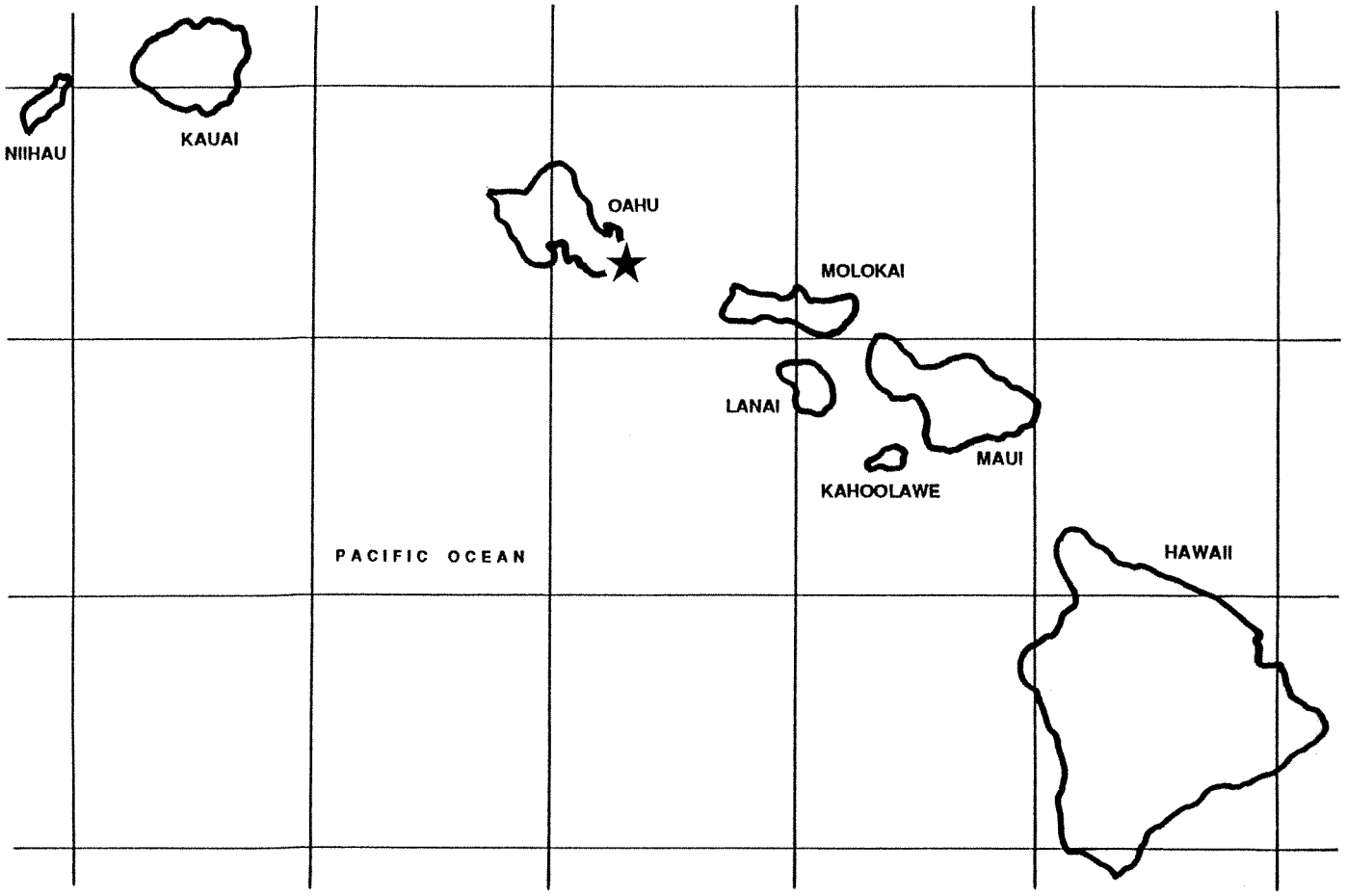
DERP-FUDS
Inventory Project Report



Pali Training Camp
Kailua, Island of Oahu, Hawaii
Site No. H09HI027700

U.S. Army Engineer District
Pacific Ocean Division
Fort Shafter, Hawaii

SITE SURVEY SUMMARY SHEET

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
PALI TRAINING CAMP
KAILUA, ISLAND OF OAHU, HAWAII
SITE NO. H09HI027700
20 MAY 1994

SITE NAME(S): Pali Training Camp, also known as Camp Pali and Pali Camp.

LOCATION: Base of Nuuanu Pali, Maunawili Valley and Makalii Valley, District of Koolaupoko, Island of Oahu (refer to figures 1 and 2). TMKs 4-02-014; various parcels; and 4-05-035: various parcels.

SITE HISTORY: Pali Training Camp was located in Kailua at the foot of the Koolau mountain range near the southeast end of the island of Oahu. It consisted of as many as four noncontiguous parcels totalling an estimated 4,378 acres that also included Maunawili and Makalii Valleys. The regimental training camp was opened in late 1943 on property belonging to Harold K. Castle (dba Kaneohe Ranch).

Pali Training Camp was established as a regimental combat team training center emphasizing the use of and familiarity with modern arms and field weapons, in addition to providing rugged terrain for jungle and ranger training. Troops were billeted in a tent complex at the base of Nuuanu Pali capable of supporting 3,000 to 5,000 individuals. Latrines, showers, messhalls, administration buildings, and motor pools were also erected at the encampment. Additional barracks, an ice plant, a bakery, and a field hospital were situated within Maunawili and Makalii Valleys. The military structures at Pali Training Camp were subsequently sold as surplus building materials by bid sale in 1946, therefore they no longer exist on-site.

Camp training aids consisted of 200- and 300-yard rifle ranges, a 1,000-inch range, four obstacle courses, an infiltration course, a combat in cities course, a close combat course, and a 400-yard long jungle firing course. An artillery impact area was also established in the rear of Maunawili Valley. Area residents recall artillery rounds being fired into Maunawili Valley from points at the mouth of the valley or from other locations throughout Kailua.

Although Pali Training Camp's impact area was reportedly cleared of ordnance in 1945, a public warning to exercise caution when entering Maunawili Valley due to the potential presence of dud rounds was issued in June 1948 by the commanding officer of Army ordnance services. There have been no recent reports of OEW being discovered at the former impact area, though a former resident and a retired Kaneohe Ranch manager report the previous discovery of 155 mm duds, .30 caliber blanks, and other unidentified rounds in Maunawili Valley. Former and present residents of Makalii Valley also report that mortar rounds and machine gun bullets were frequently unearthed as agricultural fields in that valley were tilled indicating it may have been a firing point of artillery directed into Maunawili Valley.

In action taken in October 1945, G-3 Headquarters ordered the release of Pali Training Camp. The encampment was abandoned by the end of 1945, all on-site buildings were sold for scrap in 1946 following a bid sale of the structures, and the land reverted to Kaneohe Ranch. The municipal Pali Golf Course, privately owned Koolau Golf Course, and Hawaii Pacific University (formerly Hawaii Loa College) presently occupy the parcel then supporting the primary troop encampment at the base of Nuuanu Pali. Training areas and portions of the former artillery impact area at Makalii and Maunawili Valleys are currently owned by Royal Hawaiian Country Club, Inc. The landowner has since constructed an 18-hole golf course and clubhouse, with plans for a second course, in Maunawili Valley. Makalii Valley is being leased by Royal Hawaiian Country

Club, Inc. to individual tenants engaged in various agricultural activities. The rear of Maunawili Valley is presently within Waimanalo Forest Reserve through which a public hiking trail, identified in figure 3 as Maunawili Demonstration Trail, is currently being developed by the Hawaii Department of Land and Natural Resources. A portion of the forest reserve is being leased to Hawaiian Sugar Planters' Association for plant breeding.

SITE VISIT: A site visit was conducted on 13 March 1992 by Farley Watanabe (CEPOD-ED-ES), and Carol-Ann Suda and Wilbert Chee (Wil Chee - Planning). The site visit concentrated on visual reconnaissance of extant Pali Golf Course, an area where the troop encampment was situated. The site is devoid of military remnants. Second and third site visits were conducted on 12 and 15 November 1993 in Maunawili Valley and neighboring Makalii Valley, respectively, by senior UXO supervisor Byron Donaldson (Donaldson Enterprises, Inc.) and Derek Yasaka (Wil Chee - Planning). Although they too failed to discover any military remnants during both site visits, interviews with former and present valley residents confirmed the firing of artillery rounds into Maunawili Valley. OEW in the form of a 155 mm round was discovered in Maunawili Valley by a former Kaneohe Ranch manager. Mortars and bullets were unearthed in Makalii Valley indicating artillery may have been fired from this valley over Olomana Ridge to the impact area in Maunawili Valley.

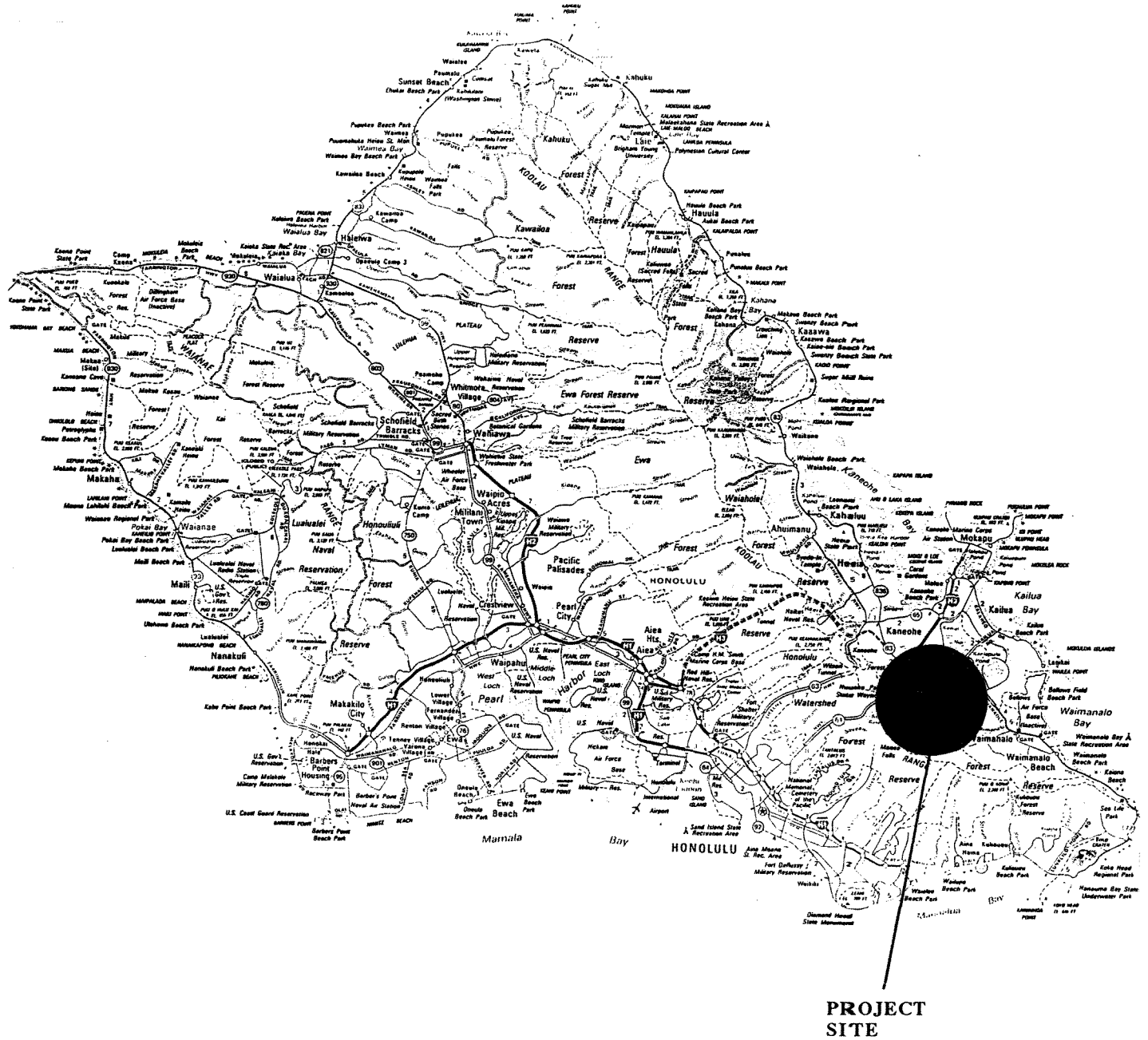
CATEGORY OF HAZARD: OEW.

PROJECT DESCRIPTION: There is one potential project at this site.

a. OEW. Maunawili and Makalii Valleys on the island of Oahu were used for regimental combat team training during World War II, the former being utilized as an artillery impact area, and the latter as a potential firing point. A 155 mm round and .30 caliber blanks were reportedly discovered in Maunawili Valley following departure of the Army from the area. Dud mortar rounds and machine gun bullets were discovered by a resident in Makalii Valley as agricultural fields in that valley were being tilled. A Risk Assessment Code (RAC) worksheet has been prepared and is attached herewith. The RAC for this site was determined to be 1. It is recommended that this INPR be referred to CEHND for final determination of the next appropriate action as it requires further investigation beyond the scope of this preliminary site assessment.

AVAILABLE STUDIES AND REPORTS: None identified.

PA POC: Helene Takemoto, CEPOD-ED-ES, 808-438-6931.



Prepared for:

U.S. Army Engineer District
Pacific Ocean Division
Fort Shafter, Hawaii

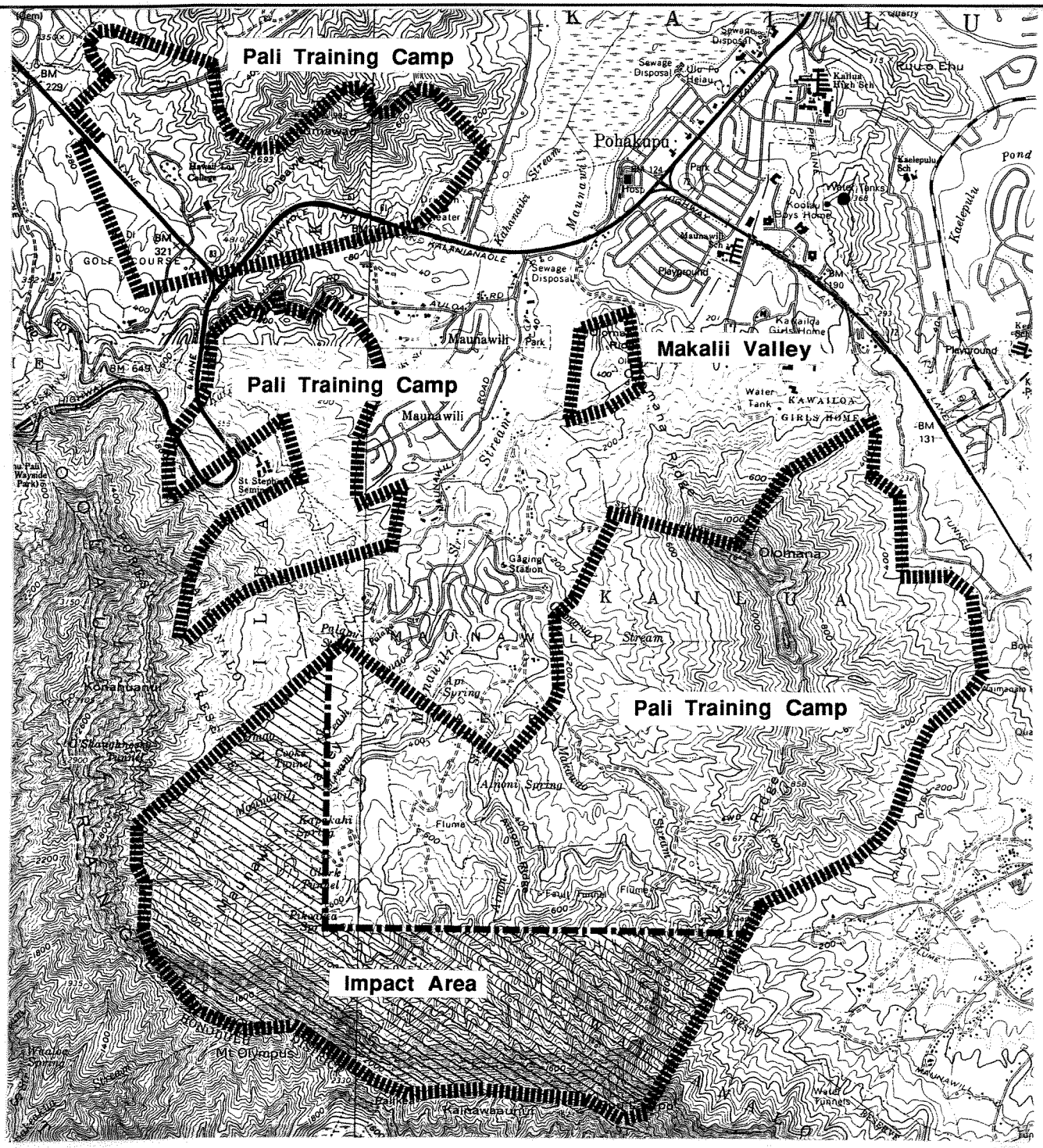
Prepared by:

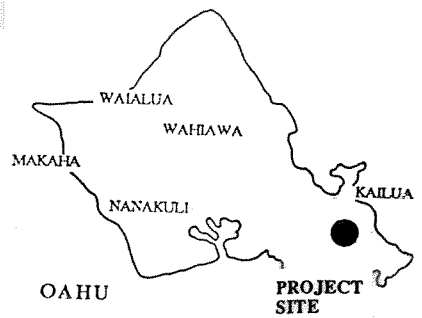
Wil Chee - Planning

DERP - FUDS Inventory Project Report
for
Pali Training Camp
Kailua, Island of Oahu, Hawaii
Site No.H09HI027700

Site Location

Figure 1





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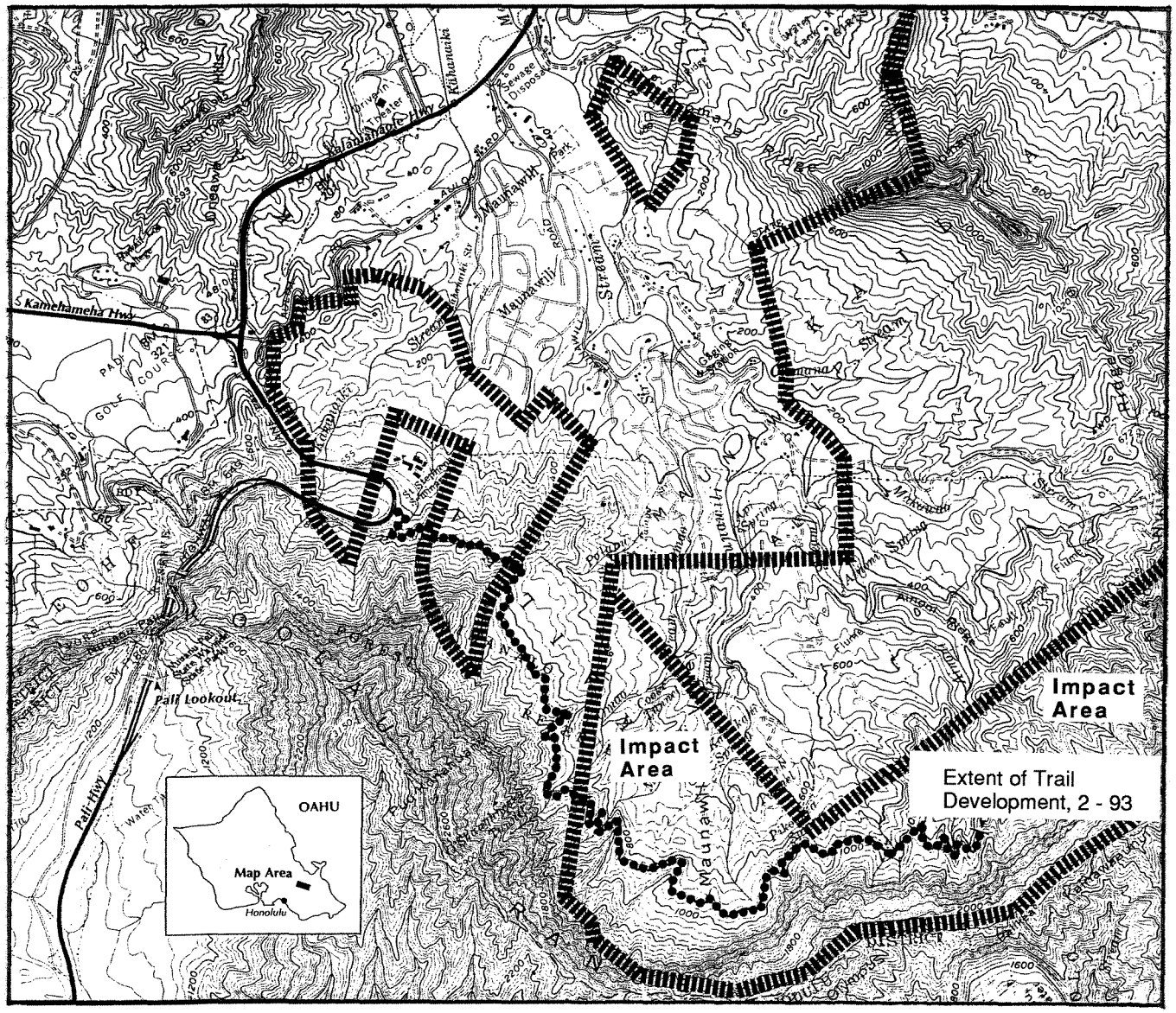
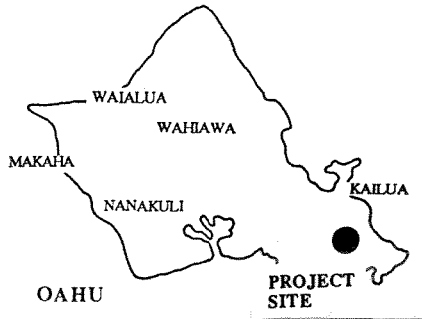
Site Location

Figure 2





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for
Pali Training Camp
Kailua, Island of Oahu, Hawaii
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Maunawili Demonstration Trail

Figure 3

FINDINGS AND DETERMINATION OF ELIGIBILITY

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
PALI TRAINING CAMP
KAILUA, ISLAND OF OAHU, HAWAII
SITE NO. H09HI027700

FINDINGS OF FACT

1. Pali Training Camp was located in Kailua at the foot of the Koolau mountain range near the southeast end of the island of Oahu. It consisted of up to four noncontiguous parcels totalling an estimated 4,378 acres that also included portions of Makalii and Maunawili Valleys. The regimental training camp was opened in late 1943 on property belonging to Harold K. Castle (dba Kaneohe Ranch).[1] Documentation evidencing property acquisition could not be located following research at the United States Army Corps of Engineers, Real Estate Directorate; City and County of Honolulu Department of Finance, Real Property Assessment Division; Hawaii Department of Land and Natural Resources, Bureau of Conveyances; Hawaii Department of Accounting and General Services, Division of Archives, and Kaneohe Ranch.

2. Pali Training Camp was established as a regimental combat team training center emphasizing the use of and familiarity with modern arms and field weapons, in addition to providing rugged terrain for jungle and ranger training.[1,19,22,25] Troops were billeted in a sprawling tent city at the base of Nuuanu Pali capable of supporting 3,000 to 5,000 individuals.[3,6,7,19,23,24,25] In addition to barracks, the encampment also contained latrines, showers, messhalls, administration buildings, and motor pools.[19,24] Additional barracks, an ice plant, a bakery, and gun pits were situated within Makalii Valley.[13,14,18] A field hospital was erected where extant Maunawili Park now resides.[6] Military-erected structures at Pali Training Camp were subsequently sold as surplus by bid sale in 1946, consequently none presently exist.[21] Camp training aids consisted of 200- and 300-yard rifle ranges, a 1,000-inch range, four obstacle courses, an infiltration course, a combat in cities course, a close combat course, and a 400-yard long jungle firing course. An artillery impact area was also established in the rear of Maunawili Valley. [20] Valley residents recall artillery rounds being fired into Maunawili Valley from firing points at the mouth of the valley or from other locations within Kailua.[5,6,9,13,14,15,18] Although the Pali Training Camp's impact area was reportedly cleared of ordnance by the 212th ordnance disposal squad and the 18th engineer search team prior to property disposal in 1945, a warning to the public was issued in June 1948 by the commanding officer of Army ordnance services. The impact area in Maunawili Valley was one of several sites in which the public was advised to exercise caution when entering the area due to the potential presence of dud ordnance rounds.[2] Representatives of Army and Marine EOD detachments, and the Special Services Division of the Honolulu Police Department recently contacted state that no reports of OEW discovered in Maunawili or Makalii Valleys have been received.[8] The Hawaii Department of Land and Natural Resources and Royal Hawaiian Country Club, Inc., Maunawili Valley landowners, have not discovered any OEW in the valley, the former during construction of a public hiking trail (Maunawili Demonstration Trail), and the latter during construction of a golf course and clubhouse.[4,11] There also have been no OEW discoveries by Hawaiian Sugar Planters' Association personnel at their Maunawili Breeding Station, also in the rear of Maunawili Valley on forest reserve land.[16] However, former valley residents and a retired Kaneohe Ranch manager reportedly discovered 155 mm duds, .30 caliber blanks, and other unidentified rounds in Maunawili Valley shortly after reversion of the property to Kaneohe Ranch.[15,24] Former and present residents of Makalii Valley report that mortar rounds and machine gun bullets were frequently unearthed as agricultural fields were tilled indicating that valley may have served as a firing point with artillery directed into Maunawili Valley.[17,18]

FINDINGS AND DETERMINATION OF ELIGIBILITY

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
PALI TRAINING CAMP
KAILUA, ISLAND OF OAHU, HAWAII
SITE NO. H09HI027700
(continuation)

3. With the cessation of wartime hostilities on 2 September 1945, training areas and facilities on the island of Oahu were studied to determine their disposition. In action taken on 8 October 1945, G-3 Headquarters ordered the release of Pali Training Camp.[20] The encampment was abandoned by the end of 1945.[23] By the end of 1946, all on-site buildings had been removed and the land reverted to Kaneohe Ranch following a bid sale of the surplus structures by the Army Corps of Engineers real estate office.[21,24] Documentation evidencing property disposal could not be located following research at the United States Army Corps of Engineers, Real Estate Directorate; City and County of Honolulu Department of Finance, Real Property Assessment Division; Hawaii Department of Land and Natural Resources, Bureau of Conveyances; Hawaii Department of Accounting and General Services, Division of Archives; and Kaneohe Ranch. The municipal Pali Golf Course, privately owned Koolau Golf Course, and Hawaii Pacific University (formerly Hawaii Loa College) presently occupy the parcel previously supporting the primary troop encampment at the base of Nuuanu Pali. Training areas and portions of the former artillery impact area at Maunawili and Makalii Valleys are presently owned by Royal Hawaiian Country Club, Inc. Said landowner has since constructed an 18-hole golf course and clubhouse on a portion of Maunawili Valley with plans for development of a second golf course in the valley. Makalii Valley is being leased by Royal Hawaiian Country Club, Inc. to individual tenants engaged in diverse agricultural activities. The rear of Maunawili Valley is presently within Waimanalo Forest Reserve through which Maunawili Demonstration Trail, a public recreational hiking trail is currently being developed by the Hawaii Department of Land and Natural Resources. A portion of the forest reserve is being leased to Hawaiian Sugar Planters' Association for plant breeding.

DETERMINATION

Based on the foregoing findings of fact, the site has been determined to be formerly used by the Department of Defense. It is therefore eligible for the Defense Environmental Restoration Program - Formerly Used Defense Sites established under 10 USC 2701 et seq.

26 OCT 1994
Date

for HENRY S. MILLER, JR.
Brigadier General, USA
Commanding

PROJECT SUMMARY SHEET

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
PALI TRAINING CAMP
KAILUA, ISLAND OF OAHU, HAWAII
DERP - FUDS OEW PROJECT NO. H09HI027701
SITE NO. H09HI027700
20 MAY 1994

PROJECT DESCRIPTION: Pali Training Camp consisted of an estimated 4,378 acres of land comprising as many as four noncontiguous parcels located at the base of Nuuanu Pali. It was established as a regimental combat training center in the use of modern arms and field weapons, and jungle warfare. Approximately 896 acres in the rear of Maunawili Valley were designated as an artillery impact area, and sections of Makalii Valley were purportedly utilized as firing points. An Army press release published in June 1948 warned the public to exercise caution when entering the impact area within Maunawili Valley due to the potential presence of dud rounds.

The impact area is estimated to be located wholly within Waimanalo Forest Reserve which encompasses the rear (southern) portion of Maunawili Valley up to the Koolau Range ridgeline. It is bordered to the north by lower levels of Maunawili Valley, to the west by Aniani Nui Ridge, and to the south and west by Koolau Range. The former impact area is uninhabited, though portions are leased from the State of Hawaii by Hawaiian Sugar Planters' Association for its Maunawili Breeding Station.

Waimanalo Forest Reserve begins at approximately 400 feet above mean sea level (msl) ascending to an elevation greater than 2,000 feet msl at the Koolau Range ridgeline. Between 800 and 1,000 feet msl is Maunawili Demonstration Trail presently under construction by the Sierra Club under the auspices of the Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife. The public recreational hiking trail is one of several in the Koolaupoko Trail Complex of the State's Na Ala Hele trail and access system, and will, when completed, connect Maunawili Valley with Waimanalo to the east.

A residential community is located at the approximate center of Maunawili Valley north of the former impact area. Maunawili Estates, another residential community, is located at the valley mouth further north. Interspersed within the valley are several parcels whose tenants are engaged in the propagation of diversified agricultural cultivars. Along the east sector of the valley is the Royal Hawaiian Country Club comprising an 18-hole golf course and clubhouse. The country club resides along Olomana Ridge and Mount Olomana with its golf course abutting the northern border of Waimanalo Forest Reserve and the former impact area. A second 18-hole golf course in Maunawili Valley is planned by Royal Hawaiian Country Club.

Former and present residents of Maunawili Valley and neighboring Makalii Valley recall artillery being fired from various points in Kailua into Maunawili Valley during World War II. A 155 mm dud round was reportedly discovered in the valley subsequent to reversion of the land to its owner, Kaneohe Ranch. Blank .30 caliber cartridges are also reported to have been discovered in the valley. Mortar rounds and bullets were reportedly unearthed in and around Makalii Valley after agricultural plots were tilled.

PROJECT ELIGIBILITY: Kaneohe Ranch is reported to have granted a lease or license to the Army in 1943 for training purposes and establishment of a troop encampment at the base of Nuuanu Pali. Official release of Pali Training Camp property was issued by G-3 Headquarters on 8 October 1945. The camp was abandoned by the end of 1945, and all Army-constructed buildings thereon sold for its salvage value by bid sale in 1946. The land reverted to Kaneohe Ranch which in turn returned the land to cattle grazing.

POLICY CONSIDERATIONS: There are no known threatened or endangered species known to inhabit Maunawili and Makalii Valleys. Although several indigenous and endemic vascular plants were observed during a 1991 reconnaissance survey of the Maunawili Demonstration Trail alignment (the list of plants is attached herewith), none are included on the Federal or State list identifying candidate, proposed, or listed threatened or endangered species.[4,12] The native upland forests of Maunawili Valley reportedly disappeared during the 1800s when the trees were harvested to operate steam propelled equipment. Reforestation during the later 18th and early 19th centuries consisted of the planting of exotic trees in the valley including propagation of a coffee orchard.[6]

One endemic and two indigenous avian species were identified visually or audibly also during survey of the Maunawili Demonstration Trail alignment. They are the endemic Oahu *'elepaio* (*Chasiempis sandwichensis gayi*), and indigenous white-tailed tropicbird or *koa'e kea* (*Phaethon lepturus dorotheae*) and lesser golden plover or *kolea* (*Pluvialis fulva*). The three species are not listed as threatened or endangered, though the tropicbird and plover are protected by the Federal Migratory Bird Treaty Act.[12]

An archaeological survey performed appurtenant to development of Maunawili Demonstration Trail identified two prehistoric agricultural sites in Maunawili Valley at an elevation of approximately 750 feet msl. There are a number of relatively level sections of Maunawili Demonstration Trail where agricultural endeavors or habitation would have been possible. Prehistoric occupation is possible at four sites along the trail, with two of these sites exhibiting a major historic component. Two probable charcoal kilns have also been identified. As many as 42 sites on Royal Hawaiian Country Club property in Maunawili Valley were identified in 1986 including Kukapoki *heiau*, 9 house sites, 3 burial sites, and several house sites. These sites are all believed to be below 400 feet msl. Other potentially significant archaeological resources identified in Maunawili Valley include charcoal kilns and prehistoric agricultural complexes.[10] These surveys covered only a small portion of the impact area. The remaining portions of the site abut and are partially contained within the proposed National Register site boundaries for Kawainui Marsh. It is prudent to predict that a fairly large number of significant historic sites would likely be identified within and proximal to the former impact area as have other areas of similar terrain and features along windward (east) Oahu.

OEW survey and clearance activities will require compliance with Section 106 of the National Historic Preservation Act of 1966 et seq. pursuant to implementing regulations contained in 36 CFR Part 800. Said activities must be coordinated with the Hawaii State Historic Preservation Officer. Measures addressing historic preservation parameters must be completed prior to commencement of OEW survey and clearance. Such measures include archaeological reconnaissance of the project site; inventory of historic or cultural properties; significance assessment of these properties for nomination to the National Register of Historic Places; determination of probable adverse effects to the properties resulting from proposed OEW survey and clearance tasks; and development of appropriate mitigation methods in order to protect the properties and/or to retrieve significant data.

PROJECT SUMMARY SHEET

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
PALI TRAINING CAMP
KAILUA, ISLAND OF OAHU, HAWAII
DERP - FUDS OEW PROJECT NO. H09HI027701
SITE NO. H09HI027700
20 MAY 1994
(continuation)

A conservation district use permit may also be required as the impact area is within a forest reserve.

Except for anecdotal information received from former and present area residents, and the testimony of a former Kaneohe Ranch manager, there have been no reports of OEW discovered in Maunawili and Makalii Valleys received by Army and Marine EOD detachments. Additionally, no OEW has been discovered during construction of Maunawili Demonstration Trail.

PROPOSED PROJECT: A surface sweep and clearance of approximately 900 accessible acres of Maunawili and Makalii Valleys is proposed utilizing a team of ten UXO specialists and technicians under the guidance of a senior UXO supervisor. Discovered OEW would be prepared for off-site transport and disposal. Render safe procedures (RSP) would be employed to the greatest extent possible during OEW access and recovery. Blast mitigation techniques in accordance with Blow In Place (BIP) protocol would be utilized to minimize habitat damage when an OEW item must be detonated in place. Archaeologists would monitor the effort throughout survey and clearance. Training pertinent DLNR personnel and valley inhabitants in OEW recognition and notification protocol is also proposed to effect proper safety precautions subsequent to the survey and clearance effort.

RAC: The Risk Assessment Code for this site is 1. The RAC worksheet is attached herewith.

DD FORM 1391: Attached herewith.

DISTRICT POC: Helene Takemoto, CEPOD-ED-ES, 808-438-6931.

18 Apr 94
Previous editions obsolete

RISK ASSESSMENT PROCEDURES FOR ORDNANCE AND EXPLOSIVE WASTE (OEW) SITES

Site Name: Pali Training Camp
Site Location: Kailua, Oahu, Hawaii
DERP Project #: H09HI027700
Date Completed: 20 May 94

Rater's Name: Byron Donaldson
Phone No.: 808-235-2662
Organization: Donaldson Enterprises, Inc.
RAC Score: 1

OEW RISK ASSESSMENT:

This risk assessment procedure was developed in accordance with MIL-STD 882C and AR 385-10. The RAC score will be used by CEHND to prioritize the remedial action at Formerly Used Defense Sites. The OEW risk assessment should be based upon best available information resulting from records searches, reports of Explosive Ordnance Disposal (EOD) detachment actions, and field observations, interviews, and measurements. This information is used to assess the risk involved based upon the potential OEW hazards identified at the site. The risk assessment is composed of two factors, **hazard severity and hazard probability**. Personnel involved in visits to potential OEW sites should view the CEHND videotape entitled "A Life Threatening Encounter: OEW."

Part I. Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel exposure to various types and quantities of unexploded ordnance items.

TYPE OF ORDNANCE
(Circle all values that apply)

A. Conventional Ordnance and Ammunition

	VALUE
Medium/Large Caliber (20 mm and larger)	(10)
Bombs, Explosive	10
Grenades, Hand and Rifle, Explosive	10
Landmines, Explosive	10
Rockets, Guided Missiles, Explosive	10
Detonators, Blasting Caps, Fuzes, Boosters, Bursters	6
Bombs, Practice (w/ spotting charges)	6
Grenades, Practice (w/ spotting charges)	4
Landmines, Practice (w/ spotting charges)	4
Small Arms (.22 cal. - .50 cal)	(1)

Conventional Ordnance and Ammunition (Select the largest single value) **10**

What evidence do you have regarding conventional OEW? Portions of the former Army training camp were used as artillery impact and training areas from 1943 to 1945. Mortars, 155 mm projectiles, and .30 caliber bullets were reportedly discovered in Maunawili and Makalii Valleys.

B. Pyrotechnics (For munitions not described above)

	VALUE
Munition (Container) Containing White Phosphorus (WP) or Other Pyrophoric Material (i.e., Spontaneously Flammable)	10
Munition Containing a Flame or Incendiary Material (i.e., Napalm, Triethylaluminum Metal Incendiaries)	6
Flares, Signals, Simulators, Screening Smokes (other than WP)	4
Pyrotechnics (Select the largest single value)	**0**

What evidence do you have regarding pyrotechnics? No evidence of pyrotechnics.

C. Bulk High Explosives (Not an integral part of conventional ordnance; uncontainerized)

	VALUE
Primary or Initiating Explosives (Lead Styphnate, Lead Azide, Nitroglycerin, Mercury Azide, Mercury Fulminate, Tetracene, etc.)	10
Demolition Charges	10
Secondary Explosives (PETN, Compositions A, B, C, Tetryl, TNT, RDX, HMX, HBX, Black Powder, etc.)	8
Military Dynamite	6
Less Sensitive Explosives (Ammonium Nitrate, Explosive D, etc.)	3
Bulk High Explosives (Select the largest single value)	**0**

What evidence do you have regarding bulk explosives? No evidence of bulk explosives.

D. Bulk Propellants (Not an integral part of rockets, guided missiles, or other conventional ordnance; uncontainerized)

	VALUE
Solid or Liquid Propellants	6
Propellants	**0**

What evidence do you have regarding bulk propellants? No evidence of bulk propellants.

E. Chemical Warfare Materiel and Radiological Weapons

	VALUE	
Toxic Chemical Agents (Choking, Nerve, Blood, Blister)	25	
War Gas Identification Sets	20	
Radiological	15	
Riot Control and Miscellaneous (Vomiting, Tear)	5	
Chemical and Radiological (Select the largest single value)		**0**

What evidence do you have of chemical/radiological OEW? No evidence of chemical warfare materiel or radiological weapons.

==========

TOTAL HAZARD SEVERITY VALUE **10**
(Sum of Largest Value for A through E – Maximum of 61)

Apply this value to Table 1 to determine Hazard Severity Category.

TABLE 1

HAZARD SEVERITY*

Description	Category	Hazard Severity Value
CATASTROPHIC	I	21 and greater
CRITICAL	II	10 to 20
MARGINAL	III	5 to 9
NEGLIGIBLE	IV	1 to 4
**NONE		0

*** Apply Hazard Severity Category to Table 3.**

** If Hazard Severity Value is 0, you do not need to complete Part II. Proceed to Part III and use a RAC Score of 5 to determine your appropriate action.

Part II. Hazard Probability. The probability that a hazard has been or will be created due to the presence and other rated factors of unexploded ordnance or explosive materials on a formerly used DOD site.

AREA, EXTENT, ACCESSIBILITY OF OEW HAZARD
(Circle all values that apply)

A. Locations of OEW Hazards

	VALUE
On the surface	(5)
Within Tanks, Pipes, Vessels or Other Confined Locations.	4
Inside Walls, Ceilings, or Other Parts of Buildings or Structures	3
Subsurface	2

Location (Select the single largest value) **5**

What evidence do you have regarding the location of OEW? Individuals previously discovering OEW recall the items being on the surface, or brought to the surface after tilling.

B. Distance to nearest inhabited locations or structures likely to be at risk from OEW hazard (roads, parks, playgrounds, and buildings).

	VALUE
Less than 1250 feet	(5)
1250 feet to 0.5 mile	4
0.5 mile to 1.0 mile	3
1.0 mile to 2.0 miles	2
Over 2 miles	1

Distance (Select the single largest value) **5**

What are the nearest inhabited structures? Public roads, a plant reeding station, a public recreational hiking trail, and buildings.

C. Number of buildings within a 2-mile radius measured from the OEW hazard area, not the installation boundary.

	VALUE
26 and over	(5)
16 to 25	4
11 to 15	3
6 to 10	2
1 to 5	1
0	0

Number of Buildings (Select the single largest value) **5**

Narrative. Numerous buildings are situated adjacent to the OEW hazard area, are within Maunawili and Makalii Valleys, and are located to the east over Aniani Nui Ridge.

D. Types of Buildings (within a 2-mile radius)

	VALUE
Educational, Child Care, Residential, Hospitals, Hotels, Commercial, Shopping Centers	(5)
Industrial, Warehouse, etc.	4
Agricultural, Forestry, etc.	(3)
Detention, Correctional	(2)
No Buildings	0

Types of Buildings (Select the single largest value) **5**

Describe types of buildings in the area. Residential dwellings, a seminary, a golf clubhouse, agricultural warehouses, and a detention center.

E. Accessibility to site refers to access by humans to ordnance and explosive wastes. Use the following guidance:

BARRIER	VALUE
No barrier or security system	(5)
Barrier is incomplete (e.g., in disrepair or does not completely surround the site). Barrier is intended to deny egress from the site, as for a barbed wire fence for grazing.	4
A barrier, (any kind of fence in good repair) but no separate means to control entry. Barrier is intended to deny access to the site.	3
Security guard, but no barrier	2
Isolated site	1
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility; or An artificial or natural barrier (e.g., a fence combined with a cliff) which completely surrounds the facility; and a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the facility).	0

Accessibility (Select the single largest value) **5**

Describe the site accessibility. The designated artillery impact area in the rear of Maunawili Valley is accessible by a public recreational hiking trail. Although privately owned, Makalii Valley is accessible to valley residents and their guests. Other than restricted entry to Royal Hawaiian Country Club in Maunawili Valley, there are no known barriers or security systems.

F. Site Dynamics - This deals with site conditions that are subject to change in the future, but may be stable at the present. Examples would be excessive soil erosion by beaches or streams, increasing land development that could reduce distances from the site to inhabited areas or otherwise increase accessibility.

	VALUE
Expected	(5)
None Anticipated	0

Site Dynamics (Select largest value) **5**

Describe the site dynamics. The rear of Maunawili Valley is situated within a State forest reserve. Construction of Maunawili Demonstration Trail, which traverses the forest reserve, is ongoing. Royal Hawaiian Country Club, Inc., which owns much of Maunawili Valley up to the forest reserve, plans to develop a second 18-hole golf course in the valley.

TOTAL HAZARD PROBABILITY VALUE **30**
(Sum of Largest Values for A through F – Maximum of 30)

Apply this value to Hazard Probability Table 2 to determine Hazard Probability Level.

TABLE 2

HAZARD PROBABILITY

Description	Level	Hazard Probability Value
FREQUENT	A	27 or greater
PROBABLE	B	21 to 26
OCCASIONAL	C	15 to 20
REMOTE	D	8 to 14
IMPROBABLE	E	Less than 8

*** Apply Hazard Probability Level to Table 3.**

Part III. Risk Assessment. The risk assessment value for this site is determined using the following Table 3. Enter the results of the hazard probability and hazard severity values.

TABLE 3

Probability Level		FREQUENT A	PROBABLE B	OCCASIONAL C	REMOTE D	IMPROBABLE E
Severity Category:						
CATASTROPHIC	I	1	1	2	3	4
CRITICAL	II	(1)	2	3	4	5
MARGINAL	III	2	3	4	4	5
NEGLIGIBLE	IV	3	4	4	5	5

RISK ASSESSMENT CODE (RAC)

RAC 1 Expedite INPR, recommending further action by CEHND – Immediately call CEHND-ED-SY — commercial 205-955-4968 or DSN 645-4968.

RAC 2 High priority on completion of INPR – Recommend further action by CEHND.

RAC 3 Complete INPR – Recommend further action by CEHND.

RAC 4 Complete INPR – Recommend further action by CEHND.

RAC 5 Usually indicates that no further action (NOFA) is necessary. Submit NOFA and RAC to CEHND.

==========

Part IV. Narrative. Summarize the documented evidence that supports this risk assessment. If no documented evidence was available, explain all the assumptions that you made.

There is documented evidence confirming establishment of an artillery impact area in Maunawili Valley. Use of the impact area was verified through the testimony of former and current area residents. The purported existence of OEW remnants in Maunawili Valley is based on a 1948 warning to the public published in a local newspaper, and the testimony of individuals who previously discovered OEW, or recall the firing of artillery into the area. The existence of OEW in Makalii Valley is based on the testimony of a father and son who had discovered mortar rounds and bullets in the valley.

Refer to Parts I and II above for additional narration.

TRIP REPORT

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
PALI TRAINING CAMP
KAILUA, ISLAND OF OAHU, HAWAII
SITE NO. H09HI027700
DATES OF SITE VISIT: 13 MARCH 1992, AND 12 AND 15 NOVEMBER 1993

Individuals participating in the 13 March 1992 site visit of Pali Training Camp included Farley Watanabe (CEPOD-ED-ES), and Carol-Ann Suda and Wilbert Chee (Wil Chee - Planning). The team visually surveyed Pali Golf Course, the site formerly occupied by a troop encampment between 1943 and 1945. Pali Golf Course is located at the foot of Nuuanu Pali. It is bounded to the west by Kionaole Road and to the south by Nuuanu Pali. To the north and east is Kamehameha Highway.

The team arrived at the golf course at approximately 1430 hours whereupon they met and conversed with a group of five elderly golfers who mentioned that they were stationed at Pali Training Camp during the early years of World War II. Two of the five individuals explained their affiliation with the 298th Infantry that was encamped where the golf course's 17th hole is presently located. The men were tasked with security of ammunition stores located further uphill. None could recall the eventual size of Pali Training Camp as they were subsequently shipped off for overseas duty shortly thereafter. One of the individuals noted that he has spent quite a bit of time at Pali Golf Course since moving to nearby Kaneohe in 1960 (the course was constructed circa 1957), and has not encountered any evidence of military occupation, i.e., equipment or debris, at the site. Others in the group explained that prisoners of war were utilized to clean up the encampment upon which the land reverted to cattle grazing prior to golf course construction.

The perimeter of the golf course was traversed by the team in a clockwise fashion starting at the clubhouse then progressing from the 12th through the 18th holes. Site topography and terrain resemble an August 1945 areal photograph. Although the team was able to discern the location of encampment structures relative to the golf course, the area is completely devoid of any evidence of previous military use.

A second site visit to the former Pali Training Camp was conducted on 12 November 1993 by senior UXO supervisor Byron Donaldson (Donaldson Enterprises, Inc.), and Derek Yasaka (Wil Chee - Planning). The site visit was concentrated in Maunawili Valley, in particular that portion of the valley formerly designated the training camp's artillery impact area. Maunawili Valley is located at the foot of Nuuanu Pali and is bordered to the south and west by the Koolau mountain range. Bordering the valley to the east is Aniani Nui Ridge, Olomana Ridge, and Mount Olomana. To the north is Kalanianaole Highway. Lower sections of the valley to the north are occupied by St. Stephens Diocesan Center (the former Harold K. Castle residence), and by single-family residential dwellings. Along Olomana Ridge and Mount Olomana is extant Royal Hawaiian Country Club consisting of an 18-hole golf course and attendant clubhouse. The upper reaches of Maunawili Valley to the south are situated within Waimanalo Forest Reserve.

Because the artillery impact area was located at the rear of the valley to the south and southeast, Messrs. Donaldson and Yasaka elected to traverse Maunawili Demonstration Trail which is one of several public hiking trails within the State's Na Ala Hele trail and access system. According to Curt Cottrell of the Division of Forestry and Wildlife, construction of the demonstration trail, which is still ongoing, commenced about three years ago with the aid of the Sierra Club and its volunteers. An approximately seven-foot wide swath was cut to develop a three- to four-foot wide foot trail. Mr. Cottrell is unaware of any OEW or other military remnants being discovered during construction of the trail. An archaeological survey of the trail corridor likewise failed to detect any OEW. The trail will eventually connect Maunawili Valley with Waimanalo.

TRIP REPORT

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DATES OF SITE VISIT: 13 MARCH 1992, AND 12 AND 15 NOVEMBER 1993
(continuation)

The team commenced its site visit at the Maunawili Demonstration Trail head located at a Pali Highway hairpin turn located just south of the entrance to St. Stephens Diocesan Center. The trail begins at approximately the 650-foot elevation climbing rapidly to the 800-foot elevation as it follows the Koolau mountain range in the rear of Maunawili Valley. Vegetation is relatively dense on each side of the trail with tall stands of a variety of trees including guava, ironwood, kukui, and Christmasberry. Beneath the canopy of trees is an understory of ferns, ti, and an assortment of shrubs and grasses (refer to the attached vascular plant checklist compiled by Hawaii Heritage Program). There was no evidence of OEW observed along the trail. Mr. Donaldson extended his investigation to above and below the established trail visually surveying the surface supplemented by areal toning utilizing a Schonstedt Instrument Company Model GA-52C ferromagnetic locator. Again, no evidence of OEW was observed.

Forward progress on the demonstration trail terminated after approximately 1.75 miles. From a vantage point atop a small ridge at the 950-foot elevation, a panoramic view of Maunawili Valley to the west, north, east, and southeast became available. Except for a cleared and graded plot to the east (reportedly leased from the State of Hawaii by Hawaiian Sugar Planters' Association for its Maunawili Breeding Station), there was no visible topographic scarring or erosion to indicate potential artillery impact points. The dense valley vegetation obscures any gross evidence of the former impact area. Despite the lack of visual evidence indicative of artillery impact areas, Mr. Donaldson noted the naturally shaped bowl formed by the Koolau Range and Aniani Nui Ridge would have provided an ideal range for practice bombardment.

On 15 November 1993, Messrs. Donaldson and Yasaka met with and interviewed Tsuyoshi "Rocky" and Peggy Mikami at their home located in Makalii Valley at the mouth of Maunawili Valley and near the secured entry/exit to Royal Hawaiian Country Club. Mrs. Mikami also invited brothers Katsuri and Soichi Hirata, former neighbors of the Mikamis prior to World War II, to join the interview. The Mikamis and Hiratas were asked to recount their collective experiences in Makalii and Maunawili Valleys during and after military occupation of the area. The Hirata brothers recalled that all the families in Makalii Valley, tenants of Kaneohe Ranch as landowner, were evicted from 7 December 1941 to the end of the war in 1945. The families were forced to seek habitation elsewhere during the war. The Mikamis returned to Makalii Valley at the end of the war while the Hiratas relocated elsewhere. Valley lessees, such as the Mikamis, are currently engaged in diverse agricultural activities.

During the interview, Greg Mikami, son of Mr. and Mrs. Mikami arrived. He informed the interviewers that after World War II ended and the family returned to Makalii Valley, he would often discover unearthed mortar rounds and machine gun bullets as Makalii Valley fields were being tilled. He collected them as souvenirs and had saved the items for quite a number of years. Mr. and Mrs. Mikami suspect, however, that the OEW items have since been disposed. Mr. Mikami also recalled the sound of artillery rounds overhead as the Army fired into Maunawili Valley. The Hirata brothers provided corroboration recalling the Army firing artillery rounds of unknown size over Olomana Ridge into Maunawili Valley from a point approximately where Koolau Boys Home is presently located (approximately 0.75 mile northeast of Makalii Valley across Kalanianaole Highway).

The Hirata brothers then escorted Messrs. Donaldson and Yasaka into Makalii Valley. They pointed to the site of troop barracks on the north face of Makalii Valley where their family dwelling was formerly located. Gun pits were installed on the opposite side of the valley. An unpaved access road at the rear of Makalii Valley is said to have exited over the top of the valley wall to what is presently Kawailoa Girls Home. There are no vestiges of Army occupation and use of the valley.

A flat, open area at the mouth of Makalii Valley just north of an adjacent to the Royal Hawaiian Country Club entry/exit gate formerly supported an ice plant, a bakery, and more troop barracks. The structures have since been removed and the construction materials salvaged.

Further investigation of an OEW hazard in Maunawili and Makalii Valleys appears warranted.

SOURCES OF INFORMATION

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
PALI TRAINING CAMP
KAILUA, ISLAND OF OAHU, HAWAII
SITE NO. H09HI027700
20 MAY 1994

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15. Kakazu, Samuel. 45-554 Apapane Street, Kaneohe, HI 96744. Telephone 808-247-5771.

16. Kleimm, Rick. Hawaiian Sugar Planters' Association. 99-193 Aiea Heights Drive, Aiea, HI 96701. Telephone 808-487-5561.

SOURCES OF INFORMATION

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PALI TRAINING CAMP
KAILUA, ISLAND OF OAHU, HAWAII
SITE NO. H09HI027700
20 MAY 1994
(continuation)

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1-24-94

WIL CHEE PLANNING
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1585 Kapiolani Blvd.
Honolulu, Hawaii 96814

RE: PALI IMPACT AREA TRIP REPORT (UXO).

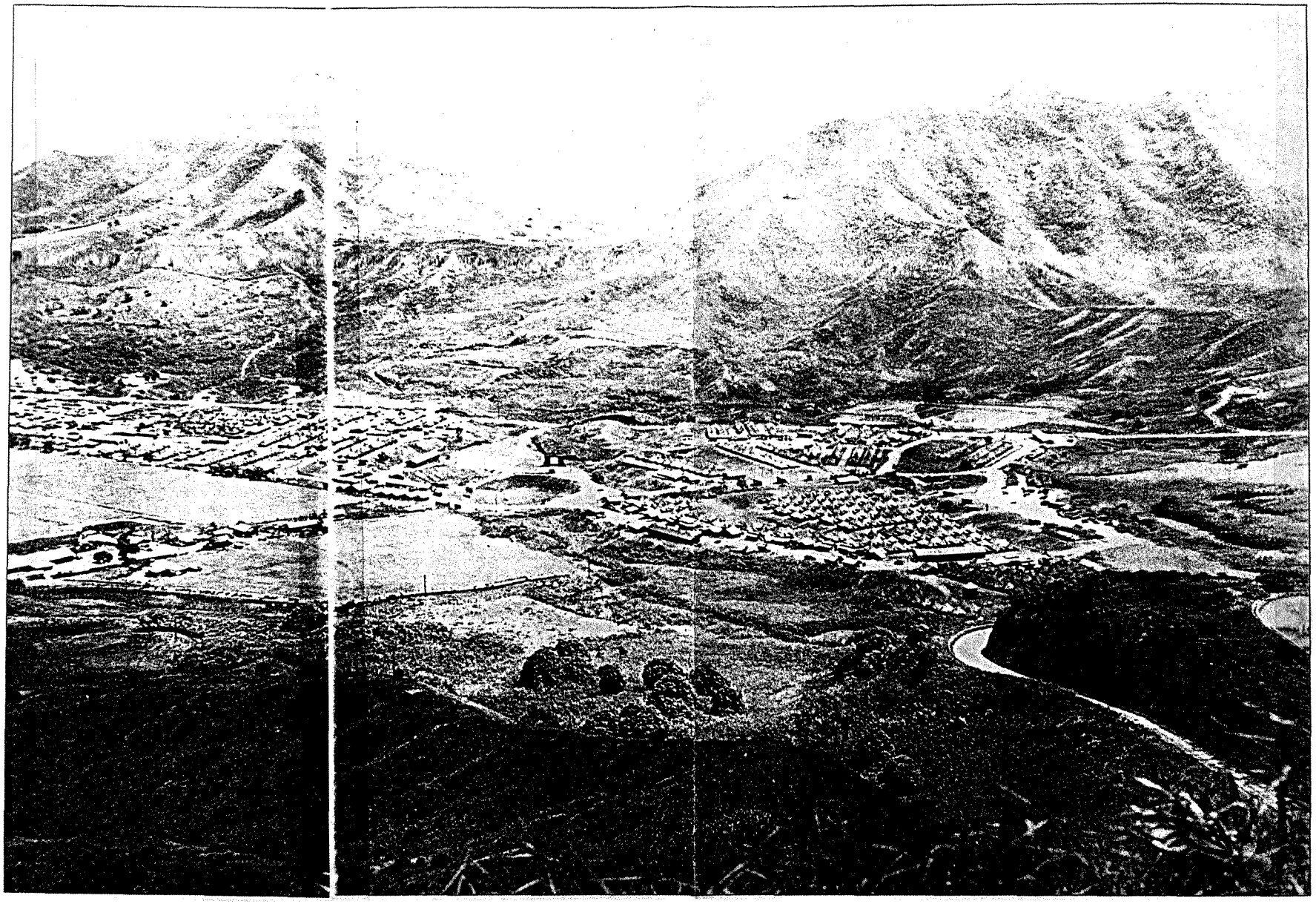
On 11-12-93, 11-15-93, 11-19-93 and 11-25-93 a survey to determine the extent and magnitude of uxo contamination was conducted in and around the former Pali Impact Area. A visual walk through survey method was utilized to search for indications of surface oew/uxo. The Schonstedt GA-52C was utilized to search for subsurface anomalies that would indicate the possible presence of subsurface oew/uxo.

The intended search pattern attempted was to diagonally crisscross the long axis of the site with several traverse. To have attempted the search the long axis would have been virtually impossible due to the steep and slippery terrain. The site was covered with typical jungle vegetation (Ti plants, Lauhala,lantana) and Australian Pine.

No visual indication of oew/uxo was located other than what appears to be scarring on the face of the cliffs behind the former impact area.. This may be from the winds but is located only on the portion of the area that was the Pali Impact area and is atypical of artillery scarring. Interviews with former residents indicated that artillery rounds were fired over there heads in the Makalii and Maunawili Valleys from what is now the Olomana housing subdivision. In discusssion with Capt Shivers of the 6th EOD Detachment and Sgt Hanzawa of the HPD Bomb Squad there is no recent reports of uxo being reported at the site of former impact area.

It is recommended that an expanded search and wider scope investigation be conducted at the site to determine the extent and magnitude of uxo contamination.

BYRON L DONALDSON
VICE PRESIDENT



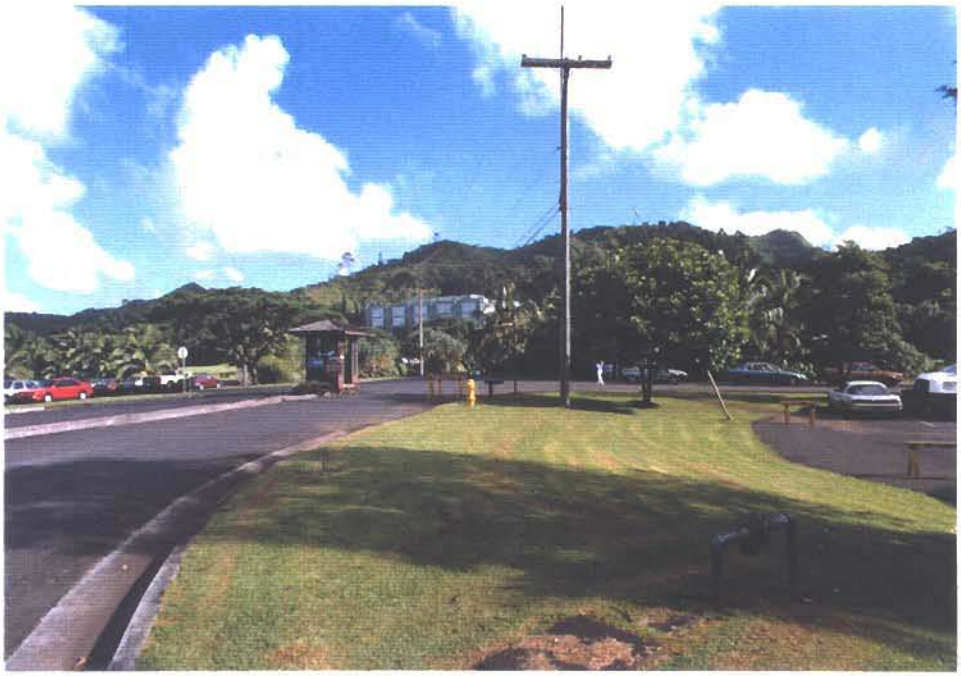
1. August 1945 photograph of Pali Training Camp's troop encampment at the foot of Nuuanu Pali where Hawaii Pacific College, Pali Golf Course, and Koolau Golf Course are presently located. Visible at the upper right corner of the photograph is Oneawa Hills. From *Hawaii Goes to War*, 1989, by D. Brown.

2. Present day view of the encampment at the foot of Nuuanu Pali from approximately the same vantage point as that in photo no. 1. At far right center is Oneawa Hills. Visible at its base is Hawaii Pacific University. Open spaces are Pali and Koolau Golf Courses. View facing northeast.

3. View of Kamehameha Highway facing northwest towards the town of Kaneohe. Entrances to Pali Golf Course and Hawaii Pacific University are visible at left and right, respectively, in the photograph.

4. View of Pali Golf Course from the clubhouse facing northeast. Visible in the distance are Oneawa Hills and Hawaii Pacific University.

5. View of Pali Golf Course from the 18th green facing west. Koolau Range is visible in the distance.



6. Entrance to the Hawaii Pacific University campus. View facing north.

7. Hawaii Pacific University campus. View facing northeast.

8. View of Maunawili Valley facing east from Pali Highway. St. Stephens Diocesan Center is in the foreground and Mount Olomana is in the background.

9. View of Maunawili Valley facing northeast from Maunawili Demonstration Trail. The trail and that pictured in the foreground would have resided within the artillery impact area.

10. View of the artillery impact area in Maunawili Valley facing southeast. Aniani Nui Ridge is visible at left in the photograph.

11. View of the artillery impact area facing east. Aniani Nui Ridge is visible in the background. The unvegetated area at center in the photograph is reported to have been cleared by Hawaii Sugar Planters' Association for plant breeding.

12. View of Maunawili Valley facing northeast. Visible at left center in the photograph is Mount Olomana and Olomana Ridge. To its right is Aniani Nui Ridge. In the distance beyond the ridge is Waimanalo.

13. View of the artillery impact area in Maunawili Valley facing southwest from the Royal Hawaiian Country Club clubhouse. The unvegetated plot at center in the photograph is the same as that pictured in photo no. 11. The country club golf course is in the foreground.

14. Royal Hawaiian Country Club golf course and the rear of Maunawili Valley. View facing south.

15. Mouth of Maunawili and Makalii Valleys where an Army ice house and bakery formerly resided. In the distance is the artillery impact area in Maunawili Valley.

16. Site of the former Hirata residence in Makalii Valley where Army barracks were erected. The barracks were demolished at the end of World War II, and the construction materials salvaged for reuse by the civilian community. View facing north.

17. Gun pits in Makalii Valley were situated behind the taro patch just beyond the stand of trees.

Appendix 1: Maunawili Trail Alignment Vascular Plant Checklist

The following vascular plants were observed during the Hawaii Heritage Program reconnaissance surveys during August 1990 and March 1991. The list is arranged alphabetically by family within the Pteridophyta (ferns and fern allies), and the two Angiosperm (flowering plant) classes: Dicots and Monocots. Under each family, genera and species are listed alphabetically. Common names, if any, are given for each species. Fern nomenclature is after Lamoureux (in prep.). Angiosperm nomenclature is after Wagner, et al (1990).

There is a column for each of five general vegetation types observed along the Maunawili trail alignment: Koa Lowland Mesic Forest (K), Mamaki Lowland Wet Shrubland (M), 'Ohi'a/Uluhe Lowland Wet Forest (O), Uluhe Lowland Wet Shrubland (U), and Non-native Vegetation (N). The presence of plants in the vegetation types is indicated with an "*" in appropriate columns.

			Native Vegetation:				
STATUS	TAXON	COMMON NAME (if known)	K	M	O	U	N
	FERNS AND FERN ALLIES						
	Adiantaceae						
N	Adiantum raddianum Presl	Maidenhair fern					*
	Angiopteridaceae						
N	Angiopteris evecta (Forst.) Hoffm.	-	*				*
	Aspidiaceae						
E	Cranfia latifrons (Brack.) Copel.	-					*
E	Tectaria gaudichaudii (Mett.) Maxon	'Iwa'hra lau nui		*			*
	Aspleniaceae						
I	Asplenium nidus L.	'Ekaha, bird's-nest fern					*
	Athyriaceae						
N	Athyrium japonicum (Thunb.) Copel.	-		*	*		*
E	Deparia prolifera (Kaulf.) Hook. & Grev. var. marginale (Hillebr.)	-		*			*
E	Diplazium sandwichianum (Presl) Diels	Ho'i'o, pohole		*			*
	Blechnaceae						
N	Blechnum occidentale L.	-		*	*		*
E	Sadleria cyatheoides Kaulf.	'Ama'u, ma'u	*			*	
	Dennstaedtiaceae						
I	Microlepia strigosa (Thunb.) Presl	Palapalai					*
	Dicksoniaceae						
E	Cibotium splendens (Gaud.) Krajina ex Skottsb.	Hapu'u pulu, treefern	*		*	*	*
	Elaphoglossaceae						
E	Elaphoglossum crassifolium (Gaud.) Anders. & Crosby	-					*
	Gleicheniaceae						
I	Diplopteris linearis (Burm.) Underw.	Uluhe	*		*	*	*
	Hemionitidaceae						
N	Pityrogramma calomelanos (L.) Link	Goldfern					*
	Hymenophyllaceae						
I	Gonocormus minutus (Blume) v. d. Bosch	-					*
E	Vandenboschia cyrtotheca (Hillebr.) Copel.	-					*
E	Vandenboschia davallioides (Gaud.) Copel.	-					*

Status Codes: N = Non-native I = Indigenous (found naturally in Hawaii and elsewhere) E = Endemic (restricted to Hawaii)

MAUNAWILI TRAIL ALIGNMENT VASCULAR PLANT CHECKLIST (continued)

STATUS	TAXON	COMMON NAME (if known)	Native Vegetation: K	M	O	U	N
	Hypolepidaceae						
E	Pteridium aquilinum (L.) Kuhn ssp. decompositum (Gaud.)	-	*		*		
	Lindsaeaceae						
I	Sphenomeris chinensis (L.) Maxon	Pala'a					*
	Lycopodiaceae						
I	Lycopodium cernuum L.	Wawae'iole	*				
	Nephrolepidaceae						
I	Nephrolepis exaltata (L.) Schott	Kupukupu, ni'ani'au					*
N	Nephrolepis multiflora (Roxb.) Jarrett ex Morton	Kupukupu, ni'ani'au	*	*	*	*	*
	Ophioglossaceae						
E	Ophioglossum pendulum L. ssp. falcatum Clausen	Puapuamoa	*				*
	Polypodiaceae						
N	Phlebodium aureum (L.) J. Sm.	Hare'a-loot fern, laua'e haole	*				*
N	Phymatosorus scolopendria (Burm.) Pic.-Ser.	Laua'e					*
I	Pleopeltis thunbergiana Kaulf.	Pakahakaha, 'ekaha 'akolea					*
	Psilotaceae						
I	Psilotum nudum (L.) Beauv.	Moa			*		*
	Selaginellaceae						
E	Selaginella arbuscula (Kaulf.) Spring	Lepelepe-a-moa			*		*
	Thelypteridaceae						
E	Christella cyatheoides (Kaulf.) Holtt.	Kikawaio					*
N	Christella dentata (Forsk.) Brownsey & Jermy	-					*
N	Christella parasitica (L.) Levl.	-	*	*	*	*	*
N	Macrothelypteris torresiana (Gaud.) Ching	-					*
E	Pneumatopteris hudsoniana (Brack.) Holtt.	-					*
			..				
	Vittariaceae						
I	Vittaria elongata Sw.	-	*				*
	FLOWERING PLANTS: DICOTS						
	Acanthaceae (Acanthacea family)						
N	Thunbergia laurifolia Lindl.	Purple allamanda					*
	Amaranthaceae (Amaranth family)						
E	Charpentiera obovata Gaud.	Papala					*
	Anacardiaceae (Mango family)						
N	Mangifera indica L.	Mango					*
N	Schinus terebinthifolius Raddi	Christmas berry, wiliwili			*		*
	Apiaceae (Parsley family)						
N	Centella asiatica (L.) Urb.	Asiatic pennywort, pohe kula	*		*		*
	Apocynaceae (Dogbane family)						
E	Alyxia oliviformis Gaud.	Maile					*
	Aquifoliaceae (Holly family)						
E	Ilex anomala Hook. & Arnott	Kawa'u			*		
	Araliaceae (Ginseng family)						
N	Schefflera actinophylla (Endl.) Harms	Octopus tree			*		*
	Asteraceae (Sunflower family)						
I	Adenostemma lavenia (L.) Kuntze	Kamanamana					*
N	Ageratina adenophora (Spreng.) R. King & H. Robinson	Maui pamakani					*
N	Ageratina riparia (Regel) R. King & H. Robinson	Hamakua pamakani					*
N	Ageratum conyzoides L.	Maile hohono					*

Status Codes: N = Non-native I = Indigenous (found naturally in Hawaii and elsewhere) E = Endemic (restricted to Hawaii)

MAUNAWILI TRAIL ALIGNMENT VASCULAR PLANT CHECKLIST (continued)

STATUS	TAXON	COMMON NAME (if known)	Native Vegetation: K	M	O	U	N
E	Artemisia australis Less.	Hinahina, hinahina kuahiwi					•
E	Bidens sandvicensis Less. ssp. sandvicensis	Ko'oko'olau, koko'olau					•
N	Conyza bonariensis (L.) Cronq.	Hairy horseweed, ilioha					•
N	Crassocephalum crepidioides (Benth.) S. Moore	-	•		•	•	•
N	Emilia sonchifolia (L.) DC	Flora's paintbrush	•		•		•
N	Erechtites valerianifolia (Wolf) DC	Fireweed	•		•	•	•
N	Erigeron karvinskianus DC	Daisy fleabane					•
N	Pluchea indica (L.) Less.	Indian fleabane					•
N	Pluchea symphytifolia (Mill.) Gillis	Sourbush	•		•	•	•
N	Sonchus oleraceus L.	Sow thistle, puaiele	•				
N	Vernonia cinerea (L.) Less. var. parviflora (Reinw.) DC	Little ironweed					•
N	Youngia japonica (L.) DC	Oriental hawksbeard	•	•		•	•
	Begoniaceae (Begonia family)						
N	Begonia hirtella Link	Begonia					•
	Bignoniaceae (Bignonia family)						
N	Jacaranda mimosifolia D. Don	Jacaranda					•
N	Spathodea campanulata P. Beauv.	African tulip tree	•		•		
	Buddlejaceae (Butterfly bush family)						
N	Buddleia asiatica Lour.	Dogtail					•
	Campanulaceae (Bellflower family)						
E	Clermontia kakeana Meyen	'Oha, 'ohawai			•		
E	Cyanea angustifolia (Cham.) Hillebr.	'Oha, haha, 'ohawai					•
	Caryophyllaceae (Pink family)						
N	Drymaria cordata (L.) Willd. ex Roem. & Schult. var. pacifica Mizush.	Pipili, pilipili					•
	Casuarinaceae (She-oak family)						
N	Casuarina equisetifolia L.	Common ironwood, paina	•				•
	Cecropiaceae (Cecropia family)						
N	Cecropia obtusifolia Bertol.	Guarumo, trumpet tree	•		•	•	
	Combretaceae (Indian almond family)						
N	Terminalia myriocarpa Van Heurck & Mull. Arg.	Jhaina					•
	Convolvulaceae (Morning glory family)						
N	Ipomoea alba L.	Moon flower, koali pehu				•	•
I	Ipomoea indica (J. Burm.) Merr.	Koali 'awa, koali 'awahia					•
	Cucurbitaceae (Gourd family)						
N	Momordica charantia L.	Balsam pear					•
	Ebenaceae (Ebony family)						
E	Diospyros hillebrandii (Seem.) Fosb.	Lama, elama					•
E	Diospyros sandwicensis (A. DC) Fosb.	Lama, elama	•				•
	Elaeocarpaceae (Elaeocarpus family)						
E	Elaeocarpus bifidus Hook. & Arnott	Kalia	•				
	Epacridaceae (Epacris family)						
I	Styphelia tameiameiae (Cham. & Schlechtend.) F. v. Muell.	Pukiawe					•
	Euphorbiaceae (Spurge family)						
N	Aleurites moluccana (L.) Willd.	Candlenut, kukui	•	•	•	•	•
E	Antidesma platyphyllum H. Mann var. platyphyllum	Hame, mehame					•
E	Chamaesyce multiformis (Hook. & Arnott) Croizat & Degener var. microphylla	-					•
	Fabaceae (Pea family)						
N	Acacia confusa Merr.	Formosan koa					•
E	Acacia koa A. Gray	Koa	•		•		•
N	Caesalpinia decapetala (Roth) Alston	Wait-a-bit, mysore thorn	•				
N	Chamaecrista nictitans (L.) Moench ssp. patellaria (DC ex Collad.)	-					•

Status Codes: N = Non-native I = Indigenous (found naturally in Hawaii and elsewhere) E = Endemic (restricted to Hawaii)

MAUNAWILI TRAIL ALIGNMENT VASCULAR PLANT CHECKLIST (continued)

			Native Vegetation:				
STATUS	TAXON	COMMON NAME (if known)	K	M	O	U	N
N	Desmodium incanum DC	Spanish clover, ka'imi					•
N	Leucaena leucocephala (Lam.) de Wit	Haole koa, koa haole, ekoa					•
N	Parasenianthus falcataria (L.) I. Nielsen	-					•
N	Senna septemtrionalis (Viv.) H. Irwin & Barneby	Kolomona					•
	Gesneriaceae (African violet family)						
E	Cyrtandra grandiflora Gaud.	Ha'iwale, kanawao ke'oke'o		•			•
E	Cyrtandra laxiflora H. Mann	Ha'iwale, kanawao ke'oke'o		•			•
E	Cyrtandra paludosa Gaud. var. paludosa	Ha'iwale, kanawao ke'oke'o					•
	Goodeniaceae (Goodenia family)						
E	Scaevola gaudichaudiana Cham.	Naupaka	•	•	•		•
	Loganiaceae (Logania family)						
E	Labordia tinifolia A. Gray var. tinifolia	Kamakahala					•
	Malvaceae (Mallow family)						
I?	Hibiscus tiliaceus L.	Hau			•		•
I	Sida fallax Walp.	'Ilima					•
	Melastomataceae (Melastoma family)						
N	Arthrostema ciliatum Pav. ex D. Don	-	•		•		•
N	Clidemia hirta (L.) D. Don var. hirta	Koster's curse	•		•		•
N	Oxyspora paniculata (D. Don) DC	-			•		
	Meliaceae (Mahogany family)						
N	Toona ciliata M. Roem. var. australis (F. v. Muell.) C. DC	Australian red cedar	•		•		•
	Menispermaceae (Moonseed family)						
I	Cocculus trilobus (Thunb.) DC	Huehue	•		•		
	Moraceae (Mulberry family)						
N	Ficus sp.	-	•				•
N	Ficus microcarpa L. fil.	Chinese banyan, Malayan banyan	•		•		•
	Myrsinaceae (Myrsine family)						
E	Myrsine lessertiana A. DC	Kolea					•
	Myrtaceae (Myrtle family)						
I	Eugenia reinwardtiana (Blume) DC	Nioi					•
N	Melaleuca quinquenervia (Cav.) S. T. Blake	Paperbark	•				
E	Metrosideros macropus Hook. & Arnott	'Ohi'a, 'ohi'a lehua, lehua			•		
E	Metrosideros polymorpha Gaud.	'Ohi'a, 'ohi'a lehua, lehua	•		•	•	•
E	Metrosideros tremuloides (A. Heller) P. Knuth	Lehua 'ahihi					•
N	Psidium cattleianum Sabine	Strawberry guava, waiawi	•		•		•
N	Psidium guajava L.	Guava, kuawa	•		•	•	•
N	Syzygium cumini (L.) Skeels	Java plum	•		•		•
N	Syzygium jambos (L.) Alston	Rose apple					•
N	Syzygium malaccense (L.) Merr. & Perry	Mountain apple, 'ohi'a 'ai					•
	Nyctaginaceae (Four-o'clock family)						
E	Pisonia umbellifera (G. Forster) Seem.	Papala kepau		•			•
	Oleaceae (Olive family)						
E	Nestegis sandwicensis (A. Gray) Degener, I. Degener & L. Johnson	Olopua, pua					•
	Onagraceae (Evening primrose family)						
N?	Ludwigia octovalvis (Jacq.) Raven	Primrose willow, kamole					•
	Passifloraceae (Passion flower family)						
N	Passiflora laurifolia L.	Yellow granadilla, yellow water lemon					•
N	Passiflora suberosa L.	Huehue haole					•
	Piperaceae (Pepper family)						
I	Peperomia leptostachya Hook. & Arnott	'Ala'ala wai nui					•
E	Peperomia membranacea Hook. & Arnott	'Ala'ala wai nui		•			•

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MAUNAWILI TRAIL ALIGNMENT VASCULAR PLANT CHECKLIST (continued)

STATUS	TAXON	COMMON NAME (if known)	Native Vegetation: K	M	O	U	N
E	Peperomia sandwicensis Miq.	'Ala'ala wai nui					•
I	Peperomia tetraphylla (G. Forster) Hook. & Arnott	'Ala'ala wai nui	•				
N	Piper methysticum G. Forster	Kava, 'awa					•
	Pittosporaceae (Pittosporum family)						
E	Pittosporum flocculosum (Hillebr.) Sherff	Ho'awa					•
	Proteaceae (Protea family)						
N	Grevillea robusta A. Cunn. ex R. Br.	Silk oak	•		•		•
	Rosaceae (Rose family)						
I	Osteomeles anthyllidifolia (Sm.) Lindl.	'Ulei					•
N	Rubus rosifolius Sm.	Thimbleberry	•	•	•		•
	Rubiaceae (Coffee family)						
E	Bobea elatior Gaud.	'Ahakea	•		•	•	
I	Canthium odoratum (G. Forster) Seem.	Alahe'e					•
N	Coffea arabica L.	Arabian coffee					•
E	Hedyotis acuminata (Cham. & Schlechtend.) Steud.	Au					•
E	Hedyotis terminalis (Hook. & Arnott) W. L. Wagner & Herbst	Manono			•		•
N	Morinda citrifolia L.	Noni					•
N	Paederia scandens (Lour.) Merr.	Maile pilau	•		•	•	•
E	Psychotria kaduana (Cham. & Schlechtend.) Fosb.	Kopiko, 'opiko					•
E	Psychotria mariniana (Cham. & Schlechtend.) Fosb.	Kopiko, 'opiko			•		•
	Solanaceae (Nightshade family)						
I?	Solanum americanum Mill.	Glossy nightshade, Popolo	•				•
	Thymelaeaceae ('Akia family)						
E	Wikstroemia oahuensis (A. Gray) Rock	'Akia					•
	Tiliaceae (Linden family)						
N	Triumfetta semitriloba Jacq.	Sacramento bur					•
N	Heliocarpus popayanensis Kunth	Moho, white moho	•				•
	Urticaceae (Nettle family)						
E	Boehmeria grandis (Hook. & Arnott) A. Heller	-		•	•		•
N	Pilea microphylla (L.) Liebm.	Artillery plant, rockweed					•
I	Pilea peploides (Gaud.) Hook. & Arnott	-					•
E	Pipturus albidus (Hook. & Arnott) A. Gray	Mamaki	•	•	•		•
E	Touchardia latifolia Gaud.	Olona					•
E	Urera glabra (Hook. & Arnott) Wedd.	Opuhe		•			•
	Verbenaceae (Verbena family)						
N	Citharexylum caudatum L.	Fiddlewood	•		•	•	•
N	Lantana camara L.	Lantana			•		•
N	Stachytarpheta dichotoma (Ruiz & Pav.) Vahl	Oi					•
N	Stachytarpheta urticifolia (Salisb.) Sims	-					•
	FLOWERING PLANTS: MONOCOTS						
	Agavaceae (Agave family)						
N	Cordyline fruticosa (L.) A. Chev.	Ti, ki	•	•	•	•	•
E	Pleomele halapepe St. John	Halapepe					•
	Araceae (Philodendron family)						
N	Alocasia macrorrhiza (L.) Schott	'Ape					•
N	Colocasia esculenta (L.) Schott	Taro, kalo					•
	Arecaceae (Palm family)						
N	Livistonia chinensis (Jacq.) R. Br. ex Mart.	Chinese fan palm			•		•
N	Phoenix sp.	Date palm					•
N	Roystonea sp.	Royal palm			•		•
	Commelinaceae (Spiderwort family)						
N	Commelina diffusa N. L. Burm.	Honohono					•

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MAUNAWILI TRAIL ALIGNMENT VASCULAR PLANT CHECKLIST (continued)

STATUS	TAXON	COMMON NAME (If known)	Native Vegetation: K	M	O	U	N
	Cyperaceae (Sedge family)						
I	Carex meyenii Nees	-					•
E	Carex wahuensis C. A. Mey.	-					•
I	Cladium jamaicense Crantz	'Uki					•
N	Eleocharis geniculata (L.) Roem. & Schult.	Spikerush					•
I	Fimbristylis dichotoma (L.) Vahl	-	•				•
N	Kyllinga nemoralis (J. R. Forster & G. Forster) Dandy ex Hutchinson & Dalziel	Kili'o'opu					•
E	Machaerina mariscoides (Gaud.) J. Kern ssp. meyenii (Kunth) T. Koyama	-	•			•	
	Dioscoreaceae (Yam family)						
N	Dioscorea alata	Yam	-				•
N	Dioscorea bulbifera L.	Bitter yam, hoi	•	•			•
N	Dioscorea pentaphylla L.	Pi'a	•		•		•
	Heliconiaceae (Heliconia family)						
N	Heliconia sp.	Heliconia					•
	Musaceae (Banana family)						
N	Musa x paradisiaca L.	Banana, mai'a					•
	Orchidaceae (Orchid family)						
N	Epidendrum x obrienianum Rolfe	Scarlet orchid, butterfly orchid					•
N	Spathoglottis plicata Blume	Malayan ground orchid,					•
	Pandanaceae (Screw pine family)						
I	Freycinetia arborea Gaud.	'ie'ie	•		•		•
I?	Pandanus tectorius S. Parkinson ex Z.	Hala, screw pine					•
	Poaceae (Grass family)						
N	Andropogon virginicus L.	Broomsedge, yellow bluestem					•
I?	Chrysopogon aciculatus (Retz.) Trin.	Golden beardgrass, manienie 'ula, pilipili					•
N	Coix lachryma-jobi L.	Job's tears, pu'ohe'ohe					•
N	Digitaria ciliaris (Retz.) Koeler	Henry's crabgrass, kukaepua'a					•
N	Digitaria pentzii Stent	Pangola grass					•
E	Eragrostis variabilis (Gaud.) Steud.	Kawelu, 'emoloa					•
I?	Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult.	Pili, twisted beardgrass					•
N	Oplismenus hirtellus (L.) P. Beauv.	Basketgrass, honohono kukui	•	•	•		•
N	Paspalum conjugatum Bergius	Hilo grass			•		•
I?	Paspalum scrobiculatum L.	Ricegrass					•
N	Pennisetum purpureum Schumach.	Elephant grass, Napier grass					•
N	Secciolepis indica (L.) Chase	Glenwood grass					•
N?	Schizostachyum glaucifolium (Rupr.) Munro	Bamboo, 'ohe					•
N	Setaria gracilis Kunth	Yellow foxtail					•
N	Setaria palmifolia (J. Konig) Stapf	Palmgrass	•		•		•
	Smilacaceae (Catbrier family)						
E	Smilax melastomifolia Sm.	Hoi kuahiwi					•
	Zingiberaceae (Ginger family)						
N	Hedychium gardnerianum Ker-Gawl.	Kahili ginger					•
N	Zingiber zerumbet (L.) Sm.	Shampoo ginger, 'awapuhi kuahiwi	•		•		•

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Appendix 2: Avian Checklist

The birds listed have been reported from visual and audio identification along the Maunawili trail alignment. The list includes information compiled from the literature and other sources. Taxonomy follows the "Checklist of the Birds of Hawaii" (Pyle 1988).

STATUS	SCIENTIFIC NAME	HAWAIIAN AND/OR VERNACULAR NAME	SOURCE
N	Acridotheres tristis	common myna	*
N	Cettia diphone	Japanese bush-warbler	*
E	Chasiempis sandwichensis gayi	Oahu 'elepaio	x
N	Copsychus malabaricus	white-rumped shama	*
N	Geopelia striata	zebra dove	*
N	Leiothrix lutea	red-billed leiothrix	*
I	Phaethon lepturus dorotheae	koa'e kea, white-tailed tropicbird	*
I	Pluvialis dominica	kolea, lesser golden-plover	*
N	Pycnonotus cafer	red-vented bulbul	*
N	Streptopelia chinensis	spotted dove	*
N	Zosterops japonicus	Japanese white-eye	*

+ = Rare
E = Endemic
N = Non-native
I = Indigenous

x = Personal communication (Dick Davis, DOFAW trail alignment team, 1990)
* = Observed during field survey

Note: though not considered rare by the Hawaii Heritage Program, the Oahu 'elepaio appears to be declining and is of academic concern.