water pump or electric generator for lights, must meet the State's maximum permissible sound limits according to the applicable zoning district class. Temporary enclosures or barrier walls may be required to adequately mitigate noise from this equipment. If it is not feasible or practical to meet the State's noise limits, the Contractor may apply for a noise variance with the Hawaii DOH.

6.2 Mitigation of Residential Subdivision Noise

The design of the new residential housing should give consideration to controlling the noise emanating from stationary mechanical equipment so as to comply with the State Department of Health *Community Noise Control* rules [Reference 1]. Noisy equipment should be located away from neighbors and the residential units, as much as is practical. Enclosed mechanical rooms may be required for some equipment.

6.3 Mitigation of Project Generated Vehicular Traffic Noise

Noise from vehicular traffic on Highway 130 is not expected to significantly increase due to the project. Therefore, noise mitigation of vehicular traffic should not be required for the project.

6.4 Mitigation of Ambient Noise to Meet HUD Noise Guidelines

Ambient noise levels in the vicinity of the project site is less than L_{dn} 57 = dBA, and meets the "Acceptable" noise criteria. Therefore, additional measures to improve the sound isolation beyond standard construction practices should not be required for meeting the HUD Noise Guidelines.

7.0 REFERENCES:

1. Chapter 46, *Community Noise Control*, Department of Health, State of Hawaii, Administrative Rules, Title 11, September 23, 1996.

2. *Toward a National Strategy for Noise Control*, U.S. Environmental Protection Agency, April 1977.

3. *Department of Transportation, Federal Highway Administration Procedures for Abatement of Highway Traffic Noise*, Title 23, CFR, Chapter 1, Subchapter J, Part 772, 38 FR 15953, June 19, 1973; Revised at 47 FR 29654, July 8, 1982.

4. *Federal Highway Administration's Traffic Noise Model*, FHWA-RD-77-108; U.S. Department of Transportation, December 1978.

5. *Noise Analysis and Abatement Policy*, Department of Transportation, Highways Division, State of Hawaii, June 1977.

6. *Department of Housing and Urban Development Environmental Criteria and Standards*, Title 24, CFR, Part 51, 44 FR 40860, July 12, 1979; Amended by 49 FR 880, January 6, 1984.

APPENDIX A

ACOUSTIC TERMINOLOGY

Sound Pressure Level

Sound, or noise, is the term given to variations in air pressure that are capable of being detected by the human ear. Small fluctuations in atmospheric pressure (sound pressure) constitute the physical property measured with a sound pressure level meter. Because the human ear can detect variations in atmospheric pressure over such a large range of magnitudes, sound preasure is expressed on a logarithmic scale in units called decibels (dB). Noise is defined as "unwanted" sound.

Technically, sound pressure level (SPL) is defined as:

$$SPL = 20 \log (P/P_{ref}) \text{ dB}$$

where P is the sound pressure fluctuation (above or below atmospheric pressure) and P_{ref} is the reference pressure, 20 μPa, which is approximately the lowest sound pressure that can be detected by the human ear. For example:

If P = 20 μPa, then SPL = 0 dB
If P = 200 μPa, then SPL = 20 dB
If P = 2000 μPa, then SPL = 40 dB

The sound pressure level that results from a combination of noise sources is not the arithmetic sum of the individual sound sources, but rather the logarithmic sum. For example, two sound levels of 50 dB produce a combined sound level of 53 dB, not 100 dB. Two sound levels of 40 and 50 dB produce a combined level of 50.4 dB.

Human sensitivity to changes in sound pressure level is highly individualized. Sensitivity to sound depends on frequency content, time of occurrence, duration, and psychological factors such as emotions and expectations. However, in general, a change of 1 or 2 dB in the level of sound is difficult for most people to detect. A 3 dB change is commonly taken as the smallest perceptible change and a 6 dB change corresponds to a noticeable change in loudness. A 10 dB increase or decrease in sound level corresponds to an approximate doubling or halving of loudness, respectively.

A-Weighted Sound Level

Studies have shown conclusively that at equal sound pressure levels, people are generally more sensitive to certain higher frequency sounds (such as made by speech, horns, and whistles) than most lower frequency sounds (such as made by motors and engines)[1] at the same level. To

---

[1] D.W. Robinson and R.S. Dadson, "A Re-Determination of the Equal-Loudness Relations for Pure Tones," *British Journal of Applied Physics*, vol. 7, pp. 166 - 181, 1956. (Adopted by the International Standards Organization as Recommendation R-226.

address this preferential response to frequency, the A-weighted scale was developed. The A-weighted scale adjusts the sound level in each frequency band in much the same manner that the human auditory system does. Thus the A-weighted sound level (read as "dBA") becomes a single number that defines the level of a sound and has some correlation with the sensitivity of the human ear to that sound. Different sounds with the same A-weighted sound level are perceived as being equally loud. The A-weighted noise level is commonly used today in environmental noise analysis and in noise regulations. Typical values of the A-weighted sound level of various noise sources are shown in Figure A-1.

Equivalent Sound Level

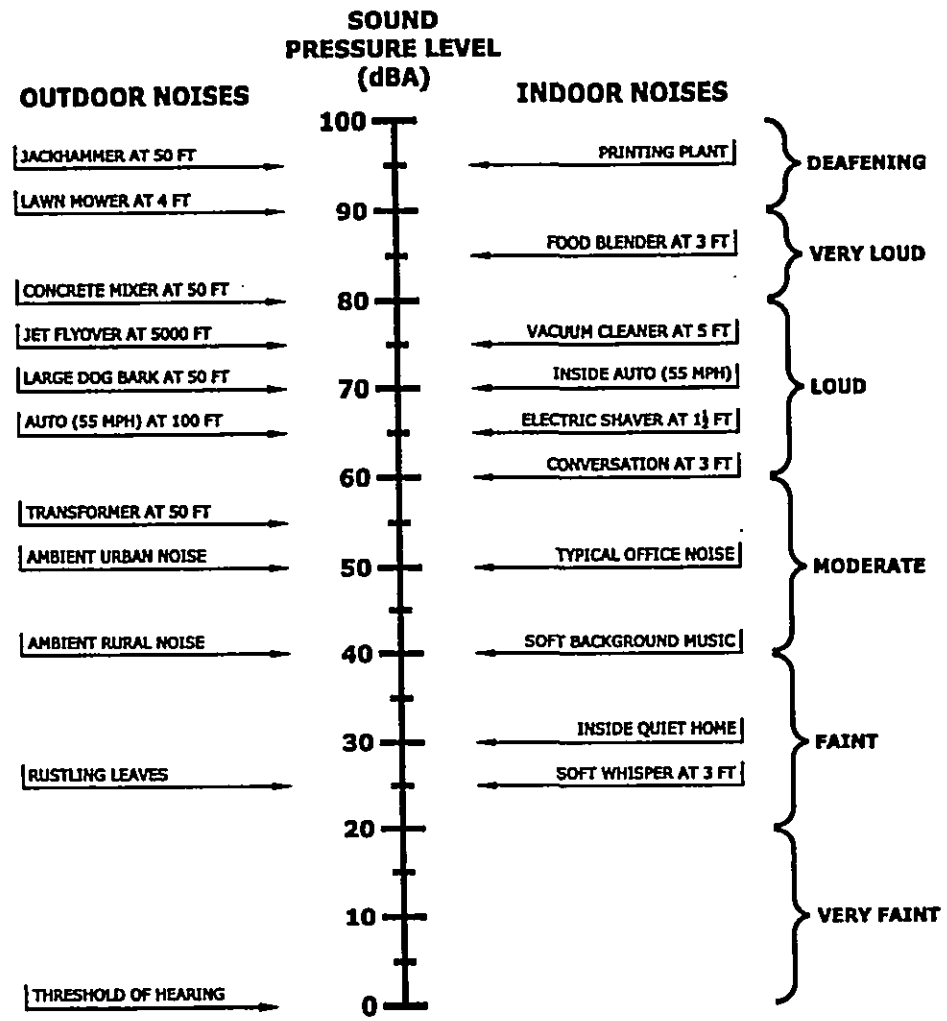
The Equivalent Sound Level (L_{eq}) is a type of average which represents the steady level that, integrated over a time period, would produce the same energy as the actual signal. The actual *instantaneous* noise levels typically fluctuate above and below the measured L_{eq} during the measurement period. The A-weighted L_{eq} is a common index for measuring environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

Statistical Sound Level

The sound levels of long-term noise producing activities such as traffic movement, aircraft operations, etc., can vary considerably with time. In order to obtain a single number rating of such a noise source, a statistically-based method of expressing sound or noise levels has been developed. It is known as the Exceedence Level, L_n. The L_n represents the sound level that is exceeded for n% of the measurement time period. For example, L_{10} = 60 dBA indicates that for the duration of the measurement period, the sound level exceeded 60 dBA 10% of the time. Typically, in noise regulations and standards, the specified time period is one hour. Commonly used Exceedence Levels include L_{01}, L_{10}, L_{50}, and L_{90}, which are widely used to assess community and environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

Day-Night Equivalent Sound Level

The Day-Night Equivalent Sound Level, L_{dn}, is the Equivalent Sound Level, L_{eq}, measured over a 24-hour period. However, a 10 dB penalty is added to the noise levels recorded between 10 p.m. and 7 a.m. to account for people's higher sensitivity to noise at night when the background noise level is typically lower. The L_{dn} is a commonly used noise descriptor in assessing land use compatibility, and is widely used by federal and local agencies and standards organizations.

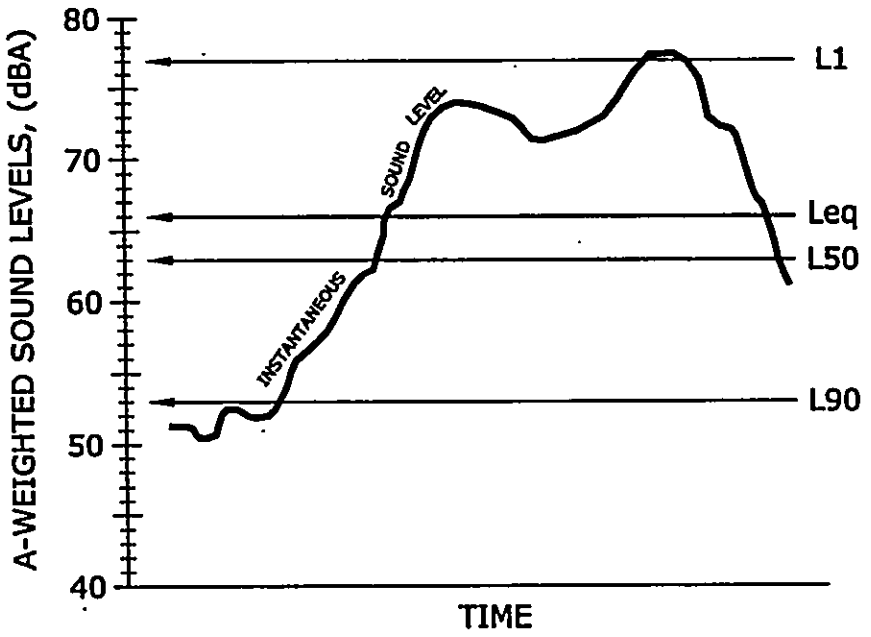


Common Outdoor/Indoor Sound Levels

Maku'u-Popoki Residential Subdivision

not to scale

Date	Project No.	Drawn By	Figure No
November 2004	04-53	TRB	A-1



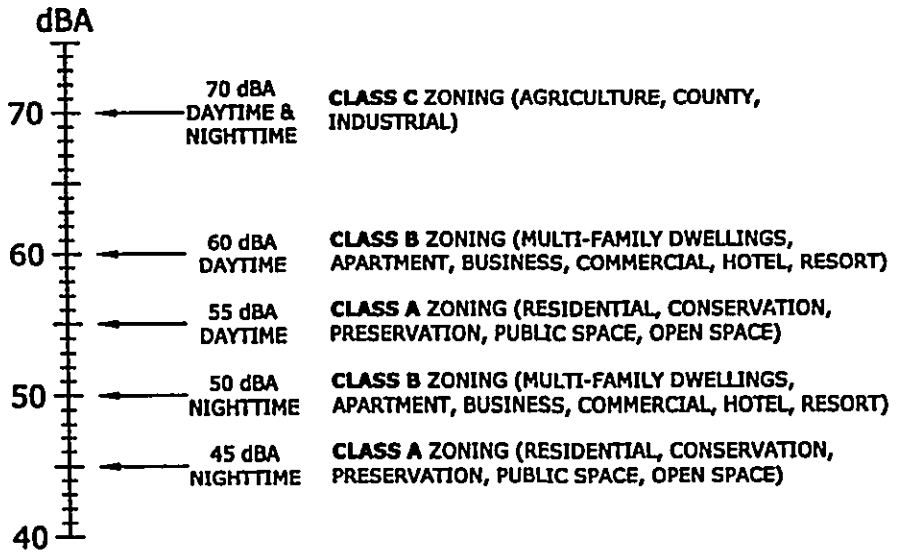
Example Graph of Equivalent Sound Level and Statistical Sound Levels

Maku'u-Popoki Residential Subdivision

not to scale

Date: November 2004 | Project No.: 04-53 | Drawn By: TRB

Figure No: A-2



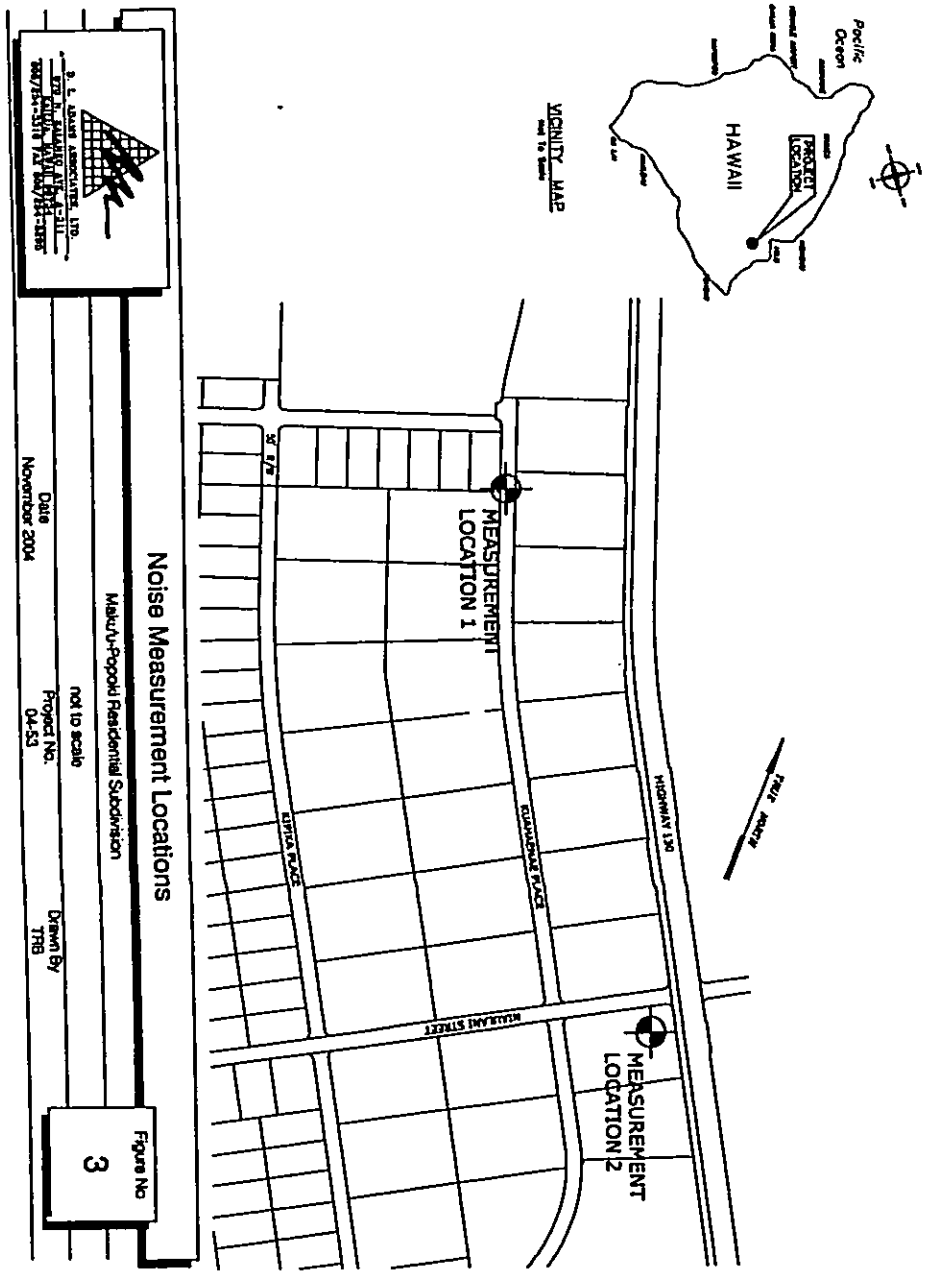
State of Hawaii & Honolulu Land Use Ordinance Maximum Permissible Sound Levels for Various Zoning Districts

Maku'u-Popoki Residential Subdivision

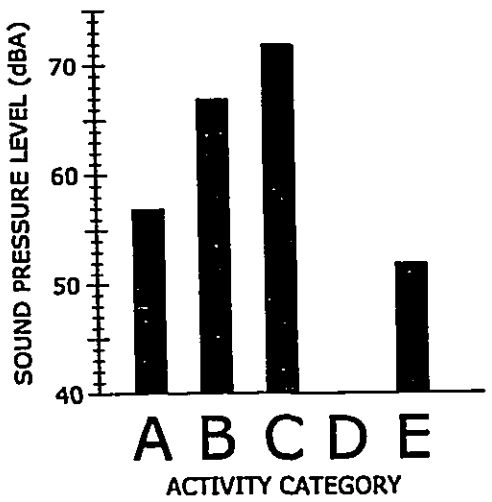
not to scale

Date: November 2004 | Project No.: 04-53 | Drawn By: TRB

Figure No: 1



ACTIVITY CATEGORY	ACTIVITY CATEGORY DESCRIPTION	EQUIVALENT SOUND LEVEL $L_{eq(h)}$
A	LANDS ON WHICH SERENITY AND QUIET ARE OF EXTRAORDINARY SIGNIFICANCE AND SERVE AN IMPORTANT PUBLIC NEED AND WHERE THE PRESERVATION OF THOSE QUALITIES IS ESSENTIAL IF THE AREA IS TO CONTINUE TO SERVE ITS INTENDED PURPOSE.	57 dBA (EXTERIOR)
B	PICNIC AREAS, RECREATION AREAS, PLAYGROUNDS, ACTIVE SPORT AREAS, PARKS, RESIDENCES, MOTELS, HOTELS, ACHOOLS, CHURCHES, LIBRARIES, AND HOSPITALS.	67 dBA (EXTERIOR)
C	DEVELOPED LANDS, PROPERTIES, OR ACTIVITIES NOT INCLUDED IN ACTIVITY CATEGORIES A OR B ABOVE.	72 dBA (EXTERIOR)
D	UNDEVELOPED LAND	N/A
E	RESIDENCES, MOTELS, HOTELS, PUBLIC MEETING ROOMS, SCHOOLS, CHURCHES, LIBRARIES, HOSPITALS, AND AUDITORIUMS.	52 dBA (INTERIOR)



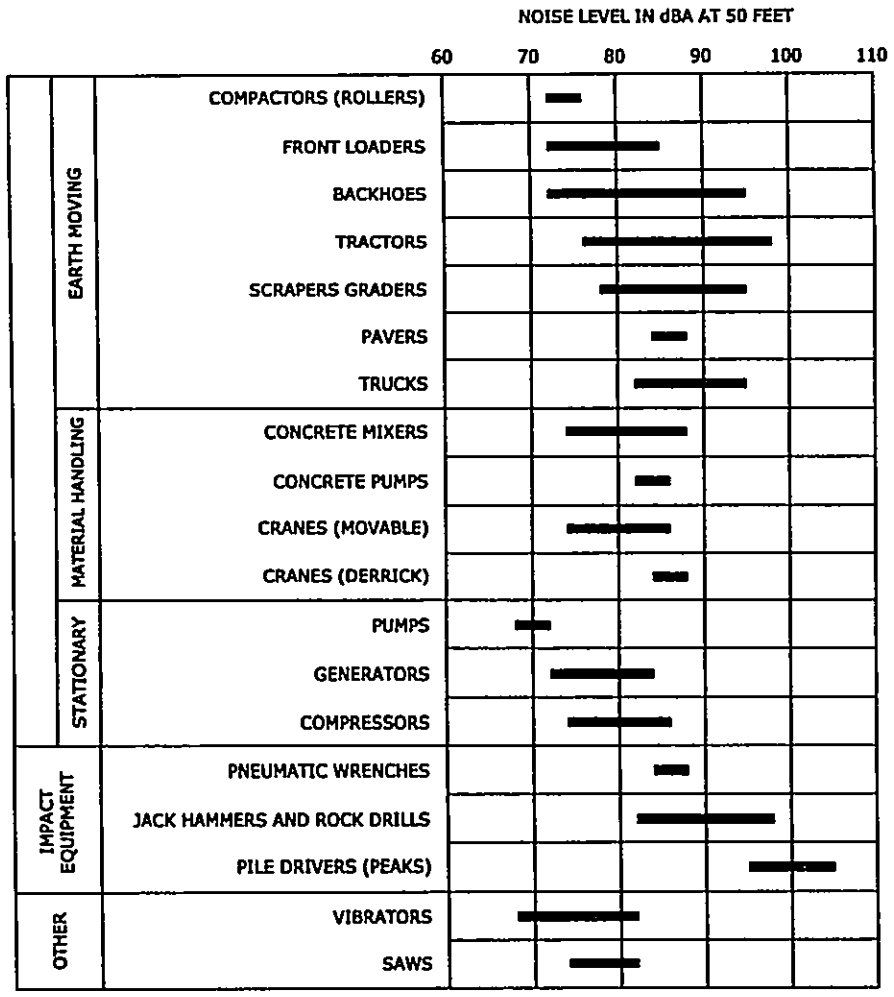
Federal Highways Administration Recommended Equivalent Hourly Sound Levels Based on Land Use [Reference 3]

Malu'u-Popoki Residential Subdivision

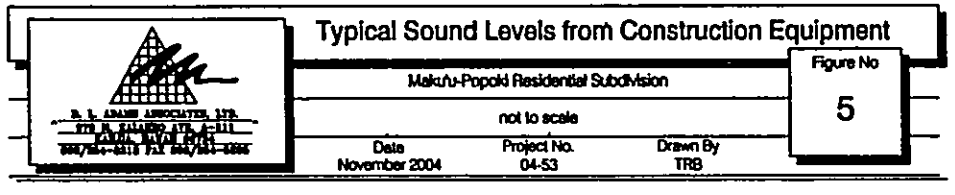
not to scale

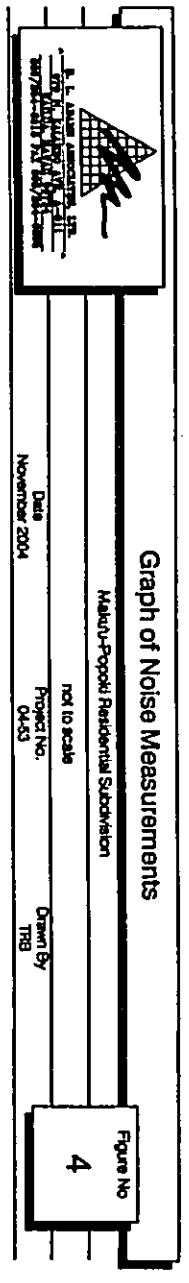
Date November 2004 | Project No. 04-53 | Drawn By TRB

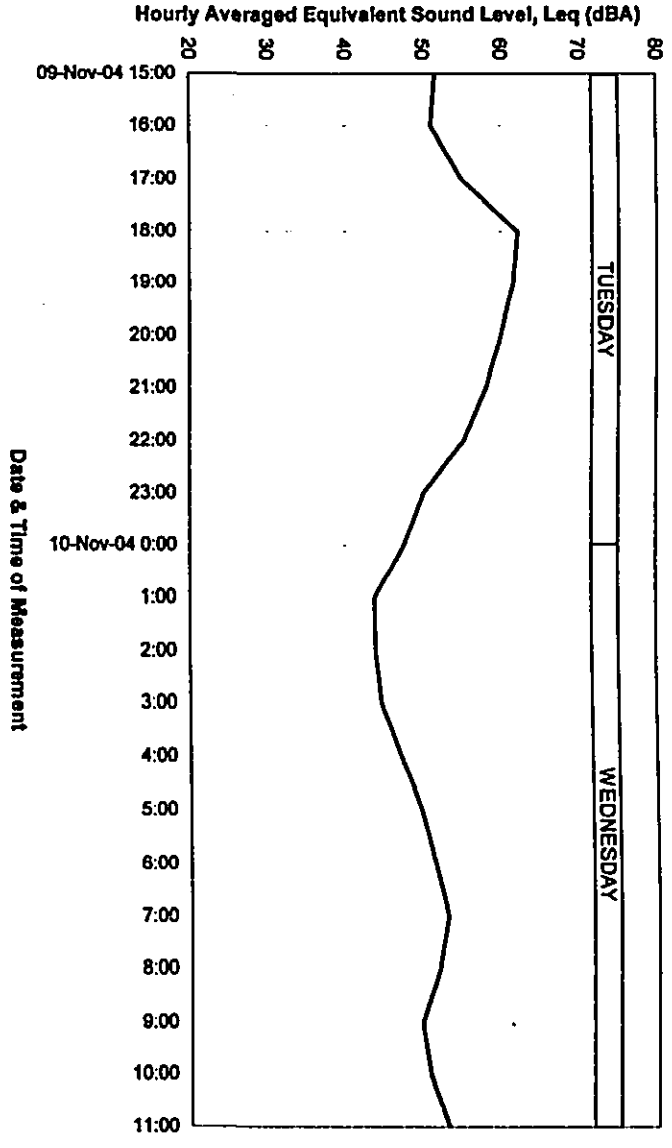
Figure No 2



NOTE: BASED ON LIMITED AVAILABLE DATA SAMPLES







APPENDIX F

MEMORANDUM OF AGREEMENT

Memorandum of Agreement Between the County of Hawaii and the Department of Hawaiian Home Lands

I. Purpose

The purpose of this Memorandum of Agreement (MOA) is to clarify the respective roles, responsibilities, and obligations of the County of Hawaii (County) and the Department of Hawaiian Home Lands (DHHL) relating to land use planning, infrastructure maintenance, enforcement of laws, and collection of taxes and other fees on Hawaiian home lands.

II. Guiding Principles

The following general principles have guided the development of this MOA:

A. The Hawaiian Homes Commission is responsible for determining land use on Hawaiian home lands. The County may not use its land use and zoning powers to prevent the Hawaiian Homes Commission from controlling the use of Hawaiian home lands.

B. The County and DHHL share common goals in planning for the use of Hawaiian home lands: both support the orderly development of those lands for the benefit of native Hawaiians and both are committed to the integration of planning by DHHL and Hawaii County.

C. The County should manage and maintain all infrastructure built to County standards

D. The County is authorized to enforce criminal laws and applicable County ordinances and regulations on Hawaiian home lands.

E. Hawaiian homestead lessees are residents of the County of Hawaii and should be treated in a manner consistent with all other residents of the County.

F. Hawaiian homestead lessees should pay all taxes and fees required by law.

G. The County and DHHL acknowledge that there are areas where agreement will not be reached, and agree to continue to work together toward a mutually acceptable resolution of such issues.

III. Relating to Planning and Land Use

A. DHHL will implement its Planning System which includes plans with DHHL land use designations such as the Hawaii Island Plan, various Development and Subdivision Plans, and Homestead Community Plans. In the formulation, updating, and amendment of these plans, DHHL will consult with the relevant County departments, and shall give due consideration and weight to their

comments, and to the Hawaii County General Plan, and other officially adopted plans such as Community Development Plans. All land uses on DHHL property will be placed according to the applicable DHHL plans.

B. The County will consult with DHHL over the appropriate designations of DHHL property in the Hawaii County General Plan LUPAG maps, and shall give due weight and consideration to the comments of DHHL, and to officially adopted DHHL plans.

C. Based on its plans and DHHL land use designations, DHHL will determine the appropriate County zoning districts that shall apply to the property in question. DHHL will communicate these zoning districts to the County.

D. All normal land use controls will be applied by Hawaii County to DHHL property according to the zoning district selected by DHHL. Except as specifically provided in the Agreement, DHHL will follow all normal land use procedures, regulations, and standards applicable to the zoning district.

E. All land use permit applications on Hawaiian home lands must be accompanied by written consent from DHHL before the County can begin processing those applications.

F. The standards of the various zoning districts selected will apply to DHHL property. DHHL and its lessees will go through normal County administrative variance procedures if they seek exemptions from standards.

G. For uses allowed in the various zoning districts that require special permits or use permits, DHHL and its lessees will go through the applicable County permit procedures. At some time in the future, DHHL may implement its own use permit procedure for Hawaiian home lands. If DHHL grants use permits, it will be responsible for enforcing violations of those permits. The County will be notified when DHHL has formulated its use permit system.

H. The County will advise DHHL of all violations by its lessees. The County will enforce land use codes and regulations on Hawaiian home lands in the same manner as with other landowners. DHHL will cooperate with the County in enforcing the terms of its leases requiring conformity to applicable laws and regulations, if requested by the County. Ongoing violations and failure to comply will be referred to DHHL after the County has exhausted all remedies short of pursuing legal action to address the violation. DHHL may institute lease enforcement proceedings in advance of, or in lieu of, County enforcement actions.

IV. Relating to Public Facilities and Infrastructure Serving Hawaiian Home Lands

A. In the development of future projects, DHHL will construct public facilities in accordance with County standards. Where departures from County standards are desired, DHHL will pursue exemptions and other administrative variances from the appropriate County department, in accordance with procedures established for all property owners. Should DHHL choose not to construct infrastructure in accordance with County standards, the County may view such improvements as private facilities for repair and maintenance purposes.

B. The County will accept operation, repair, and maintenance of all future DHHL infrastructure constructed according to County standards.

C. Existing infrastructure shall be subject to County inspection prior to being accepted by the County for operation, repair, and maintenance. The County may require DHHL to repair any damage such as leaks, holes, sags, or deterioration affecting the operation of the existing infrastructure, identified as a result of the inspection.

D. In the case of existing infrastructure that is not constructed to County standards, the County and DHHL will work to establish minimum standards for residential, agricultural, and pastoral subdivisions. Existing projects will be evaluated based on these new standards. The County may require DHHL to upgrade the infrastructure to the minimum standard prior to being accepted by the County for operations, repair, and maintenance.

E. The County will maintain infrastructure according to its own standards, resources and schedules. Any decisions as to upgrades or rehabilitation will be at the County's discretion.

F. Should DHHL elect to convert its land to a more intensive land use, DHHL will be responsible for upgrading the onsite infrastructure to accommodate the new use, and will consult with the County regarding the need to upgrade offsite infrastructure. DHHL and the County shall negotiate the extent to which DHHL will be responsible for any such offsite improvements requested by the County. DHHL shall be responsible for project-related offsite improvements to the extent that these would be required of other developers with similar projects. If offsite improvements benefit other property, DHHL and the County shall cooperate so that DHHL bears only its fair share of these improvement costs.

G. The County will treat DHHL lessees in the same manner as other property owners with respect to conformity with laws, ordinances, and regulations. The County will advise DHHL of violations, and will refer cases of ongoing violation to DHHL after the County has exhausted all remedies short of pursuing legal action

to address the violation. DHHL reserves the right to institute lease enforcement proceedings in advance of, or in lieu of, County enforcement actions.

V. Relating to the Enforcement of Criminal Violations on Hawaiian Home Lands

A. The County is authorized to and will enforce violations of criminal law on Hawaiian home lands.

B. County law enforcement agencies and DHHL will work to establish procedures regarding sharing information and providing testimony relating to arrests made on Hawaiian home lands needed for contested case hearings and other administrative and/or judicial proceedings.

VI. Relating to Real Property Taxes

A. Homestead lessees on Hawaiian home lands are responsible for the payment of real property taxes in accordance with the Hawaiian Homes Commission Act, 1920, as amended, and applicable County ordinances.

B. The County agrees to waive the penalty and interest on all delinquent real property taxes owed by Hawaiian homestead lessees as of December 31, 2001. Such waiver will apply to payments made by February 20, 2002, or to payments advanced by DHHL pursuant to paragraph C.

C. For those homestead lessees with real property tax balances, excluding penalty and interest, of more than $500, if payment is not made by February 20, 2002, DHHL will advance full payment of all real property taxes, excluding penalty and interest, to bring those bills current, within 60 days of receipt of an updated real property tax listing. This date may be extended by mutual agreement of the parties.

D. It is understood that the County's waiver of interest and penalty charges on delinquent real property taxes owed by homestead lessees as of December 31, 2001, and DHHL's advance of full payment of real property taxes, excluding interest and penalty, in accordance with paragraph C, is a one-time only offer,

E. In order to alleviate or reduce further delinquencies, the County will notify DHHL on an annual basis of any delinquent property owners.

F. The parties will continue to meet on an annual basis to evaluate the extent of delinquencies by Hawaiian homestead lessees on the Island of Hawaii and take action, if necessary, to keep delinquencies from recurring.

G. The County and DHHL shall work to establish a customer trust fund by July 1, 2004 to collect real property tax payments as part of the mortgage/loan payments in order to make smaller, regular payments.

VII. Areas for Further Collaboration

The parties agree to work further on the following issues:

A. The creation of new County zoning districts for farming and pastoral activities.

B. The development of infrastructure standards for rural land uses such as agricultural and pastoral activities.

C. The establishment of procedures for sharing evidence, information, and testimony involving criminal violations on Hawaiian home lands.

D. The implementation of actions to prevent and/or address future real property tax delinquencies by Hawaiian homestead lessees.

VIII. Termination

To achieve the objectives of this MOA, either party may, by mutual agreement in writing, further clarify or waive any term or condition of this agreement, provided such action does not violate any statutes, ordinances, or binding rules or regulations. DHHL and the County reserve the right to terminate this MOA upon one hundred eighty (180) days notice in writing to the other party.

In agreement thereof, the parties have entered into this Memorandum of Agreement on this 27th day of December, 2002.

COUNTY OF HAWAII

By _____
Harry Kim, Mayor

DEPARTMENT OF HAWAIIAN HOME LANDS

By _____
Raynard C. Soon, Chairman
Hawaiian Homes Commission

APPROVED AS TO FORM:

By _____
Corporation Counsel

By _____
Deputy Attorney General

APPENDIX G

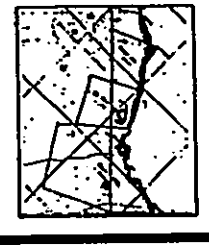
ARCHAEOLOGICAL SURVEY

RC-0146

Archaeological Survey of the DHHL Maku'u Residential Subdivision

(TMK: 3-1-5-08:03)

Maku'u/Pōpōkī/Hālona Ahupua'a
Puna District
Island of Hawai'i



PREPARED BY:

Michael Desilets, M.A.
and
Robert B. Rechtman, Ph.D.

PREPARED FOR:

Environet, Inc.
2850 Pa'a Street, Suite 212
Honolulu, Hawai'i 96819

November 2004

RECHTMAN CONSULTING, LLC
HC 1 Box 41- Ke[illegible]u, Hawai'i 96749-9710
phone: (808) 966-[illegible]636 fax: (808) 443-0065
e-mail: b[illegible]@rechtmanconsulting.com
ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

Archaeological Survey of the DHHL Maku'u Residential Subdivision
(TMK: 3-1-5-08:03)

Maku'u/Pōpōkī/Hālona Ahupua'a
Puna District
Island of Hawai'i

RECHTMAN CONSULTING

EXECUTIVE SUMMARY

At the request of Environet, Inc., on behalf of their client the Department of Hawaiian Home Lands (DHHL), Rechtman Consulting, LLC performed an archaeological survey for a proposed DHHL residential subdivision. The proposed development will occur on state-owned land (TMK:3-1-5-08:03) in Maku'u/Pōpōkī/Hālona *ahupua'a*, Puna District, Island of Hawai'i (Figures 1 and 2); however, Federal agency assistance money from the U.S. Department of Housing and Urban Development (HUD) is being used for this project, therefore it qualifies as a Federal undertaking, and thus must be compliant with Section 106 of the National Historic Preservation Act. The purpose of this study is to document the presence of any Historic Properties that might exist within the project area and provide a statement of impact to any such resources resulting from development of the proposed subdivision.

The current project area is located *mauka* of Highway 130 roughly 1.5 mile south of the 'Āinaloa Subdivision and 2 miles north of Pāhoa Town ranging in elevation from 540 to 720 feet above sea level. The survey area consists of 245.55 acre encompassing the southwestern portion of TMK:3-1-5-08:03. Terrain is very rocky with exposed *Pāhoehoe* common in unvegetated areas. The landscape slopes gently to the northeast and contains numerous small sinkholes. Vegetation in the project area is extremely dense in most places. The only notable exception is a large region in the southern portion of the parcel.

An archaeological survey of the project area was conducted between June 29 and July 13, 2004. Because of very dense vegetation portions of the project area could not be surveyed. Areas of moderate to sparse vegetation were, however, present in the south and far north. In these areas, systematic transects were used. Transect spacing ranged from 10 to 15 meters depending on terrain and vegetation cover. Two archaeological sites were recorded within the study area. One is an enclosure complex (SIHP Site 50-10-81-24231) and the other is a small retained terrace (SIHP Site 50-10-81-24232).

Site 24231 is a complex of connected features including a large enclosure, a constructed mound, a wall, and a platform. The site is located on the eastern side of a moderately high basalt outcrop in the northern portion of the project area. The site complex measures approximately 10 x 10 meters. The construction methods and overall design of Site 24231 clearly indicate a traditional Hawaiian cultural affiliation. Functionally, however, the site is somewhat ambiguous. Of the possible functional types known for traditional Hawaiian features, both residential and ceremonial seem to fit the location and design of Site 24231. Five test units were excavated at Site 24231, but they produced no evidence of habitation. A constructed subsurface feature within a mound in the center of the enclosure suggests a possible ceremonial function. As such this site is significant under Criterion d and considered eligible for listing in the National Register of Historic Places. The proposed Department of Hawaiian Home Lands (DHHL) residential subdivision has the potential to affect this site. However, given the low-density nature of the proposed development, this site can be preserved within a sufficiently large buffer zone so as to render a no adverse effects determination.

Site 24232 is a small stone-retained terrace located near the top of an outcrop in the northern portion of the project area. The terrace surface measures 1 x 0.6 meters and is composed of cobbles covered with organic debris. The terrace riser stands 50 centimeters high and is 1.3 meters long. This feature remains functionally ambiguous. Neither its structure nor the results of test excavation shed light on its purpose or its antiquity. It remains a possibility that the feature is natural in origin, being simply a chance collection of cobbles perched on the outcrop slope. In either case, this site is evaluated is not eligible for listing in the National Register of Historic Places and therefore not considered a historic property. By definition the proposed project will have no effect on this site.

Given the unsurveyable nature of the vegetation cover with portions of the project area, it is further recommended that an archaeological monitor be present during initial grubbing to ensure a timely and appropriate response to the unanticipated discovery of historic properties that may occur.

Contents

Figures

Tables

INTRODUCTION

At the request of Environet, Inc., on behalf of their client the Department of Hawaiian Home Lands (DHHL), Rechtman Consulting, LLC performed an archaeological survey for a proposed DHHL residential subdivision. The proposed development will occur on state-owned land (TMK:3-1-5-08:03) in Maku'u/Pōpōkī/Hākoa *ahupua'a*, Puna District, Island of Hawai'i (Figures 1 and 2); however, Federal agency assistance money from the U.S. Department of Housing and Urban Development (HUD) is being used for this project, therefore it qualifies as a Federal undertaking. The purpose of this study is to document the presence of any Historic Properties that might exist within the project area and provide a statement of impact to any such resources resulting from development of the proposed subdivision.

This report is intended to accompany an Environmental Assessment (EA) being prepared in compliance with the National Environmental Policy Act (NEPA) and its implementing regulations, as well as fulfilling the requirements of Section 106 of the National Historic Preservation Act and its implementing regulation, 36 CFR 800.

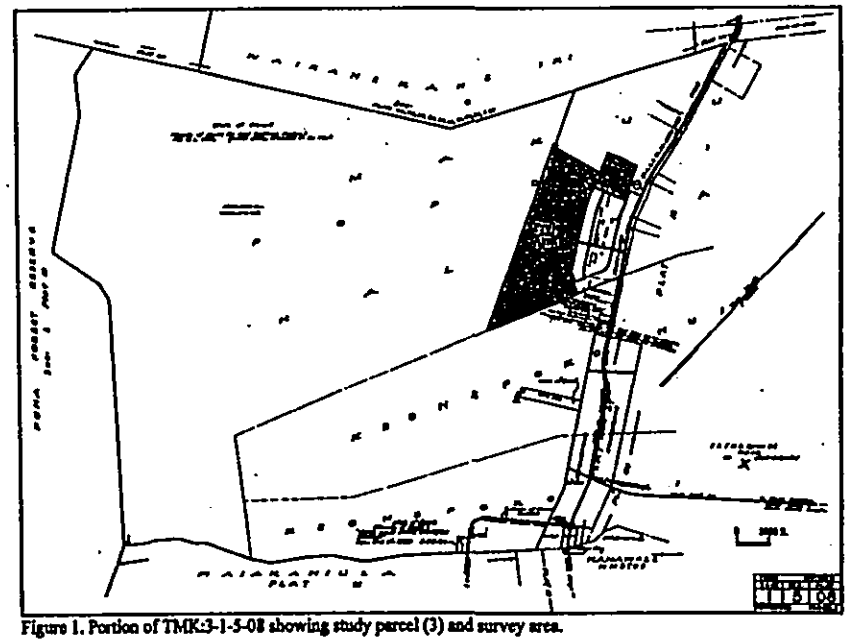
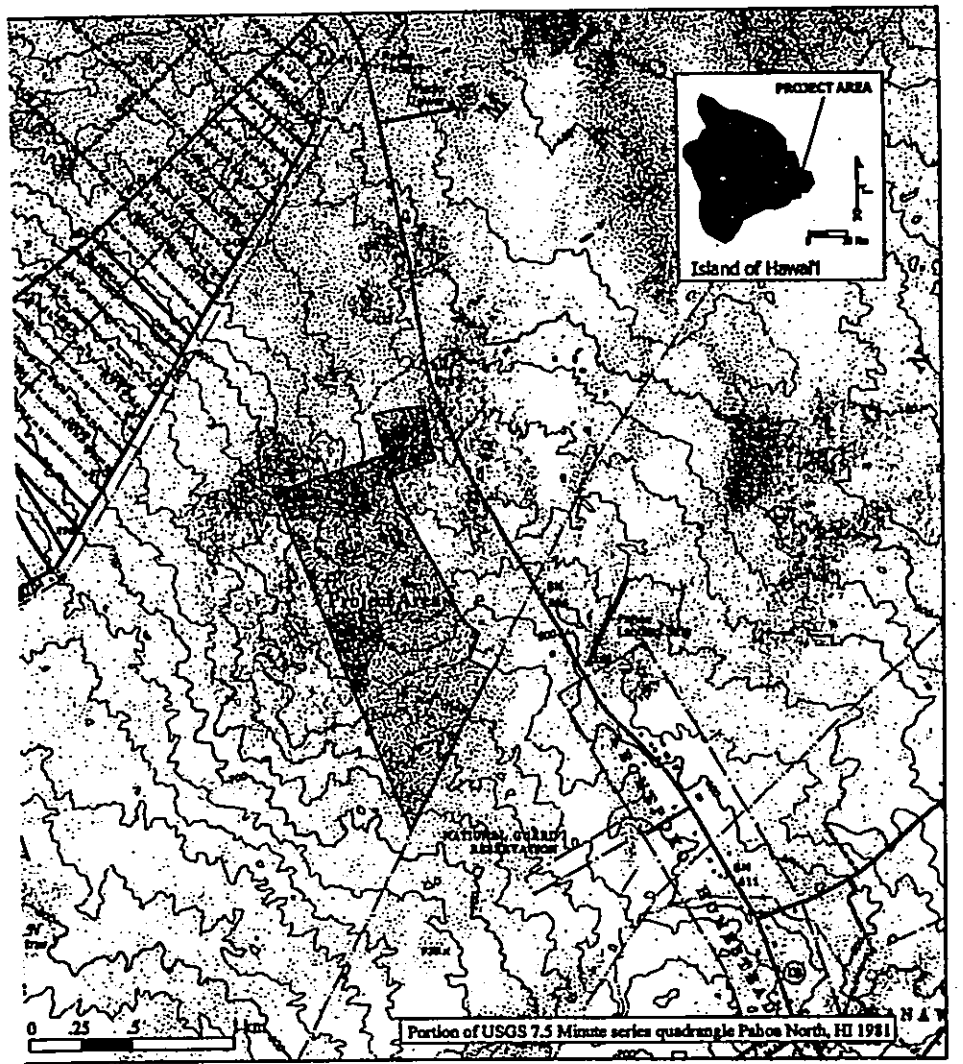


Figure 1. Portion of TMK:3-1-5-08 showing study parcel (3) and survey area.



ure 2. Project area location.

RC-0246

PROJECT AREA DESCRIPTION

The current project area is located *mauka* of Highway 130 roughly 1.5 mile south of the 'Āinaloa Subdivision and 2 miles north of Pāhoa Town ranging in elevation from 540 to 720 feet above sea level (see Figure 1). The survey area consists of 245.55 acre encompassing the southwestern portion of TMK:3-1-5-08:03. Terrain is very rocky with exposed *Pāhoehoe* common in unvegetated areas. The landscape slopes gently to the northeast and contains numerous small sinkholes.

Soil in the study area is primarily classified as a histosol; a thin soil that develops on geologically young, yet forested lava. Starting around 1,000 ft elevation (just above the study area) there are also limited pockets of more developed soils of the Kekake-Keei-Kilea series and Haipoe-Maile-Puu Oo series (Sato et al. 1973), these are thin rocky soils that overlay an 'Aila'au flow dated between 450-260 years B.P. (Holcomb 1987). Flows in the current study area are dated between 750-200 B.P. (Wolfe and Morris 1996).

Vegetation in the project area is extremely dense in most places. The only notable exceptions are a large region in the southern portion of the parcel and the northern corner block of the parcel. The vegetation regime (Figure 3) is classified as Lowland Wet 'Ōhi'a/Uluhe Fern Forest (Gagne and Cuddihy 1990). *'Ōhi'a* (*Metrosideros polymorpha*) are abundant but generally small and sparsely distributed among patches of *uluhe* (*Dicranopteris linearis*) and broomsedge (*Andropogon virginicus*). *Melastoma candidum* is also prevalent within the study area. Also present, but not as common, are *ki* (*Cordyline fruticosa*), pandanus (*Pandanus tectorius*), and *kōpiko* (pronounced *'ōpiko* on Hawai'i Island) (*Psychotria* sp.). Table 1 lists plant species identified during a recent floral survey of a waterline corridor in the southern part of the study area (Terry 2003).

Table 1. List of identified plant species (from Terry 2003).

Scientific Name	Common/Hawaiian Name	Status
Andropogon virginicus	Broomsedge	Alien
Arundina graminifolia	Bamboo orchid	Alien
Bothriochloa pertusa	Pitted beard grass	Alien
Cibotium glaucum	Tree fern/*hāpu'u*	Endemic
Cladium jamaicense	Sawgrass	Indigenous
Desmodium incanum	Spanish clover	Alien
Dicranopteris linearis	False staghorn fern/*uluhe*	Indigenous
Fimbristylis dichotoma	Fimbristylis	Indigenous
Lycopodiella cernua	Club moss/*lāuu 'ahu 'wia*	Indigenous
Machaerina mariscoides	Sedge/*'uki*	Indigenous
Melaleuca quinquenervia	Paperbark	Alien
Melastoma candidum	Melastoma	Alien
Metrosideros polymorpha	*'ōhi'a lehua*	Endemic
Mimosa pudica	Sensitive plant	Alien
Nephrolepis cordifolia	Sword fern/*kapukapu*	Endemic
Paraserianthes falcataria	Albizia	Alien
Pluchea symphytifolia	Sourbush	Alien
Psidium cattleianum	Strawberry guava	Alien
Pteris cretica	Cretan brake	Indigenous
Santalum paniculatum	Sandalwood/*'iliahi*	Endemic
Scaevola chamissoniana	*naupaka kuahiwi*	Endemic
Spathoglottis plicata	Philippine ground orchid	Alien
Sphenomeris chinensis	Lace fern/*pala'ā*	Indigenous
Stachytarpheta sp.	Vervain	Alien
Waltheria indica	*'ahualoa*	Indigenous
Xyris complanata	Yellow-eyed grass	Alien

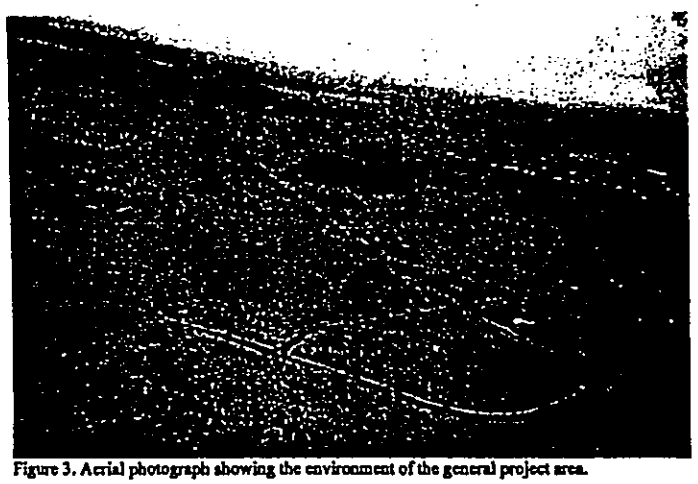


Figure 3. Aerial photograph showing the environment of the general project area.

BACKGROUND STUDIES

This section of the report describes and synthesizes prior archaeological, cultural, and historical studies (Table 2) that are relevant to the current project area; and provides a brief culture-historical background. McEldowney (1979) authored an archaeological and historical literature review and research design for the South Hilo and Puna areas, which can be used as a general predictive model for archaeological site distributions within the current study area. This model is based on ethnohistorical and early historical observations and descriptions of the region; and has been supported by several subsequent archaeological studies, some of which (Figure 4) have taken place in the same, or adjacent, *ahupua'a* as the current study area (Barrera 1990; Bordner 1977; Chaffee and Spear 1993; Charvet-Pond and Rosendahl 1993; Conte and Kolb 1994; Ewart and Luscomb 1974; Franklin et al. 1992; Komori 1987; McEldowney and Stone 1991; Smith 1991; Yent 1983).

Table 2. Prior relevant archaeological, historical, and cultural studies.

Author/Date	*Type of Study*	*Ahupua'a*
Barrera 1990	Archaeological Survey	Maku'u
Barrère 1959	Archival and Historical Literature Review	Various
Bordner 1977	Archaeological Survey	Maku'u
Chaffee and Spear 1993	Archaeological Survey	Maku'u
Charvet-Pond and Rosendahl 1993	Archaeological Survey	Maku'u, Hīlona, Pōpōkī
Conte and Kolb 1994	Archaeological Survey	Maku'u, Hīlona, Pōpōkī
Ewart and Luscomb 1974	Archaeological Survey	Various
Franklin et al. 1992	Archaeological Survey	Waikahkabe
Komori 1987	Archaeological Survey	Various
Maly 1999	Archival and Oral-Historical Study	Various
McEldowney 1979	Literature Review and Research Design	Various
McEldowney and Stone 1991	Archaeological/Environmental Survey	Various
Smith 1991	Field Inspection	Hīlona, Pōpōkī
Yent 1983	Archaeological Survey	Maku'u
Rechtman 2003	Archaeological Assessment	Maku'u, Hīlona

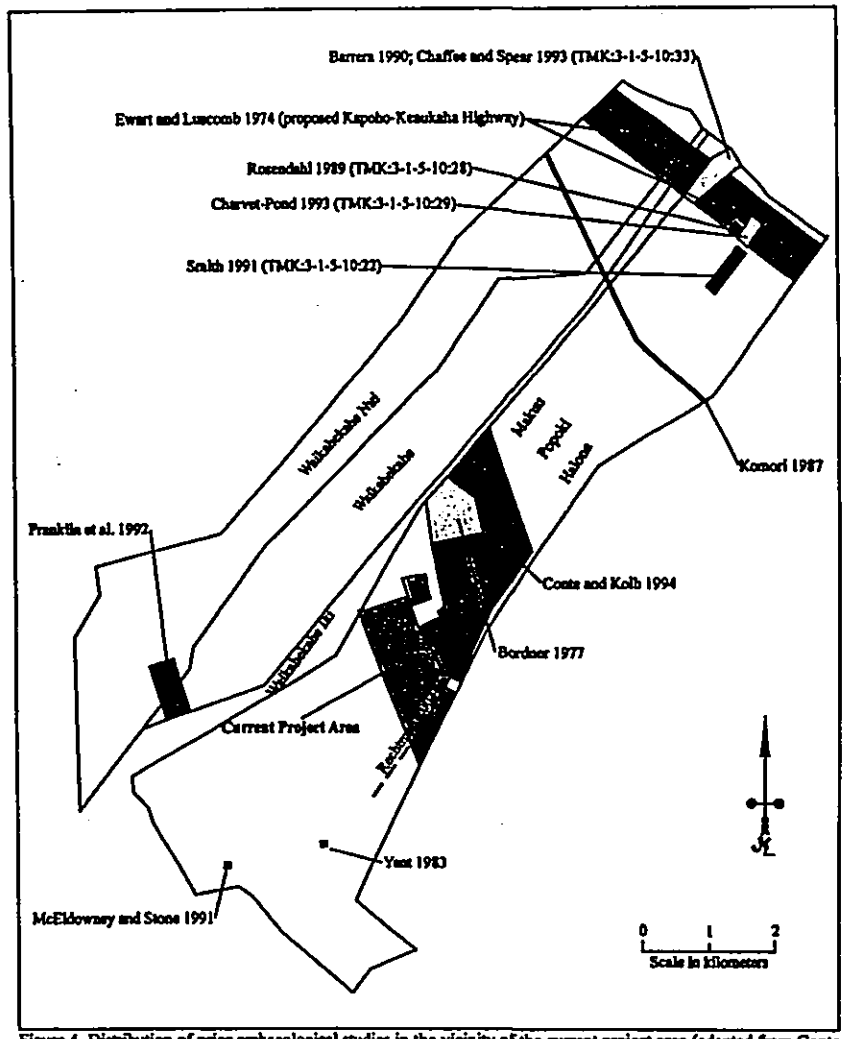


Figure 4. Distribution of prior archaeological studies in the vicinity of the current project area (adapted from Conte and Kolb 1994).

Of the archaeological studies listed in Table 2, six (Bordner 1977; Conte and Kolb 1994; Franklin et al 1992; Rechtman 2003; McEldowney and Stone 1991; Yent 1983) were conducted in inland areas comparable to the current study area. Aside from the extensive lava tube systems containing cultural material and burials documented in two of these studies (McEldowney and Stone 1991; Yent 1983), only three other features were recorded in a over 2,000 acres of total survey area (Bordner 1977; Conte and Kolb 1994; Franklin et al. 1992). One of these features was an *ahu*, or cairn (Bordner 1977); and the other two were small terraces interpreted as agricultural planting areas (Franklin et al. 1994). A recent monitoring project (Kasberg and Rechtman 2004) for a reservoir and waterline related to the current study also produced negative results. This lack of archaeological features is understandable considering that most of the area is a relatively young unsoiled lava flow.

Hīlona, Pōpōkī, and Maku'u *ahupua'a* are portions of the larger Puna District, one of six major districts on the island. This division of districts (and likely all of the smaller land divisions) extends back in time to at least A.D. 1475, in the time of the Chief Līloa; and were brought together under a single ruler when 'Umi a Līloa (son of Līloa) came to power in about A.D. 1525 (Maly 1999). Barrère (1959) summarizes the Precontact geopolitics of the Puna District as follows:

> Puna, as a political unit, played an insignificant part in shaping the course of history of Hawaii Island. Unlike the other districts of Hawaii, no great family arose upon whose support one or another of the chiefs seeking power had to depend for his success. Puna lands were desirable, and were eagerly sought, but their control did not rest upon conquering Puna itself, but rather upon control of the adjacent districts, Kau and Hilo. (Barrère 1959:15)

The Puna District generally remained under the control of outside chiefs until the time of Kalani'ōpu'u's reign. Shortly before his death in A.D. 1782, Kalani'ōpu'u's dominion over Puna and portion of Ka'ū was challenged by the Puna chief 'Imakakōloa. Kalani'ōpu'u resolved the unrest, but following his death the disposition of Puna once again became an issue until Kamehameha I successfully brought the entire island under his control in A.D. 1793.

As a result of the *Māhele* of A.D 1848, Maku'u, Hīlona, and Pōpōkī *ahupua'a* were retained as government land. Large coastal portions of these land units (Figure 5) were later commuted as grants (in A.D 1852 Grant 1013 to Malau and Grant 1014 to Kea, and in A.D 1855 Grant 1537 to Kapohano); the *mauka* lands have since remained idle. By the 1890s the government was investigating ways to improve access and resources in Puna. In A.D 1892 Loebenstein was directed to survey a new inland road (roughly in the location of the current Highway 130) through the district. In a newspaper interview, he describes the area as follows:

> The arable belt of Puna is from three to six miles from the sea coast, and is consequently unexplored. It is a wonderful country and I could talk of it by the hour. It only lies in the hands of the Government to develop it. Everything depends on an appropriation being made for the road, of which the preliminary survey has been made.
>
> . . . The road begins at the edge of the Ramie camp, one mile from the edge of the woods-nine miles from Hilo. It follows the old road for a mile and a half more, and is to extend to Kalmu on a new survey . . . I met with ancient trails showing traces of a dense population and cultivation in early times. The road, if opened, will afford beautiful scenery to tourists, as there are natural wonders all along, lava trees, pit craters and lava tunnels extending for miles which formed ancient burial places. There are natural benches formed by the lava, where the dead were placed, and on these are the bones, skulls and sometime complete skeletons. These tunnels are from 25 to 30 feet wide and about the same in height, and of course pitch dark . . . From the ninth to the nineteenth mile [the current study area is at about the ninth mile] the road is over *pahoehoe*, the arable land lying about a mile and a half above . . . There is considerable sandal wood growing on the *pahoehoe*, but the ranchers are too indolent to drive cattle, so they make fires and burn off the brush, which kills the sandal wood. It is a shame. There are no wild cattle in Puna . . . (Hawaiian Gazette, March 22, 1892)

A Hawaii Territorial Survey map (Register Map 2268) dated A.D 1903 shows a *mauka/makai* trail extending inland from the shore along the Hīlona/Pōpōkī boundary (see Figure 6); however, it is unclear how far inland this trail may have gone, but it is possible that it provided coastal residents access to the more fertile (soil covered) lands *mauka* (above 100 feet elevation) of the current study area.

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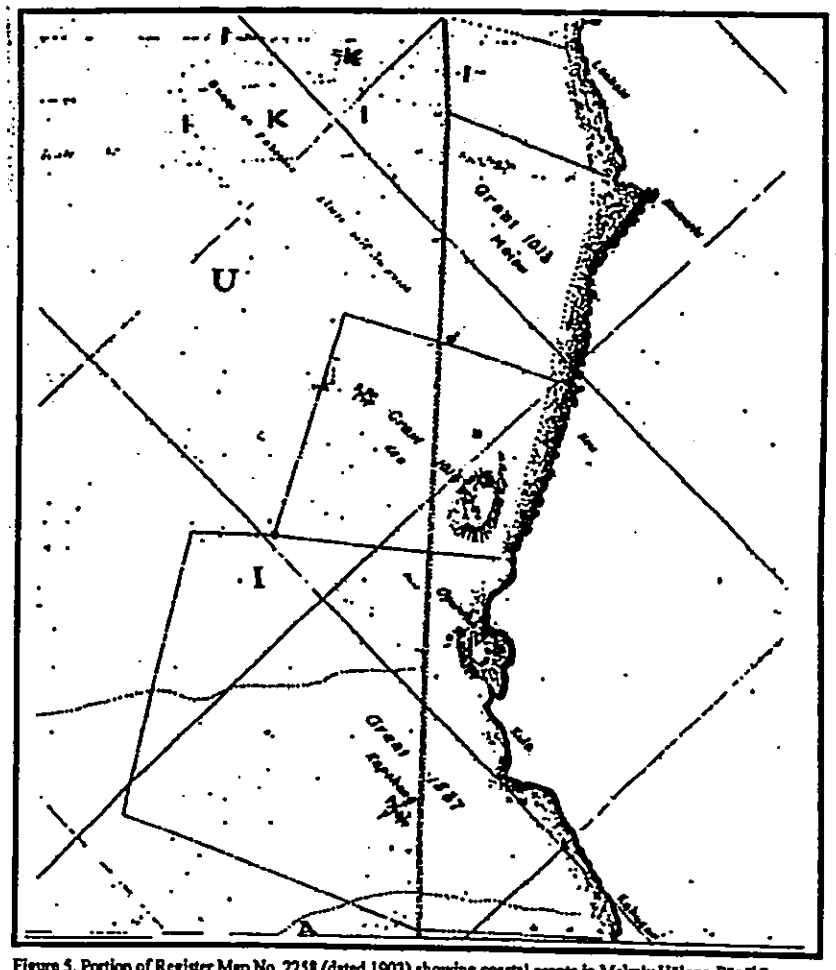

Figure 5. Portion of Register Map No. 2258 (dated 1903) showing coastal grants in Maku'u-Hīlona-Pōpōkī *ahupua'a*.

CURRENT PROJECT EXPECTATIONS

Based solely on elevation, the current project area falls within the Upland Agricultural Zone (Zone II) as defined by McEldowney (1979). However, as she indicates, this zone also corresponds with the distribution of ash soils, which do not extend into the current study area (Figure 6). The environmental qualities of the current study area are more akin to McEldowney's (1979) description of the Lower Forest Zone (Zone III). This region is characterized by scattered *'ōhi'a* with an understory of *hapu'u* and *uluhe*. Thus, the archaeological expectations for the general project area are limited to trails, localized agricultural features, ephemeral habitations, and lava tubes containing both habitation debris and burials. While undocumented in the literature, it has been suggested based on oral information (see Franklin et al. 1992:15) that lava tubes also were used as secret places in which chant, *hula*, and other traditional cultural activities were practiced during the period (A.D. 1830-1870s) of prohibition on such activities.

This general model can be refined for the specific study area based on the results of prior archaeological investigations (see Table 2). Collectively, these investigations document an overwhelming paucity of archaeological sites. While it is possible that some agricultural and temporary habitation features could be present in the study area, it is more likely that the only sites discoverable would be trails or trail markers and lava tubes (see Bordner 1977; Conte and Kolb 1994; Franklin et al. 1992).

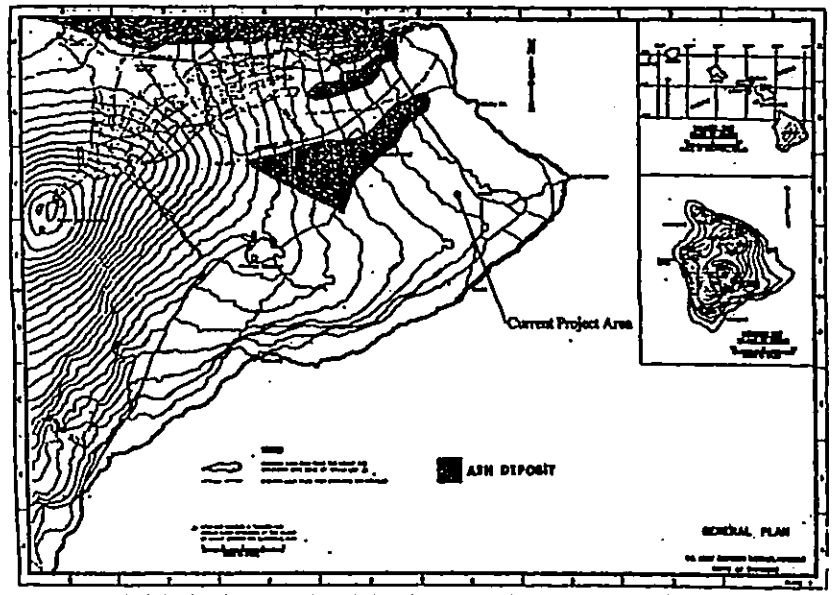

Figure 6. Map depicting locations of weather ash deposits corresponding to the Upland Agricultural Zone (adapted from McEldowney 1979:63).

FIELDWORK METHODS AND RESULTS

Archaeological fieldwork for the current project was conducted between June 29 and July 13, 2004 under the supervision of Robert Rechtman, Ph.D. by Christopher Hand, B.A., Thomas B. Jones, B.A., Michael Vitousek, and Michael Desilets, M.A. Prior to the fieldwork, and associated with a related study (Rechtman 2003), a helicopter survey of the general area was conducted in an effort to identify *kīpuka* and possible lava tube entrances within the otherwise dense vegetation that covers much of the current study area. GPS coordinates were obtained during the aerial reconnaissance locating two potential small *kīpuka* identified by the presence of large Indian banyan (*Ficus benghalensis*) and moluccan albizia (*Falcataria moluccana*) trees. During the archaeological survey work it was determined that the project area vegetation was too dense to penetrate leaving a large portion of the project area unsurveyable. However, areas of moderate to sparse vegetation were present in the southern and extreme northern regions; and in these areas, systematic transects were employed (Figure 7). Transect spacing ranged from 10 to 15 meters depending on terrain and vegetation cover. In addition to the systematic transect survey the areas identified during the earlier helicopter survey were inspected for the presence of cultural resources and lava tube entrances.

As a result of the on-ground field survey two potential historic properties were identified. Both were found in a grove of guava and pandanus growing on basalt outcrops in the northernmost portion of the project area (see Figure 7). One is a small retained terrace and the other is an enclosure complex. The following sections present detailed descriptions of these sites including the results of subsurface testing.

SIHP Site 24231

Site 24231 is a complex of connected features including a large enclosure, a constructed mound, a wall, and a platform (Figure 8). The site is located on the eastern side of a moderately high basalt outcrop in the northern portion of the project area. The site complex measures approximately 10 x 10 meters. Pandanus (*Pandanus tectorius*), *kōpiko* (*Psychotria* sp.), and guava (*Psidium guajava*) are present in and around the site area.

Feature 1 (enclosure)

Feature 1 is a roughly circular enclosure with a large basalt slab forming its northwestern side (Figure 9). It is constructed of medium to large cobbles stacked several courses high. The wall is consistently 60 to 70 centimeters in width and stands anywhere from 15 to 40 centimeters high. It is in fair to good condition in most places with some collapse evident. One section in the south is particularly well preserved and appears to be in or near its original state (Figure 10). Cobbles form the surface of the inside of the enclosure and the northeastern half of the interior is notably higher than the southwest half. The variability in surface elevation may be, at least in part, a function of the underlying bedrock. A constructed mound is situated in the center of the enclosure (Figure 11).

In the interest of obtaining information regarding feature function, two test units were excavated within the enclosure (see Figure 8).

Test Unit 1

Test Unit 1 was a .5 x .5 meter unit located in the far southern portion of the enclosure and adjacent to the interior side of its southeastern wall (Figure 12). Excavation was conducted in 10 centimeter levels and all sediment was passed through ¼ inch mesh. Two stratigraphic layers were identified (Figure 13); the uppermost was an approximately 10 centimeter thick layer of decaying organic matter enmeshed in a thick root mat (Layer I). The lower layer (Layer II) also contained abundant roots, but was principally very dark brown (10YR 2/2) silt loam with pebbles of decomposing basalt. The unit terminated at bedrock at a depth of 20 centimeters below the surface. The bedrock exposed in the unit consisted of a ropy *pāhoehoe* flow with a glassy surface (Figure 14).

One water-worn basalt cobble was recovered from Layer II of Test Unit 1. This stone was clearly transported to the site. No evidence of wear or battering was present on the cobble. Also present in Layer II were naturally fractured glassy pebbles that originated from the underlying bedrock surface. These bedrock fragments may have been intentionally flaked from the parent material, however the poor quality of the stone makes identification of diagnostic attributes difficult at best.

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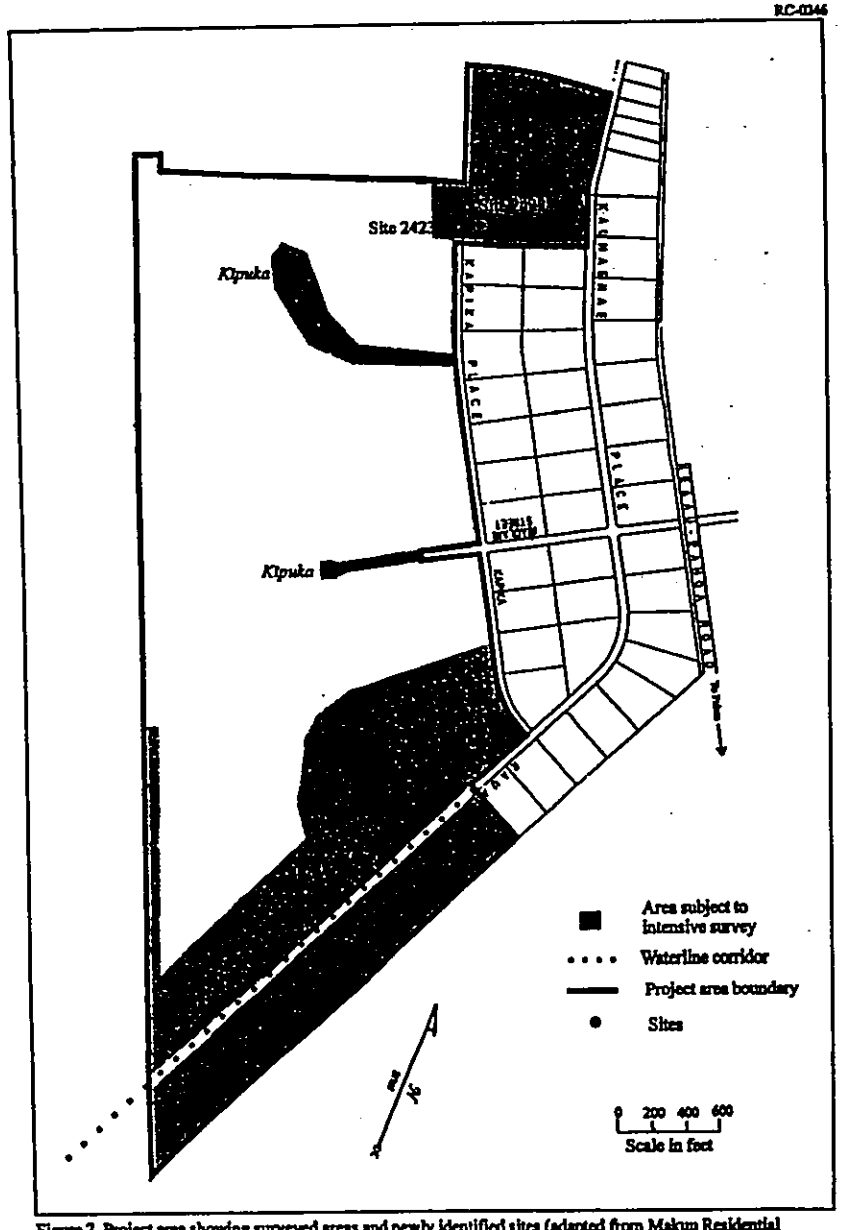

Figure 7. Project area showing surveyed areas and newly identified sites (adapted from Makua Residential Subdivision Master Plan, Community Planning, Inc., February 2004).

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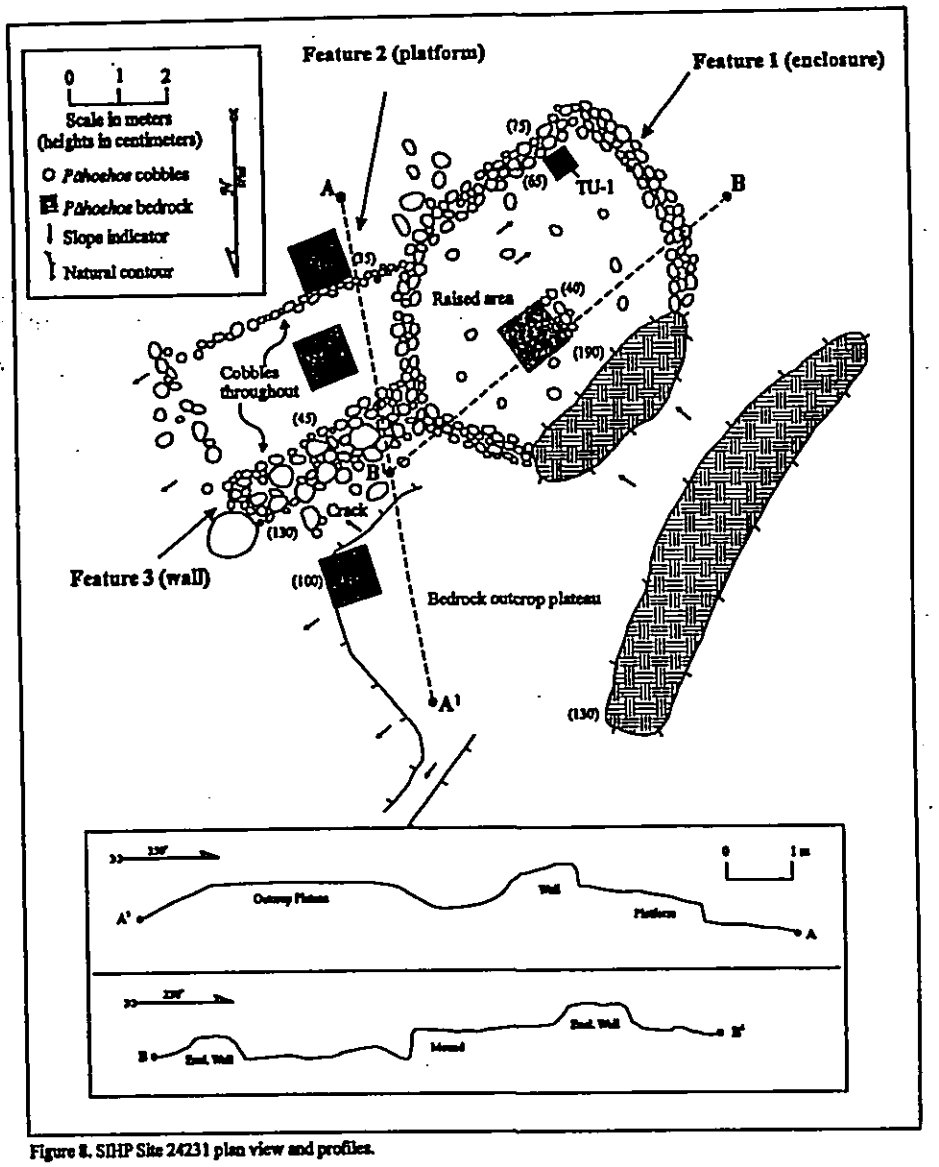

Figure 8. SIHP Site 24231 plan view and profiles.

Figure 9. Site 24231 enclosure, view to east.

Figure 10. Well preserved southeastern wall, Site 24231 enclosure.

Figure 11. Constructed mound in center of Site 24231 enclosure.

Figure 12. Test Unit 1 abutting southeastern interior enclosure wall at Site 24231. Note dense root mat and ropy *pāhoehoe* bedrock at base, view to southeast.

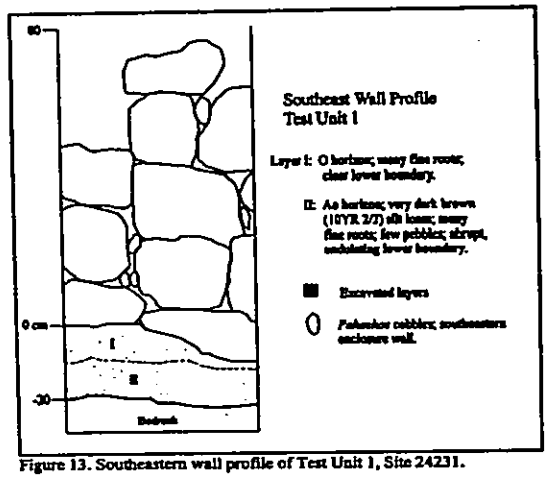

Figure 13. Southeastern wall profile of Test Unit 1, Site 24231.

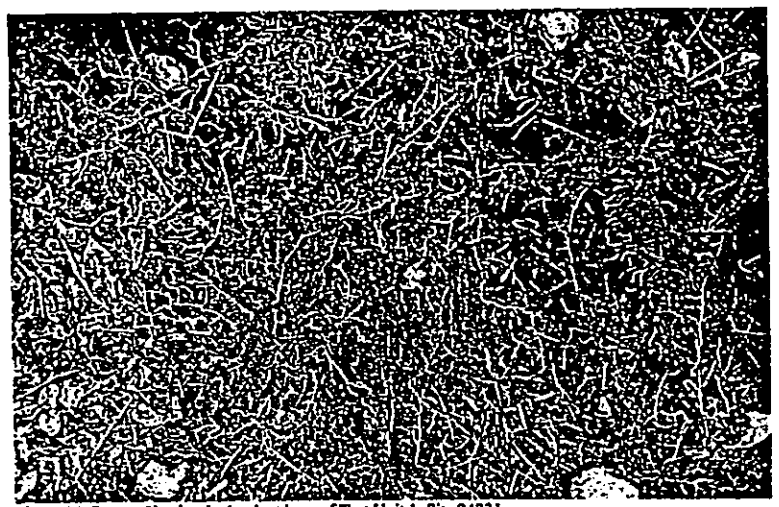
Figure 14. Ropy *pāhoehoe* bedrock at base of Test Unit 1, Site 24231.

Test Unit 2

Test Unit 2 was a 1 x 1 meter unit placed directly on top of the mound in the center of the enclosure (see Figure 8). The unit was set back from the mound's finely-faced southwestern side so as not to impact its aesthetic qualities (Figure 15). Excavation proceeded primarily though basalt cobbles to the base of the unit. Maintaining horizontal control was difficult due to the size and orientations of the cobbles. After an attempt at traditional 10 and 20 centimeter level increments, 30 centimeter arbitrary levels were found to be the only practical option. All recovered sediment was passed through ¼ inch mesh.

In terms of stratigraphy, two layers of interstitial material were recorded (Figure 16). Layer I was composed of decaying organic matter and roots. This layer was about 10 centimeters thick. Below this was very dark brown (10YR 2/2) silt loam. The unit terminated on bedrock at a depth of 60 centimeters below the feature's surface.

Test Unit 2 produced an interesting, if enigmatic, subsurface feature. At the base of Level 1 (30 centimeters below surface), several upright, tabular cobbles were exposed (Figures 17 and 18). These and some adjoining cobbles are arranged parallel to one another. Between these large cobbles was a line of small water-worn cobbles. The water-worn cobbles were presumably transported to the site from the coast. An alignment of four cobbles runs at a 150° bearing, all at the same depth and sandwiched between large cobbles. Two other water-worn cobbles were present at the same depth 20 centimeters away. These two run perpendicular to the other alignment. The linear orientation of the cobbles and their careful placement suggest that there is a larger pattern extending beyond the limits of the test unit. Following completion of excavation, the upright slabs and water-worn cobbles were replaced in their original positions (see Figure 18).

Fractured volcanic glass fragments were very common in both levels. These pieces clearly derive from the glassy bedrock surface observed at the base of several test excavations at the site. Whether they were subsequently used as tools seems unlikely; no evidence of use-wear or retouch was observed. Furthermore, there was no evidence that the water-worn cobbles were utilized as hammerstones. However, their abundance in the Test Unit 2 deposit strongly suggests that they were intentionally incorporated in the construction ofthe mound.


Figure 15. Test Unit 2, Site 24231, view to northeast.

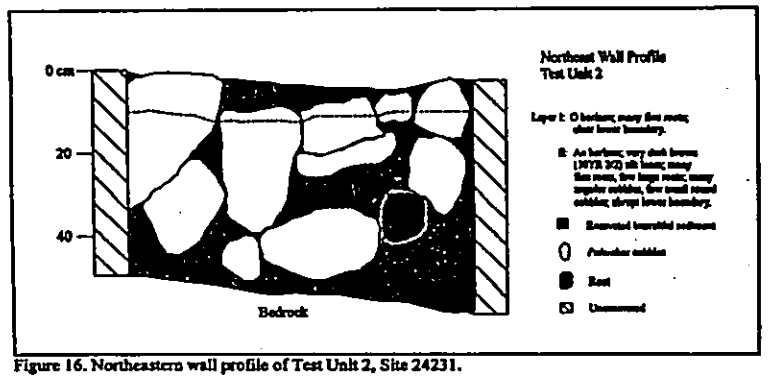

Figure 16. Northeastern wall profile of Test Unit 2, Site 24231.

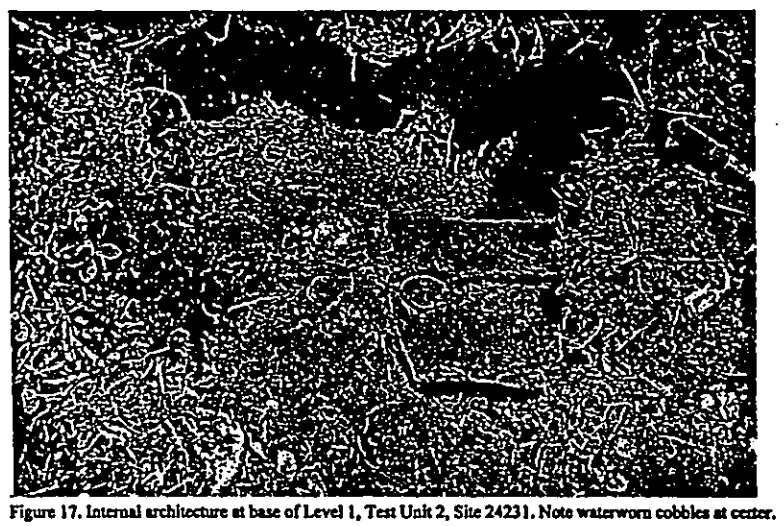

Figure 17. Internal architecture at base of Level 1, Test Unit 2, Site 24231. Note waterworn cobbles at center.

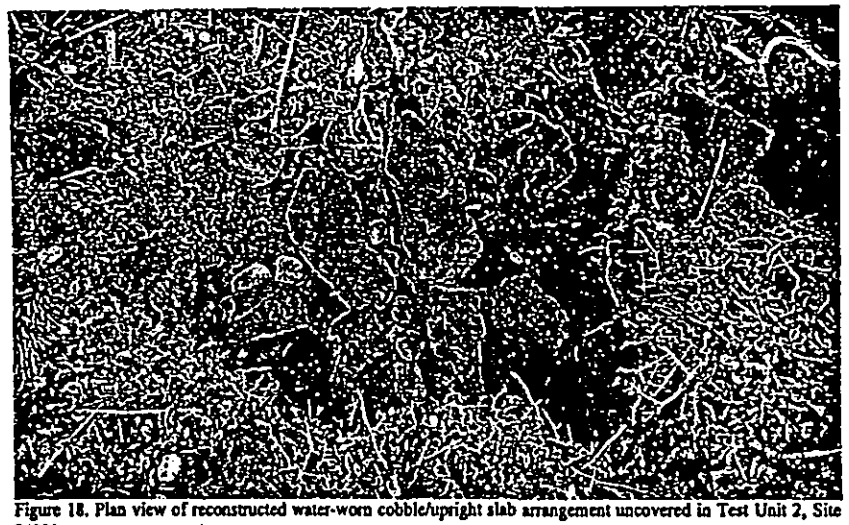

Figure 18. Plan view of reconstructed water-worn cobble/upright slab arrangement uncovered in Test Unit 2, Site 24231.

Feature 2 (platform)

Feature 2 is a basalt cobble platform built off the east side of Feature 1 (enclosure) and adjoining the large wall segment (Feature 3) to the north (see Figure 8). The platform has a roughly level surface and is only one to two courses high at its southern end (Figure 19). It is constructed of small to medium *pahoehoe* cobbles that average 15 to 20 centimeters in diameter. The northeastern end of the platform is somewhat deflated with some cobbles migrating downslope. The feature is rectangular and measures 5 x 2.5 meters. No artifacts were observed on the surface of the Feature 2. Two test units were excavated at Feature 2; one against its southern end and one within the platform proper. The results of these excavations are presented below.

Test Unit 3

Test Unit 3 was placed outside the platform, adjacent to its southeastern end (see Figure 8). The unit was 1 x 1 meter and all excavated material was passed through ¼ inch mesh. Excavation extended only 5 to 8 centimeters below the surface before bedrock was encountered (Figure 20). Two layers were observed within this deposit (Figure 21). Layer I, extending from 0 to 2 centimeters below surface, consisted of organic matter and roots. Layer II, extending from 2 centimeters to bedrock, consisted of very dark brown (10YR 2/2) silt loam with some sand and pebbles. No cultural material was recovered from Test Unit 3.

Figure 19. Site 24231 platform shown in center with wall behind it and enclosure to left, view to northwest.

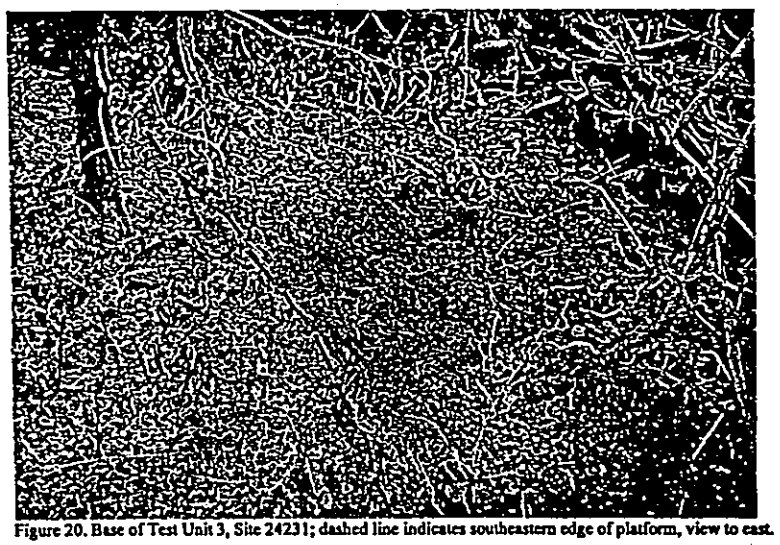

Figure 20. Base of Test Unit 3, Site 24231; dashed line indicates southeastern edge of platform, view to east.

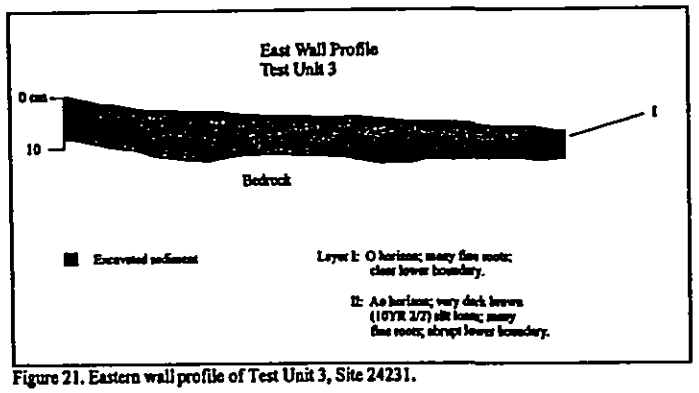

Figure 21. Eastern wall profile of Test Unit 3, Site 24231.

Test Unit 4

Test Unit 4 was a 1 x 1 meter unit placed centrally within the platform (see Figure 8). Due to the density and size of the cobble fill, excavation in arbitrary levels proved difficult. After some trial digging, it was determined that 20 centimeters levels were the smallest practicable increment. All interstitial sediment was passed through ¼ inch mesh.

Three stratigraphic layers were recorded (Figures 22 and 23). Layer I, extending from the surface to 5 centimeters depth, consisted of black (10YR 2/1) silty loam with a high organic fraction and many fine roots. This sediment layer was present between the constituent cobbles of the platform surface. Layer II consisted entirely of small to medium basalt cobbles with negligible amounts of interstitial sediment. This layer extended from 5 centimeters to 42 centimeters below surface. Finally, Layer III extended from 42 centimeters to 47 centimeters below surface and terminated at bedrock (Figure 24). Layer III consisted of black (10YR2/1) silty loam with fine roots and a few charcoal bits. This layer may have been the original ground surface prior to platform construction. No cultural material was recovered from Test Unit 4.

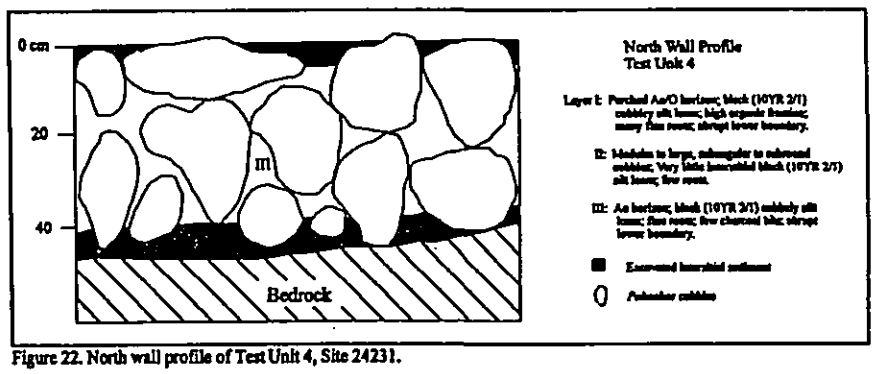

Figure 22. North wall profile of Test Unit 4, Site 24231.

Figure 23. North wall profile of Test Unit 4, Site 24231 with wall segment in background, view to northwest.

Figure 24. Bedrock exposed at base of Test Unit 4, Site 24231 view of east wall.

Feature 3 (wall)

Feature 3 is a fairly massive wall connected to the eastern side of the enclosure (Feature 1) and adjoining the northern side of the platform (Feature 2) (Figure 25). The base of the wall is constructed of small basalt boulders while the middle and upper portions are small, medium, and large cobbles. The wall is 4.5 meters long and 1 meter wide. Its height varies dramatically depending on which side and end is measured. In the northeast, the wall extends to the base of the outcrop and stands 1.3 meters high (Figure 26). On its southern side, it stands on average 45 centimeters tall before reaching the top of the platform (Figure 27).

Although described here as a discrete subfeature, it is important to note that it is integral with the platform and, perhaps to a lesser degree, with the enclosure.

Figure 25. Site 24231 wall segment background, platform in foreground, and enclosure wall to left, view to northwest.

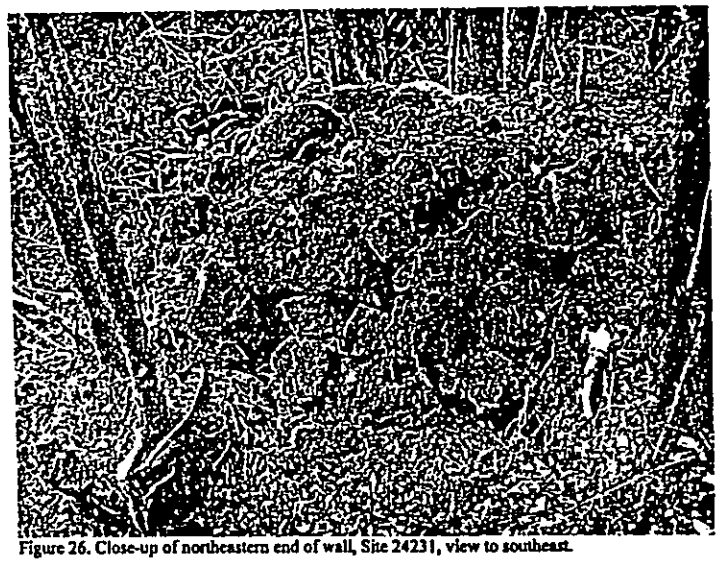

Figure 26. Close-up of northeastern end of wall, Site 24231, view to southeast.

Figure 27. Southern wall face, Site 24231, view to northeast.

Test Unit 5

In addition to the four test units located in the architectural elements of the site, a fifth (Test Unit 5) was dug on a conspicuously flat portion of the outcrop itself. This area was of interest because of its proximity to the main features, its similar elevation, and its connection to a moderately sloped earthen ramp leading down to the low areas northeast of the outcrop. This small plateau has a commanding view of areas to the east and would be a good area for performing work. If Site 24231 is habitation related, one might expect to find associated deposits on just such a well-situated landform.

Test Unit 5 was a shallow 1 x 1 meter excavation located approximately 1.5 meters northwest of the large wall segment and 3 meters northeast of the enclosure (see Figure 8). The excavation extended to a depth of 10 centimeters before bedrock was reached (Figures 28 and 29). Two stratigraphic layers were recorded (Figure 30). Uppermost was a 2 to 5 centimeters thick layer of roots, decaying organic matter, and about 40 % very dark brown (10YR 2/2) silt loam (Layer I). Underlying this was an additional 5 centimeters of very dark brown (10YR 2/2) silt loam with small, fractured, glassy basalt throughout (Layer II). The glassy basalt was identical to that found in Test Units 1 and 2 within the enclosure. Also like Test Units 1 and 2, the exposed bedrock surface was glassy basalt.

Layer II contained three large water-worn pebbles. These vesicular basalt pebbles are all of similar size (5.5 x 3.5 centimeters, 5.5 x 5.0 centimeters, and 6.5 x 5.0 centimeters). Although they show no evidence of use-wear, it is almost certain that these stones were transported to the site from coastal areas to the southeast. They are about half the size of the small cobbles found in Test Units 1 and 2.

Figure 28. Excavation in progress at Test Unit 5, Site 24231, view to northeast.

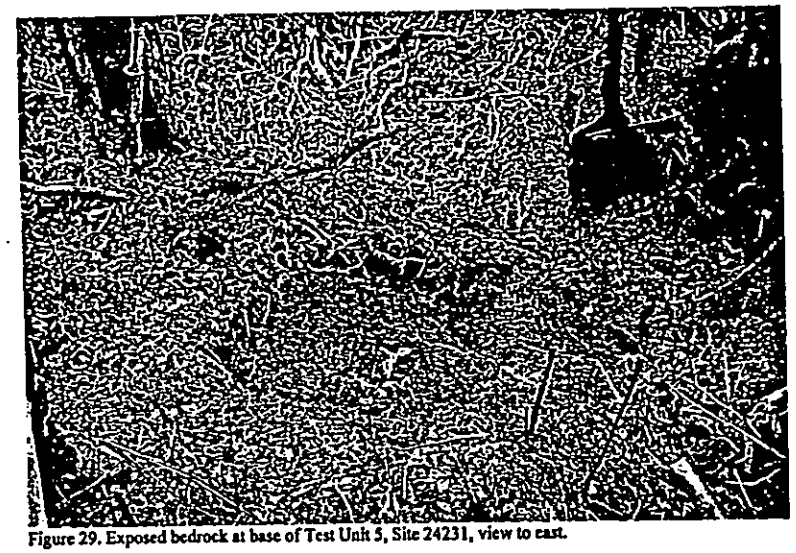

Figure 29. Exposed bedrock at base of Test Unit 5, Site 24231, view to east.

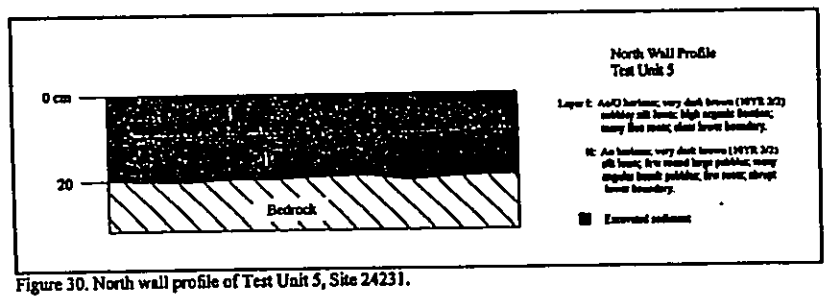

Figure 30. North wall profile of Test Unit 5, Site 24231.

Discussion

The construction methods and overall design of Site 24231 clearly indicate a traditional Hawaiian cultural affiliation. Functionally, however, the site is somewhat ambiguous. Of the possible site function known for this complex of formal feature types, both residential and ceremonial could fit the location and design of the site. However, test excavation produced no evidence of habitation. The subsurface feature within the mound in the center of the enclosure suggests a possible ceremonial function.

SIHP Site 24232

Site 24232 is a small stone-retained terrace located near the top of an outcrop in the northern portion of the project area (see Figure 7). The terrace surface measures 1 x 0.6 meters and is composed of cobbles covered with organic debris (Figures 31, 32, and 33). The terrace riser stands 50 centimeters high and is 1.3 meters long. In terms of construction, it is five cobbles wide and two to three courses high. The riser is oriented on a 170-350° bearing.

A single 0.5 x 0.5 m test unit (Test Unit 6) was excavated into the terrace surface (see Figure 32). The test unit was set back 10 centimeters from the riser so as to prevent its collapse. The excavation proceeded through a single layer of basalt cobbles that extended to 35 centimeters below surface(Figure 34. Interstitial soil and roots were present throughout. The unit was terminated when bedrock was encountered (Figure 35). Across much of the unit, bedrock was hit by 20 centimeters with only the center extending to 35 centimeters.

Test Unit 6 produced one item, a rusted metal ring. This was encountered at 5 centimeters below surface in the northeast corner. No traditional Hawaiian artifacts or subsurface features were observed.

This single feature site remains functionally ambiguous. Neither its structural components nor the results of test excavation definitively shed light on its function or its antiquity. The discovery of the metal ring of recent origin goes however indicate the possibility that the alignment of rocks maybe of modern origin. It remains a possibility that the feature is simply a natural collection of cobbles perched on the outcrop slope.

Figure 31. Profile view of Site 24232, view to north.

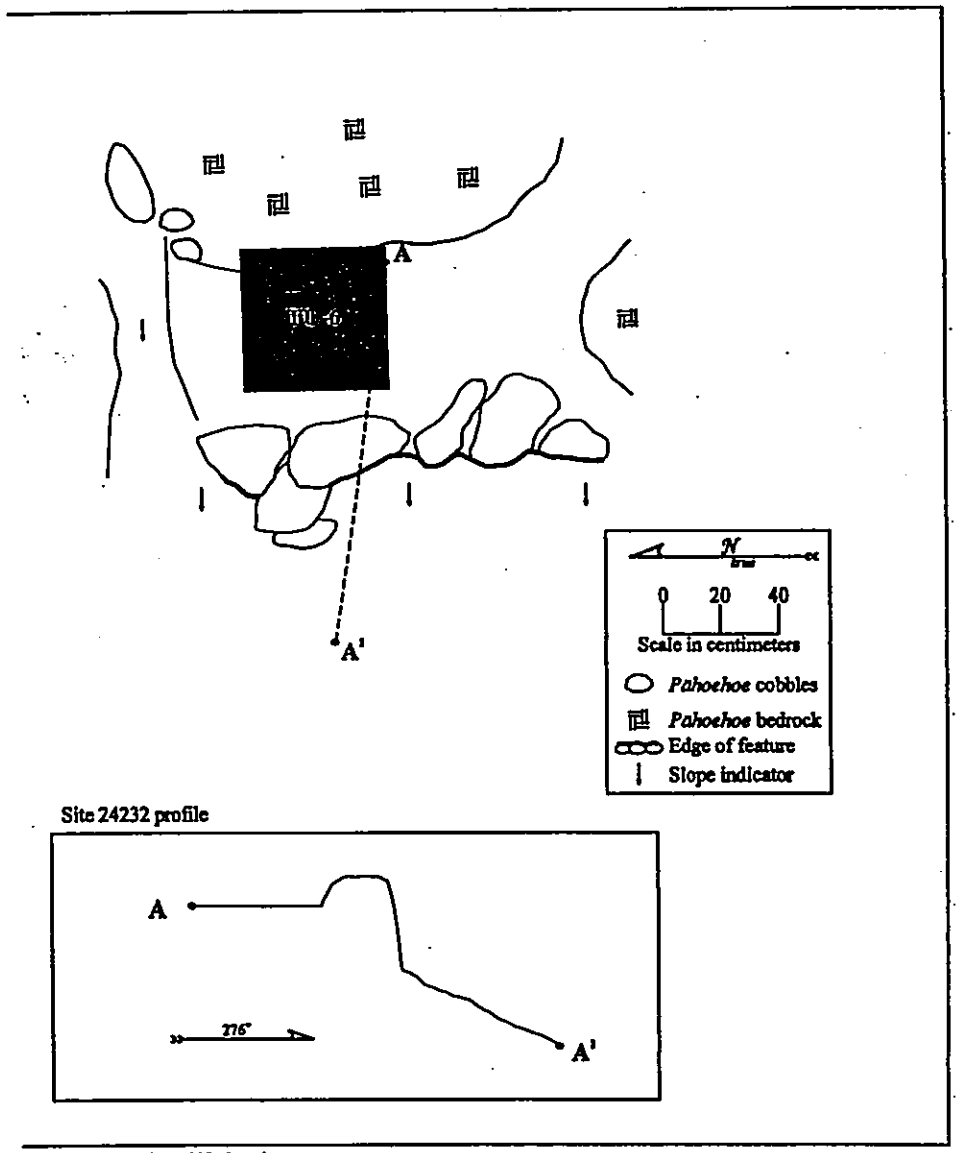

Figure 32. SIHP Site 24232 plan view.

Figure 33. Site 24232 terrace surface, view to south.

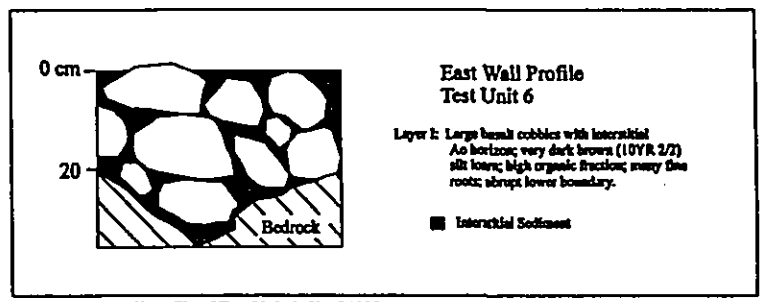

Figure 34. East wall profile of Test Unit 6, Site 24232.

Figure 35. Test Unit 6 base of excavation, Site 24232.

Summary

Two archaeological sites were recorded on the current study parcel. One is an enclosure complex (Site 24231) and the other is a small retained terrace (Site 24232) of ambiguous antiquity and function. Site 24231 is a complex of connected features including a large enclosure, a constructed mound, a wall, and a platform. The site is located on the eastern side of a moderately high basalt outcrop in the northern portion of the project area. The site complex measures approximately 10 x 10 meters. Five test units were excavated at Site 24231. The construction methods and overall design of Site 24231 clearly indicate a traditional Hawaiian cultural affiliation. Functionally, however, the site is somewhat ambiguous. Of the possible functional types known for traditional Hawaiian features, both residential and ceremonial seem to fit the location and design of Site 24231. However, test excavation within the enclosure produced no evidence of habitation. A constructed subsurface feature within a mound in the center of the enclosure suggests a possible ceremonial function. Several waterworn basal cobbles were also present at the site.

Site 24232 is a small stone-retained terrace located near the top of an outcrop in the northern portion of the project area. The terrace surface measures 1 x 0.6 meters and is composed of cobbles covered with organic debris. The terrace riser stands 50 centimeters high and is 1.3 meters long. In terms of construction, it is five rocks wide and two to three courses high. A 1 x 1 meter test unit was excavated at this site. This feature remains temporally and functionally ambiguous. It is a strong possibility that the feature of modern origin, or possibly a natural collection of cobbles perched on the outcrop slope.

SIGNIFICANCE EVALUATION AND DETERMINATION OF EFFECTS

The two sites recorded during the current study are assessed for their significance based on the National Register Criteria. This significance evaluation should be considered as preliminary until the Hawai'i State Historic Preservation Officer (SHPO) provides concurrence. As contained in the Federal legislation and its implementing regulation (Section 106 of the National Historic Preservation Act and 36 CFR Part 800, respectively), a resource must be considered a Historic Property, that is a resource "listed or eligible for listing in the National Register of Historic Places" before a determination of effects can be made. By definition if a resource is not eligible for listing in the National Register then there are no effects. The criteria for evaluating eligibility are as follows:

> The quality of significance in American History, architecture, archaeology, engineering, and culture is present in districts, sites buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and,
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period, or method of construction; or that represent the work of a master; or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or;
>
> (d) that have yielded, or may be likely to yield, information important in prehistory or history [36 CFR § 60.4).

Site 24231 is a complex of connected surface features including a large enclosure, a constructed mound, a wall, and a platform. This site occupies a surface area of roughly 100 square meters. The surface features were recorded in detail, and five subsurface test units were excavated. Excavation revealed intact stratigraphic layers and the presence of subsurface features. Based on the formal characteristics of the site's features and the results of the subsurface testing, this site is interpreted to have been a location of Native Hawaiian ceremonial activity. As such this site is significant under Criterion d and considered eligible for listing in the National Register of Historic Places.

The proposed Department of Hawaiian Home Lands (DHHL) residential subdivision has the potential to affect this site. However, given the low-density nature of the proposed development, this site can be preserved within a sufficiently large buffer zone so as to render a no adverse effects determination. The specific conditions of preservation assuring the no adverse effects determination will be contained in an agreement document (see Attachment A for a sample Memorandum of Agreement [MOA]).

Site 24232, a small stone-retained terrace, was recorded in detail and subject to subsurface testing. Archaeologically, there was nothing observed, recorded, of recovered that facilitated a definitively temporal or functional interpretation. In fact, it is quite possible that this alignment of stones and the small terrace created behind the stones is either of modern origin or simply a natural feature. In either case, this site is evaluated is not eligible for listing in the National Register of Historic Places and therefore not considered a Historic Property. By definition the proposed project will have no effect on this site (see sample MOA in Attachment A).

Given the unsurveyable nature of the bulk of the study area because of impenetrable vegetation, archaeological monitoring is recommended during initial grubbing to insure an appropriate and timely response to any unanticipated discoveries (see sample MOA in Attachment A for the specifics of the recommended monitoring).

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ATTACHMENT A

SAMPLE MEMORANDUM OF AGREEMENT (MOA)

MEMORANDUM OF AGREEMENT (MOA)
BETWEEN THE U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)
AND THE HAWAI'I STATE HISTORIC PRESERVATION OFFICER (SHPO)
PURSUANT TO 36 CFR § 800.6(b)(1)
REGARDING THE DEPARTMENT OF HAWAIIAN HOMELANDS (DHHL) MAKU'U
RESIDENTIAL SUBDIVISION PHASE I

For the purposes of this MOA, HUD is the responsible Federal agency and has provided financial assistance to DHHL for the development of the Maku'u Residential Subdivision Phase I. Signing parties to this MOA are HUD and SHPO, plus DHHL as a concurring party.

WHEREAS HUD proposes to assist DHHL in the development of the Maku'u Residential Subdivision Phase I; and

WHEREAS HUD has established the Maku'u Residential Subdivision Phase I's Area of Potential Effects (APE), as defined in 36 CFR § 800.16(d), to be a 245.55 acre portion of TMK:3-1-5-08:03 in Maku'u/Pōpōkī/Hālona *ahupua'a*, Puna District, Island of Hawai'i; and

WHEREAS HUD has determined that the Maku'u Residential Subdivision Phase I may have effects on SIHP Site 24231 as recorded during an archaeological study entitled *Archaeological Survey of the DHHL Maku'u Residential Subdivision*. Said archaeological study was submitted to the SHPO for review; and

WHEREAS HUD, pursuant to 36 CFR § 800.4(c), has determined that SIHP Site 24231 is eligible for inclusion in the National Register of Historic Places; and

WHEREAS a significant portion of the Department of Hawaiian Homelands Maku'u Residential Subdivision Phase I APE was deemed unsurveyable because of impenetrable vegetation cover, and the potential, albeit limited, exists for undiscovered historic properties; and

WHEREAS HUD has consulted with the SHPO in accordance with Section 106 of the National Historic Preservation Act (16 U.S.C. § 470), and its implementing regulations (36 CFR 800) to resolve the possible adverse effects of the Maku'u Residential Subdivision Phase I on historic properties; and

WHEREAS HUD and the SHPO have also invited the DHHL to participate in the consultation and to concur in this MOA; and

WHEREAS the Hawai'i State Office of Hawaiian Affairs has been invited to consult, but not concur in this MOA; and has provided valuable input on the *Archaeological Survey of the DHHL Maku'u Residential Subdivision* that has been taken into consideration in preparing the final version of said archaeological study;

NOW THEREFORE, HUD and the SHPO agree that upon HUD's decision to proceed with the Department of Hawaiian Homelands Maku'u Residential Subdivision Phase I, HUD shall ensure that the following stipulations are implemented in order to take into account the effects of the Department ofHawaiian Homelands Maku'u Residential Subdivision Phase I on historic properties. Adherence to the following stipulation shall result in a determination that the Department of Hawaiian Homelands Maku'u Residential Subdivision Phase I will have no adverse effect on historic properties.

Stipulations

HUD shall ensure that the following stipulations are implemented:

HUD and DHHL shall ensure that a plan to preserve SIHP Site 24231 in place is developed in consultation with the SHPO and other interested parties and submitted to the SHPO for review. Unless the SHPO objects within 30 days after receipt of the plan, HUD and DHHL shall ensure that the plan is implemented.

Until such time that HUD implements the in place preservation plan for SIHP Site 24231, HUDshall ensure that SIHP Site 24231 is immediately secured and protected against damage. To achieve such security and protection, HUD shall erect a protective barrier (construction fencing) around SIHP Site 24231 at a distance of ten meters from the edge of the site's surface features. This barrier will remain in place until a permanent preservation plan is approved an implemented.

HUD shall ensure that a monitoring plan is prepared and submitted to the SHPO prior to issuance of a county grubbing/grading permit; and that as specified in the plan, an archaeological monitor be present during initial grubbing of the APE defined for the Department of Hawaiian Homelands Maku'u Residential Subdivision Phase I. HUD shall ensure that the archaeological monitoring work is carried out by or under the direct supervision of a person or persons meeting at a minimum the Secretary of the Interior's Professional Qualifications Standards for Archaeology (48 FR 44738), and possesses a valid Permit to Conduct Archaeological Activities in the State of Hawai'I. HUD shall also ensure that a report of the archaeological monitoring be provided to the SHPO within 180 days following the completion of the monitoring.

EXECUTION of this MOA by HUD and SHPO, concurrence by DHHL, and implementation of its terms evidence that HUD has taken into account the effects of the Department of Hawaiian Homelands Maku'u Residential Subdivision Phase I on historic properties.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

By: _____ Date: _____

HAWAI'I STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: _____

CONCUR:

STATE OF HAWAI'I DEPARTMENT OF HAWAIIAN HOMELANDS
By: _____ Date: _____

APPENDIX H

CULTURAL IMPACT ASSESSMENT

RC-0246

Cultural Impact Assessment Associated with the Proposed Development of a Department of Hawaiian Home Lands (DHHL) Residential Subdivision

(TMK: 3-1-5-08:03)

Maku'u/Pōpōkī/Hālona Ahupua'a
Puna District
Island of Hawai'i

PREPARED BY:

Robert B. Rechtman, Ph.D.

PREPARED FOR:

Environet, Inc.
2850 Pa'a Street, Suite 212
Honolulu, Hawai'i 96819

January 2005

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phone: (808) 966-[illegible] fax: (808) 443-0065
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ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

RC-0246

Cultural Impact Assessment Associated with the Proposed Development of a Department of Hawaiian Home Lands (DHHL) Residential Subdivision
(TMK: 3-1-5-08:03)

Maku'u/Pōpōkī/Hālona Ahupua'a
Puna District
Island of Hawai'i

RECHTMAN CONSULTING

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INTRODUCTION

At the request of Environet, Inc., on behalf of their client the Department of Hawaiian Home Lands (DHHL), Rechtman Consulting, LLC prepared a Cultural Impact Assessment (CIA) associated with the proposed development of a DHHL residential subdivision on 245.55 acres in TMK:3-1-5-08:03 within Maku'u/Pōpōkī/Hīlona Ahupua'a, Puna District, Hawai'i Island (Figure 1). There have been several cultural and archaeological studies conducted for the current project and associated projects (Conte and Kolb 1994; Desilets and Rechtman 2004; Kasberg and Rechtman 2004; Rechtman 2003); and there has been a significant amount of work conducted in the general vicinity of the current project area (Barrera 1990; Bordner 1977; Chaffee and Spear 1993; Charvet-Pond and Rosendahl 1993; Ewart and Luscomb 1974; Franklin et al. 1992; Komori and Peterson 1987; McEldowney and Stone 1991; Smith 1991; Yent 1983). Aside from an extensive lava tube systems containing cultural material and burials documented in two of these studies (McEldowney and Stone 1991; Yent 1983), only four other sites were recorded in a over 2,000 acres of total survey area (Bordner 1977; Conte and Kolb 1994; Desilets and Rechtman 2004; Franklin et al. 1992). Two of these sites (SIHP Site 24231 and SIHP Site 24232) are located within the current study area. This lack of archaeological features is understandable considering that most of the area is on a relatively young lava flow. It is however, interesting to speculate about the potential cultural significance of the flow itself. This part of Puna was no doubt inhabited when the flow occurred sometime during the sixteenth or seventeenth century. Based on specific ethnographic analogy (with historic lava flows in Kona and Ka'ū) it is likely that this flow was a storied event with cosmologic and mythical associations. There is no specific legend, however, that has survived to the present.

This report is intended to accompany an Environmental Assessment (EA) compliant with Chapter 343 HRS, as well as fulfilling the requirements of the County of Hawai'i Planning Department and the Department of Land and Natural Resources (DLNR) with respect to permit approvals for land-altering and development activities. This study has been prepared pursuant to Act 50, approved by the Governor on April 26, 2000; and in accordance with the Office of Environmental Quality Control (OEQC) *Guidelines for Assessing Cultural Impact*, adopted by the Environmental Council, State of Hawai'i, on November 19, 1997.

Below is a description of the general project area and the proposed development activities. This is followed by a background section providing setting and context (cultural, historical, and regional) to facilitate a more complete understanding of the potential significance of the cultural landscape and the historic and cultural properties within that landscape. Next, the consultation process is described, which is followed by a discussion of potential cultural impacts and the appropriate actions and strategies that mitigate any potential impacts.

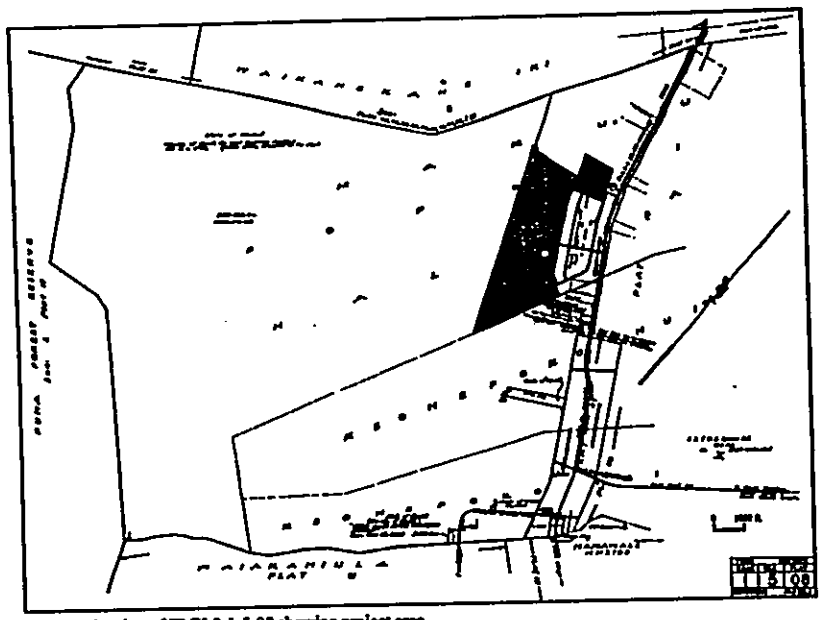


Figure 1. Portion of TMK:3-1-5-08 showing project area.

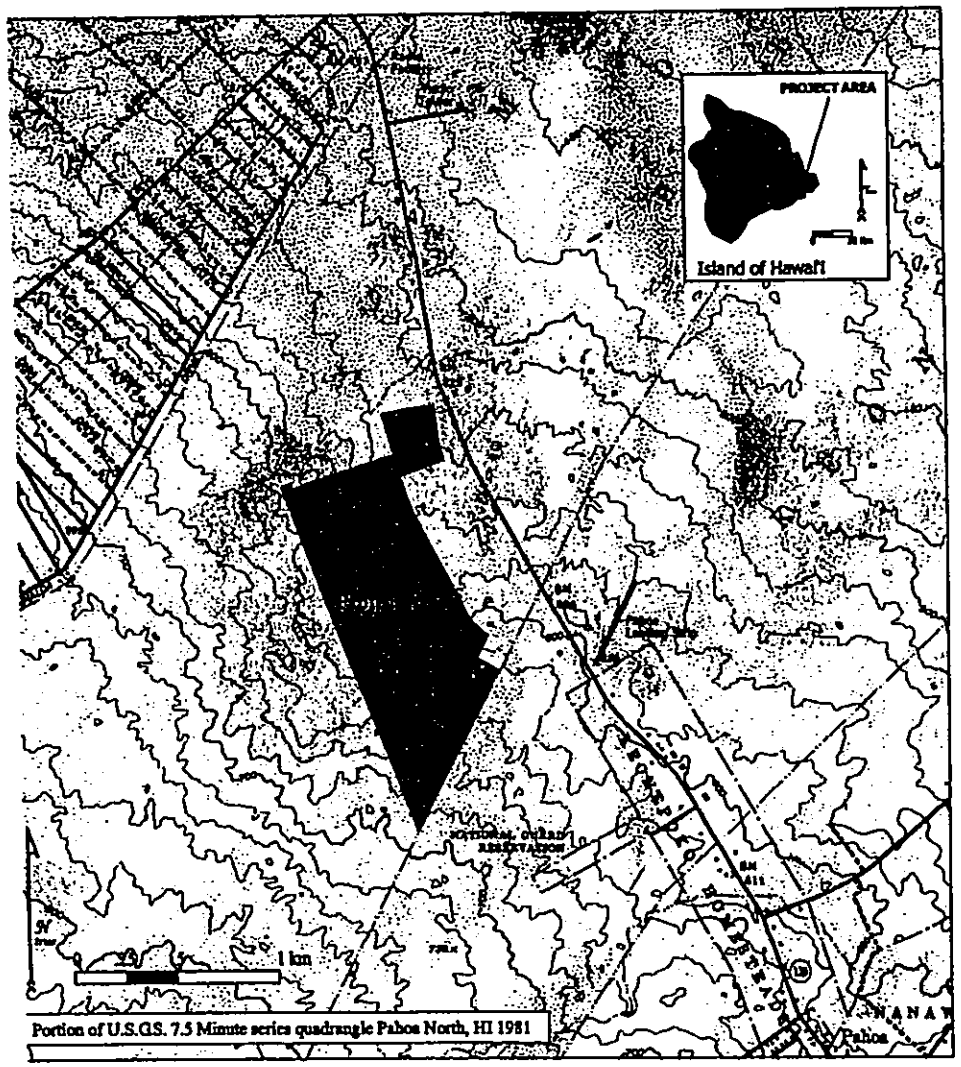
PROJECT AREA DESCRIPTION AND PROPOSED DEVELOPMENT ACTIVITIES

The current project area is located *mauka* of Highway 130 roughly 1.5 mile south of the 'Āinaloa Subdivision and 2 miles north of Pāhoa Town ranging in elevation from 540 to 720 feet above sea level (Figure 2). The area consists of 245.55 acre encompassing the southwestern portion of TMK:3-1-5-08:03. Terrain is very rocky with exposed *Pāhoehoe* common in unvegetated areas. The landscape slopes gently to the northeast and contains numerous small sinkholes. Soil in the study area is primarily classified as a histosol; a thin soil that develops on geologically young, yet forested lava. Starting around 1,000 ft elevation (just above the study area) there are also limited pockets of more developed soils of the Kekake-Keei-Kiloa series and Halpoe-Malie-Puu Oo series (Sato et al. 1973), these are thin rocky soils that overlay an 'Aila'au flow dated between 450-260 years B.P. (Holcomb 1987). Flows in the current study area are dated between 750-200 B.P. (Wolfe and Morris 1996). Vegetation in the project area is extremely dense in most places. The only notable exceptions are a large region in the southern portion of the parcel and the northern corner block of the parcel. The vegetation regime (Figure 3) is classified as Lowland Wet 'Ōhi'a/Uluhe Fern Forest (Gagne and Cuddihy 1990). *'Ōhi'a* (*Metrosideros polymorpha*) are abundant but generally small and sparsely distributed among patches of *uluhe* (*Dicranopteris linearis*) and broomsedge (*Andropogon virginicus*). *Melastoma candidum* is also prevalent within the study area. Also present, but not as common, are *ti* (*Cordyline fruticosa*), pandanus (*Pandanus tectorius*), and *kōpiko* (pronounced '*ōpiko* on Hawai'i Island) (*Psychotria* sp.). Table 1 lists plant species identified during a recent floral survey of a waterline corridor in the southern part of the study area (Terry 2003).

Table 1. List of identified plant species (from Terry 2003).

Scientific Name	Common/Hawaiian Name	Status
Andropogon virginicus	Broomsedge	Alien
Arundina graminifolia	Bamboo orchid	Alien
Bothriochloa pertusa	Pitted beard grass	Alien
Cibotium glaucum	Tree fern/*hāpu'u*	Endemic
Cladium jamaicense	Sawgrass	Indigenous
Desmodium incanum	Spanish clover	Alien
Dicranopteris linearis	False staghorn fern/*uluhe*	Indigenous
Fimbristylis dichotoma	Fimbristylis	Indigenous
Lycopodiella cernua	Club moss/*limu 'aho 'ula*	Indigenous
Machaerina mariscoides	Sedge/*'uki*	Indigenous
Melaleuca quinquenervia	Paperbark	Alien
Melastoma candidum	Melastoma	Alien
Metrosideros polymorpha	*'Ōhi'a lehua*	Endemic
Mimosa pudica	Sensitive plant	Alien
Nephrolepis cordifolia	Sword fern/*hapuukapu*	Endemic
Paraserianthes falcataria	Albizia	Alien
Pluchea symphytifolia	Sourbush	Alien
Psidium cattleianum	Strawberry guava	Alien
Pteris cretica	Cretan brake	Indigenous
Santalum paniculatum	Sandalwood/*'iliahi*	Endemic
Scaevola chamissoniana	*naupaka kuahiwi*	Endemic
Spathoglottis plicata	Philippine ground orchid	Alien
Sphenomeris chinensis	Lace fern/*palaʻā*	Indigenous
Stachytarpheta sp.	Vervain	Alien
Waltheria indica	*'ahualoa*	Indigenous
Xyris complanata	Yellow-eyed grass	Alien

The proposed DHHL development plans call for the creation of a total of 375 lots—361 lots ranging between 20,000 and 39,700 square feet, thirteen lots between 1.0 and 3.42 acres, and one 12.7 acre park site; along with associated roadways and infrastructure (Figure 4). This proposed subdivision would be an extension of the existing Maku'u Agricultural Lots, Unit 1.



igure 2. Project area location.

Figure 3. Aerial photograph showing the environment of the general project area.

BACKGROUND STUDIES

This section of the report describes and synthesizes prior archaeological, cultural, and historical studies (Table 2) that are relevant to the current project area; and provides a brief culture-historical background. McEldowney (1979) authored an archaeological and historical literature review and research design for the South Hilo and Puna areas, which can be used as a general predictive model for archaeological site distributions within the current study area. This model is based on ethnohistorical and early historical observations and descriptions of the region; and has been supported by several subsequent archaeological studies, some of which (Figure 5) have taken place in the same, or adjacent, *ahupua'a* as the current study area (Barrera 1990; Bordner 1977; Chaffee and Spear 1993; Charvet-Pond and Rosendahl 1993; Conte and Kolb 1994; Desilets and Rechtman 2004; Ewart and Luscomb 1974; Franklin et al. 1992; Komori and Peterson 1987; McEldowney and Stone 1991; Smith 1991; Yent 1983).

Table 2. Prior relevant archaeological, historical, and cultural studies.

Author/Date	*Type of Study*	*Ahupua'a*
Barrera 1990	Archaeological Survey	Maku'u
Barrère 1959	Archival and Historical Literature Review	Various
Bordner 1977	Archaeological Survey	Maku'u
Chaffee and Spear 1993	Archaeological Survey	Maku'u
Charvet-Pond and Rosendahl 1993	Archaeological Survey	Maku'u, Hīlona, Pōpōkī
Conte and Kolb 1994	Archaeological Survey	Maku'u, Hīlona, Pōpōkī
Desilets and Rechtman 2004	Archaeological Survey	Maku'u, Hīlona, Pōpōkī
Ewart and Luscomb 1974	Archaeological Survey	Various
Franklin et al. 1992	Archaeological Survey	Waikahkahe
Komori and Peterson 1987	Archaeological Survey	Various
Maly 1999	Archival and Oral-Historical Study	Various
McEldowney 1979	Literature Review and Research Design	Various
McEldowney and Stone 1991	Archaeological/Environmental Survey	Various
Smith 1991	Field Inspection	Hīlona, Pōpōkī
Yent 1983	Archaeological Survey	Maku'u
Rechtman 2003	Archaeological and Cultural Assessment	Maku'u, Hīlona

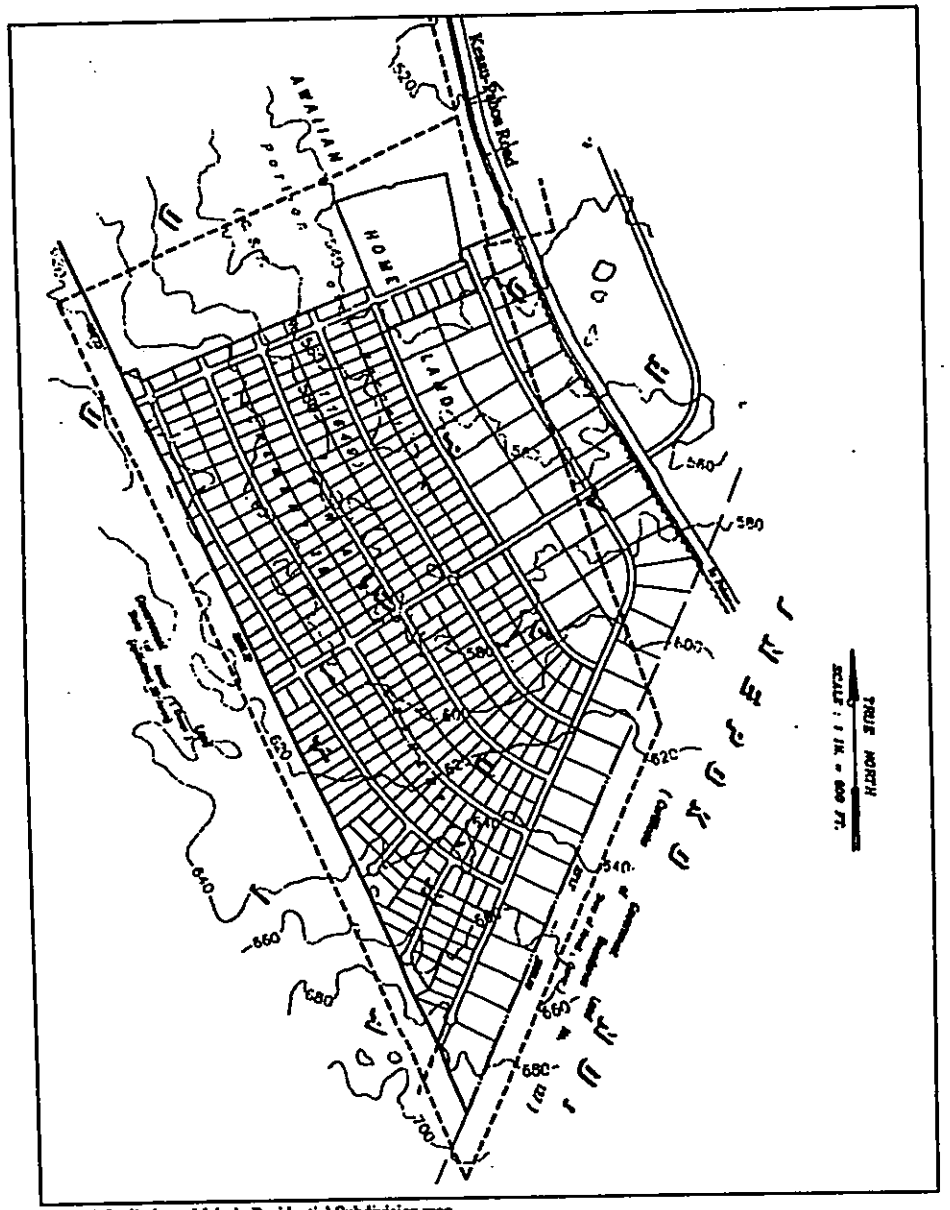


Figure 4. Preliminary Maku'u Residential Subdivision map.

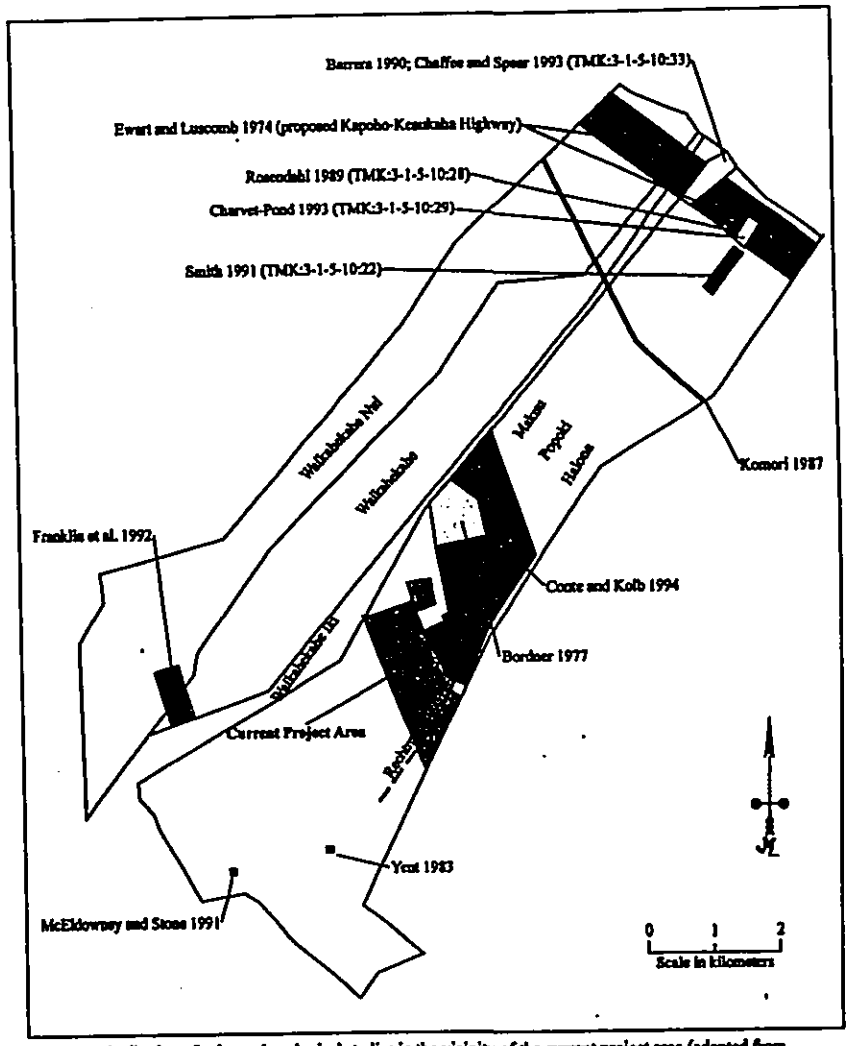


Figure 5. Distribution of prior archaeological studies in the vicinity of the current project area (adapted from Coote and Kolb 1994).

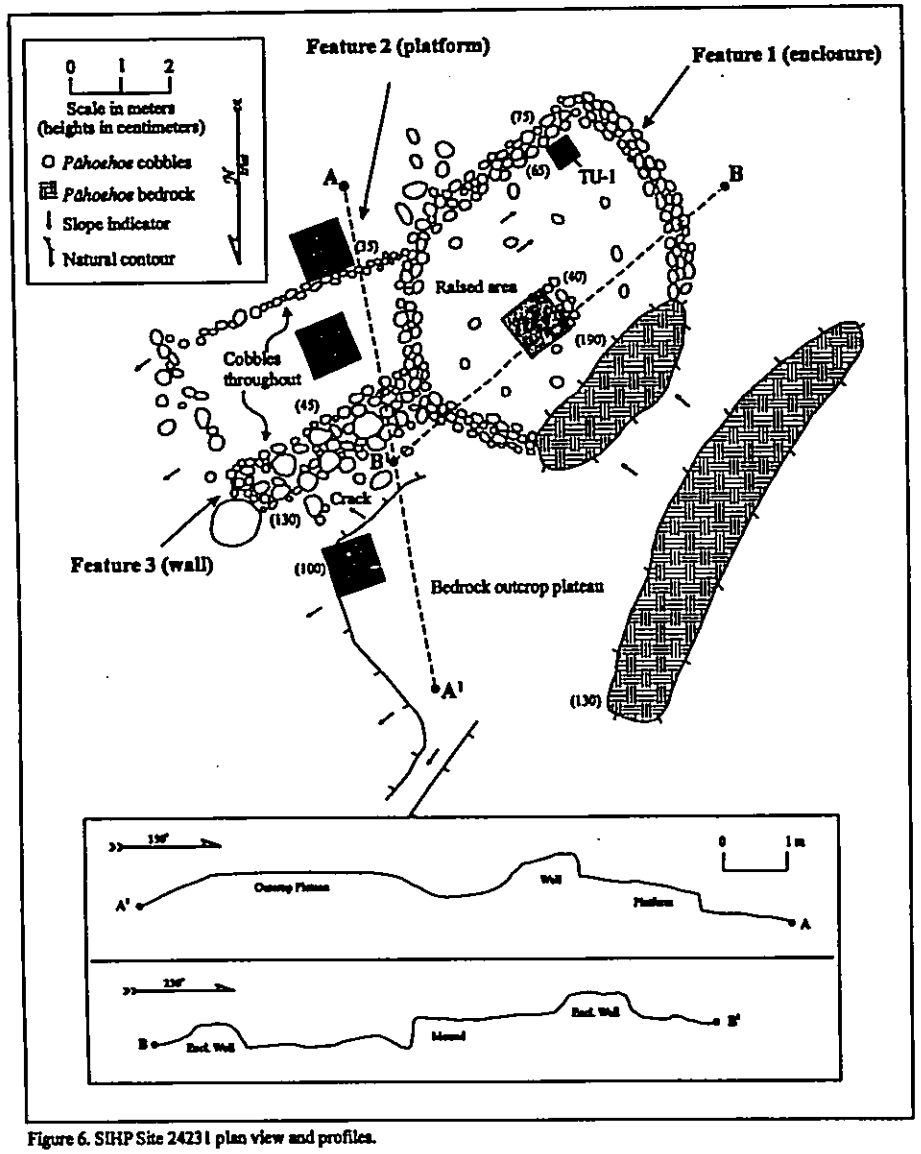


Figure 6. SIHP Site 24231 plan view and profiles.

As a results of the archaeological inventory survey (Desilets and Rechtman 2004) of the current study area two sites were recorded. Site 24232, a small stone-retained terrace, was recorded in detail and subject to subsurface testing. Archaeologically, there was nothing observed, recorded, or recovered that facilitated a definitively temporal or functional interpretation. In fact, it is quite possible that this alignment of stones and the small terrace created behind the stones is either of modern origin or simply a natural feature. In either case, this site was evaluated as not significant. Site 24231 is a complex of connected surface features including a large enclosure, a constructed mound, a wall, and a platform (Figures 6 and 7). This site occupies a surface area of roughly 100 square meters. The surface features were recorded in detail, and five subsurface test units were excavated. Excavation revealed intact stratigraphic layers and the presence of subsurface features (Figure 8). Based on the formal characteristics of the site's features and the results of the subsurface testing, this site was interpreted to have been a location of Native Hawaiian ceremonial activity. As such this site is significant under multiple criteria and considered eligible for listing in the National Register of Historic Places.

Figure 7. Constructed mound in center of Site 24231 enclosure.

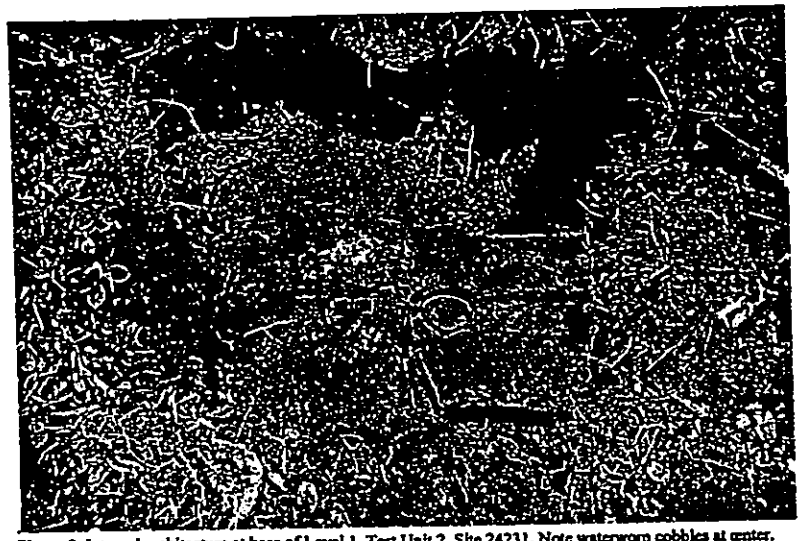


Figure 8. Internal architecture at base of Level 1, Test Unit 2, Site 24231. Note waterworn cobbles at center.

Hālona, Pōpōkī, and Maku'u *ahupua'a* are portions of the larger Puna District, one of six major districts on the island. This division of districts (and likely all of the smaller land divisions) extends back in time to at least A.D. 1475, in the time of the Chief Līloa; and were brought together under a single ruler when 'Umi a Līloa (son of Līloa) came to power in about A.D. 1525 (Maly 1999). Barrère (1959) summarizes the Precontact geopolitics of the Puna District as follows:

> Puna, as a political unit, played an insignificant part in shaping the course of history of Hawaii Island. Unlike the other districts of Hawaii, no great family arose upon whose support one or another of the chiefs seeking power had to depend for his success. Puna lands were desirable, and were eagerly sought, but their control did not rest upon conquering Puna itself, but rather upon control of the adjacent districts, Kau and Hilo. (Barrère 1959:15)

The Puna District generally remained under the control of outside chiefs until the time of Kalani'ōpu'u's reign. Shortly before his death in A.D. 1782, Kalani'ōpu'u's dominion over Puna and portion of Ka'ū was challenged by the Puna chief 'Īmakakōloa. Kalani'ōpu'u resolved the unrest, but following his death the disposition of Puna once again became an issue until Kamehameha I successfully brought the entire island under his control in A.D 1793.

Following the death of Kamehameha I in 1819, the Hawaiian religious and political systems began a radical transformation; Ka'ahumanu proclaimed herself "*Kuhina nui*" (Prime Minister), and within six months the ancient *kapu* system was overthrown. Within a year, Protestant missionaries arrived from America (Fornander 1973; I'i 1959; Kamakau 1961). In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (ABCFM) toured the island of Hawai'i seeking out communities in which to establish church centers for the growing Calvinist mission. Ellis recorded observation made during this tour in a journal (Ellis 1963). His writings contain descriptions of residences and practices that are applicable to the general study area:

> As we approached the sea, the soil became more generally spread over the surface, and vegetation more luxuriant. About two p.m. we sat down to rest. The natives ran to a spot in the neighbourhood, which had formerly been a plantation, and brought a number of pieces of sugar-cane, with which we quenched our thirst, and then walked on through several plantations of sweet potato belonging to the inhabitants of the coast . . . (Ellis 1963:182-183)

> The population in this part of Puna, though somewhat numerous, did not appear to possess the means of subsistence in any great variety or abundance; and we have often been surprised to find desolate coasts more thickly inhabited than some of the fertile tracts in the interior; a circumstance we can only account for, by supposing that the facilities which the former afford for fishing, induce the natives to prefer them as places of abode; for they find that where the coast is low, the adjacent water is usually shallow.
>
> We saw several fowls and a few hogs here, but a tolerable number of dogs, and quantities of dried salt fish, principally albacores and bonitos. This latter article, with their *poë* [*poi*] and sweet potatoes, constitutes nearly the entire support of the inhabitants, not only in this vicinity, but on the sea coasts of the north and south parts of the island.
>
> Besides what is reserved for their own subsistence, they cure large quantities as an article of commerce, which they exchange for the vegetable productions of Hilo and Mamakua [Hāmākua], or the *mamaki* and other tapas of Ora ['Ōla'a] and the more fertile districts of Hawaii.
>
> When we passed through Punau [Pūnāu], Leapuki [Laeapuki], and Kamomoa [Kamoamoa], the country began to wear a more agreeable aspect. Groves of coca-nuts ornamented the projecting points of land, clumps of kou-trees appeared in various directions, and the habitations of the natives were also thickly scattered over the coast . . .
>
> ...About three p.m. we approached Kaimu. This was the birth-place of Mauae [Ellis' guide], and the residence of most of his relations . . . The old people from the houses welcomed him as he passed along, and numbers of the young men and women came out to meet him, saluted him by touching noses, and wept for joy at his arrival. Some took off his hat, and crowned him with a garland of flowers; others hung around his neck wreaths of a sweet-scented plant resembling ivey [*maile*], or necklaces composed of the nut of the fragrant pandanus oddoratissime . . . (Ellis 1963:190-191)

One year after Ellis' tour, the ABCFM established a base church in Hilo. From that church (Hālil), the missionaries traveled to the more remote areas of the Hilo and Puna Districts. David Lyman who came to Hawai'i in 1832, and Titus Coan who arrived in 1835 were two of the most influential Congregational missionaries in Puna and Hilo. As part of their duties they compiled census data for the areas within their missions. In 1835, 4,800 individuals are recorded as residing in the district of Puna (Schmitt 1973); the smallest total district Population on the island of Hawai'i. In 1841, Titus Coan recorded that most of the 4,371 recorded residents of Puna, lived near the shore, though there were hundreds of individuals who lived inland (Holmes 1985). In that same year, Commander Charles Wilkes of the United States Exploring Expedition, toured the Hawaiian Islands (Wilkes 1845). His expedition travel through lower Puna not far from the current study area:

> Almost all of the hills or craters of any note have some tradition connected with them; but I found that the natives were now generally unwilling to narrate these tales, calling them "foolishness." After leaving the *pahoihoi* [pāhoehoe] plain, we passed along the line of cone-craters towards Point Kapoho, the Southeast part of the island.
>
> Of these cone-craters we made out altogether, large and small, fifteen, trending about east-northeast. The names of the seven last are Pupukai, Pobohuaokahowele [Pu'u-hōhua-o-Kahawali], Punomakalua, Kapoho, Puukea, Puuku, and Keala. On some of these the natives

pointed out where there had formerly been slides, an amusement or game somewhat similar to the sport of boys riding down hill on sleds. These they termed *kolua* [*hōlua*].

This game does not appear to be practiced now, and I suppose that the chiefs consider themselves above such boyish amusements. The manner in which an old native described the velocity with which they passed down these slides was, by suddenly blowing a puff; according to him, these amusements were periodical, and the slides were usually filled with dried grass.

As we approached the sea-shore, the soil improved very much, and was under good cultivation, in taro, sweet-potatoes, sugar cane, and a great variety of fruit and vegetables. At about four o'clock, we arrived at the house of our guide, Kekahunamii, who was the "head man." I was amused to find that none of the natives knew him by this name, and were obliged to ask him . . .the view from the guide's house was quite pretty, the eye passing over well-cultivated fields to the ocean, whose roar could be distinctly heard. (Wilkes 1845 Vol. IV:186)

During the night, one of the heaviest rains I had experienced in the island, fell; but the morning was bright and clear—every thing seemed to be rejoicing around, particularly the singing-birds, for the variety and sweetness of whose notes Hawaii is distinguished.

Previous to our departure, all the tenantry, if so I may call them, came to pay their respects, or rather to take a look at us. We had many kind wishes, and a long line of attendants, as we wended our way among the numerous taro patches of the low grounds, towards Puna; and thence along the sea-coast where the lava entered the sea, at Nanavalie [Nānāwale]. The whole population of this section of the country was by the wayside, which gave me an opportunity of judging of their number; this is much larger than might be expected from the condition of the country, for with the exception of the point at Kapoho, very little ground that can be cultivated is to be seen. The country, however, is considered fruitful by those who are acquainted with it, notwithstanding its barren appearance on the roadsides. The inhabitants seemed to have an abundance if bread-fruit, bananas, sugar-cane, taro, and sweet-potatoes. The latter, however, are seen to be growing literally among heaps of stones and pieces of lava, with scarcely soil enough to cover them; yet they are, I am informed, the finest on the island. (Wilkes 1845 Vol. IV:188).

In 1846, Chester S. Lyman, "a sometime professor" at Yale University visited Hilo, Hawai'i, and stayed with Titus Coan (Maly 1998). Traveling the almost 100 mile long stretch of the "Diocese" of Mr. Coan, Lyman reported that the district of Puna had somewhere between 3000-4000 inhabitants (Maly 1998). Entering Puna from Hilo, and traveling to Kea'au along the coast, Lyman offered the following observations:

> ...The groves of Pandanus were very beautiful, and are the principal tree of the region. There is some grass and ferns, and many shrubs; but the soil is very scanty. Potatoes are almost the only vegetable that can be raised, and these seem to flourish will amid heaps of stone where scarcely a particle of soil could be discovered. The natives pick out the stones to the depth often of from 2 to 4 feet, and in the bottom plant the potato–how it can expand in such a place is a wonder.
>
> Nearly all Puna is like this. The people are necessarily poor – a bare subsistence is all they can obtain, and scarcely that. Probably there are not $10 in money in all Puna, and it is thought that not over one in five hundred has a single cent. The sight of some of these potatoe patches would make a discontented N.E. farmer satisfied with his lot. Yet, I have no where seen the people apparently more contented & happy. (Maly 1998:35)

In 1848, the Hawaiian system of land tenure was radically altered by the *Māhele 'Āina* (Division of Land). The *Māhele* defined the land interests of Kamehameha III (the King), the high-ranking chiefs, and the *konohiki*. As a result of the *Māhele*, all land in the Kingdom of Hawai'i came to be placed in one of three categories: (1) Crown Lands (for the occupant of the throne); (2) Government Lands; and (3) *Konohiki* Lands (Chinen 1958, 1961). As a result of the *Māhele* of A.D 1848, Maku'u, Hīlona, and Pōpōkī *ahupua'a* were retained as government land. Large coastal portions of these land units (Figure 5) were later commuted as grants (in A.D 1852 Grant 1013 to Maiau and Grant 1014 to Kea, and in A.D 1855 Grant 1537 to Kapohano); the *mauka* lands have since remained idle. By the 1890s the government was investigating ways to improve access and resources in Puna. In A.D 1892 Loebenstein was directed to survey a new inland road (roughly in the location of the current Highway 130) through the district. In a newspaper interview, he describes the area as follows:

> The arable belt of Puna is from three to six miles from the sea coast, and is consequently unexplored. It is a wonderful country and I could talk of it by the hour. It only lies in the hands of the Government to develop it. Everything depends on an appropriation being made for the road, of which the preliminary survey has been made.
>
> . . . The road begins at the edge of the Ramle camp, one mile from the edge of the woods-nine miles from Hilo. It follows the old road for a mile and a half more, and is to extend to Kaimu on a new survey . . . I met with ancient trails showing traces of a dense population and cultivation in early times. The road, if opened, will afford beautiful scenery to tourists, as there are natural wonders all along, lava trees, pit craters and lava tunnels extending for miles which formed ancient burial places. There are natural benches formed by the lava, where the dead were placed, and on these are the bones, skulls and sometime complete skeletons. These tunnels are from 25 to 30 feet wide and about the same in height, and of course pitch dark . . . From the ninth to the nineteenth mile [the current study area is at about the ninth mile] the road is over *pahoehoe*, the arable land lying about a mile and a half above . . . There is considerable sandal wood growing on the *pahoehoe*, but the ranchers are too indolent to drive cattle, so they make fires and burn off the brush, which kills the sandal wood. It is a shame. There are no wild cattle in Puna . . . (Hawaiian Gazette, March 22, 1892)

A Hawaii Territorial Survey map (Register Map 2268) dated A.D 1903 shows a *mauka/makai* trail extending inland from the shore along the Hīlona/Pōpōkī boundary (Figure 9); however, it is unclear how far inland this trail may have gone, but it is possible that it provided coastal residents access to the more fertile (soil covered) lands *mauka* (above 1000 feet elevation) of the current study area.

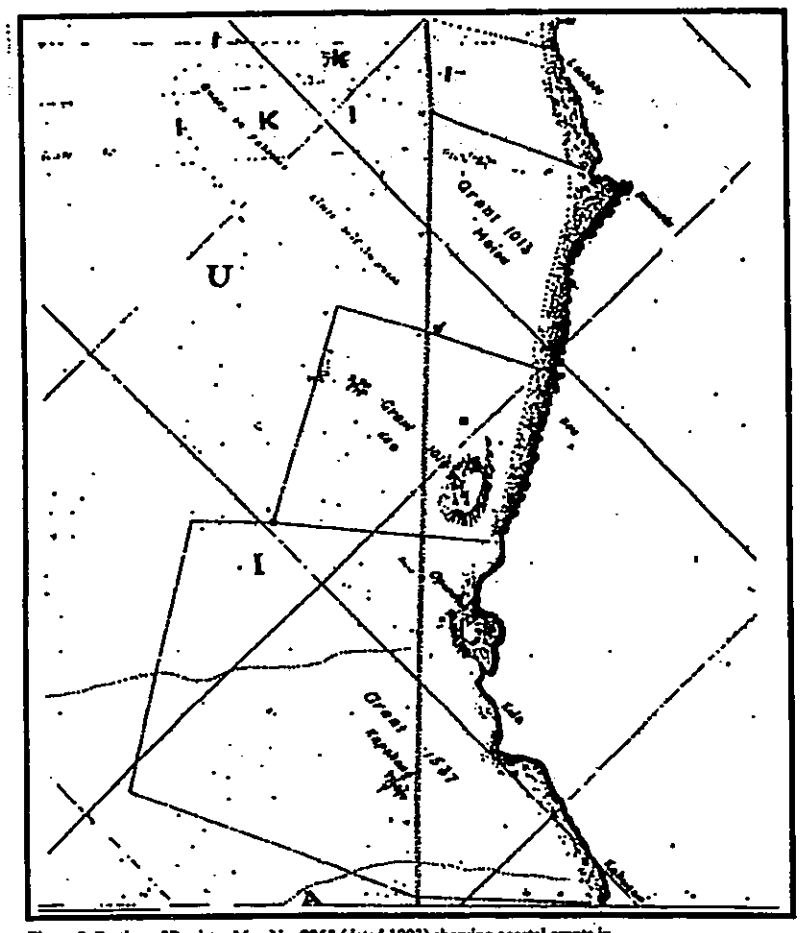


Figure 9. Portion of Register Map No. 2258 (dated 1903) showing coastal grants in Maku'u-Hīlona-Pōpōkī *ahupua'a*

Despite its perceived lack of importance with respect to the emerging political history of Hawaiian leadership, Puna was a region famed in legendary history for its associations with the goddess Pele and god Kāne (Maly 1998). Because of the relatively young geological history and persistent volcanic activity the region's association with Pele has been a strong one. However, the association with Kāne is perhaps more ancient. Kāne, ancestor to both chiefs and commoners, is the god of sunlight, fresh water, verdant growth, and forests (Pukui 1983). It is said that before Pele migrated to Hawai'i from Kahiki, there was "no place in the islands . . . more beautiful than Puna" (Pukui 1983:11). Contributing to that beauty were the groves of fragrant *hala* and forests of *'ōhi'a lehua* for which Puna was famous:

> *Puna pāla 'ala i ka hala* (Puna, with walls fragrant with pandanus blossoms)
> Puna, Hawai'i, is a place of *hala* and *lehua* forests. In olden days the people would stick the bracts of *hala* into the thatching of their houses to bring some of the fragrance indoors. (Pukui 1983:301)

The inhabitants of Puna were likewise famous for their expertise and skill in *lauhala* weaving. "To this day, Puna is known for its growth of *hala*, and the floors and furniture of some of the old households are still covered with fine woven mats and cushions. Weaving remains an important occupation of many native families of Puna" (Maly 1998:6).

CONSULTATION

The Office of Hawaiian Affairs (Ululani Sherlock), the Maku'u Farmers Association (Paula Kekahuna along with several other members), and Kepā Maly (Kumu Pono Associates) were contacted in an effort to obtain information about any potential traditional cultural properties that might be present in upper Maku'u, Hīlona, and Pōpōkī *ahupua'a*. In general, the elevationally intermediate portions of Puna possess a variety of floral and lithic resources that have documented cultural uses (Burtchard and Mobolo 1994; Holmes 1985; Maly 1992, 1999). Potentially, such resources would have associated cultural practices; these primarily being the gathering of plants for medicinal and ceremonial purposes. Although undocumented, the continuation of traditional gathering practices was asserted to occur in the general area. This assertion was part of the community response to the geothermal development in the region. However, none of the organizations/individuals contacted had any information relative to the existence of traditional cultural properties in the immediate vicinity of the current project area; nor did they provide any information indicating current use of the area for traditional and customary practices.

IDENTIFICATION AND MITIGATION OF POTENTIAL CULTURAL IMPACTS

The OEQC guidelines identify several possible types of cultural practices and beliefs that are subject to assessment. These include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The guidelines also identify the types of potential cultural resources, associated with cultural practices and beliefs that are subject to assessment. Essentially these are nature features of the landscape and historic sites, including traditional cultural properties. In the Hawai'i Revised Statutes–Chapter 6E a definition of traditional cultural property is provided.

> "Traditional cultural property" means any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in an ethnic community's history and contribute to maintaining the ethnic community's cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both.

The origin of the concept of traditional cultural property is found in National Register Bulletin 38 published by the U.S. Department of Interior-National Park Service. "Traditional" as it is used, implies a time depth of at least 50 years, and a generalized mode of transmission of information from one generation to the next, either orally or by act. "Cultural" refers to the beliefs, practices, lifeways, and social institutions of a given

community. The use of the term "Property" defines this category of resource as an identifiable place. Traditional cultural properties are not intangible, they must have some kind of boundary; and are subject to the same kind of evaluation as any other historic resource, with one very important exception. By definition, the significance of traditional cultural properties should be determined by the community that values them.

It is however with the definition of "Property" wherein there lies an inherent contradiction, and corresponding difficulty in the process of identification and evaluation, because it is precisely the concept of boundaries that runs counter to the traditional Hawaiian belief system. The sacredness of a particular landscape feature is often times cosmologically tied to the rest of the landscape as well as to other features on it. To limit a property to a specifically defined area may actually partition it from what makes it significant in the first place. However offensive the concept of boundaries may be, it is nonetheless the regulatory benchmark for defining and assessing traditional cultural properties. As the OEQC guidelines do not contain criteria for assessing the significance for traditional cultural properties, this study will adopt the state criteria for evaluating the significance of historic properties, of which traditional cultural properties are a subset. To be significant the potential historic property or traditional cultural property must possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of the followig criteria:

A Be associated with events that have made an important contribution to the broad patterns of our history;

B Be associated with the lives of persons important in our past;

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

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

E Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.

While it is the practice of the DLNR-SHPD to consider most historic properties significant under Criterion D at a minimum, it is clear that traditional cultural properties by definition would also be significant under Criterion E.

As a result of the current assessment only one significant cultural resources has been identified, the archaeological site SIHP 24231, which is evaluated as significant under Criterion D as well as Criterion E. However unlikely, other resources may be identified during land clearing activities. Given the unsurveyable nature of the bulk of the study area because of impenetrable vegetation, archaeological monitoring will occur during initial grubbing to insure an appropriate and timely response to any unanticipated discoveries. A monitoring plan is prepared and submitted to the DLNR-SHPD prior to issuance of a county grubbing/grading permit

To mitigate potential impacts to SIHP Site 24231, and any other as of yet undetermined resource, DHHL, working in conjunction with the U.S. Department of Housing and Urban Development and the Hawai'i State Historic Preservation Officer, through a Memorandum of Agreement will ensure that this site be preserved within a sufficiently large buffer zone so as to render a no adverse effects determination. And, until such time that the in place preservation plan for SIHP Site 24231 is implemented, SIHP Site 24231 will be secured and protected against damage by a protective barrier (construction fencing) erected around the site at a distance of ten meters from the edge of the site's surface features. This barrier will remain in place until the permanent preservation plan is approved an implemented.

Execution of the above described mitigation measures will help to ensure that no cultural practices and beliefs or associated cultural resources will be adversely affected by the proposed DHHL Maku'u Residential Lots development.

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APPENDIX I

TRAFFIC IMPACT ANALYSIS REPORT

Traffic Impact Analysis Report

Makuu-Halona Subdivision
and
Makuu-Popoki Residential Subdivision

TMK (3) 1-5-08: parcel 3
Pahoa, Hawaii

May 2005

Prepared for:

State of Hawaii
Department of Hawaiian Home Lands

Environet, Inc.

Prepared by:

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TMK (3) 1-5-08: parcel 3
Pahoa, Hawaii

May 2005

The Department of Hawaiian Home Lands (DHHL) has proposed to subdivide a portion of the subject parcel consisting of approximately 245 acres west of and adjacent to an existing 38-lot subdivision near Pahoa in the Puna District of the island of Hawaii to create 363 new residential lots. Vehicular access will be through the existing subdivision streets, which connect to Highway 130 (Keaau-Pahoa Road) at the existing cross-intersection with Niaulani Street (also referred to as Aulani Road on some maps). Figure 1 shows the project location.

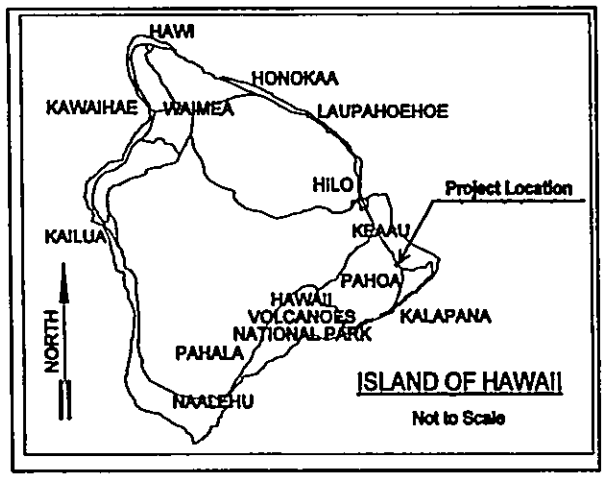

Figure 1 – Project Location

Existing Conditions

Niaulani Street serves an existing 38 lots west of the highway; east of the highway, the roadway is named Kaluahine Road and is one of two streets serving the existing Makuu Farm Lots Unit 1 subdivision (127 lots total, of which 111 are closer to Ka Ohuwalu Street, the other connection to the highway). The existing subdivisions are currently mostly vacant and very little traffic is generated from either Niaulani Street or Kaluahine Road. Stop signs on Niaulani Street and Kaluahine Road control the approaches to the intersection with the highway.

Highway 130 is a minor arterial that is the main roadway serving the makai Puna area, starting near Keaau to the north and continuing past Pahoa just south of the project site. Posted speed limit on Highway 130 near the project site is 55 miles per hour. Separate left turn lanes were recently installed on Highway 130 at several intersections, including Niaulani Street/Kaluahine Road.

The State Highways Division has estimated average daily traffic (ADT) volumes on the segment of Highway 130 near the project site, based on traffic counts taken during even-numbered years. The recent ADTs are shown in Table 1 (Niaulani Street/Kaluahine Road is located 0.69 miles north of the Old Keaau-Pahoa Road intersection).

Table 1 – Average Daily Traffic, Highway 130

	1992	1994	1996	1998	2000	2002
Ainaloa Boulevard to Old Keaau-Pahoa Road	10,514	11,115	10,966	10,159	10,545	11,397

Source: State of Hawaii, Department of Transportation, Highways Division. *Traffic Summary, Island of Hawaii 2002*

Future Highway Traffic Estimates

The proposed project creates a residential subdivision. Occupancy, however, is expected to occur over a period of several years. For the purpose of evaluating traffic impacts, peak hour traffic volumes were estimated at the intersection of Highway 130 and Niaulani Street for a future year in which daily traffic volume on the highway would be approximately 15,000 vehicles per year. A straight-line extrapolation of the ADTs for 1998 and 2002 was used to develop a high estimate, with a projected ADT of 15,420 vehicles per day for the year 2015, or 35 percent higher than the volume for the year 2002, at an average annual growth of 2.35 percent. (If a straight-line extrapolation of the ADTs for 1992 and 2002 were used, an ADT of 14,872 vehicles per day for the year 2035 would be projected; this volume would be 31 percent higher than the volume for the year 2002, with an average annual growth of 0.81 percent.)

Future peak hour volumes on the highway were computed using the "K"-factors (peak hour volume/daily volume) and the "D" (distribution) factors reported for the year 2002. These volumes were used as the volume of traffic that would remain of the highway and proceed through the Niaulani Street/Kaluahine Road intersection.

Project Traffic Estimates

The proposed project was assumed to be occupied by residents with typical suburban characteristics; i.e., they would generate traffic during weekday peak hours for work or school trips. Similarly, the existing lots on both sides of the highway were also assumed to have similar traffic-generating characteristics. Traffic estimates for the project at full occupancy of the project are shown in Table 2.

Table 2 – Project Traffic Generation

	Weekday	AM Peak Hour		PM Peak Hour	
Trip factors from ITE, *Trip Generation 7th ed.*	Per DU	Per DU	%entering	Per DU	%entering
	9.57	0.75	25%	1.01	64%
Project Traffic (363 DUs)	Total	entering	exiting	entering	exiting
	3,470	68	231	204	136

DU = dwelling unit. Factors for single family detached dwellings

Of the project traffic, 70 percent was estimated to travel to or from the north, 29 percent to or from the south, and 1 percent across the highway. Peak hour traffic volumes, assuming the project is fully occupied in 2015, are shown in Figure 2.

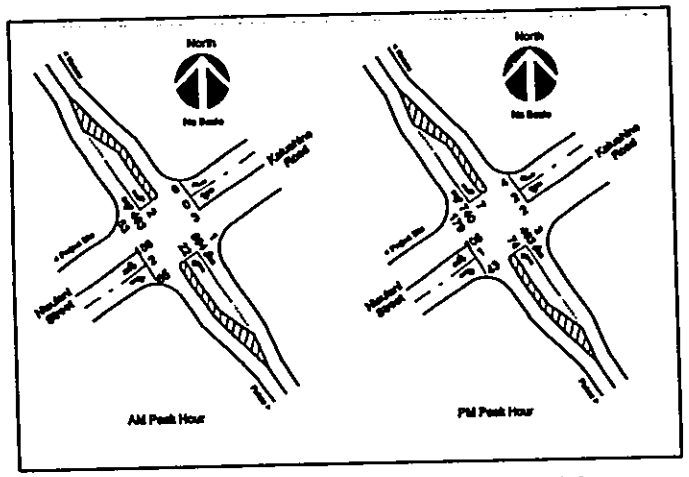

Figure 2 – Traffic Assignments, Project Fully Occupied

The unsignalized intersection was analyzed using the procedure described in the *Highway Capacity Manual*. In this procedure, average delays are computed and a "Level of Service" (LOS) identified for each controlled movement. Levels of service range from "A" for minimal delay to "F" for very long delays; LOS C or better is desirable for rural conditions and LOS D is considered acceptable.

Niaulani Street and Kaluahine Road are wide enough for their approaches to operate as if separate lanes were provided for left turns and right turns onto the highway (with through movements sharing the lane with left turns).

The unsignalized intersection was found to not have adequate capacity for eastbound left turns onto the highway (and through movements across the highway) in either peak hour. The existing northbound left turn lane on Highway 130 would not have adequate length for the projected turn volume. For an unsignalized intersection, the peak volume of 74 vehicles per hour would require storage for three cars plus deceleration from the design speed to a stop (605 feet compared to an existing length of 260 feet).

The left turn movements onto the highway were also evaluated for the case in which a refuge lane would be available so that the left turn can be made in two steps: one to cross the nearside flow (from left to right, or southbound) and secondly to merge with the farside flow (right to left, or northbound). Adequate capacity with decreased delays and improved levels of service would result. This movement will require that drivers use the highway southbound left turn lane as a refuge area, and would likely be done where left turn volumes are low (less than 30 per hour, or one every two minutes). Use of the northbound left turn lane as a refuge area in the PM Peak Hour may not be reasonable due to the higher volumes of northbound left turns from the highway.

Table 3 shows the results of the capacity and level of service analyses.

Table 3 – Unsignalized Intersection Conditions (project traffic at full development)

	AM Peak Hour			PM Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Northbound left turn from highway	0.02	8.7	A	0.12	10.9	B
Southbound left turn from highway	0.00	9.2	A	0.01	8.5	A
Westbound left turn/through movement	0.03	40.6	E	0.06	59.5	F
*If northbound left turn lane is used **	*0.01*	*21.2*	*C*	*0.03*	*29.2*	*D*
Westbound right turn	0.01	14.0	B	0.01	11.7	B
Eastbound left turn/through movement	1.38	279.6	F	1.58	>300	F
*If southbound left turn lane is used **	*0.69*	*46.9*	*E*	*0.60*	*48.9*	*E*
Eastbound right turn	0.13	12.6	B	0.14	17.6	C

V/C = volume/capacity ratio
ADPV = average delay per vehicle, in seconds
LOS = Level of Service
* as refuge lane before merging (see text)

Traffic signal control of the intersection would provide Level of Service C or better conditions for all movements and overall Level of Service B during both peak hours. With traffic signals, the intersection would operate at less than 80 percent of its capacity. Table 4 shows the results of the analysis of a signalized intersection.

Table 4 – Signalized Intersection Levels of Service – Project Fully Occupied

	AM Peak Hour			PM Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Overall Intersection	0.63	14.8	B	0.72	16.4	B
Westbound left turn/through	0.01	17.9	B	0.01	27.3	C
Westbound right turn	0.02	18.0	B	0.01	27.4	C
Eastbound left turn/through	0.45	24.4	C	0.39	33.5	C
Eastbound right turn	0.16	19.5	B	0.14	28.9	C
Southbound left turn	0.01	6.5	A	0.02	5.1	A
Southbound through/right turn	0.54	11.3	B	0.84	18.4	B
Northbound left turn	0.06	7.0	A	0.47	16.2	B
Northbound through/right turn	0.72	15.1	B	0.44	8.2	A

V/C = volume/capacity ratio
ADPV = average delay per vehicle, in seconds
LOS = Level of Service

Traffic assignments were also developed for traffic generated by a partially occupied project. An iterative process was used to determine the level of development that would generate peak hour traffic sufficient to satisfy the Peak Hour Warrant for traffic signals; the occupancy was determined to be 202 dwelling units west of the highway, or slightly more than half of the total of the existing subdivision and the subject project. Figure 3 shows the traffic assignments for this level of development.

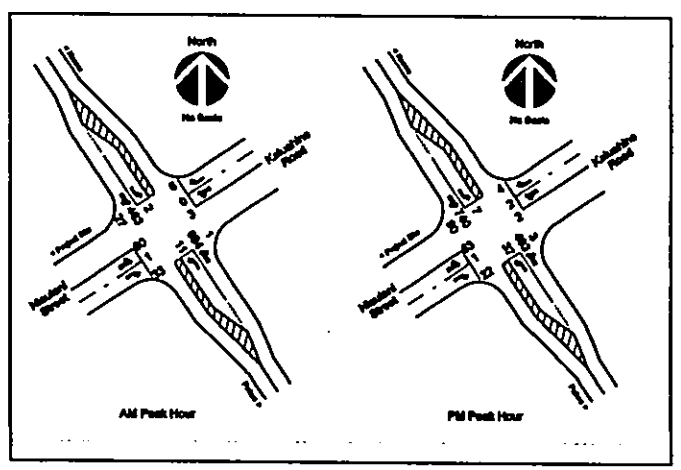

Figure 3 – Traffic Assignments, Project Partially Occupied

The unsignalized intersection analysis was repeated for the traffic assignments shown in Figure 3. While very long delays were still found for the eastbound left turn/through lane on Niaulani Street, capacities for the movements were greater than the assigned volumes. Table 5 shows the results of the unsignalized intersection analyses.

Table 5 – Unsignalized Intersection Conditions (project traffic with 202 dwellings occupied)

	AM Peak Hour			PM Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Northbound left turn from highway	0.01	8.5	A	0.05	10.0	B
Southbound left turn from highway	0.00	9.2	A	0.01	8.5	A
Westbound left turn/through movement	0.02	34.8	D	0.04	42.9	E
*If northbound left turn lane is used **	*0.01*	*19.6*	*C*	*0.02*	*22.9*	*C*
Westbound right turn	0.01	14.0	B	0.01	11.7	B
Eastbound left turn/through movement	0.65	71.6	F	0.60	88.1	F
*If southbound left turn lane is used **	*0.33*	*25.7*	*D*	*0.26*	*27.1*	*D*
Eastbound right turn	0.06	11.9	B	0.06	15.7	C

V/C = volume/capacity ratio
ADPV = average delay per vehicle, in seconds
LOS = Level of Service
* as refuge lane before merging (see text) n.a. = not applicable

The poor levels of service at full occupancy could be mitigated by installing a traffic signal system to control movements at the intersection. As indicated above, traffic volumes are expected to meet the minimum volumes described in the Peak Hour Warrant from the *Manual on Uniform Traffic Control Devices* when 202 dwelling units are occupied west of the highway (while application of the warrant may not be appropriate for the residential roadway, use of the peak hour warrant provides an indicator of when other warrants are likely to be met).

Prior to the intersection being signalized, there will be long delays for left turn movements onto the highway, but volumes will be less than capacities. If left turns to and from Kaluahine Road are prohibited and the existing southbound left turn lane is restriped as a refuge lane for eastbound left turns, acceptable conditions for all remaining movements can be maintained until the traffic signals are installed. Alternatively, if this measure is used in lieu of installing traffic signals, adequate capacities would be available for up to full development but LOS E would describe conditions for the eastbound left turns/through movements during peak hours (Table 3).

Regional Impacts

The proposed project will increase the supply of buildable lots in the makai Puna area, thereby increasing pressure to improve the major highways, including Highway 130, that serve the area. The addition of 363 lots in the project represents a 1.3% increase in the number of vacant parcels available for residential use in the makai Puna area [Source: Townscape, Inc., as part of the Puna Regional Circulation Plan study for the County of Hawaii Planning Department, has estimated that there are 27,000 vacant parcels in the area (as presented to the study's Citizen Advisory Group meeting, September 21, 2004)].

If all of the parcels in Makuu Residence Lots were occupied by 2015, the 363 new dwellings would represent an increase of less than 5 percent of the 7,860 existing dwellings [source: ibid.] in the makai Puna area. This increase compares with the 35 percent increase in traffic that was assumed using a straight-line extrapolation of the highway ADTs for 1998 and 2002. The project could increase the rate of growth of traffic volumes on Highway 130.

Conclusions and Recommendations

The proposed project will increase traffic volumes on Niaulani Street. Poor peak hour conditions are expected to occur as the lots are built upon and homes occupied. The replacement of the existing stop sign control with a traffic signal at the intersection of Niaulani Street and Highway 130 may eventually be needed to allow for safe turns from Niaulani Street onto the highway.

The existing northbound left turn lane on the highway should be lengthened to provide for adequate deceleration length plus storage for three cars (75 feet).

• • •

APPENDIX J-1

DRAFT EA COMMENT LETTERS AND RESPONSES

MAR 16 2005

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

March 15, 2005

Regulatory Branch

Mr. William Makanui
Project Manager
Dept. of Hawaiian Home Lands
P.O. Box 1879
Honolulu, HI 96805

Dear Mr. Makanui:

This responds to your request for written comments for the draft Environmental Assessment (dEA) which addressess activities and impacts of the proposed 240-acre Maku'u-Halona Subdivision and Maku'u-Popoki Residential Subdivision Project, Pahoa, Puna, Hawaii Island (TMK (3) 1-5-08:3).

The dEA does not indicate that waters of the United States, as represented by wetlands are in, adjacent to, or absent from, the proposed project area. The dEA does list, in the draft botanical survey section by LeGrande Biological Surveys, Inc. that there are plants located in the project areas which the Corps recognizes are positive indicators for potential wetlands. It is also noted in other sections of the dEA that older *kipuka* landforms, perched water, and a characteristic 'ohi'a/uluhe Lowland Wet Forest are also present within, and adjacent to, this undeveloped parcel. Without a clear statement that wetlands are absent or present, the dEA does not address the issue that waters of the U.S., such as wetlands, may be impacted by construction of project structures and associated ground disturbing activities within the proposed subdivision area. The dEA should address the issue of wetlands in order for the Corps to assist the Department of Hawaiian Home Lands in determining whether a Department of Army (DA) permit for Section 404 activities of the Clean Water Act may, or may not be, required for the proposed project.

Thank you for your consideration of potential impacts to the environment of the Pahoa watershed. Please contact Mr. Farley Watanabe of my staff at 438-7701, or facsimile 438-4060, if you have any questions or need additional information. Please refer to File Number POH-2005-184 in any future correspondence with us.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Enclosure

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAILEANA M. PARK
EXECUTIVE ASSISTANT

May 5, 2005

Mr. George P. Young, P.E.
Chief, Regulatory Branch
U.S. Army Engineer District, Honolulu
Ft. Shafter, Hawaii 96858-5440

Dear Mr. Young:

Subject: Draft Environmental Assessment, Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision, Puna, Hawaii, File No. POH-2005-184

This is in response to your letter dated March 15, 2005, regarding the presence or absence of wetlands within the proposed project area.

According to the botanical surveyor for this project, LeGrande Biological Surveys, Inc, there were no wetlands observed within the proposed development site. The site has areas that could potentially support a wetland habitat, but no wetlands were observed at the time of the survey.

Since areas within the survey site that could potentially be wetlands did not have standing water, it is the botanical surveyor's opinion that the survey site itself is not likely to harbor potential wetlands. Even though the plant species list notes wetland species, in order for a wetland to be designated, it must have the plant species and must also meet the requirements with regards to number of days with standing water and type of substrate present.

Based on the aforementioned information, we have determined that wetlands are absent within the project area and request concurrence that a permit for Section 404 activities of the Clean Water Act is not required for the proposed project.

Thank you for your comments and recommendations with regards to this project. Your participation in the planning phase of the project is greatly appreciated. Should you have any questions or concerns regarding the preparation or content of the EA please feel free to contact Ms. Ida Namur of Environet, Inc. at 833-2225.

Should you have any questions regarding the project itself, please feel free to call Mr. William Makanui of our Land Development Division at 587-6449.

Aloha and Mahalo

Micah A. Kane, Chairman
Hawaiian Homes Commission

c: Environet, Inc.
Engineers Surveyors Hawaii, Inc.

APR -9 2005
Hii emailed
Colette, JV, RY

15-3075 Nacle Road
Pahoa, HI 96778

April 8, 2005

Environet, Inc.
Attn: Colette Sakoda
2850 Paa Street, Suite 212
Honolulu, HI 96819

Dear Ms. Sakoda,

As a student in an Environmental Impact Assessment class at the University of Hawaii at Hilo as well as being a member of the Pahoa community it is my responsibility to provide a review of the draft environmental assessment of the proposed Maku'u-Halona and Maku'u Popoki subdivision. It is my hope by submitting this review that a greater detailed environmental impact assessment will be produced.

Please bear with me as this is the first time I am submitting a review of a draft environmental assessment.

Mahalo for your time and consideration,

Amy Shimabukuro
UH-Hilo student, Geog 494 A: Environmental Impact Assessment

MAY - 6 2005

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

May 5, 2005

Ms. Amy Shimabukuro
15-3075 Naele Rd
Pahoa, HI 96778

Dear Ms. Shimabukuro:

Subject: Draft Environmental Assessment - Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision, Puna, Hawaii

Thank you for your letter of April 8, 2005 submitting comments to the "Draft Environmental Assessment (EA), Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision, Pahoa, Puna, Hawaii". We acknowledge your concern regarding the adequacy of the document. Please keep in mind that the EA process that the Department of Hawaiian Home Lands (DHHL) is complying with is driven by regulations specified in Chapter 343, Hawaii Revised Statutes and that whether the EA is "adequate" is determined by its ability to meet these standards.

In regards to the EA's inability to inform the community about the project, pre-consultation letters as well as copies of the draft EA itself were mailed to local interest groups. These included the Makuu Farmers Association (MFA), Hui Kako'o Aina Ho'opulapula, Hawaii Community College, the Office of Hawaiian Affairs and interested individuals (such as yourself). The EA is a public document and it was made available for public review at Keaau Public Library, the nearest public library. The EA did evaluate traffic impact to the area; specifically the traffic report incorporated therein concluded that improvements may be needed only after 200 dwelling units are built and occupied.

You comment that "*No mitigation provided to limit introduction of other non-native species of plants to an area that is undeveloped*". However, the EA states on page 12 that "Clearing of the project site should be done in a manner that minimizes the introduction of additional invasive plant species that have the potential to spread into adjacent native forest area." The EA also states that "Care should be taken to clean the machinery as well as possible before beginning work in a new area."

In response to your comment about the inadequacy of the faunal study conducted by Rana Productions, Ltd., the study concluded that the findings of the field survey were consistent with several previous studies of the avian fauna in the area. Although a one-time survey can not provide a total picture of the wildlife utilizing any given area due to seasonal or annual changes in usage patterns by various species, we feel the study provides sufficient assurance that no threatened or endangered species will be affected by the proposed project. If endangered species are encountered during construction, adequate mitigation measures, as defined by Section 7 of the Endangered Species Act, will be implemented.

Regarding your comment about mitigation to protect Pahoa Cave, you may be interested to know that its location was verified during the EA for DHHL's related "Makuu Offsite Water System, Phase 2" project whose location overlaps the Pahoa-side of the Makuu-Halona Subdivision project site. The Final EA for that project, intended to develop a new water system for the subject project, was published in June 2004 and mentioned that the water system's alignment was intentionally revised to avoid this known cave. Its actual location was not disclosed in that EA to avoid attracting looters and this EA has proceeded likewise. Moreover, the presence of the cave was considered in the design of the Makuu-Halona Subdivision by minimizing density in the cave's general vicinity by proposing larger agricultural lots there instead of residential lots.

In any event, DHHL shares your concerns over this and any other cultural resources that may be present and has retained an archaeological monitor who will be present during the initial grubbing to ensure a timely and appropriate response to unanticipated discoveries of historic properties. If burials or historic sites are present, mitigation measures will be implemented as directed by the State Historic Preservation Division and the Hawaii Island Burial Council in accordance with Section 106 of the National Historic Preservation Act.

You comment that "*The EA readily admits that during the construction process of this project could cause runoff pollution endangering the aquifer*". The EA does state that the proposed project could lead to increased runoff due to the construction process and that the finished development will have more impermeable surfaces that would increase runoff during rain storms. However, this does not mean that pollutants will be discharged into the underlying aquifer. It is not within the scope of the EA to specify the details of the storm water drainage system. That will be determined in cooperation with the Hawaii Department of Health during the construction phase of the project.

Regulations like the National Pollutant Discharge Elimination System (NPDES) permit process ensure that mitigation measures will be implemented in to prevent contamination of nearby waterways. A clarification regarding the difference in potential impacts and mitigation measures for surface water and groundwater will be made in the Final EA.

In response to your concern about the presence of unexploded ordinance (UXO) on the project site, the limits of the former Popoki Target Area are more than a mile away and on the opposite side of Keaau-Pahoa road from the proposed project. On April 14, 2005, the U.S. Army Corps of Engineers (USCOE) confirmed in a presentation for DHHL and the MFA that the former target area is centered on the northernmost portion of DHHL's existing 5-acre farm lots subdivision completed November 1997. The contractor for that project did not encounter anything to indicate the presence of UXO during its construction nor have any lessees already living in the area since then. A clarification will be made in the Final EA regarding this.

As far as your concern about the air quality study, it was based on available air quality data and general knowledge about the site's climate, history of use and future use. The purpose of the study is to estimate the short term and long term impacts to air quality from the proposed project. An expansive air quality test of current conditions was not deemed necessary in this case due to the relatively undeveloped nature of the project site and vicinity.

With regard to the archaeological site identified in the Archaeological Survey, an agreement document between DHHL and the State Historic Preservation Office (SHPO) specifying conditions of preservation of this archaeological site encountered is considered to be a sufficient mitigation measure according to State regulations. A buffer zone will be established and temporary fencing is being installed around the archaeological site to prevent its inadvertent disturbance. A Cultural Impact Assessment was completed for this project and is included in the EA.

The following is in response to your list of specific recommendations (in italics):

- *The DHHL needs to provide a more intensive and thorough EA via a study lasting at least 6 month-1 year in order to accurately determine if native species of birds and/or hoary bats use this site as well as the presence of Aeolian life in Pahoa Cave.*

A study lasting for 6 months to 1 year is not within the scope of the Environmental Assessment, and would not be a feasible option. Furthermore, based on what has been determined in an earlier EA this project will not impact Pahoa Cave. In any event, since the Faunal study completed for this project found similar results as previous studies, a more comprehensive study is not warranted at this time.

- *If this study finds that endangered native fauna exists in these areas, adequate mitigation must be put into place in order to protect these animals.*

If endangered species are encountered during construction, adequate mitigation measures as defined by Section 7 of the Endangered Species Act will be implemented.

- *The construction company and the DHHL must specify an alternate means to storm drains in order to prevent water contamination of the underground aquifer.*

DHHL will consult with DOH during the permitting process to prevent contamination of the underlying aquifer and surface waterways.

- *An air quality study must be conducted in order to accurately assess the current air quality of the site and other nearby areas.*

An expansive air quality test of current conditions is not deemed necessary in this case due to the relatively undeveloped nature of the project site and vicinity.

- *A thorough search by the US Navy must be conducted in order to determine the presence of UXO's as well as HTW's; it is irresponsible for DHHL to allow the supposed "bombs" to be found by chance.*

The USCOE are currently in the process of conducting a Remedial Investigation/Feasibility Study of the former Popoki Target Area. Conclusion of that study is estimated for mid-June of 2006. In any case the Popoki Target range is at a distance away from the project site as to not warrant any concerns regarding encountering UXO during construction or by the eventual residents for this project.

- *The archaeological site as well as the secondary archaeological site should both undergo a CIA in order to accurately determine its relevance to Hawaiian culture.*

A CIA was completed for this project and is included in the EA.

We thank you for your comments and recommendations with regards to this project. Your participation in the planning phase of the project is greatly appreciated and should you have any questions or concerns regarding the preparation or content of the EA please feel free to contact Ms. Ida Namur of Environet, Inc. at 833-2225.

Should you have any questions regarding the project itself, please feel free to call Mr. William Hakanui of our Land Development Division at 587-6449.

Aloha and Mahalo

Micah A. Kane, Chairman
Hawaiian Homes Commission

c: Environet, Inc.
Engineers Surveyors Hawaii, Inc.

APR 19 2005 emailed CS, FY, IN

verizon

Infrastructure Provisioning
OSP Engineering O Hawaii

Engineering Department
161 Kinoole Street
Hilo, HI 96720

Phone 808.933.6488
Fax 808.935.0475

April 18, 2005

Environet, Inc.
2850 Paa St., Suite 212
Honolulu, Hawaii 96819
Attention: Colette Sakoda

Subject: Makuu-Halona Subdivision and Makuu Popoki Residential Subdivision, Pahoa, Puna, Hawaii. Draft Environmental Assessment

Dear Ms Sakoda:

Thank you for allowing us to review and comment on your environmental assessment draft for the aforementioned project.

Please note your Draft Environmental Assessment was received by our office on March 17, 2005 and to inform your customer this draft will be place in our file under TPS #05049 until we receive further documents for this project.

If there are any questions or problems in meeting our request, please call Rodney Kelii at (808) 933-6488.

Sincerely,

Gordon Yadao
Section Manager-Network Engineering

GY/rk

c: TPS #05049

05/06/2005 16:08 FAX 8085863923 DHHL-LDD 007

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

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KAHLEA M. PAHE
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

May 5, 2005

Mr. Gordon Yadao
Section Manager-Network Engineering
Verizon, Engineering Department
161 Kinoole Street
Hilo, HI 96720

Dear Mr. Yadao:

Subject: Draft Environmental Assessment - Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision, Puna, Hawaii, File No. TPS #05049

Thank you for your comment letter dated April. 18, 2005 requesting further documents for this project. Our consultant will be mailing you a copy of the Final Environmental Assessment (EA) upon publication of the document.

We appreciate your comments with regards to this project and please feel free to contact Ms. Ida Namur of Environet, Inc. at 833-2225 should you have any questions or concerns regarding the preparation or content of the EA.

Should you have any questions regarding the project itself, please feel free to call Mr. William Makanui of our Land Development Division at 587-6449.

Aloha and Mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

c: Environet, Inc.
Engineers Surveyors Hawaii, Inc.

APR - 8 2005 - sent email to duette, RSY, IKN

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

April 7, 2005

The Honorable Micah A. Kane, Chairman
Hawaiian Homes Commission
Mr. William Makanui
Department of Hawaiian Home Lands – State of Hawai'i
P.O. Box 1879
Honolulu, Hawai'i 96806

Ms. Colette Sakoda
Environet Inc.
2850 Pa'a Street,
Honolulu, Hawai'i 96749

Dear Messrs. Kane and Makanui, and Ms. Sakoda:

The Office of Environmental Quality Control (OEQC) has reviewed the draft environmental assessment for your proposed subdivisions at Maku'u-Halona and Maku'u-Popoki, Tax Map Key (3rd) 1-5-08: 003, in the judicial district of Puna, and offers the following comments for your consideration.

1. **SECONDARY IMPACTS AND POSSIBLE MITIGATION RELATED TO INCREASED TRAFFIC:** The proposed project is one of many related to growth in the Puna area. Increased development in the Puna area will entail secondary impacts related to roads and transportation in the South Hilo district. Please discuss with the State Department of Transportation and the County of Hawai'i, transportation alternatives (such as increase bus service, carpooling, telework, etc.) that will optimize the level of service on roads in the Puna and South Hilo districts. .

Thank you for the opportunity to comment. If there are any questions, please call Mr. Leslie Segundo, Environmental Health Specialist, at (808) 586-4185.

Sincerely,

for GENEVIEVE SALMONSON
Director

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

May 5, 2005

To: Genevieve Salmonson, Director of OEQC
Department of Health

From: Micah A. Kane, Chairman
Hawaiian Homes Commission

Subject: Makuu-Halona Subdivision and Makuu Popoki Residential Subdivision Environmental Assessment, Popoki and Halona, Puna, Island of Hawaii

Thank you for your letter of April 7, 2005 regarding the Draft Environmental Assessment (EA) for the subject project. Your letter mentions secondary impacts and possible mitigation related to increased traffic in the Puna area as a result of a number of projects related to growth including the subject project.

As found in the traffic report prepared for this project, the proposed development will increase the supply of buildable lots in the makai Puna area. This will lead to an increase in pressure to improve the major highways that serve the area. The addition of 363 lots in the project represents a 1.3% increase in the number of vacant parcels available for residential use in the makai Puna area. If all of the parcels in the Makuu Residence Lots are occupied by 2015, the 363 new dwellings would represent an increase of less than 5% of the 7,860 dwellings being developed by the County of Hawaii Planning Department according to the upcoming Puna Regional Circulation Plan.

Thank you for your comments and recommendations with regards to this project. Your participation in the planning phase of the project is greatly appreciated. Should you have any questions or concerns regarding the preparation or content of the EA please feel free to contact Ms. Ida Namur of Environet, Inc. at 833-2225.

Should you have any questions regarding the project itself, please feel free to call Mr. William Makanui of our Land Development Division at 587-6449.

c: Environet, Inc.
Engineers Surveyors Hawaii, Inc.

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

March 24, 2005

Mr. William Makanui
Department of Hawaiian Home Lands
P. O. Box 1879
Honolulu HI 96805

Dear Mr. Makanui:

Draft Environmental Assessment
Maku'u-Halona Subdivision and Maku'u-Popoki Residential Subdivision
Tax Map Key: 1-5-8:Portion of 3, Pahoa, Puna, Hawai'i

This is in response to the above referenced document submitted for our review.

The proposed development consists of 361 residential lots of about 20,000 square feet each, 13 agricultural lots ranging in size from 1.0 to 3.42 acres, a 12.7 acres park site and related site improvements.

After reviewing the document, we have the following to offer:

1. TMK: 1-5-8:3 consists of 524.433 acres.

2. This development includes the consolidation of 12 existing 2-acre farm lots and re-subdivision into residential lots. The tax map key numbers of these parcels should also be identified as part of the project. Further, information such as State Land Use designation, County zoning, SMA, etc. of these 12 lots should also be included in this document.

3. The County of Hawaii General Plan (2005) became effective on February 9, 2005. The subject parcel is now designated as Extensive Agriculture on the Land Use Pattern Allocation Guide (LUPAG) Map.

Hawai'i County is an equal opportunity provider and employer

4. Zoning of this parcel should be clarified. The County's zoning is Agricultural (A-20a). The Department of Hawaiian Home Lands has designated it Single-Family Residential (RS-15).

5. The Draft Environmental Assessment requires further discussion regarding improvements at the Nisulani Street and Highway 130 intersection. Coordination between the Department of Hawaiian Home Lands and the State Department of Transportation, and the projected cost and timeframe for full channelization and/or the installation of a traffic signal system and related improvements should be addressed.

Thank you for the opportunity to comment on the Draft Environmental Assessment for the proposed project. If you have questions, please feel free to contact Esther Imamura or Larry Brown of our office at (808) 961-8288.

Sincerely,

CHRISTOPERH J. YUEN
Planning Director

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MAY - 6 2005

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MOSES A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN REMIGIO
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

May 5, 2005

The Honorable Christopher J. Yuen, Director
County of Hawaii Planning Department
101 Pauahi Street, Suite 3
Hilo, Hawaii 96720-3043

Dear Mr. Yuen:

Subject: Draft Environmental Assessment - Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision, Puna, Hawaii

We have received your letter dated March 24, 2005, and have the following responses to offer in answer to your comments.

1. The final environmental assessment (EA) will reflect that the size of the parcel identified by Tax Map Key: 1-5-08:003 is 524.433 acres.

2. The tax map key numbers for the 12 existing 2-acre farm lots that are to be consolidated and re-subdivided with this project will be included in the final EA. The TMK numbers include parcels 1-5-119: 10 through 21. State Land Use Commission designation and County zoning for these parcels will also be included in the final EA.

3. A revised land use map will be incorporated in the final EA to reflect the changes indicated in the February 9, 2005 County of Hawaii General Plan.

4. Under provisions of the Hawaiian Homes Commission Act of 1920, as amended, the Department of Hawaiian Home Lands (DHHL) is not subject to the provisions of the Land Use Ordinance, Subdivision Code and Zoning Code. However, DHHL will follow all normal land use procedures, regulations, and standards applicable to the zoning district selected by DHHL as stated in the Memorandum of Agreement (MOA) between the County of Hawaii and DHHL, executed on December 27, 2002.

In a letter from the County of Hawaii Planning Department to Engineers Surveyors Hawaii dated September 20, 2004, a copy of which is enclosed, the County acknowledged the DHHL designation of Single Family Residential (RS-20 [later changed to RS-15]) and that the County will adjust their zoning maps accordingly. Clarification will be made in the final EA regarding the difference in new land use designation by DHHL, Single-Family Residential (RS-15), and the County's originally designated Agricultural (A-20a) zoning of the project site.

5. The traffic report has concluded that improvements may be needed only after 200 dwelling units are built and occupied. DHHL will coordinate any requirements for intersection improvements if warranted. If such improvements are deemed to be required later, plans will be submitted to the appropriate agencies at that time and the costs will be included as off-site costs for developing the property.

Thank you for your comments and recommendations with regards to this project. Your participation in the planning phase of the project is greatly appreciated. Should you have any questions or concerns regarding the preparation or content of the EA please feel free to contact Ms. Ida Namur of Environet, Inc. at 833-2225.

Should you have any questions regarding the project itself, please feel free to call Mr. William Makanui of our Land Development Division at 587-6449.

Aloha and Mahalo

Micah A. Kane, Chairman
Hawaiian Homes Commission

Encl.

c: Environet, Inc. (w/ encl.)
Engineers Surveyors Hawaii, Inc. (w/ encl.)

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

September 20, 2004

Jerry S. Nakagawa
Engineers Surveyors Hawaii, Inc.
900 Halekauwila Street
Honolulu, HI 96814

Dear Mr. Nakagawa:

PRELIMINARY PLAT MAP & DEFER ACTION
SUBDIVIDER: STATE-DHHL
"Maku'u Residential Subdivision-Phase 1, Increment 1-A and 1-B"
Proposed Consolidation of Lots 10 to 21, Inclusive
And Lot 51 of Maku'u Agricultural Lots, Unit 1, F.P. 2236
And Resubdivision into Lots 1 to 193, Inclusive (Phase 1, Increment 1-A)
And Lots 1 to 182, Inclusive (Phase 1, Increment 1-B)
Maku'u, Popoki & Halona, Puna, Island of Hawaii, Hawaii
TMK: 1-5-008:003 and 1-5-119:010 through 021, Inclusive (SUB 2004-0136)

This is to acknowledge receipt of ten (10) copies of the preliminary plat map dated June 25, 2004, for the referenced application for 375 lots.

Per telephone conversation between Jonathan Holmes of this department and Larry Sumida of DHHL-Land Development Division on September 15, 2004, please be aware that, per the Memorandum of Agreement between the County of Hawaii and DHHL, Item III-D, the subdivision must comply with the applicable standards of the Zoning District.

You have asserted that Single-Family Residential (RS-20) zoning is the appropriate designation for this development and the County of Hawaii will respect that and adjust our zoning maps accordingly upon Final Approval of the subdivision. Does DHHL plan to develop the remainder of Parcel 003 similarly (20,000± sq. ft. lots)?

As stated above, the subdivision must comply with the applicable regulations of the RS Zoning District. Among the requirements of the RS District is Section 25-5-6 regarding minimum building site average width. Section 25-5-6 states:

> "Each building site in the RS district shall have a minimum average width of sixty feet, plus two feet for each five hundred square feet of *required building site area* in excess of seven thousand five hundred square feet, except that no building site shall be required to have an average width of more than one hundred fifty feet." (emphasis added)

Since the zoning is (will be) RS-20 (20,000 sq.ft. minimum building site area), the average width of the lots is required to be 110 feet (20,000 less 7,500 = 12,500/500 = 25 x 2 feet = 50 feet + the required 60 feet = 110 feet total). In order to comply, there may need to be a reduction in the number of lots to accommodate the increased lot widths. Your attention and response to this matter is appreciated.

Also, please clarify the size of the remainder lot.

By a copy of this letter, we are forwarding the application and preliminary plat map to the listed officers for their review and comments. Please be advised that we are deferring action on the referenced application until all listed officers' comments are received.

Should you have any questions, please feel free to contact Ed Chepilc or Jonathan Holmes of this Department.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

JRH:lnm
P:\WP60\SUBDIV\Documents\Subc2004-3\20040135DHHLMakuuPh1Incr1A&1BPPMDEF.doc

xc: Manager, DWS w/application & PPM
Director, DPW w/application & PPM
District Environmental Health Program Chief, DOH w/application & PPM
District Engineer, DOT w/application & PPM
Micah A. Kane, Chairman, Hawaiian Homes Commission
GIS Section – Planning Department
SUB 6902

Environet, Inc.
PRESERVING EARTH'S RESOURCES FOR THE FUTURE

E-MAIL MEMORANDUM

Project: Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision, Pahoa, Puna, Hawaii

From: Marilet A. Zablan, USFWS
To: William Makanui, DHHL
Date: 4/8/05
Time: 4:33 PM

Re: Draft Env. Assessment for Makuu-Halona and Makuu-Popoki Subdivisions [TMK (3)1-5-08:03]

E-mail content:

dear mr. makanui:

I'm following up our brief phone conversation this afternoon on the subject draft environmental assessment we received from your office. while our office is unable to provide written comments due to shortage of staff, I wanted to let you know that one of our wildlife biologists, jay nelson, was able to review the document with regard to endangered animals. thank you for allowing me to submit these informal comments by e-mail.

although wildlife surveys conducted did not detect the hawaiian hawk (buteo solitarius) and hawaiian hoary bat (lasiurus cinereus semotus), both species could be within the project area. the hawaiian hawk and hawaiian hoary bat are federally listed endangered species. to minimize any potential impacts to these species we recommend the following: if a hawaiian hawk is sighted, perched within the project area, work activities in proximity of the hawk should be temporarily suspended until the hawk moves of its own accord. during the months of june through august, hawiian hoary bats could potentially be breeding in the project area. young bats, which are unable to fly, cling to trees and possibly bushes and shrubs and could potentially be injured or killed by tree felling and vegetation clearing. limiting tree felling and vegatation clearing to the months of september through may will minimize the potential of harming young bats should the hawaiian hoary bat be using the area for breeding.

If you have specific questions on these informal comments, please contact jay nelson, fish and wildlife biologist of this office, at the number below or by e-mail (see above). thank you again for the opportunity,

~MAZ

Marilet A. Zablan, Vertebrate Conservation Program Leader

Recorded by: I.K.N

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

NICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. KAWAHARA
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

May 6, 2005

Ms. Marilet A. Zablan,
Vertebrate Conservation Program Leader
U.S. Fish & Wildlife Service
Pacific Islands Fish & Wildlife
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

Dear Ms. Zablan:

Subject: Draft Environmental Assessment - Makuu-Halona Subdivision and Makuu-Popoki Residential Subdivision, Puna, Hawaii

Thank you for your comments submitted on April 8, 2005 via e-mail regarding the subject environmental assessment (EA). You comment that although wildlife surveys conducted under this EA did not detect the Hawaiian hawk (Buteo solitarius) and Hawaiian hoary bat (Lasiurus cinereus semotus) within the project area, both species could possibly exist in the vicinity of the project area. The Hawaiian hawk and Hawaiian hoary bat are federally listed endangered species.

As a consideration for minimizing impacts to both species, the Department of Hawaiian Homes Lands (DHHL) will notify its contractor(s) that they should temporarily suspend work activities in the immediate proximity of any hawks or bats encountered, if sighted perched within the project area, until they move of their own accord.

DHHL will consider scheduling the start of the project, and the majority of the initial clearing and grubbing periods, to fall outside of the bat breeding season which is between June and August, as such as possible in order to minimize the potential of harming young bats. If bats are inadvertently encountered during construction, adequate mitigation measures as defined by Section 7 of the Endangered Species Act will be implemented.

Ms. Marilet Zablan
May 6, 2005
Page 2

The foregoing is being incorporated into the final EA and we thank you for your comments and recommendations with regards to this project. Your participation in the planning phase of the project is greatly appreciated. Should you have any questions or concerns regarding the preparation or content of the EA please feel free to contact Ms. Ida Namur of Environet, Inc. at 833-2225.

Should you have any questions regarding the project itself, please feel free to call Mr. William Makanui of our Land Development Division at 587-6449.

Aloha and mahalo,

Nicah A. Kane, Chairman
Hawaiian Homes Commission

c: Environet, Inc.
Engineers Surveyors Hawaii, Inc.

APPENDIX J-2
PRECONSULTATION LETTERS

OCT -8 2004

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
LINDEN H. JOESTING
BRIAN H. SEDOGUCHI

IN REPLY REFER TO:

STP 8.1398

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

September 28, 2004

Ms. Ida K. Namur
Environmental Scientist
Environet, Inc.
2850 Paa Street, Suite 212
Honolulu, Hawaii 96819

Dear Ms. Namur:

Subject: DHHL Makuu Residential Subdivision
TMK: (3) 1-5-08: 03 (portion of)

Thank you for your transmittal requesting our review of the subject project.

The Department of Hawaiian Home Land's (DHHL) is proposing to develop 240 acres of the total 540 acres that make up the Makuu Residential Subdivision. The current proposal will consist of up to 375 residential/agricultural lots and a park. We are concerned that the cumulative impact of the proposed project along with the adjoining existing and future areas of the Makuu Subdivision and the adjacent Makuu Farm Lots will require roadway improvements including intersection improvements at Ni Aulani Street and Route 130.

The applicant should prepare a Traffic Impact Analysis Report (TIAR) for our review and approval. The TIAR should identify improvements required to address traffic impacts from the proposed development and an implementation schedule for these improvements.

The applicant should also be willing to contribute its fair share for required regional improvements.

We appreciate the opportunity to provide our comments.

Very truly yours,

RODNEY K. HARAGA
Director of Transportation

SEP -4 2004

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAI'I
345 KEKŪANAŌ'A STREET, SUITE 20 • HILO, HAWAI'I 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

September 1, 2004

Ms. Ida K. Namur
Environet, Inc.
2850 Pa'a Street
Honolulu, HI 96819

WATER REQUIREMENTS
MAKU'U AGRICULTURAL AND RESIDENTIAL SUBDIVISION
TAX MAP KEY 1-5-008:PORTION OF 003

This is in response to your letter of July 23, 2004.

Please be informed that the Department of Water Supply is in correspondence with the State of Hawai'i, Department of Hawaiian Homelands (DHHL), and their consultants, Engineers Surveyors Hawaii, Inc., for the design of the required water system improvements for the subject project. Water will become available for the subject project upon completion of the following water system improvements in accordance with the County of Hawai'i, Water System Standards 2002, as amended, and the Rules and Regulations of the Department of Water Supply:

1. Well: Capable of providing adequate water supply for maximum day consumption with one (matching) alternate source pump out of service.

2. Tank: Located at an elevation such that the subdivision water distribution system will be provided with adequate pressure. The tank must also be sized to provide adequate storage (at ¾ full) for the highest fire-flow demand and maximum day usage with credit of flow from any other incoming pumps, with one maximum size pump out of service.

3. Transmission Lines: Properly sized to deliver sufficient water at adequate pressure from the tank to the subdivision water system under peak-flow and fire-flow conditions.

4. Subdivision Water System: Designed to deliver water at adequate pressure and volume under peak-flow and fire-flow conditions. The water system shall include, but not be limited to, mains (minimum 6 inches in diameter), service laterals to front each lot, and fire hydrants at the appropriate spacing.

All construction plans, calculations, and specifications for the above must be submitted by a professional engineer, registered in the State of Hawai'i, to this Department for review and approval.

In addition to the above water system improvements, the developer must also pay the prevailing facilities charge, which is subject to change, of $1,190.00 for the first unit (or service), for each

... Water brings progress...

existing lot of record, and $5,500.00 for any additional units. Payment is due and payable upon completion of the installation of the required water system improvements.

Upon completion of the above water system improvements, payment of the prevailing facilities charges, and proper dedication and conveyance of said water system to the Water Board of the County of Hawai'i, all requirements of this Department will have been fulfilled.

Should there be any questions, you may contact Mr. Finn McCall of our Water Resources and Planning Branch at 961-8070, extension 255.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

FM:sco

AUG 28 2004

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

August 23, 2004
Ms. Ida K. Namur
Environmental Scientist
Environet, Inc.
2850 Paa St., Suite 212
Honolulu HI 96819

Dear Ms. Namur:

Pre-Consultation on Draft Environmental Assessment
DHHL Makuu Residential Subdivision
Tax Map Key: 1-5-8:Portion of 3

In reference to the proposed project, we would like to offer an additional comment to our letter dated July 29, 2004.

The proposal is to develop 365+ residential/agricultural lots. The project site is adjacent to the Makuu Agricultural Lots, Unit 1 consisting of 50 lots and across the Keaau-Pahoa Road (Hwy 130) from the Makuu Farm Lots, Unit 1 consisting of 128 lots. Therefore, the Environmental Assessment must address traffic circulation and improvements necessary to mitigate impacts resulting from increased access and egress to the Keaau-Pahoa Road.

Should you have questions or require further information, please feel free to contact Esther Imamura or Larry Brown of our Department at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

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Hawai'i County is an equal opportunity provider and employer.

SEP -1 2004

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii

PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

July 29, 2004

Zach M. Payne
Environet, Inc.
2850 Paa St., Suite 212
Honolulu, Hawaii 96819

Dear Mr. Payne:

Subject: Pre-Draft Environmental Assessment Comments
Project: Maku'u Residential Subdivision
Land Owner: State of Hawaii, Department of Hawaiian Homelands (DHHL)
Tax Map Key: (3) 1-5-008:003

This is in response to your letter, dated July 23, 2004, in which you requested our comments prior to your preparation of an environmental assessment on the proposed development of an unspecified portion of the subject 540-acre DHHL property and 12 adjacent existing 2-acre farm lots. It is our understanding that DHHL intends to create a residential subdivision consisting of 365 to 375 lots with a minimum area of 20,000 square feet.

The project area is zoned Agricultural (A-20a) by Hawaii County and is situated in the State Land Use Agricultural district. These lands are designated for use as orchards under the Hawaii County General Plan. Lands classified as orchard are those agricultural lands, which though rocky in character and content, support productive macadamia nuts, papaya, citrus and other similar agricultural products.

A Memorandum of Agreement (MOA) between the County of Hawaii (COH) and the Department of Hawaiian Homelands was adopted by Resolution No. 19-03 and became effective on December 30, 2002. This MOA provided clarification on the respective roles and responsibilities, and obligations of the COH and DHHL relating to land use planning, infrastructure maintenance, enforcement of laws, and the collection of taxes and other fees on Hawaiian home lands.

AUG 05 2004

Although the guiding principles of the MOA directs responsibility for land uses on Hawaiian home lands to the Hawaiian Homes Commission, the provisions of this MOA, a copy of which is enclosed, as it relates to the proposed development, should be thoroughly discussed in the environmental assessment.

Should you have questions, please feel welcome to contact Larry Brown or Esther Imamura of my staff at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

LMB:cd
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Memorandum of Agreement Between the County of Hawaii and the Department of Hawaiian Home Lands

I. Purpose

The purpose of this Memorandum of Agreement (MOA) is to clarify the respective roles, responsibilities, and obligations of the County of Hawaii (County) and the Department of Hawaiian Home Lands (DHHL) relating to land use planning, infrastructure maintenance, enforcement of laws, and collection of taxes and other fees on Hawaiian home lands.

II. Guiding Principles

The following general principles have guided the development of this MOA:

A. The Hawaiian Homes Commission is responsible for determining land use on Hawaiian home lands. The County may not use its land use and zoning powers to prevent the Hawaiian Homes Commission from controlling the use of Hawaiian home lands.

B. The County and DHHL share common goals in planning for the use of Hawaiian home lands: both support the orderly development of those lands for the benefit of native Hawaiians and both are committed to the integration of planning by DHHL and Hawaii County.

C. The County should manage and maintain all infrastructure built to County standards

D. The County is authorized to enforce criminal laws and applicable County ordinances and regulations on Hawaiian home lands.

E. Hawaiian homestead lessees are residents of the County of Hawaii and should be treated in a manner consistent with all other residents of the County.

F. Hawaiian homestead lessees should pay all taxes and fees required by law.

G. The County and DHHL acknowledge that there are areas where agreement will not be reached, and agree to continue to work together toward a mutually acceptable resolution of such issues.

III. Relating to Planning and Land Use

A. DHHL will implement its Planning System which includes plans with DHHL land use designations such as the Hawaii Island Plan, various Development and Subdivision Plans, and Homestead Community Plans. In the formulation, updating, and amendment of these plans, DHHL will consult with the relevant County departments, and shall give due consideration and weight to their

IV. Relating to Public Facilities and Infrastructure Serving Hawaiian Home Lands

A. In the development of future projects, DHHL will construct public facilities in accordance with County standards. Where departures from County standards are desired, DHHL will pursue exemptions and other administrative variances from the appropriate County department, in accordance with procedures established for all property owners. Should DHHL choose not to construct infrastructure in accordance with County standards, the County may view such improvements as private facilities for repair and maintenance purposes.

B. The County will accept operation, repair, and maintenance of all future DHHL infrastructure constructed according to County standards.

C. Existing infrastructure shall be subject to County inspection prior to being accepted by the County for operation, repair, and maintenance. The County may require DHHL to repair any damage such as leaks, holes, sags, or deterioration affecting the operation of the existing infrastructure, identified as a result of the inspection.

D. In the case of existing infrastructure that is not constructed to County standards, the County and DHHL will work to establish minimum standards for residential, agricultural, and pastoral subdivisions. Existing projects will be evaluated based on these new standards. The County may require DHHL to upgrade the infrastructure to the minimum standard prior to being accepted by the County for operations, repair, and maintenance.

E. The County will maintain infrastructure according to its own standards, resources and schedules. Any decisions as to upgrades or rehabilitation will be at the County's discretion.

F. Should DHHL elect to convert its land to a more intensive land use, DHHL will be responsible for upgrading the onsite infrastructure to accommodate the new use, and will consult with the County regarding the need to upgrade offsite infrastructure. DHHL and the County shall negotiate the extent to which DHHL will be responsible for any such offsite improvements requested by the County. DHHL shall be responsible for project-related offsite improvements to the extent that these would be required of other developers with similar projects. If offsite improvements benefit other property, DHHL and the County shall cooperate so that DHHL bears only its fair share of these improvement costs.

G. The County will treat DHHL lessees in the same manner as other property owners with respect to conformity with laws, ordinances, and regulations. The County will advise DHHL of violations, and will refer cases of ongoing violation to DHHL after the County has exhausted all remedies short of pursuing legal action

G. The County and DHHL shall work to establish a customer trust fund by July 1, 2004 to collect real property tax payments as part of the mortgage/loan payments in order to make smaller, regular payments.

VII. Areas for Further Collaboration

The parties agree to work further on the following issues:

A. The creation of new County zoning districts for farming and pastoral activities.

B. The development of infrastructure standards for rural land uses such as agricultural and pastoral activities.

C. The establishment of procedures for sharing evidence, information, and testimony involving criminal violations on Hawaiian home lands.

D. The implementation of actions to prevent and/or address future real property tax delinquencies by Hawaiian homestead lessees.

VIII. Termination

To achieve the objectives of this MOA, either party may, by mutual agreement in writing, further clarify or waive any term or condition of this agreement, provided such action does not violate any statutes, ordinances, or binding rules or regulations. DHHL and the County reserve the right to terminate this MOA upon one hundred eighty (180) days notice in writing to the other party.

In agreement thereof, the parties have entered into this Memorandum of Agreement on this ____ day of _____, 2002.

COUNTY OF HAWAII

By _____
Harry Kim, Mayor

APPROVED AS TO FORM:

By _____
Corporation Counsel

DEPARTMENT OF HAWAIIAN HOME LANDS

By _____
Raynard C. Soon, Chairman
Hawaiian Homes Commission

By _____
Deputy Attorney General

AUG 17 2004

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD / CWB

08015PKP.04

August 5, 2004

Ms. Ida K. Namur
Environmental Scientist
Environet, Inc.
2850 Paa Street, Suite 212
Honolulu, Hawaii 96819

Dear Ms. Namur:

Subject: Department of Hawaiian Home Lands
Makuu Residential Subdivision
Pahoa, Hawaii, TMK: (3)1-5-08:03

The Department of Health (DOH), Clean Water Branch (CWB), has reviewed the subject document and offers the following comments:

1. The Army Corps of Engineers should be contacted at (808) 438-9258 to identify whether a Federal license or permit (including a Department of Army permit) is required for this project. Pursuant to Section 401(a)(1) of the Federal Water Pollution Act (commonly known as the "Clean Water Act"), a Section 401 Water Quality Certification is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters...."

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following activities:

   a. Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi).

   b. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. **An NPDES permit is required before the commencement of the construction activities.**

   c. Discharges of treated effluent from leaking underground storage tank remedial activities.

   d. Discharges of once through cooling water less than one (1) million gallons per day.

   e. Discharges of hydrotesting water.

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

AUG 03 2004

REPLY TO ATTENTION OF

August 2, 2004

Regulatory Branch

Ms. Ida K. Namur
Environet, Inc.
2850 Paa Street, Suite 212
Honolulu, Hawaii 96819

Dear Ms. Namur:

This letter responds to your request for comments on the Proposed DHHL Makuu Residential Subdivision, Pahoa, Hawaii, dated July 23, 2004. Based on the information provided in your letter I am unable to determine if a Department of the Army (DA) permit will be required for this project. Please be sure to include information in the Draft Environmental Assessment (DEA) concerning the presence or absence of streams, wetlands or other water bodies within the project area boundaries, and place this office on the mailing list for the DEA.

If you have any questions concerning this matter, please contact William Lennan of my staff at 438-6986 or FAX 438-4060, and reference File No. 200400431.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Hawaii Electric Light Company, Inc. • PO Box 1027 • Hilo, HI 96721-1027

AUG 17 2004

August 16, 2004

Environet, Inc.
Attn: Ms. Ida K. Namur
2850 Paa Street, Suite 212
Honolulu, HI 96819

Dear Ms. Namur,

Subject: DHHL Makuu Residential Subdivision, Pahoa, HI
TMK: (3) 1-5-08:03 (portion of)

Thank you for your letter dated July 28, 2004. We appreciate the opportunity to comment on the proposed subdivision on 240 acres which will be divided into 365 to 375 residential/agricultural lots and a park site.

The following are general comments regarding the electrical requirements:

1. The 3-Phase 12.4 7 KV line along Keaau-Pahoa Road is adequate to serve project. Ainaloa substation and main line on Ni Aulani Road may need to be upgraded.

2. HELCO 2003 system peak load of 186,700 KW and total generation capability is 255,100 KW. The 2003 reserve margin is 36.6% over system peak.

3. We strongly recommend that energy efficient and conservation features suitable to reduce the peak electrical demand is part of the development's plans.

4. The project consultants and engineers are urged to contact HELCO Engineering Department as soon as practical to open a service request to insure timely service

Please contact Mel Yamaki at (808) 969-0323 if you have any questions.

Sincerely,

Clyde H. Nagata, P.E.
Manager, Engineering Department

CHN: MSY: ln

AUG 25 2004

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD04/1493

August 19, 2004

Ida K. Namur
Zach M. Payne
Environet, Inc.
2850 Pa'a Street. Suite 212
Honolulu, HI 96819

RE: DHHL Maku'u Subdivision, TMK (3) 1-5-08:03 (portion)

Dear Ms. Namur and Mr. Payne:

The Office of Hawaiian Affairs (OHA) is in receipt of your two letters dated July 23, 2004. Thank you for the opportunity to comment on the above referenced project. OHA is supportive of DHHL's efforts to provide homesteads for native Hawaiians, and offers the following comments so that the project may move forward in a timely and responsible manner.

Because the area proposed for development is vacant with presumably little alteration to its natural state, it is important that the environmental assessment fully address the potential existence of burials, archaeological sites, endangered species, and plants and animals used in the exercise of traditional and customary Hawaiian gathering rights. We will be able to offer more full comments on these matters when your draft EA is issued.

We suggest that in your preliminary work you contact Native Hawaiians and others in the area who are familiar with the site and may be able to alert you to the existence of these resources and practices. Our Community Resource Coordinator in Hilo, Ms. Ululani Sherlock [(808) 920-6418] suggests that a good person to begin discussions with is the President of the Maku'u Farmers Association, Paula Kekahuna. She may be reached via mail at P.O. Box 1357, Pāhoa, Hawai'i, 96778.

If you have further questions, please contact Dr. Jonathan Likeke Scheuer at 594-1946 or by e-mail at jonathans@oha.org.

Sincerely,

Clyde W. Nāmu'o
Administrator

CC: Ululani Sherlock
Office of Hawaiian Affairs
162 A Baker Avenue
Hilo, Hawai'i 96720-4869

Paula Kekauhuna
Maku'u Farmers Association
P.O. Box 1357
Pāhoa, Hawai'i 96778