

**CULTURAL RESOURCE MANAGEMENT
at the
ARMY SUB-INSTALLATIONS
of the
U.S. ARMY GARRISON HAWAII**

ANNUAL REPORT

Prepared by:
Pacific Cooperative Studies Unit, University of Hawaii
Army Natural Resource Center, Building 1595
Schofield Barracks, HI 96857-5000

David Cox, with Loren Zulick

Dr. Laurie Lucking, Principle Investigator

For The U.S. Army Garrison, Hawaii

Contract: ECOSYSTEM MANAGEMENT PROGRAM at Various Army
Training Areas, Island of O`ahu (as revised 8 June 1998).

November 2005

ABSTRACT

This report documents the research results of the fourth year of a contract for various Cultural Resources Management activities undertaken on Army lands on the Island of O`ahu. This continuing contract has been entered into between the Conservation and Restoration Branch, Environmental Division of the Directorate of Public Works (DPW), of the US Army Garrison, Hawaii (USAG-HI), and the Pacific Cooperative Studies Unit (PCSU) of the Research Corporation University of Hawaii (RCUH). The provisions of that contract are specified in the Scope of Work for the Ecosystems Management Program at Various Training Areas, Island of O`ahu (SOW) (as revised 8 June 1998). This report specifically addresses those projects and activities as they are outlined in that Contract in the section entitled Cultural Resources Management, or Section 5. Part c sub parts (1) and (2), on pages 5 and 6 of that June 1998 SOW. On the basis of the contract a Cultural Resources Section has been established as a part of the DPW's Conservation and Restoration Branch, along the lines of the previously established Natural Resources Section.

The goal of the Cultural Resources Section of the US Army's Ecosystem Management Program of which we are a part, is to provide those research and support services needed to conserve, protect, and enhance the cultural resources of Hawai'i in general , and specifically on Army lands. In practice this means balancing compliance of applicable Federal and State laws and regulations while at the same time improving the Army's ability to conduct training and maintain military readiness. The primary Army lands that are considered for these services for the purpose of this contract are the seven Major Training Areas and Ranges on O`ahu, namely: Makua Military Reservation (MMR), Kawaihoa Training Area (KLO), Kahuku Training Area (KTA), Dillingham Military Reservation (DMR), and Schofield Barracks Military Reservation (SBA = Schofield Barracks All - including all sub areas; SBC = Schofield Barracks Cantonment – the central developed area; SBE = East Range; SBS = South Range; and SBW = West Range) (see Figure 1, Map of O`ahu). In addition, the Cultural Resources Section is responsible for all historic and cultural properties on each of the other 15 Army Sub-Installations on O`ahu, and occasionally provides assistance with service on those Army properties located on the Island of Hawai'i.

The projects, research and activities called for in the Cultural Resources Section of the Ecosystems Management Program SOW, and that are presented in this report, consist of a variety of actions and deliverables, as listed as follows:

- Field Inventory Surveys and Reports
- Site Identification and Documentation
- Site Relocation (with sub-meter GPS)
- Site Monitoring
- Site and Area Assessment and Prioritization
- Development and Preparation of Various Field Data and Record Forms
- Development and Management of an Archaeological Site Database
- Management of a Storage Facility
- Various Other Duties as Performed Outside the SOW

David Cox and Loren Zulick (Cultural Resources Specialists) performed these actions and produced these deliverables as PCSU / RCUH year to year contract employees. All work was done at the direction of and under the supervision of Dr. Laurie Lucking of the Directorate of Public Works (DPW), Environmental Division, and Cultural Resources Manager for the U. S. Army Garrison – Hawaii (USAG-HI).

The research and field operations that are summarized in this report occurred between 1 June 2002 and 31 May 2003, and was in part a continuation of on going research and field activities that were initiated in June of 1999. Loren Zulick left DPW / PCSU to take a position at Ft. Shafter with the Corps of Engineers Environmental Office in December 2003.

TABLE OF CONTENTS

ABSTRACT	ii
TABLE OF CONTENTS	iv
INTRODUCTION	1
PEDESTRIAN FIELD SURVEY: 5.c (1)(a and b)	7
Introduction	7
Standards for Preservation Planning	7
Standards for Identification	7
Standards for Evaluation	8
Standards for Registration	8
Standards for Historical Documentation	9
Standards for Archaeological Documentation	9
FIELD SURVEYS	9
Methods and Procedures	10
Findings	12
Surveys at Dillingham Military Reservation (DMR)	12
Survey within Kawaihoa Training Area (KLO)	20
Surveys within Kahuku Training Area (KTA)	44
Survey within Pohakuloa Training Area (PTA)	56
Surveys within Makua Military Reservation (MMR)	61
Surveys within Schofield Barracks, Cantonment Area (SBC)	80
Surveys within Schofield Barracks West Range (SBW)	83
SITE MONITORING AND DATA SHEETS: SECTION 5.c (1)(c and g)	89
Periodic Monitoring	89
Monitored Sites	90
Monitoring , Discussion and Findings	92
State Site #50-80-08-5392, SBS	92
State Site #50-80-08-5448, SBS	93
Sites 50-80-02-2358 and 2359 KTA	95
Recommendations	95
Monitoring Training at Makua Military Reservation	96
CRM DATABASE & GPS SITE PLOTTING: SECTION 5.c (1)(d and b)	100
Site Plotting with GPS	100
Cultural Resources Management Database	100
SHARING INFORMATION & DATA: SECTION 5.c (2)	105
DPW	105
ITAM	105
SBCT/ Transformation	107
FTI / SBCT Communication Towers	107
RCI	113
Additional Research in Support of CEMML	113
Inter Agency Consultations	114
ADDITIONAL PROJECTS & ACTIVITIES OUTSIDE THE SOW	115
Field Reconnaissance for ‘Dig Requests’ in Potentially Sensitive Areas	115

Providing Escort for Cultural Access Visits to Makua Military Reservation.....	119
Assistance Provided when Chartered Helicopter Went Down	130
Construction Inspection and Salvage of Historic Fixtures During Renovations at Wheeler Army Air Field.....	130
Reconnaissance and GPS Survey of proposed ungulate exclosures in the State Forestry's Pahole Natural Area Reserve (NAR)	132
Escorting Jan Becket, Photographer to Sites at MMR.....	137
JOB RELATED STAFF TRAINING	140
RECOMMENDATIONS	142
Sites Database	142
REFERENCES.....	143
APPENDIX.....	152
APPENDIX I.....	153
APPENDIX II	158

LIST OF FIGURES

Figure 1.	Map of the Seven Major Training Installations on O`ahu.....	2
Figure 2.	Captain Blum, CO of H & HQ Co., and Staff at DMR.	13
Figure 3.	Members of 45 th Corps Support Group (Forward), Considering Possible.....	14
	Defensive Position Locations, at DMR.....	14
Figure 4.	Christi Shaw and Steve Kim starting out old Jeep Trail.....	17
Figure 5.	Eroded Upper Middle Section of Old Jeep Trail.....	17
Figure 6.	Dillingham Ranch (to right of center) and Dillingham Air Strip (left of center)... ..	18
Figure 7.	West edge of DMR, and Air Strip, with mild Telephoto Lens.....	18
Figure 8.	Typical Jeep Trail, in Kawiul Gulch. Viewed to NW	19
Figure 9.	Map showing 'Kawailoa 20' Project Area, and Disturbed Soils.....	21
Figure 10.	Pre-Use Photo of LZ Area at 'Kawailoa 20'. Viewed to Northwest.....	22
Figure 11.	Pre-Use Photo Showing Center of Main Training Area. Viewed to Southwest... ..	22
Figure 12.	Tall Grass Boundary and View of Project Area Interior. Viewed to East.....	23
Figure 13.	Photo of Guinea Grass Boundary. Viewed to South.....	23
Figure 14.	Photo of Southeast Boundary with Old Roadway. Viewed to East.....	24
Figure 15.	Photo of Pre-Existing Roadway Extending Into Project Area. Viewed to South.....	24
Figure 16.	Photo of 'Occupied' Area from SW Perimeter Road. Viewed to Southeast.....	25
Figure 17.	Photo of 'Occupied' Area from SW Perimeter Road. Viewed to North.....	25
Figure 18.	Photo Displaying Soil Stratigraphy; Top 18"-20" Disturbed. Viewed to North.....	26
Figure 19.	Per-Existing Soil Mound Within Project Area. Viewed to Northwest.....	27
Figure 20.	Old Soil Berm on Bluff Along Perimeter Roadway. Viewed to East.....	27
Figure 21.	A 'Deuce' Beginning Excavation of TOC Surrounding Berm. Viewed to West.....	28
Figure 22.	Photo of TOC Berm Under Construction. Viewed to Southeast.....	28
Figure 23.	Interior of 0.94-Acre TOC Berm Near Completion. Viewed to West.....	29
Figure 24.	Excavation of Crew SER Fighting Position, by a SEE Truck. Viewed to North.....	29
Figure 25.	BOE at 4½ Feet for an "L" Shaped Crew SER Position. Viewed to South.....	30
Figure 26.	BOE at 4 Feet for a "T" Shaped Crew SER Position. Viewed to Northwest... ..	31
Figure 27.	Excavation of 2-Man Position on North Side of Kawailoa Rd. Viewed to West.....	31
Figure 28.	Photo of Survivability Position and Soil Filled Diverter. Viewed to WSW.	32
Figure 29.	Photo of FSSP at DMR on 24 Sept 2002. A FSSP was Planned but not.....	33
	Utilized at 'Kawailoa 20'.	33
Figure 30.	Map of the Project Area.....	34
Figure 31.	Photo of Helicopter Pick-up at Poamoho Trailhead. Viewed to South.....	35
Figure 32.	Photo of Pe`ahināi`a Landing Zone (Inside `Ōpae`ula Exclosure)	36
	Viewed to NE.....	36
Figure 33.	Survey began at this Fence line (`Ōpae`ula Exclosure) on the Ko`olau.....	37
	Summit Trail (sign) with Matt Burt next to simple Stile.	37
Figure 34.	Photo of Northern "Bowl" to be Enclosed. Part of Summit Trail Visible.....	37
	on Slope to Left Center.	37
Figure 35.	Photo of Larger, Helemano Watershed (Southern Bowl). Viewed to East.....	38

Figure 36.	General Overview of Terrain Within Proposed Exclosure. View of.....	38
	Helemano Gulch, to N.....	38
Figure 37.	Fence line Will Extend Part Way Up This Pu'u Then Around to Left,.....	39
	Viewed to West.	39
Figure 38.	Photo of Fence line Route Descending Down Ridgeline Into Helemano	40
	Gulch, Viewed to SW, with M. Burt in mid distance.	40
Figure 39.	Fence Will Follow This Ridge Down Into the South Side of Helemano	41
	Gulch, Viewed to S.	41
Figure 40.	Fence line Will Follow This Ridge Down Into Helemano Gulch,	42
	Viewed to North.	42
Figure 41.	Fence line Will Follow Part of This Summit Ridge on North Side.....	42
	of Helemano Gulch.	42
Figure 42.	Proposed Location of UHF Communication System Tower, to Left of Power Pole.....	45
Figure 43.	The New Area B-2 Road Work (indicated by red cross hatching), from portion of KTA Field Map indicating nearby Sites.	46
Figure 44.	Mid Section of New Cut, w/ Old Road High on Left & New Berm on Right. .	47
Figure 45.	Lower Section, from Upper End of Old Road. Viewed to E.	47
Figure 46.	Upper Section of Road, w/ 3 Windmills in Distance. Viewed to SW.....	48
	(S. or left half of panoramic).....	48
Figure 47.	Upper Section, from Remains of Old Road. Viewed to W. (N. half of pan.)..	48
Figure 48.	Avengers on Lower Section. Viewed to W. (Figs 46 & 47 were taken from right of <i>Causarina</i> tree on bank beyond front of middle Humvee).....	49
Figure 49.	SHPO's Concurrence letter to NHPA Section 106 Review.....	50
Figure 50.	Map of Features at PAA # A1, KTA.....	52
Figure 51.	Hill 544, PAA 1, PTA. The Planned Defensive Positions Will be in Trees Further to the Right.	53
Figure 52.	Private Survey Marker on Low Hill to East of Hill 544.	53
Figure 53.	1927 Triangulation Station, at Hill 534, KTA. w/ L. Zulick recording	55
	a GPS shot.	55
Figure 54.	Map of Na Puu Kulua and Northwest Corner of the PTA Impact Area.	56
Figure 55.	Sean Gleason (DPW-ENV/PTA) and Crew Setting Off on Sweep.	57
Figure 56.	On the Open Grassy Pahoeohoe Area. Half of the Crew Fanning out for the Sweep, with the top Puu Kulua in the Distance.	58
Figure 57.	Burned Section Between the Puu, with Marines on Jeep Trail.	59
Figure 58.	The Aa Flow area, with Scattered Naio, Patches of Fountain Grass, the Edge of the O'hia Trees to the East, & Puu Kulua and Mauna Loa in the Distance....	60
Figure 59.	Map showing the Six (numbered in boxes) Proposed Firebreak Improvements for Prescribed Burns at MMR.....	64
Figure 60.	Photo of Crater with Rubbish, View to West (photo taken prior to reconnaissance).	66
Figure 61.	Photo Showing Condition of State Site #50-80-03-4541 Feature 2 (wall remnant) Prior to Reconnaissance.	66
Figure 62.	Clearing at MW- 2 Drill Site Area on Punapohaku Stream at	68
	the West Boundary Fence, MMR, viewed to the South.....	68
Figure 63.	Hop Toe on Access Route to Wellhead Area, viewed to North.	69

Figure 64.	View North along Fence, with Equipment Finishing Wellhead, and Ukanipo Heiau in Distance.....	69 69
Figure 65.	Access Route from Extension of North Firebreak Road,..... viewed to NW.....	70 70
Figure 66.	Trail to North Slope of 'C' Ridge, Kahanahaiki Valley, MMR.....	71
Figure 67.	Upper Most Section of Trail over to North Slope of 'C' Ridge.	72
Figure 68.	Upper Section of Cleared Trail, viewed down slope to SW.....	72
Figure 69.	Middle Section of Trail, with North Firebreak Road in distance.	73
Figure 70.	Initial Clearing (in September) at MW- 2 Drill Site Area on Punapohaku Stream, viewed to the South.....	74 74
Figure 71.	Simple Flow Gauge Pipes in Stream Crossing.....	75
Figure 72.	Large Equipment Pad and Shelter Footings on Bank, for Flow Meter.	76
Figure 73.	Small Pad in Stream Bed for Flow Meter Unit.....	76
Figure 74.	Ortho of Area of Newly Re-Cleared Trail and Clearing for AHA at MMR, in Orange, with nearby Features of Site 5427 in Orange.	78 78
Figure 75.	Old Corral, Feature 11, of Site 5427, from Bluff above.....	79
Figure 76.	Ortho of The JOC Yard area at Duckfield, SBC.....	81
Figure 77.	BOE at Sample Area #2. Photo of Sample Collection.....	82
Figure 78.	Photo of Sample Area #3, BOE at 40cms. View to West.	82
Figure 79.	Map Showing Relationship of Burn Area to 'Elepaio Critical Habitat.	86
Figure 80.	Map Showing Relationship of Burn Area to Proposed Plant Critical Habitat..	87
Figure 81.	Map Showing location of Burn Area in SBW, and Proximity to Cultural Resources.	88 88
Figure 82.	Copy of Field Recording/Monitoring Form, (Cross Section Grid on Reverse).	91
Figure 83.	Map MMR with the CALFEX area and Cultural Sites.	97
Figure 84.	Sample of Sub-Installation Dig Map Provided to ITAM.....	106
Figure 85.	Map Showing Proposed Locations of SBCT Communication Towers.	109
Figure 86.	First Choice Location for Mt. Kaala East is Attached to this PACMERS Tower.....	110 110
Figure 87.	Kaala West: Attached to this FAA Tower Would be Ideal. Or New Tower at. Subject's Location.....	110 110
Figure 88.	Third Choice for Mt. Kaala West is Construction of a New Tower at..... Subject's Location.....	111 111
Figure 89.	First Choice Location for Pahole/ Dillingham Ridge is Attached to the..... Tower at Left.....	111 111
Figure 90.	First Choice Location for Dillingham ARPT is a New Tower at Subject's Location.....	112 112
Figure 91.	Backup Location is at Dillingham P1 just Inside 'Charlie' Gate (See Subject.. at Location).	112 112
Figure 92.	Map Showing PAA 2 Previous and Current Use Areas, KTA.	116
Figure 93.	Distance Photo of PAA #2 Showing General Condition in June 2002. Viewed to East.	117 117
Figure 94.	Photo of PAA #2 Showing General Condition in June 2002. Viewed to East.	117 117
Figure 95.	LZ Canes (in foreground, & to left) and 9.4-Acre PAA 2 in Background.	118
Figure 96.	Photo of PAA 2 on 30 Sept 2002, After Use by 2-11 th . Viewed to West.	118

Figure 97.	Site 5625, Wall and Natural Dike, with Wall starting upslope just beyond White Van. Taken from Site 4546, viewed to WSW.....	120
Figure 98.	Cultural Access Group at Site 4536, Improved Puna (Spring).....	122
Figure 99.	Dr. Lucking Pointing out The Petroglyphs on Large Vertical Sandstone Slab.	122
Figure 100.	Water flowing across upper ford, unnamed stream on North Fire Break. ...	124
Figure 101.	Moderate flow across lower ford, Makua Stream, North Fire Break.	124
	Viewed to west.	124
Figure 102.	Visitors on Cultural Access going down trail to Petroglyph Slab.....	125
Figure 103.	Visitors on Malama Makua Cultural Access, viewing Petroglyph Slab.	125
Figure 104.	Two Imu at Site 5456. Photo taken in January '03, viewed to NE	127
Figure 105.	Two Imu at Site 5456. Photo taken in early May '03, viewed to W.	127
Figure 106.	Malama Makua crew cleaning up after last sand bags are down.	129
Figure 107.	Imu at Site 5456 after re-capping with ply and new sand bags.....	129
	CALFEX impact area is in distance to left.	129
Figure 108.	Map showing location of proposed Pahole NAR, and nearest cultural resources.	134
Figure 109.	Mokuleia Trailhead at Pahole NAR entrance.	135
Figure 110.	Photo of existing "Pahole Gulch fence" where exclosure 1 will tie-in,	135
	Viewed to North.	135
Figure 111.	Photo of Mokuleia Trail. View to South.....	136
Figure 112.	Photo of existing "Pahole Gulch fence" where exclosure 2 will tie-in. View to East.	136
Figure 113.	Photo of typical forest setting along proposed fence line. View to Northeast.	137

LIST OF TABLES

Table 1	Summary of Survey Area Coverage [for fiscal year = June to end of May]	6
Table 2	Description of Sample Areas	80
Table 3	Cultural Sites Closest to June 2002 Burn Area	84
Table 4	Sites Monitored Periodically	90
Table 5	Sites Located and Plotted in Fourth Year	102
Table 6	Coordinates of Areas Surveyed as Recorded on 23 December 2002	107
Table 7	Items Removed from Bldg. 600 for possible Curation.....	132

INTRODUCTION

The goal of the Cultural Resources Management Program is to provide the services and research that are needed to conserve, protect, and enhance the cultural resources that are found on lands controlled by the US Army in Hawaii. The primary areas considered for these services are the Garrison's seven major Training Areas and Ranges on O'ahu (refer to Figure 1, Map of O'ahu). These major facilities are found at: Makua Military Reservation (MMR) with an area of 4190 acres, located near the western tip of the leeward coast; Kawaihoa Training Area (KLO) 23,348 acres, mostly a large upland wilderness area reaching to the Koolau Summit Ridge, located to the north of East Range; Kahuku Training Area (KTA) 9,398 acres in the uplands at the north of KLO; Dillingham Military Reservation (DMR) 664 acres inland of the small airfield near the western tip of the North Shore; and the one large live fire range/impact area and two training areas (areas where field training occurs but no live firing is allowed) at Schofield Barracks (SBA). SBA is actually composed of five large subunits that together cover a total of 17,266 acres in the middle of O'ahu's central plateau. This facility is comprised of the following contiguous subunits – the Cantonment Area (SBC) this is the 25th Division's main base of operations, where the barracks, administrative and most of its support facilities and housing are located; East Range (SBE / 4950 acres) extends from Wheeler AAF at the west along Kamehameha Highway to the summit ridge of the Koolau Mountains, in the area just south of the town of Wahiawa; South Range (SBS) is the area to the south of Lyman and Kolekole Roads on Schofield in the upper reaches of Waiele Stream, this range area may be expanded soon; West Range and its Impact Area (SBW) are to the north of Kolekole Road and west of Beaver Road, the Cantonment Area on the east and extending west to the main ridge of the Waianae Mountains including portions of Mount Kaala; and Wheeler Army Air Field (WAA / 1370 acres) to the south and east of the Cantonment Area and Kunia Road.

The Cultural Resources Management Program also has responsibility for all the additional remaining 15 Army Sub-Installations on O'ahu. On occasion, the O'ahu Cultural Resources Specialists (the authors) are called upon to assist with services at Pohakuloa Training Area (PTA) and the three other Army Sub-Installations on the Island of Hawai'i.

The program, as outlined in the Ecosystems Management Program SOW, consists of a series of interrelated research projects that form the core of the responsibilities and activities preformed by the authors. These duties and projects call for the implementation of the actions necessary for compliance with various laws and regulations governing possible effects of various Army actions on the historic or cultural resources that are found on Army lands. The job functions required to meet the program goals include a rather wide variety of undertakings such as compiling literature searches; performing investigations including field reconnaissance inspections and field surveys to support consultations (as in assisting with Section 106 consultation between the Army and the State Historic Preservation Division and other interested parties and other agencies); the review of construction and installation proposals and plans; the review of troop training, maneuver, construction and exercise plans and inspection and monitoring of these activities; providing project mitigation

recommendations and assistance in the field to include the support and escorting of cultural visits to sites; and finally, producing this report (and others).

A major research element called for in the SOW is field investigations specifically designed to relocate and accurately fix the position of previously recorded sites that have been found during past outside contract and other surveys in portions of the Training Ranges. To this end, we have instituted an on going series of pedestrian surveys that are done to record cultural site locations with sub-meter capable GPS equipment. Once thus re-identified and located with the GPS unit these prehistoric and historic features and their adjoining areas are mapped, photographed and recorded as appropriate.

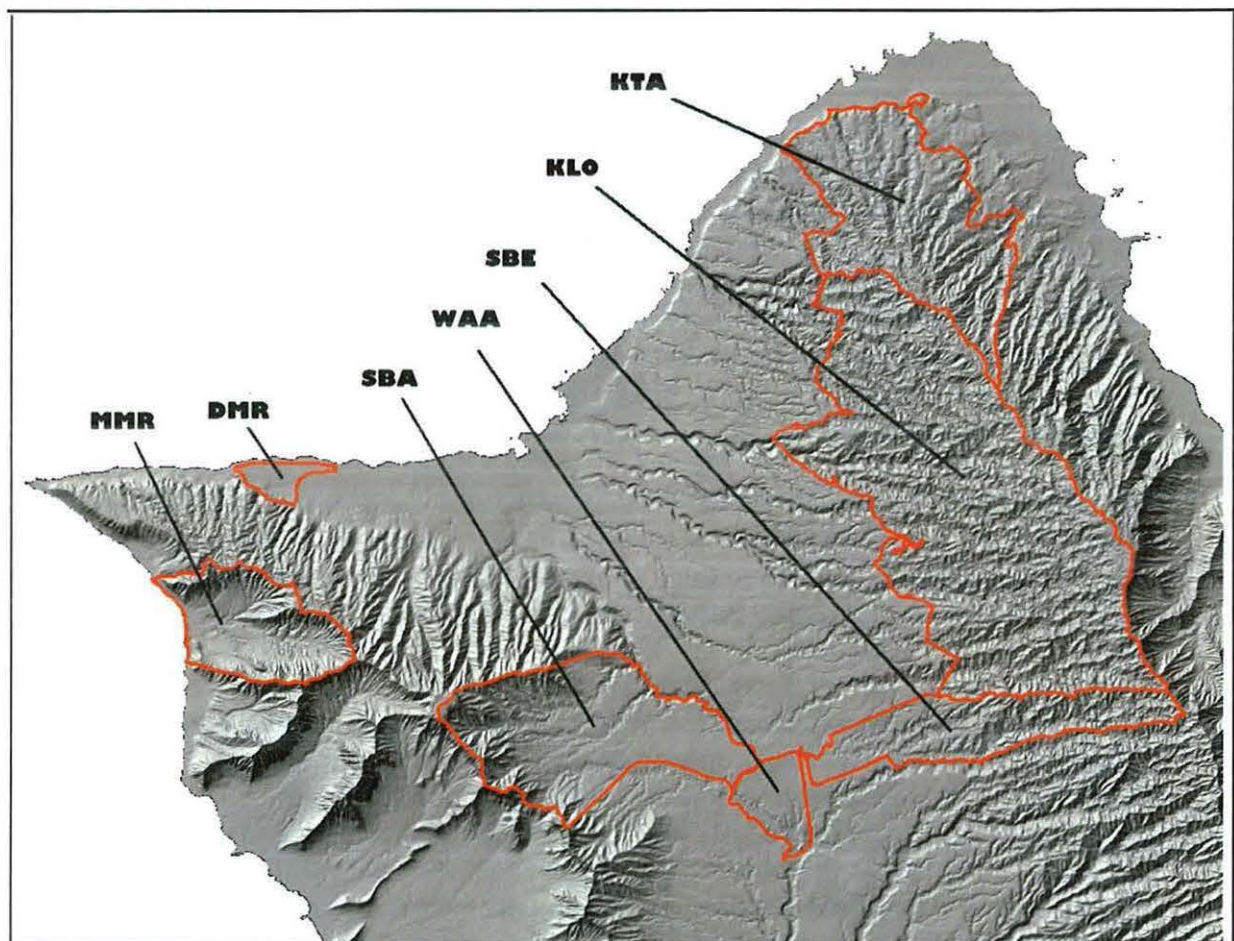


Figure 1. Map of the Seven Major Training Installations on O`ahu.

The other related major charge is to expand the inventory of cultural sites and assist the Garrison's Cultural Resources Manager in the management and protection of all these sites. This objective will be met through the implementation of a program of field surveys leading to new inventory, preservation, and monitoring projects, coordinating with outside contractors (contact archaeology firms) and the occasional preparation of reconnaissance and planning level reports. The coordinating with outside contractors includes assisting them in getting the required access documents and arranging scheduling, keys and, flight ops, etc.

Other activities involve being on call to respond to unanticipated sensitive finds (as can happen during troop construction projects or other construction and earth moving activities) and to perform small scale or short notice field surveys in support of Army training, such as frequently is needed at KTA, DMR and SBE. Occasionally we have been called on to conduct controlled subsurface testing as well. Reconnaissance field inspections and surveys, map preparation, and reports were executed at the request of Range Control (G-3) following range brush fires at SBW and in the Impact Area as well as at Makua. Many of these assessments were performed in conjunction with the DPW Natural Resources team

The specific project elements performed by the authors under provisions of the Cultural Resources Management Program, SOW, as set forth in Sec 5.c, are briefly summarized by sub-section below, and are expanded upon (more or less in the same order) in the body of the report:

- **[Section 5.c (1)(a & b)]** of the contract specifies that pedestrian archaeological inventory surveys will be performed in Training Ranges (a total of seven, these are the Major Training Areas) and other Sub-Installations (15) on O'ahu. The original scope of work calls for a selection of these surveys to be done on a total of approximately 100 acres in areas designated Priority 1 within Training Ranges (in the first year). In the first and second years of the contract we undertook on foot surveys in a total of 96+ acres and 145 acres respectively within the Priority Area 1 sections on O'ahu. Field survey projects completed during the third year of the contract covered a combined total of 1,433 acres on O'ahu, in all the priority areas (see Table 1).
- Survey projects completed during the forth year covered a combined total of 2212 acres on O'ahu, including surveys on lands adjacent to military controlled properties (see Table 1). The break down for acreage surveyed per Major Training Area in the past year is as follows: Makua Military Reservation (MMR)/ 624 acres, Kawaihoa Training Area (KLO)/ 118 acres, Kahuku Training Area (KTA)/ 383 acres, Schofield Barracks Cantonment (SBA)/ 17 acres, Schofield Barracks South Range (SBS)/ 38 acres, Schofield Barracks East Range (SES)/ 58 acres, Schofield Barracks West Range (SBW)/ 34 acres, and Dillingham Military Reservation (DMR) / 638 acres.
- In this last year a number of additional surveys have been undertaken at the following Sub-Installations: Fort Shafter (FSM)/ 11 acres, Helemanu Military Reservation (HMR)/ 3 acres, and O'ahu Roads and Trails (OTS)/ 12 acres surveyed.

- **Section 5.c (1)(c & g)** calls for the results of both the on going general Monitoring Program and the re-established project for regular monitoring of the impact(s) of the resumed Company level Live Fire Training at MMR. The former program, established in the first year of this contract periodically collects and assesses information regarding the effects of various impacts such as vehicular, military, ungulate and natural damage to cultural resources at selected archaeological sites at Schofield Barracks and Kahuku Training Area. Recommendations for management at these locations and suggestions for future monitoring at additional installations are presented.

This section of the report now also contains a discussion of the more concentrated monitoring efforts now being undertaken at MMR. This intensive monitoring was required as one of the stipulations agreed to in the court settlement when Company level live fire training, called CALFEX was started again at MMR almost two years ago.

- **Section 5.c (1)(d & b)** provides a summary of the Archaeological Site Database that was created and is maintained in Microsoft Access. This section also explains the Geographic Information System (GIS) data set, which is presently set up in ArcView 3.2, with the implementation of migrating over to a full GIS Data Base in ArcGIS 8.2 (and with the intention of eventually going to ArcGIS 9). It should be noted that specific or detailed site location information for sites discussed in this report are intentionally not provided here as this data is considered confidential and shall only be released to the public under provisions of Section 9 of the Archaeological Resources Protection Act (ARPA) and Section 304 (a) of NHPA.
- **Section 5.c (1)(f)** contains the assessment and prioritization of remaining unsurveyed areas within US Army Training Ranges and Sub-Installations.
- **Section 5.c (2)** presents the information and data gathered on cultural resources that has been requested by, provided to and shared with the USAG-HI Integrated Training Area Management (ITAM) office, the Stryker Brigade Combat Team (SBCT) Transformation Planning Group, formally called the Interim Brigade Combat Team (IBCT) office, Range Division and other interested Army Garrison units and groups. ITAM uses our material in support of their Army Training Area GIS and database and Dig Requests that are presented to them through Range Division for action.

The remainder of this report contains a discussion of the projects and activities that were performed outside the specific provisions of the Scope of Work. This section covers projects and surveys that were requested in direct support of various Army command activities. These activities include military planning, proposed land acquisitions, construction, range maintenance, support to troop training activities, VIP and other informational tours and direct assistance and support to the DPW Natural Resources Program. Other sections at the end of

the report include those actions that were undertaken to provide inter-agency consultation; public benefits programs; storage projects; job-related training, and administrative duties.

All of the cultural resource management projects undertaken are designed, planned and executed in compliance with requirements of the following regulations, laws, and statutes:

- Sections 101,106 and 110 of the National Historic Preservation Act (NHPA) (36 CFR 800) & (16 USC 470-470w)
- The Archaeological Resources Protection Act (ARPA) (32 CFR 229) & (16 USC 470aa-470ll)
- The Native American Graves Protection and Repatriation Act (NAGPRA) (46 CFR 10) & (25 USC 3001-1013)
- Army Regulation AR-200-4, Cultural Resources Management

Table 1 Summary of Survey Area Coverage [for fiscal year = June to end of May]

	SUB-INSTALLATION	ABBRV.	2000 ROAD SURVEY	2000 FOOT SURVEY	2001 ROAD SURVEY	2001 FOOT SURVEY	2002 ROAD SURVEY	2002 FOOT SURVEY	2003 ROAD SURVEY	2003 FOOT SURVEY
			All in	acres >					[on neigh-	boring
										property]
O'AHU	Dillingham Mil. Res. [on neighboring prop.] (664 a.)	DMR	42	53	122	14	72	31	136 [498]	4
	Kawailoa Training Area (23,349 a.)	KLO	116	472	160	114	116	39	70+[114]	48
	Kahuku Training Area (9398 a.)	KTA	492	203	477	44	160	29	356	27
	Makua Military Res. (4190 a.)	MMR	304	400	572	290	187	244	513	111
	Schofield Barracks - (Cantonment Area) (a.)	SBA (all) SBC >	-	-	231	17	-- 7	-- 5	-- 16	-- 1
	- East Range (5154 a.)	SBE	235	17	757	53	41	6	55	3
	- South Range (a.) +[proposed purchase for SBTC]	SBS	136	30	309	19	67	14	-- [33]	-- [4]
	- West Range (2800 a.)	SBW	47	87	320	73	103	61	33	1
	Wheeler Army Airfield (1370 a.)	WAA	--	--	--	--	<u>12</u>	<u>1</u>	--	--
	Sub Totals		1372	1262	2948	624	765	431	1179 +[644] =1814	195+ [4] =199
HAWAII	Pohakuloa Training Area (108,792 a.)	PTA	146	138	--	--	106	19	108	82
	Kawaihae Military Res. (11 a.)	KMH	6	11	--	--	--	--	--	--
Other O'AHU	Tripler Army Medical Center (367 a.)	TMC	30	93	106	15	--	--	--	--
	Fort Shafter Mil. Res. (592 a.)	FSM	--	--	--	--	24	14	8	3
	Aliamanu Military Res. (538 a.)	AMR	2	0.3	134	3	--	--	2	1
	Helemanu Military Res. (285 a.)	HMR	--	--	145	2	3	1	2	1
	O'ahu Roads & Trails (160 a.)	OTS	--	3	325	3	144	2	12	--
	(Kahuku Air Strip *, [not Pahole NAR**) Army]	KAF PAH	-- --	-- --	69* --	34* --	-- --	-- --	-- [56]	-- **[25]
	6 Others	various	--	--	<u>345</u>	<u>4</u>	<u>45</u>	<u>4</u>	<u>3</u>	<u>1</u>
	Sub Totals		184	245	1124	61	216	21	27 + [56] =83	6 + [25] =31
	Annual Subtotals		1556	1507	4072	685	1087	470	2005	308

PEDESTRIAN FIELD SURVEY: 5.c (1)(a and b)

Introduction

The overall purpose of Section 5.c (1)(a and b) is to conduct inventory surveys of cultural resources on the Army's Sub-Installations in the State of Hawaii. There are twenty-two such Sub-Installations on O'ahu, five on the Island of Hawai'i, and one on Maui. During this fourth year of the project, with the exception of one trip to PTA, fieldwork was undertaken only on the Island of O'ahu. The fieldwork primarily took the form of Pedestrian Field Surveys and site monitoring. This section reports on the former field surveys, the monitoring activities are covered in a later section of this report.

The active Training Areas at the six main Army Sub-Installations on the Island of O'ahu (and one on Hawai'i) are the primary focus of the research performed by this office in some manner between June 2002 and the end of May 2003. The results of these various field surveys are discussed separately, grouped by Sub-Installation and then more or less chronologically.

These field surveys and other activities are being completed in accordance with the regulations contained in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation. Those standards and guidelines that pertain to the survey work and reporting that were performed are briefly summarized below:

Standards for Preservation Planning

- Standard I. Preservation Planning establishes Historic Contexts.
- Standard II. Preservation Planning Uses Historic Contexts to Develop Goals and Priorities for the Identification, Evaluation, Registration, and Treatment of Historic Properties.
- Standard III. The Results of Preservation Planning are Made Available for Integration into Broader Planning Processes.

Guidelines for Preservation Planning

- Managing the Planning Process
- Developing Historic Contexts
- Developing Goals for a Historic Context
- Integrating Individual Historic Contexts-Creating the Preservation Plan
- Coordinating with Management Frameworks

Standards for Identification

- Standard I. Identification of Historic Properties is Undertaken to the Degree Required to Make Decisions.
- Standard II. Results of Identification Activities are Integrated into the Preservation Planning Process.
- Standard III. Identification Activities Include Explicit Procedures for Record-Keeping and Information Distribution.

Guidelines for Identification

- Role of Identification in the Planning Process

- Performing Identification
- Integrating Identification Results
- Reporting Identification Results

Standards for Evaluation

- Standard I. Evaluation of the Significance of Historic Properties Uses Established Criteria:
 Standard II. Evaluation of Significance Applies the Criteria within Historic Contexts.
 Standard III. Evaluation Results in a List or Inventory of Significant Properties that is Consulted in Assigning Registration and Treatment Priorities.
 Standard IV. Evaluation Results are made Available to the Public.

Guidelines for Evaluation

- The Evaluation Process
- Criteria:

§13-275-6 Evaluation of significance.

(a) Once a historic property is identified, then an assessment of significance shall occur. The agency shall make this assessment or delegate this assessment, in writing, to the SHPD. This information shall be submitted in the survey report, if historic properties were found through the survey.

(b) To be significant, a historic property shall possess integrity of location, design, setting, materials, workmanship, feeling, and association **and** shall meet one or more of the following criterion:

Criterion "a" - Be associated with events that have made an important contribution to the broad patterns of our history;

Criterion "b" - Be associated with the lives of persons important in our past;

Criterion "c" - Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;

Criterion "d" - Have yielded, or is likely to yield, information important for research on prehistory or history; or

Criterion "e" - Have an important value to the native Hawaiian people or to another ethnic group of the State due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts--these associations being important to the group's history and cultural identity. (as added by Hawaii SHPO)

- Application of Criteria within a Historic Context
- Inventory

Standards for Registration

- Standard I. Registration is Conducted According to Stated Procedures.
 Standard II. Registration Information Locates, Describes, and Justifies the Significance and Physical Integrity of a Historic Property.
 Standard III. Registration Information is Accessible to the Public.

Guidelines for Registration

- Purpose of Registration Programs
- Registration Procedures
- Documentation on Registered Properties

- Public Availability

Standards for Historical Documentation

- Standard I. Historical Documentation Follows a Research Design that Responds to Needs Identified in the Planning Process.
- Standard II. Historical Documentation Employs an Appropriate Methodology to Obtain the Information Required by the Research Design.
- Standard III. The Results of Historical Documentation are Assessed Against the Research Design and Integrated into the Planning Process.
- Standard IV. The Results of Historical Documentation are Reported and made Available to the Public.

Guidelines for Historical Documentation

- Historical Documentation Objectives
- Research Design
- Methods
- Integrating Results
- Reporting Results

Standards for Archaeological Documentation

- Standard I. Archaeological Documentation Activities Follow an Explicit Statement of Objectives and Methods that Responds to Needs Identified in the Planning Process.
- Standard II. The Methods and Techniques of Archaeological Documentation are Selected to Obtain the Information Required by the Statement of Objectives.
- Standard III. The Results of Archaeological Documentation are Assessed Against the Statement of Objectives and Integrated into the Planning Process.
- Standard IV. The Results of Archaeological Documentation are Reported and made Available to the Public.

Guidelines for Archaeological Documentation

- Archaeological Documentation Objectives
- Documentation Plan
- Methods
- Reporting Results
- Curation

FIELD SURVEYS

The field surveys discussed in this section incorporate a reconnaissance-level inventory providing an account of the presence or absence of cultural resources within the surveyed section. The goals of these reconnaissance surveys were threefold:

1. To re-identify and accurately fix the position and dimensions of known or previously identified archaeological sites using sub-meter GPS equipment;
2. To increase the overall coverage of areas that have actually been surveyed on foot within the Army's training facilities, to include an indication of those surveyed areas that have no cultural resources; and
3. To initially identify and document any previously unrecorded cultural resources on Army controlled lands.

Special focus was given to those areas that are within the main Training Ranges on O'ahu that are regularly used for military training exercises. To this end Anderson (1998) established a system that ranked and labeled the various priority areas within the seven main Training Ranges on O'ahu. In that report the Priority Areas are graphically presented as separate elements on individual installation maps. These ranked elements represent an assessment (at that time, 1998) of the combination two factors. These were the probability or likelihood for the occurrence of cultural resources/historic properties that might expected to be present within each respective part of a Training Range, and the relative level of training use and there for potential impact(s). The priority areas were evaluated and ranked on a scale of 0 to as high as 14. This assigned priority level indicated the relative need for field surveying that section or sub-region for cultural resources, based on current and planned (or future) training use, and the estimated probability that cultural resources may be present. There for generally, the lower the rank/number, the higher the priority/need. In the 1998 rankings, the Priority Area 0 element was defined as 'a previously surveyed area'. This overall ranking system was primarily based on the review of the reports from past contract projects (prior to 1998). Those original recommendations made by Anderson are periodically reviewed and analyzed, as additional findings and data are collected, and they have been modified by the authors as is presented in Section 5.c (1)(f).

Methods and Procedures

Pedestrian field surveys are performed by the authors using a series of systematic transects, or "field sweeps" with surveyors usually spaced at ten-meter intervals. On occasion, the specific field conditions will dictate some other more appropriate spacing within a given transect. The width of a transect sweep can be narrowed or widened depending on variables such as ground surface visibility, thickness of the vegetative cover, and the presence of differing terrain features. During a typical transect sweep the crew member operating the GPS unit will initially follow the nearest pathway, trail system, stream, or perhaps the dominate terrain feature in the area. This is done so that the existing natural environmental indicators, prominent terrain features and local or obvious transit routes are adequately recorded. The remaining crew (one, or more individual/s) works at the appropriate sweep intervals off of the formers' line, searching for features of interest and recording additional data as found. Field personnel each carry a short range FM ('Free-Talk') transceiver to maintain communication within the field party. In addition, at least one member of the crew has a longer range VHF radio tuned to the channel that is continually monitored by the Army's local Range Control Office (Range Control).

Once a feature, artifact, or site is identified it is marked with either lime yellow or Day-Glo-pink flagging tape, and in the case of unexploded ordnance (UXO), whatever color Range Control or the Explosives Ordinance Disposal escort (EOD) requests (usually orange or red). New cultural

features or any found to be without tags, or other wise marked are assigned a temporary field number. That field number is then written on the flagging tape with a permanent marker, and on a temporary soft aluminum tag that is then attached to a prominent part of the feature. The feature/site location is then recorded with the GPS unit, usually using the feature tag's location as a 'point feature'. If the site/feature is large it may be recorded as an 'area feature' or a 'linear feature' as appropriate. The temporary feature/site tag serves as the field marker or identification point until such time that a permanent State Site number can be assigned. Once a State Site Number is issued by the State Historic Preservation Office (SHPO) a stamped, permanent site tag can be set. The numbering system for cultural sites on O'ahu is that used for the Statewide Inventory of Historic Places (SIHP), or just 'the inventory'. In this system the number "50" represents the State of Hawaii, "80" the Island of O'ahu, "1 through 15" for the appropriate USGS 7.5' quadrangle map on which the site can be found, and the last four or five digits identify the site number that is unique for that quad map.

Detailed site mapping, recording (photos, sketches, video, etc), and testing are performed as needed, using normal procedure and standardized site/feature forms, excavation forms, and photo log sheets [as detailed in Section 5.e (1)(c, h, and j) below]. Generally, samples or portable artifacts are recorded and photographed in the field and left in situ, unless there is an obvious potential for damage, vandalism or theft of smaller items. GPS recorded sites and features are plotted and maintained as GIS information layers in ArcView. Site information and data collected is then transferred to the Cultural Resources Database. Area, Site, route and other maps are produced and shared as needed. Photos and photographic records (including CD copies) are cataloged and stored for use in reports, PowerPoint presentations, posters and other similar uses.

The scope of work for this study originally called for performing pedestrian field surveys of a total of approximately 100 acres in the Priority 1 Areas on O'ahu. Priority 1 Areas were those established by Anderson (1998) in the first Cultural Resources Management Plan for US Army Training Ranges (CRMP) for the major Training Areas on O'ahu. These Training Facilities and their total land areas are: Makua Military Reservation (MMR) 4190.5 acres; Dillingham Military Reservation (DMR) 663.9 acres; Kahuku Training Area (KTA) 9397.8 acres; Kawaihoa Training Area (KLO) 23,347.6 acres; Schofield Barracks East Range (SBE); Schofield Barracks South Range (SBS); and Schofield Barracks West Range, including the Impact Area (SBW), all combined with the Cantonment Area (SBC) and Wheeler Army Air Field (WAA) as SBA, for a total of 17,971.5 acres.

Field survey projects completed during the fourth year of the contract have covered a total of 2313 acres on O'ahu. This is a combined total that includes areas surveyed both by road and in greater detail on foot, as well as areas that have been surveyed on properties used by but not controlled by the Army and a few properties that are adjacent to Army lands (refer to Table 1). This past year's major survey breakdown is as follows, with adjacent non-Army lands investigated in brackets:

Makua Military Reservation (MMR) 623.6 acres of a total of 4190.5 acres,
Kawaihoa Training Area (KLO) 118.5+ [113.8] acres of 23,347.6,
Kahuku Training Area (KTA) 382.5 acres of 9397.8,
Schofield Barracks Cantonment (SBC) 16.5 acres,
Schofield Barracks South Range (SBS) [37.0] acres,
Schofield Barracks East Range (SBE) 57.8 acres,
Schofield Barracks West Range (SBW) 34.3 acres, and
Dillingham Military Reservation (DMR) 137.7 + [499.9] acres of 663.9.

Findings

Six Army Sub-Installations on the Island of O'ahu and one on Hawai'i were surveyed or investigated by this office in some manner between June 2002 and the end of May 2003. The results of these various surveys are discussed separately, grouped by Training Area or Sub-Installation and then more or less chronologically, as follows.

Surveys at Dillingham Military Reservation (DMR)

Three surveys were undertaken at DMR this past year. Two were in direct support of troop training activities at the Training Area, while the third was done in planning for future improvements to further training effectiveness.

A Cultural Resources / Archaeological reconnaissance was performed at the Dillingham Military Reservation by David Cox, Cultural Resources Section, Environmental Department, Directorate of Public Works (DPW) on Tuesday, 1 October 2002. The purpose of this field inspection was to monitor military field training activities that may include incidental excavations occurring on the central portion of DMR, inland of 'Bravo' gate. The section of DMR being used for field exercises by the 2-25 Aviation Battalion during this 5-day field exercise is almost entirely confined to the interior sections of the extensive WWII era taxiways and aircraft storage revetment system. The planned exercise will be confined primarily to the central section of the triangular area surrounded by the WW II taxiways. This is the section inland or *mauka* of the main Dillingham Field runway and the now abandoned Cold War Era Nike Site.

There are number of known or previously identified sites and features in the general area used during this field training exercise. The largest, Site 50-80-03-5487 is a multi feature system consisting of WW II era military improvements to what had been an early small grass covered civilian airfield. Site 5487 consists of a variety of roadways, taxiways and paved areas connecting numerous aircraft storage revetments, service and bivouac areas, plus a system of open storm drain channels and culverts. To the south of the area used during this training exercise there is a more massive flood control channel system that roughly parallels the base of the steep slope further inland. This diversion system was probably constructed in the 1940's and has been inventoried as the multi featured Site 5490. The three nearest sites with prehistoric features are portions of Sites 416, 5485 and 5486, all inland to the south of the WW II era military improvements area. No digging was done along the south or west edges of the training area in question. The military training activities in the general area had no adverse impact on these existing sites.

A single excavation was made for a Crew Served fighting position for a 50 cal HMG. This position was located along the east side of the existing abandoned Taxiway a few meters to the south of, or inside 'Bravo' Gate. The two to three foot deep rectangular hole (6 x 4ft) was cut into the old asphalt and disturbed material at the edge of the WW II runway. This location is inland of the southern extent of the Jaucus Sands that are found to the north, all the way to the coastline. For that reason and considering it is in an area of disturbed soils it was assumed that there was little or no probability that cultural remains will be encountered here. First Sergeant Huston of the 2-25

Aviation Battalion was advised to contact this office if any finds are noted during the planned digging. We heard nothing and have to surmise no finds of interest to this office were found.

A second Cultural Resources / Archaeological reconnaissance was performed at the DMR by David Cox, Cultural Resources Section, on Wednesday, 5 February 2003. He accompanied Tom Kelly, LRAM Coordinator for the Integrated Training Area Management team (ITAM) Schofield that is part of Range Division – Hawaii's (RDH). This field visit was done to inspect an area being proposed for a military field training activity by the H and HQ Company of the 45th Corps Support Group (Forward). CPT J. A. Blum commands H & HQ COMPANY. She, with some of her staff joined us for the field inspection (see Figures 2 and 3).



Figure 2. Captain Blum, CO of H & HQ Co., and Staff at DMR.



Figure 3. Members of 45th Corps Support Group (Forward), Considering Possible Defensive Position Locations, at DMR.

The three-day field exercise will include incidental excavations for crew served weapons and other functions in the central portion of DMR, Area within Training P-1. The section in question is between 'Bravo' and 'Charley' gates, and surrounded by the WWII era taxiways, mauka or inland of the main Dillingham Field runway. This is the largest site at DMR, Site 50-80-03-5487. Site 5487 is a multi feature system consisting of a variety WWII era military improvements to what had been an early small grass covered civilian airfield. The majority of these features are found in Training Area P-3. To the south or inland of the area to be used during this training exercise, in Training Area P-2 there is a more massive flood control channel system that roughly parallels the base of the steep slope further inland. This diversion system was also constructed in the 1940's and has been inventoried as the multi featured Site 5490. The three nearest sites with prehistoric features are in Training Area P-2, inland of the power line. These are portions of 416, 5485 and 5486; all to the south or well inland of the nearest section of the outer 'defensive perimeter' of their exercises base camp area. No digging will be done along the south or west edges of Training P-1.

In September 2001 a new cultural resource was seen beyond the south edge of area being utilized for this training exercise. This site consists of a section of a raised and stone lined path or possible roadway (or railroad bed) along the south edge of the low (then wet) area that is located in the south of the central triangular area inside the taxiways. This is the open grassy area that is occasionally a large wetland during the wet season. The four-meter wide soil topped pathway averages 50 centimeters above grade. Minor clearing of the initial find, for record photos indicated that an alignment of stones along the top of a soil bank was only a small portion of this site. The pathway is edged at each side with one or in places two courses of angular and rounded basalt boulders, and extends at least 75 meters or slightly more east - west. The section to the east end of the feature

may have been destroyed in the past. This is a section of at least 15 meters in length with no indications of the path or the stone alignments. At the west end the cover of java plum, *pluchea*, deadwood and various tall grasses still need to be cleared away before the extent of the pathway can be determined. No artifacts or other material that would be useful for diagnostic purposes were collected or noted in this area. Consequently no estimation of association or period of construction and use of this site has been made as yet. It should be noted that aerial photos and some early maps show indications of a roadway or possible rail-right of way, perhaps in this very location. It is hoped that with further investigation these questions can be answered.

The series of mechanical excavations that are planned for scattered fighting positions and other purposes were all pointed out Wednesday. This location is just inland of the southern extent of the Jaucus Sands that are found to the north nearer the shore. For that reason and considering it is in an area of disturbed soils there is a low probability that cultural remains will be encountered here. These excavations however may provide the opportunity to recover a limited range of data on the character, extent and depth of the various subsurface soils of this central section of DMR. This information on conditions underlying the existing WW II era construction level might add to similar test excavation data that was recovered at DMR by McGerty (1997). This may provide a better understanding of what this area may have looked like prior to those extensive additions and changes that were made during the expansion and building of the WW II military airbase here.

Sergeant Lopez of the 65th Engineer Battalion was advised to contact this office if any cultural finds are noted during the planned mechanical digging so that timely data recovery can be undertaken and valuable dateable or other material can be collected for analysis. It is felt that with these measures being observed there should be no adverse effect to cultural resources due to work on this project.

A third Cultural Resources / Archaeological reconnaissance was performed at the Dillingham Military Reservation (DMR) and adjoining portions of the Dillingham Ranch by David Cox, Cultural Resources Section on Wednesday, 23 April 2003. The field recon was primarily organized to familiarize the Army Corps of Engineers / Real Estate Office (POH) with the proposed plans of the new owners of the Dillingham Ranch property. The Corp is assisting in the long-range planning and the eventual implementation of changes needed for access to the training areas at DMR for use by the proposed Stryker Brigade Combat Team (SBCT) and other units. The purpose of our involvement in this field inspection was to investigate possible impacts to cultural resources for the various alternatives being considered for the SBCT access route(s) to DMR that might cross the nearby privately owned Dillingham Ranch properties.

There are a number of known or previously identified sites and site complexes in the general area of, and to the east of DMR, into the adjoining Dillingham Ranch. The largest site complex in the general area covers much of the southern perimeter or inland portions of DMR itself, these are Sites 50-80-03-5487 and 5490. Both of these WWII era sites have been discussed above. Remnants of a Cold War Era (1950-60's) Nike Air Defense Missile Site is located within Training Area P-1 at DMR. This general class or period of military facilities has recently been added to those requiring consideration for evaluation for historic significance, under the provisions of Section 106 of the National Historic Preservation Act (36 CFR Part 800). What remains of the DMR Nike missile launching facility has been approved for removal or demolition following the selection of the similar Kahuku Nike Site for preservation. The Kahuku Site is located on Army owned land and is the least altered and most

complete of the four that "Defended the Skies" of O'ahu.

There are three known sites with prehistoric features within the confines of DMR. These are portions of Sites 416, 5485 and 5486. These sites are all located further inland, to the south of the WWII era military improved area. The prehistoric features are situated on the talus slope at the foot of the steep fronts of the numerous spur ridges and narrow gulches that run out to the north of the main Waianae ridge. In addition Sites 191 and 189 are located just outside the DMR property line, further to the south, perhaps on Dillingham Ranch lands. There are similar inventoried multi-featured prehistoric sites found at the same mid elevations on the nearby Dillingham Ranch lands to the east as well. This group of sites are represented primarily by three Settlement Clusters, two other clusters and six separate numbered sites. The largest cluster in the area, Settlement Cluster Number 1 is composed of Site 4424, a possible heiau (or temple), located just inland of Kawaihapai Reservoir at an elevation of about 180 feet and Sites 4425 to 4428, all are on the intervening higher talus slope area to the south. Cluster 2 is a three-site group to the east of Number 1. Cluster 3 with only Site 4434 is further to the east, beyond a mauka – makai ranch road, almost in line with the main Ranch House and Number 2. None of these sites were visited during this recon. The area inland along the base of the ridge faces where these sites are found is being considered as one of the possible routes (Alternative 2) for construction of an Army access road to DMR.

Most of the field investigation was spent driving up the State Forestry road, to the two large upland parcels of the Ranch property and viewing the lower areas and DMR from above. Three separate trail sections on Ranch lands, along spur ridge spines running down to the north were checked out. The first trail we saw was a short section of the trail extending north and down slope just opposite the Peacock Flats Gate at about the 1600 foot elevation. This gate is on the paved single lane road at the entry to the State Forestry's Camping area, Forest Reserve, Game Management Areas, the Pahole Natural Area Reserve (NAR) and the Cold War Era Nike Missile Control Site. The latter Site now serves as an upland greenhouse and native plant propagation facility for both the State and the Army DPW's Natural Resources Section. The forested State lands at this elevation form a wide band extending from the ridgeline on the Waianae Range (to the South) down to the edge of the Ranch's upland property to the North.

The second trail we investigated is further to the west, off the narrow and winding, but well graded dirt road leading into the Kauokala Forest Reserve. This State Forest Reserve area extends up to the main Waianae Summit Ridge line, that also forms the back rim of Makua and Kahanahaiki Valleys, when viewed from the leeward coast, and on to the ridge above Kaena Point. The foot trail investigated here was one end of a loop of a longer very rough old jeep track on the ridge to the east of Kapuhi Gulch.

The third stop was out another old jeep trail along the ridge between Kawiū and Kalepeamoā Gulches (see Figures 4 – 7, note that Figures 6, 7 and 8 were taken from same vantage point as Figure 5). This last ridge ends above and one ridge to the east of an area the Ranch crew call Buttermilk Flat. The section of the ridge called Buttermilk Flat is the area inland just above the west half of DMR.



Figure 4. Christi Shaw and Steve Kim starting out old Jeep Trail.



Figure 5. Eroded Upper Middle Section of Old Jeep Trail.



Figure 6. Dillingham Ranch (to right of center) and Dillingham Air Strip (left of center).

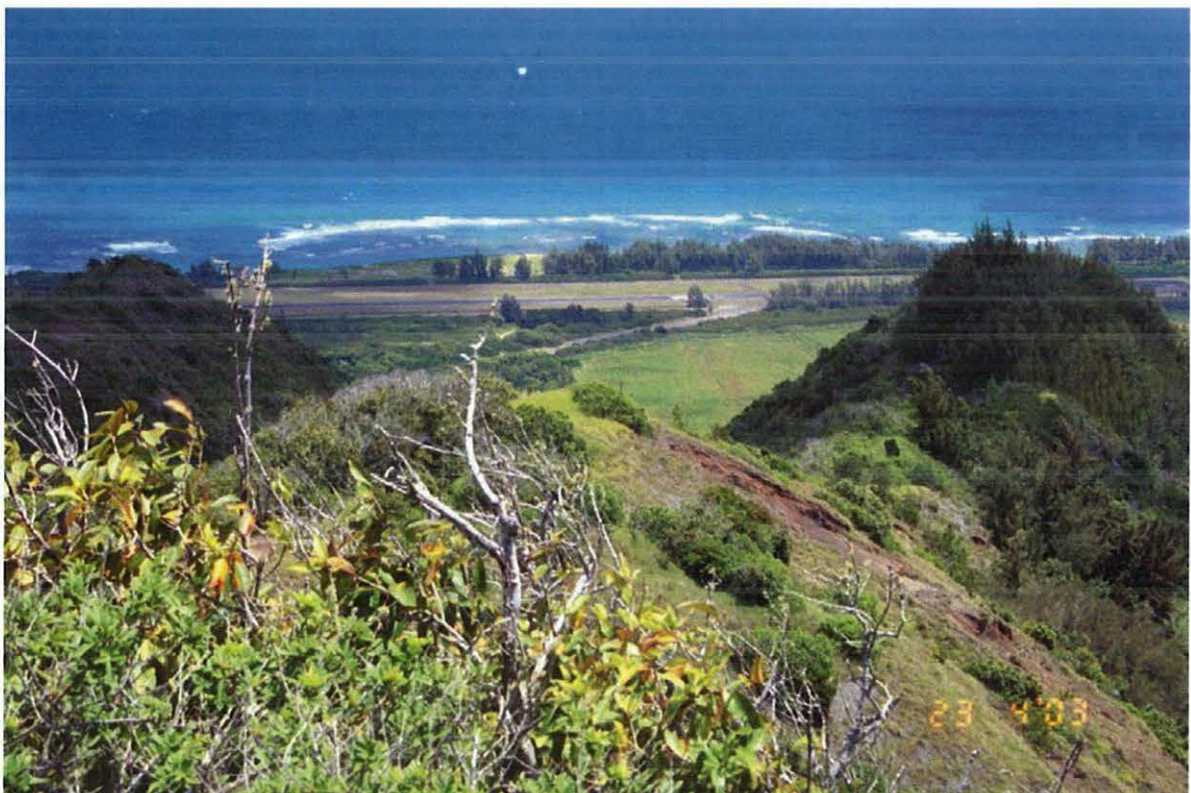


Figure 7. West edge of DMR, and Air Strip, with mild Telephoto Lens.

The mid upland ranch lands were accessed by system of rough and now overgrown jeep trails that connect the various ridges (refer to Figure 8).



Figure 8. Typical Jeep Trail, in Kawi Gulch. Viewed to NW

The first trail we investigated includes a section of trail that once (perhaps still does?) descended the steep drop, eventually coming out at the Kawaihapai Reservoir (to the east of DMR) by way of the Peacock Flats Trail.

The final leg of this field investigation consisted of driving all the way back down to the Ranch, out to Farrington Highway, into the State's part of Dillingham Field at the west end of the Air Strip. Here we viewed the lower section of the Kealia Trail (which is proposed as DMR access Alternative 3) from the area behind the Dillingham Tower, near the quarry, just beyond the western edge of DMR. The Kealia Trail passes through the west side of Buttermilk Flat.

Survey within Kawaihoa Training Area (KLO)

Two projects were started during the fourth year within or immediately adjacent to KLO. The first project consisted of the field monitoring of tactical excavations at part of a large training exercise, code named Warrior Strike II. This Brigade size tactical field training exercise used a section of abandoned sugar cane fields known as 'Kawaihoa 20'. This large open area is located along the upper reaches of Kawaihoa Road, just west and down slope of Drum Road, and is immediately adjacent to west edge of the Army's Kawaihoa Training Area (see project map, Figure 9). The archaeological reconnaissance and excavation monitoring field work was done by Loren Zulick, Cultural Resources Specialist on 28 September 2002.

A unique lease agreement had been arranged for this special use, as the land, owned by Kamehameha Schools (KS) is not normally used by the Army. The presence of a Cultural Resources Specialist was necessary for compliance with Section 106 of the National Historic Preservation Act (NHPA). This area had never been surveyed for cultural resources/historic properties (a component of Section 106) because it has not been utilized by a federal agency for this or other purposes in the past.

Upon arriving at 'Kawaihoa 20', the Cultural Resources Specialist made contact with a CPT Speaks who informed the author of the planned layout for the field support battalion area. Three variations on the standard Field Support Battalion Area (FSBA) were addressed:

- 1) The excavation of a Patient Survivability Bunker was not planned.
- 2) The ROWPU (Water Purification Unit) would not be set up.
- 3) A Fuel System Supply Point (FSSP) would be incorporated into the exercise (this component was not observed by the author, as it was established later).

After being briefed on the location(s) of planned excavations, the author began surveying the project area to establish its pre-existing condition and to investigate for possible cultural resources. This survey was conducted on foot by walking the perimeter of the FSBA and crisscrossing the interior portion many times. The land being utilized is currently a series of open fields, with a cover of low Guinea grass (*Panicum maximum*) with indications of small scattered stands of Koa haole (*Leucaena leucocephala*). This grassy field has been cut down recently, and has grown back only as much as a foot high (see Figures 10 and 11). Overhead high *Panicum* grass was observed along the western edges of the project area, and in fact defined the usable area to the west (see Figures 12 and 13). Gulches, where the slope drops off from the long term agricultural plateau, define the southeast and northeast boundaries. This boundary is further delineated by stands of Eucalyptus (*Eucalyptus robusta*) (see Figures 10, 11, and 14). There is a navigable roadway, part of the old 'cane haul road' system that extends around the perimeter of the project area (see Figures 9, 14, 15, 16, 17, and 20). The now grassy fields had been commercially cultivated for minimum of eighty years, under lease to Wailua Agriculture Company (WAC). The area was originally planted in pineapple from the 1920's. Sugarcane replaced the pineapple in the 1960's and was cultivated for nearly forty years until the last WAC field in the area was harvested in 1996. The soil tilling methods used by WAC utilized twenty-four inch shank plows that disturb the soil to a depth of eighteen to twenty inches (Masa Uehara, Field Manager for KS, personal communication). This soil disturbance / plow depth was evident in all excavations seen throughout the project area (see Figure 18). The present ground surface is very uneven, with bulky dirt clumps concealed by the grass.

Map removed to protect rare resources. Available upon request



Figure 10 Pre-Use Photo of LZ Area at 'Kawailoa 20'. Viewed to Northwest.

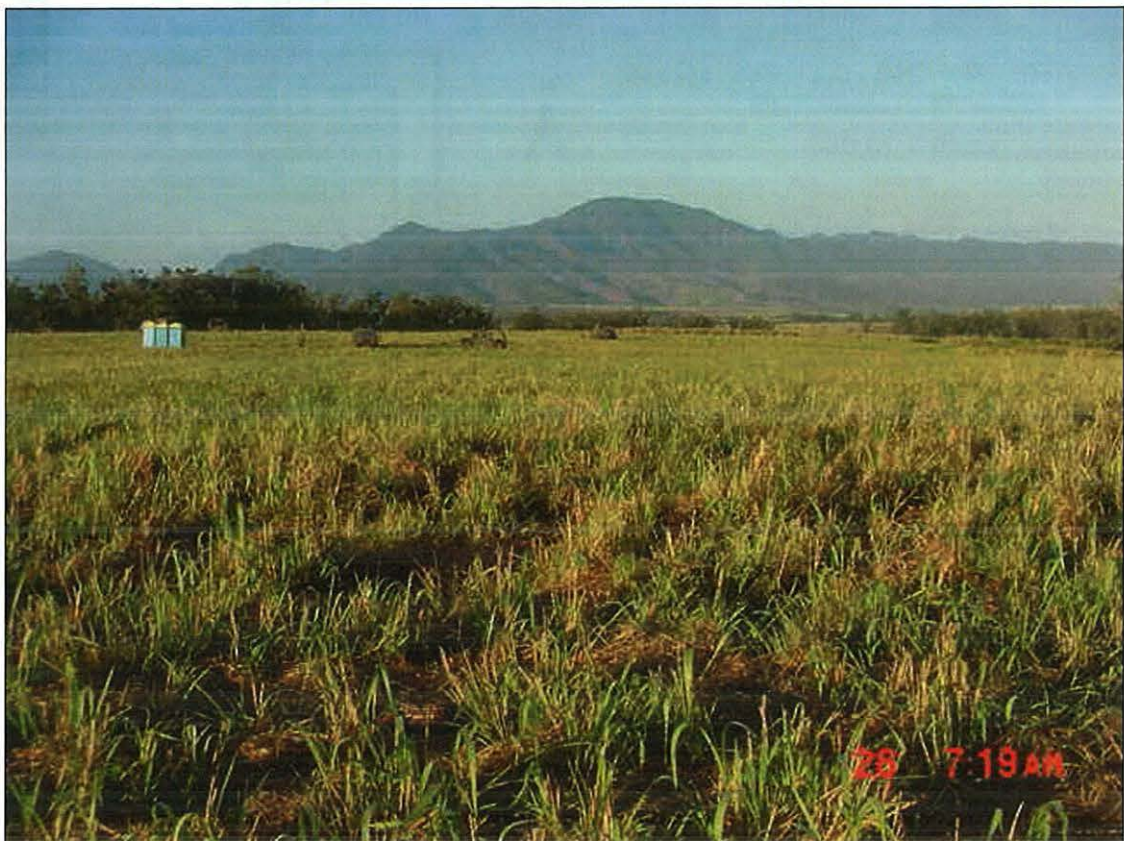


Figure 11 Pre-Use Photo Showing Center of Main Training Area. Viewed to Southwest.



Figure 12 Tall Grass Boundary and View of Project Area Interior. Viewed to East.



Figure 13. Photo of Guinea Grass Boundary. Viewed to South.



Figure 14. Photo of Southeast Boundary with Old Roadway. Viewed to East.



Figure 15. Photo of Pre-Existing Roadway Extending Into Project Area. Viewed to South.



Figure 16. Photo of 'Occupied' Area from SW Perimeter Road. Viewed to Southeast



Figure 17. Photo of 'Occupied' Area from SW Perimeter Road. Viewed to North.



Figure 18. Photo Displaying Soil Stratigraphy; Top 18"-20" Disturbed. Viewed to North.

One must exercise caution when walking or driving over this terrain. Survey revealed several soil mounds within the formerly cultivated fields (see Figure 19). A pre-existing soil berm was observed on the bluff along the southeast edge of the project area (see Figure 20).

No surface indicators of cultural resources were observed while surveying the area. No cobbles or boulders, or other (traditional) construction materials were observed on the surface of the project area. This finding does not come unexpectedly considering the years of recorded agricultural cultivation disturbance.

For Warrior Strike II, ground-disturbing activities consisted of creating a soil bermed TOC (Tactical Operations Center), excavating fighting positions, and driving fence posts (metal "T" stakes) for anchors for lots of razor wire barriers. These activities were observed and monitored by the author. A single 'Deuce' (tracked bulldozer, a militarized equivalent of a D-4 / see Figure 21) was on hand to perform the excavations. Also in use for the deeper trenching was a single Small Emplacement Excavator (SEE) Truck (refer to Figure 24). The 'Deuce' spent the entire day constructing a berm that surrounds the TOC. The circular berm was created by pushing up soil from the ground on the interior space of the berm (see Figures 21, 22, and 23). Soil disturbance for the TOC berm reached a maximum depth of 1m (39"). No cobbles or boulders were observed in soils excavated for the berm. The berm that was created measures approximately 2m high with a diameter of 70m. The TOC berm and interior space covers an area of 0.94 acres. Monitoring of the TOC berm occurred in between excavations performed by the SEE truck.



Figure 19. Per-Existing Soil Mound Within Project Area. Viewed to Northwest.



Figure 20. Old Soil Berm on Bluff Along Perimeter Roadway. Viewed to East.



Figure 21. A 'Deuce' Beginning Excavation of TOC Surrounding Berm. Viewed to West.



Figure 22. Photo of TOC Berm Under Construction. Viewed to Southeast.



Figure 23. Interior of 0.94-Acre TOC Berm Near Completion. Viewed to West.



Figure 24. Excavation of Crew SER Fighting Position, by a SEE Truck. Viewed to North.

The author monitored SEE truck excavations of five crew SER fighting positions, three 2-man fighting positions, and three survivability positions. A typical Crew SER fighting positions measure 9 feet long by 2½ feet wide, and 5 feet deep. These are “T” or “L” shaped (see Figures 24, 25, and 26) trenches. Crew SER positions usually mount a .50 caliber automatic weapon - heavy machinegun, and can be covered. The 2-man fighting positions are similar to the crew SER positions except that there is only a single trench. They measure approximately six to nine feet long, four feet deep, and as wide as the bucket on the back of the SEE truck (approximately 2½ feet) (see Figure 27). Another type of excavation performed at ‘Kawailoa 20’ is the survivability position.

These positions were placed at the entrance to the training area behind “diverters” used to control traffic flow (see Figure 28). The soil excavated for the survivability position was placed within the plywood walls of the diverter. The three excavations each measured four feet wide, six feet long, and two feet deep.



Figure 25. BOE at 4½ Feet for an “L” Shaped Crew SER Position. Viewed to South.



Figure 26. BOE at 4 Feet for a "T" Shaped Crew SER Position. Viewed to Northwest.



Figure 27. Excavation of 2-Man Position on North Side of Kawaihoa Rd. Viewed to West.



Figure 28. Photo of Survivability Position and Soil Filled Diverter. Viewed to WSW.

The other type of excavation planned at 'Kawailoa 20' is a FSSP. A Fuel System Supply Point is a bulk fuel transfer point comprised of fuel bladders (or fuel truck), pumps, and dispensers connected by a network of hoses. Each fuel bladder requires a lined containment pit with a surrounding three-foot high berm. For a similar exercise at DMR, the berm was constructed by excavating a forty-five foot long by fifteen foot wide ramped pit to a depth of two and a half feet. The pit was lined with plastic then a fuel truck was driven into it (see Figure 28). However, the construction of a FSSP did not take place while the author was on site at 'Kawailoa 20'.

The soil stratigraphy observed through military excavations was consistent throughout the project area. Mechanical excavations yielded two distinct strata (see Figure 18). Guinea grass covers the ground surface with its root system extending down into Layer I. The upper stratum (Layer I) is a dark reddish brown clay. This soil has been tilled for eighty years. Layer I extended from 0 to 22 inches below surface. The lower stratum (Layer II) is a reddish brown clay. This "red clay" is common to the area. There were no roots or rocks observed in this "sterile" stratum. Bottom of excavation reached a maximum of six feet. Layer II extended from 22 inches to BOE at six feet.

The concern about cultural resources at 'Kawailoa 20' is in the possibility of encountering previously unrecorded subsurface deposits. Surface finds were unlikely however given the extent and duration of soil disturbance over the years. The greatest concern for historic structures came from the nearby Kawainui Ditch Tunnel System. This extensive system supplied part of the water to the irrigation network for WAC fields through out the North Shore area. It has been reported that there are water tunnels near the southwest edge of the project area. This is one of the tunnel



Figure 29. Photo of FSSP at DMR on 24 Sept 2002. A FSSP was Planned but not Utilized at 'Kawailoa 20'.

systems that is accessed via short traverse tunnels called adits. It is important that these adits do not get filled in, or covered up with soil and debris from the training exercise.

The next closest cultural site in proximity to the project area is Bishop Museum Site ID #D6-26 (Kirch, 1992). This prehistoric irrigated pondfield system is located approximately 375m to the south-southeast of the project area. This is along Kawainui Stream, at nearly 500 feet lower elevation than the flats of 'Kawailoa 20'. This multi-feature site is well outside the boundary of KLO and will not be impacted by the training exercise.

Based on the findings of the first day of monitoring, it was determined by the Cultural Resources Specialist that the inadvertent discovery of subsurface cultural deposits as a result of Army excavations was highly unlikely. For this reason, monitoring of excavations at 'Kawailoa 20' was limited to seven hours on Saturday, 28 September 2002. Excavations continued after 1500 hrs on Saturday and presumably some on Sunday as well. Excavations related to, but not monitored by the author include more fighting positions, a FSSP, and possibly an interior road.

No cultural deposits of any kind (including bone or shell material), nor subsurface features were observed in the excavations that were monitored within the project area. Summarily, no cultural resources were affected by observed activities at 'Kawailoa 20'.

Helemano Ungulate Exclosure

The second project was a reconnaissance survey on the perimeter of the proposed Helemano Ungulate Exclosure, Upper Pe`ahināi`a, along the Koolau Summit Trail. This Archaeological Reconnaissance of a planned fence line route was performed in the upper reaches of the Pe`ahināi`a drainage area on 13 January 2003. Loren Zulick undertook the field investigation and GPS survey. He was accompanied by Matthew Burt, Natural Resources Specialist of the Environmental Division, DPW on this fence line survey for the proposed Helemano Ungulate Exclosure, Upper Pe`ahināi`a, Ko`olau Summit, Kawaioloa Training Area (KLO), O`ahu Island, Hawaii (refer to Figure 30, Map of the Project Area).

Map removed to protect rare resources. Available upon request

Figure 30. Map of the Project Area.

The Kawaihoa Training Area is on land owned by Kamehameha Schools and is leased for training by the Army. The ungulate exclosure is being proposed that when completed will function to keep feral pigs (*Sus scrofa*) out of a nearly pristine and unique area in the Ko'olau Mountains. This fence system will aid in securing a natural ecosystem, provide habitat for rare plants and tree snails, and serve as a site for rare species out planting, by encircling the upper most reaches of the Helemano Stream Drainage.

To gain access to the project area the crew first drove to the Poamoho Trailhead in the central section of KLO. They were picked up there by helicopter (see Figure 31) and flown to the established Pe'ahināi'a Landing Zone at the summit ridge of the Ko'olau mountain range (see Figure 32). This landing zone (LZ) is located at the head of the neighboring 'Ōpae'ula watershed. Two years ago in a project very similar to the presently planned one, a fence line was constructed that completely enclosed approximately 120 acres of the upper 'Ōpae'ula watershed. The 'Ōpae'ula Exclosure, as it is now known, is named for the stream that has its headwaters within it ('Ōpae'ula Stream). The Helemano Exclosure, as this current project will be known, will abut part of the 'Ōpae'ula Exclosure fence line, along its southern edge. The new fence will enclose approximately 113 acres at the Helemano Stream headwaters.



Figure 31. Photo of Helicopter Pick-up at Poamoho Trailhead. Viewed to South.



Figure 32. Photo of Pe`ahināi`a Landing Zone (Inside `Ōpae`ula Exclosure)
Viewed to NE.

The field survey of the new line began at the southeast corner of the existing `Ōpae`ula Exclosure, at the Koolau Ridge / Summit. It is at this point that the eastern section of the proposed Helemano Exclosure will connect to the `Ōpae`ula Exclosure. From there the author traveled south, walking along the Ko`olau Summit Trail (see Figure 33). The fence line route had been previously scouted and marked with flagging tape. From where this survey began, the fence line will be in close proximity to, and possibly crossing over the Summit Trail at five points (refer to map, Figure 34). As part of this reconnaissance the fence line route was adjusted away from the summit trail when ever possible. There are two “bowls” or low hollows separated by a ridge that form the Y shaped head of the watershed. For descriptive purposes in this report, the bowls are referred to as “Northern” and “Southern”. The Northern drainage is much smaller than the Southern drainage (see Figures 35, 36, and 37). The fence line route will cross over one ridge as it continues towards the south. The Southern drainage is the Helemano drainage. At the second ridgeline below the `Ōpae`ula Exclosure, the fence line route will turn towards the west along the ridge, away from the Ko`olau Summit Trail (see Map, Figure 30). At a prominent *pu`u* along this ridgeline, the author assisted in a Natural Resources function and collected fruit for storage from the rare *ha`iwale* plant (*Cyrtandra viridiflora*) (see Figure 38). The fence line will follow this ridge for a substantial distance before dropping down one of many spurs that descend steeply towards Helemano Stream (see Figures 39, 40, and 41). The fence line will cross the stream and ascend (steeply) up the northern gulch face.



Figure 33. Survey began at this Fence line (‘Ōpae’ula Exclosure) on the Ko’olau Summit Trail (sign) with Matt Burt next to simple Stile.



Figure 34. Photo of Northern “Bowl” to be Enclosed. Part of Summit Trail Visible on Slope to Left Center.



Figure 35. Photo of Larger, Helemano Watershed (Southern Bowl). Viewed to East.



Figure 36. General Overview of Terrain Within Proposed Exclosure. View of Helemano Gulch, to N.

At a prominent *pu`u* along this ridgeline, the author assisted in a Natural Resources function and collected fruit for storage from the rare *ha`iwale* plant (*Cyrtandra viridiflora*) (see Figure 37).

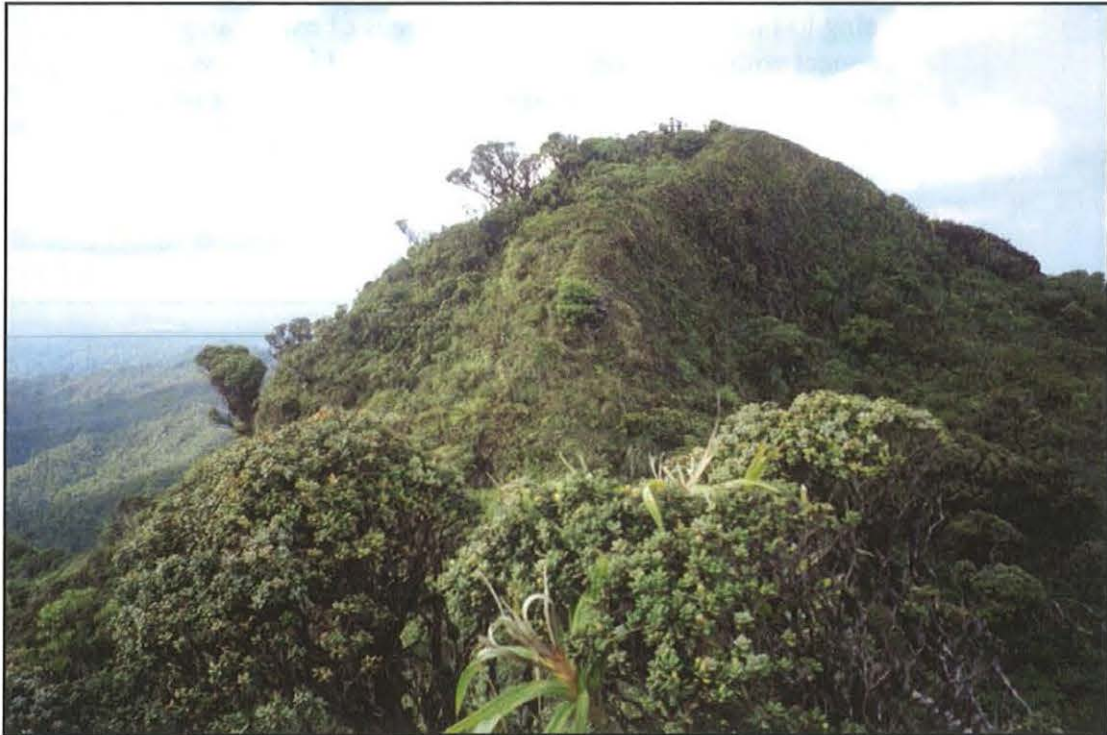


Figure 37. Fence line Will Extend Part Way Up This Pu`u Then Around to Left, Viewed to West.

The fence line will follow this ridge for a substantial distance before dropping down one of many spurs that descend steeply towards Helemano Stream (see Figures 38, 39, and 40). The fence line will cross the stream and ascend (steeply) up the northern gulch face.

At this ridge top, the fence line will turn towards the northeast (see Figure 41). It will follow the ridge and connect up with the Pe`ahināi`a Trail for a distance of approximately 300 meters. After that distance, the fence line will depart from the trail and drop down into a gulch, cross an unnamed stream, and continue up the opposite bank where it will close the loop by joining the existing `Ōpae`ula Exclosure.

Construction of the proposed enclosure may impact State Site #50-80-04-5638, the Ko`olau Summit Trail. This site was described by Dega *et al.* (2002a: 91-92) in the following manor:

“Site 50-80-04-5638 (SCS-34) consists of another major trail within the KATA, the Ko`olau Summit Trail. SCS/CRMS crew members surveyed approximately 3 km of the trail along the summit, although the trail forms the entire eastern extent of the KATA border, or approximately 19 km... The trail has been designated as a “site” as it has likely been utilized to facilitate transportation for some time. While the time depth of trail construction and use is presumably quite long, over several hundred years at least, accurate temporal ranges are ambiguous at

present. ...Only one site, the Site 5635 lava tube was associated with the trail. ...exploitation of arboricultural elements and game may have been secondary uses of the trail, the primary function being to facilitate transport to these areas of exploitation and to connect with other overland trails. The trail is well-worn at present, being a popular trail for hikers. Military use of the trail and adjacent areas is also highly obvious, particularly with many smaller paths off the main trail leading to disintegrating, wooden helicopter landing pads."



Figure 38. Photo of Fence line Route Descending Down Ridgeline Into Helemanu Gulch, Viewed to SW, with M. Burt in mid distance.

It should be noted that the present configuration of this section of the Summit / Ridge Trail was constructed as a project of the Depression Era CCC (the Civil Conservation Corp). The CCC was charged with establishing and improving trail routes and roads in both the Koolau and the Waianae Ranges for Army use. Some of the major works included the Kolekole Pass Road and the Drum Road. The former gave the Army direct access to their Ammunition Storage Area at the Lualualei Naval Magazine and the later an inland route between the Helemanu Military Reservation and the Army's (then) leased training facilities in mauka sections of Kahuku. The work in the northern part of the Koolau Ridge Area including that along this section of the trail was completed over a period of 18 (plus) months in the mid 1930's.



Figure 39. Fence Will Follow This Ridge Down Into the South Side of Helemanogulch, Viewed to S.



Figure 40. Fence line Will Follow This Ridge Down Into Helemano Gulch, Viewed to North.



Figure 41. Fence line Will Follow Part of This Summit Ridge on North Side of Helemano Gulch.

The Poamoho and Schofield-Waikane Trails were widened and improved to provide pack mule access to the succession of Trail Crew Camps that were established along the Summit / Ridge during the trail construction project (from personal communication with T. Takahama, of the State NAR Program). This trail project was one of a number undertaken by the Civil Conservation Corps (CCC) in the mid 1930s, following the request of the U. S. Army for a whole system of inland access routes on O'ahu.

The Cultural Resources Specialist looked for temporary shelters (like State Site #50-80-04-5635) and other natural and constructed features on the proposed fence line route. No extant cultural resources on the surface of the ground were observed along the project area. The proposed fence line may cross or be in close proximity to the Ko'olau Summit Trail (State Site #50-80-04-5638) for various lengths. As a result, the author recognizes the possibility of impact to the visual integrity and/or accessibility of Site 5638. One measure used to help minimize these impacts to this site is the realignment of the new route whenever possible to distance the fence line from the trail. Additionally, the building of crossovers, like the one pictured in Figure 33, will help mitigate access impacts. The Pe'ahināi'a Trail is another consideration. Presently, the Pe'ahināi'a Trail has not been given a State Site designation. As a trail, it is not regularly utilized, is very overgrown, and difficult to follow, especially as it gets further from the summit ridge. For these reasons it is questionable where the fence line will impact the trail. However, the Pe'ahināi'a Trail is likely eligible for nomination to the Statewide Register of Historic Places for the same reasons as the Ko'olau Summit Trail. The proposed enclosure construction is recognized as an undertaking as defined in the Section 106 regulations, 36 CFR, Part 800, Subpart B, 800.3(a) (establishing undertaking) of the National Historic Preservation Act of 1966, as amended. This office assisted the land owners in opening Section 106 consultation with the State Historic Preservation Officer (SHPO). This project will require a board permit from the Board of Land and Natural Resources (Section 13-5-22 Hawaii Administrative Rules) because the project falls in a Protective (P) subzone. We provided data and input to the permit and land use documentation, see copies of these documents, Appendix I and II, below.

Surveys within Kahuku Training Area (KTA)

A wider variety of surveys were performed at the Kahuku Training Area (KTA) this last year than had been the case in the past. In previous years activities here were primarily associated with proposed improvements to the Training Range and access to and through it. This year those activities continued but other kinds of investigations were called for as well.

Survey of Locations Considered for SBCT Related Improvements

A Cultural Resources / Archaeological reconnaissance and site inspection of possible antenna locations was performed by David Cox, in a portions of East Range, Schofield Barracks (SBE) and the Kahuku Training Area (KTA). On Thursday, 22 May 2003 I accompanied Mike Sato, Engineer for the 30th Signal Battalion and Directorate of Information Services Command (DISCOM) on this antenna site field check. The field reconnaissance was actually the second undertaken to assess the potential for impacts to known or even previously unidentified cultural resources that might result through construction and installation of a network of antennas for a new tactical UHF radio system (the other report is presented in the section on Sharing Info). The present action is being taken in various sections of two major training areas for planned communication improvements that will be required for use with the proposed Stryker Brigade Combat Team (SBCT).

The first area to be investigated was in the JTC - East Range, at the southeast corner of the Air Assault School compound, which is located along the north edge of the East Range Training Area, a part of Schofield Barracks. The 30th Signal will suggest this location as the site for the installation of a 100-foot tall antenna tower, with a possible five to six meter square footprint for the foundation and surrounding fence. This corner section of the facility is regularly mowed and is presently partially fenced in (see Figure 42). There are no indications of extant cultural resources of any kind within the large fenced compound area.

After leaving East Range we proceeded to the Kahuku Training Area (KTA). Here the point of interest was the three existing large antenna towers that are spotted near the summit of Puu Kawela. These antenna towers are presently in use by a number of entities, but it is hoped that space for the UHF antennas can be arranged on one or both of the taller two at this location, considering that the land is in the process of being purchased by the Army. The existing antennas are all in fenced in compounds, within plots that have been cleared and leveled during their construction. This ridge top location, at about the 975 foot elevation was originally heavily modified during the building of the numerous Control and Command structures for the Kahuku Nike Site's Integrated Fire Control (IFC) Facility in the mid 1960's. This group of older buildings is now being considered for eligibility for listing (to the State and National Register of Historic Sites) as being possibly significant as part of a Cold War Era Site. There are however presently no indications of surface cultural resources or prehistoric remains, nor have any been subsequently discovered at this narrow hilltop location.



Figure 42. Proposed Location of UFH Communication System Tower, to Left of Power Pole.

It is not anticipated that any cultural resources, artifacts or prehistoric land modifications will be impacted, discovered or inadvertently uncovered in the future during the new construction at these existing antenna towers as is being proposed for the SBCT / Transformation. The 30th Signal Battalion has been told that they are responsible for 'notification' in the eventuality of such find or inadvertent discovery of any cultural resources during the construction activities for any of these projects. The understanding is that work in that section must stop and the DPW's Cultural Resources Manager must be notified immediately so that timely data recovery can be undertaken and valuable dateable or other material can be collected for analysis. It is felt that with these measures being observed there should be no adverse effect to cultural resources due to work on this project.

Survey within Training Area B-2, Kahuku Training Area

A Cultural Resources / Archaeological reconnaissance was undertaken at Kahuku following the request of ITAM. The field visit was performed by David Cox, while accompanying Ken Zitz and Tom Kelly (both of ITAM) and Russell Leong (DPW-ENV / Clean Water) on Monday, 12 May 2003. The reconnaissance was undertaken primarily to assess the impact on cultural resources (if any) as the result of extensive new road improvement construction activities in a section of Training Area B-2. The road work was undertaken by private contractors on Army controlled lands without the knowledge or prior approval of the Army. The earth moving involved extensive

cut and fill operations over an area of approximately three acres. It was done to reduce the very steep existing grade along a 300+ meter section of one of the interior Army access roads. The earth moving was done on the eastern half of the un-surfaced, wide one lane dirt surfaced track leading off to the west from the narrow but paved Puu Kawela Road. This dirt road is only the route that leads up to the top (south edge) of Landing Zone (LZ) Canes, and then on across to access Areas B-1 & A-1 (refer to Figure 43, Map of Area B-2 Road). To our knowledge this area had not been surveyed for cultural resources in the past.

Map removed to protect rare resources. Available upon request

Figure 43. The New Area B-2 Road Work (indicated by red cross hatching), from portion of KTA Field Map indicating nearby Sites.

There are however five previously identified Sites in the general vicinity of the present construction activities. The nearest is Site 9507, on higher ground on the other side of the ridge inland and to the south, about 150m to the east. The remaining four sites are all in the area of the middle reaches of the main Oio Gulch, with the closest (Site 9508) about 400m to the NE. None of these five sites have been or will be impacted by these earth moving operations.

We were able to drive directly to the area in question. Work on the road section had been nearly completed, with only some clean up, surfacing with gravel and rolling, plus runoff control measures and grading to the sides to be finished. The project involved evening out a short section of very steep grade by cutting down a much longer section of the right of way and moving the excavated material into the neighboring gulch, immediately to the south. This has produced a massive trapezoidal section berm to the south of the new roadway that is now up to 30m wide in

some places, by up to 10+m high (see Figures 44 through 48, Photos of Area B-2 Road). The narrow gulch is a short tributary (intermittent) that feeds into the west branch of Oio Stream.



Figure 44. Mid Section of New Cut, w/ Old Road High on Left & New Berm on Right.



Figure 45. Lower Section, from Upper End of Old Road. Viewed to E.



Figure 46. Upper Section of Road, w/ 3 Windmills in Distance. Viewed to SW.
(S. or left half of panoramic)



Figure 47. Upper Section, from Remains of Old Road. Viewed to W. (N. half of pan.)



Figure 48. Avengers on Lower Section. Viewed to W. (Figs 46 & 47 were taken from right of *Causarina* tree on bank beyond front of middle Humvee)

The entire perimeter of the construction area was investigated at this time for evidence of any prehistoric, historic period or other cultural remains or modifications that might have survived within this narrow side gulch. Record photos of the existing condition of the construction area were taken. Our inspection of this work site and its surrounding area confirmed that there are no surface indications of any cultural material or modifications at this location. In addition, considering the narrow 'V' and the slope of the sides, plus the steep relief of the stream in this small gulch it is not likely that there were any cultural remains or modifications here in any case.

The contractor and their subs were required to apply for the proper permits and comply with the Corps' Standard Best Practices for erosion control and stream runoff, as well as assume the responsibility to comply with after the fact section 106 Consultation with the SHPO (copy of the latter's response is attached below as Figure 49).

LINDA LINGLE
GOVERNOR OF HAWAII



PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

ERNEST Y.W. LAU
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

JUL - 2 2003

Michael McNulty
McNulty Engineering
67-335 Kaiea Place
Waiialua, Hawaii 96791

LOG NO: 2003.0950
DOC NO: 0306EJ26

Dear Mr. McNulty:

SUBJECT: National Historic Preservation Act Section 106 Review - Notice of Intent to Be Covered Under NPDES General Permit for Site Constructors, Inc. Windmill Access Road Hanakaoe, Pahiapahialua, Kawela, Ulupehupehu, Ko'olauloa, O'ahu
TMK: (1) 5-7-002:001 Access Road
TMK: (1) 5-7-002:009-012, 015-018 Windmill Pads

Thank you for your submittal of the CWB-NOI Force C NPDES permit, received on June 17, 2003. We understand that this is an after-the-fact permit application and that all grading has been completed. The plans attached to the permit application also indicate that the plans attached are "as built". We understand that this undertaking did not undergo National Historic Preservation Act Section 106 review prior to grading activity. However, we also understand that the Army Department of Public Works personnel, when notified of the grading of the portion of the windmill access road, conducted a post-grading site inspection, and determined that no historic sites were affected by the grading activities.

We concur with the findings of the Army DPW. Should you have any questions please feel free to contact Sara Collins at 692-8026 or Elaine Jourdan at 692-8027

Sincerely,

Peter T. Young, Chairperson and
State Historic Preservation Officer

EJ:jk

c: Laurie Lucking, Directorate of Public Works, Department of the Army,
Headquarters, United States Army Garrison, Hawaii, Schofield Barracks, Hawaii 96857
✓ Dave Cox, Directorate of Public Works, Department of the Army, Headquarters,
United States Army Garrison, Hawaii, Schofield Barracks, Hawaii 96857

Figure 49. SHPO's Concurrence letter to NHPA Section 106 Review.

Survey within Eastern Sections of Training Area A1, Kahuku Training Area

A Cultural Resources / Archaeological reconnaissance and site inspection was performed by David Cox, Cultural Resource Specialist, DPW in a portion of the Kahuku Training Area (KTA) on Monday, 11 February 2003. Tom Kelly, LRAM Coordinator for ITAM, and Capt. Anthony Barbina, 65th Eng Bn & 2nd Bde accompanied me on this inspection. The field reconnaissance was undertaken to assess the potential for impacts to known cultural resources in eastern sections of Training Area A1. It should be noted that part of Training Area A1 is State Owned.

The 2nd Bde's proposal is for the mechanical digging of a series of defensive positions in and along the tree lines that separate the various larger open areas. The planned training exercises will consist of approximately two platoons defending three defensive lines in sequence as a company sized unit advances into and through the three open areas to the north of Landing Zone (LZ) X-Strip. Each initial 'assaulting' company will come in by helicopter, landing at LZ X-Strip. They will then proceed by stages, attacking down slope in an attempt to over run the 'defenders' who will man the various dug in defensive positions that overlook the three separate open grassy areas. These defensive positions range as far as 1100meters to the north of the LZ.

The first area to be 'defended' is in the ironwood grove to the immediate north and east of the LZ. The plan calls for one excavated crew served firing point and a couple of smaller sand bagged (but not excavated) positions spotted through the moderately dense stand of trees. The main defensive firing point is about 100 meters northeast of the edge of X-Strip. The under story in this area is almost non-existent due to the combination of the heavy shade of the closed canopy of the ironwoods and the thick surface layer of needles from these trees. There have been no cultural resources noted in this section during a number of past field surveys in the area.

The second set of defensive positions is being spotted on the rise facing south into the lower open area between Hill 544 on the west and a slightly lower bump on the east. To the immediate west of Hill 544 is the main Kahuku Motor Bike Park track area that is heavily used on weekends by the public. The area between the two hills has been identified as the location of a possible Primary Assembly Area (PAA 1) in Army plans for the training area. The features within the perimeter of this proposed troop staging area or PAA were GPS'ed and a series of record photos were taken of the existing condition of the site (see Figure 50, a Map of the PAA 1). There were 22 possible features found in the area within the low central area and on the two flanking hills (see Figure 51, photo of the Hill 544). Six of the features may be pre-historic or early historic. Another four are probably from the ranching era, into the 1930's, for example see Figure 31, photo of a Survey Mark situated at the top of the smaller eastern hill. Additional field investigations are in the planning stages for this site. The defensive firing points planned for the ironwood grove at the north of the open area are well into the tree line, to the north at least twenty meters beyond the nearest features. These ironwoods to the north of the grassy section are spread out more and also have more foliage low on the trunks than those seen in the first objective mentioned above. There is little other

Map removed to protect rare resources. Available upon request

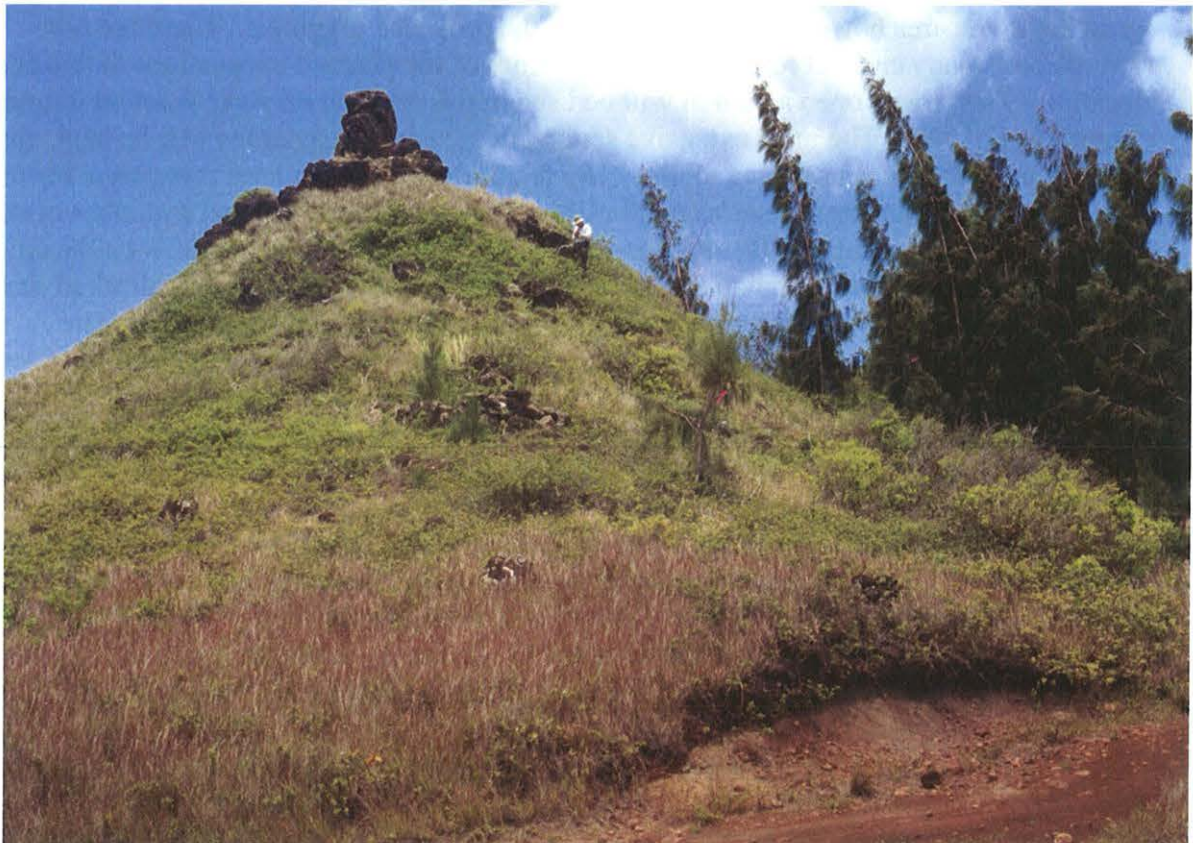


Figure 51. Hill 544, PAA 1, PTA. The Planned Defensive Positions Will be in Trees Further to the Right.



Figure 52. Private Survey Marker on Low Hill to East of Hill 544.

growing in the area however at the location of the proposed diggings. There are no indications of any cultural resources in the vicinity of the planned excavations at this central location. The largest open area that will be used in this training exercise is found inland (south) of Hill 492. The most extensive series of defensive excavations will be here, spaced out in a wide semi-circle, facing inland. The requirement is for at least three crew served positions (usually mounting the large 50 caliber heavy machine gun) and a number of smaller (individual) firing points for the defense of this area between Waiale'e Gulch on the west and the deeper Pahipahialua Gulch to the east. This section is not part of the established main Dirt Bike racecourse, but is still crisscrossed by a number of impromptu bike trails. The vegetation along the high ground here at the north of the grassy open area consists of scattered large ironwood trees. The thickest stand is found at the northwest edge of the grassy bowl that stretches 100+ meters inland. There are a few small clumps of *ulei* and some *akia* as well as some low wind carved christmasberry in shrub form, but the general aspect to the south where the 'attackers' will have to come through is open grassland. The relatively flat, mostly grassy bowl section just inland has a number of scattered non-natural features, and all but one have now been identified as being of military origin (therefore not even historic). The single possible older feature, in the form of a low wall or alignment of large rocks is located on the north face of a small bump in the center of the bowl, and it is not anticipated that it is likely to be impacted at all by this exercise as no live ammunition firing is allowed in KTA.

The only site known from previous surveys in the general vicinity is one that was somehow miss-located in Clarke (May 2000:29, Fig. 6). This site was indicated in our present study area but may actually be on an adjacent flat area, across Waiale'e Gulch well to the west of the area of this field exercise. Using the Trimble GPS in June 2002 we attempted to navigate to the assumed position of the feature with no success. What was found in this field survey is the USGS Survey Marker – 'Waiale'e 1927', at Hill 534 (listed in Clarke as SC-2 on page 52, and then SC-1 in the first paragraph, and later as SC-2 again in paragraph three of page 69). This is the only feature of any kind other than modern bike trails that we noted (after an extensive search) in the general area at that time. The feature we found is a typical older USGS Triangulation Station (Trig. Sta.). It consists of a brass medallion marker and the old "table style" base for the now missing red and white standing target, (refer to our Figure 53, a photo of the Trig. Sta.). The mortared but fractured bluestone and reinforced concrete base structure shows some damage, probably from vandalism.

It is not anticipated that any cultural resources, artifacts or prehistoric land modifications will be impacted, discovered or inadvertently uncovered during the proposed excavations for this field training exercise. The 65th Engineers will back fill all the positions excavated during this field operation to original condition following the exercise. The representative of the 65th Eng Bn was informed that in the eventuality of a find or inadvertent discovery of any cultural resources during the excavation activities for this project, work in that section must stop and the DPW Cultural Resources Manager must be notified immediately so that timely data recovery can be undertaken and valuable dateable or other material can be collected for analysis. It is felt that with these measures being observed there should be no adverse effect to cultural resources due to work on this project.



Figure 53. 1927 Triangulation Station, at Hill 534, KTA. w/ L. Zulick recording a GPS shot.

Survey within Pohakuloa Training Area (PTA)

A single trip to Pohakuloa Training Area (PTA), on the Island of Hawaii was made this year.

A Cultural Resources and Archaeological reconnaissance and site inspection was undertaken at a portion of the Pohakuloa Training Area (PTA), Island of Hawaii. The study area in question is a section of the PTA Impact Area that is being proposed as a large 'ground maneuver box' for combined live fire training by the 3rd Marines. The north edge of the box is situated along the existing Lava Road in the general area of Puu Leilani, with the new troop maneuver area extending two and a half kilometers to the south, into the corner of the restricted Impact Area, to the vicinity of the twin cinder cones of Na Puu Kulua (literally, 'the Twin Hills', P&E 1986:181). David Cox - Cultural Resources Specialist for DPW, accompanied Sean Gleason - Natural Resources Specialist, PTA Environmental Division, DPW in performing these site assessment inspections on Saturday and Sunday, 14 and 15 December 2002. We were escorted and assisted by Chief Warrant Officer Daniel Geltmacher, a Marine Explosive Ordnance Disposal (EOD) specialist and seven other personnel from the 3rd Bn 3rd Marines, from Kaneohe.

The purpose of the Cultural Resources Specialist's involvement in this field trip was to attempt to locate, explore and map any previously unidentified archaeological features that might be situated in the area of and to the north of the two prominent cinder cones of Na Puu Kulua, also called the Twin Sisters in the Marine's Planning Brief. These Puu are located near the northwest corner of the 50,000 acre PTA Impact Area (refer to map, Figure 54).

Map removed to protect rare resources. Available upon request

Figure 54. Map of Na Puu Kulua and Northwest Corner of the PTA Impact Area.

The only known cultural features in this access restricted section of PTA's Impact Area are a linear group of lava tube caves located to the west of the Puu. These lava tube features had previously been identified and investigated. The main cave was initially found during a Bishop Museum field survey in the 1950s, and then visited in 1983 by this author and then again in April 2002 by William Godby and Cox. That multi feature site is now listed as State Site Number 50-10-30-5000.

The objective of this more recent investigation was to identify and record any additional significant cultural features or other caves that had not been recorded by previous fieldwork in this general area of PTA. The first day we used a trail-less overland route striking out due south from the road at the base of Puu Leilani, having parked just outside the Impact Area (see Figure 55).



Figure 55. Sean Gleason (DPW-ENV/PTA) and Crew Setting Off on Sweep.

The Marines had been briefed on what kinds of features or artifacts they might possibly find and were good at informing me when things looked interesting. On the way in through the Impact Area the ten of us hiked south sweeping a width of 200+ meters. We went south for a total distance of over 2000 meters, all the way to the west side of the swale area between the two Puu. The route through this section of the Impact Area traverses an area that is not at all flat, yet overall is relatively level. The area is primarily a dry, grassy, rolling, rather open older pahoe-hoe lava flow (refer to Figure 56). There are scattered areas of fine volcanic ash in the lowest hollows and pockets supporting what limited growth of grasses that were found.

Here there were no trees or shrubs. This section has a few very small blister edge overhangs, and an occasional small vertical sink. None of these features are large enough, either tall or deep enough to serve as even temporary shelters, and all had very rough irregular or broken rocky bottoms. A number were searched but none had any indication of remains or past use by other than goats or mouflon sheep. There are none of the type of lava tube features that had been noted to the west side of the Puu, at Site 5000.

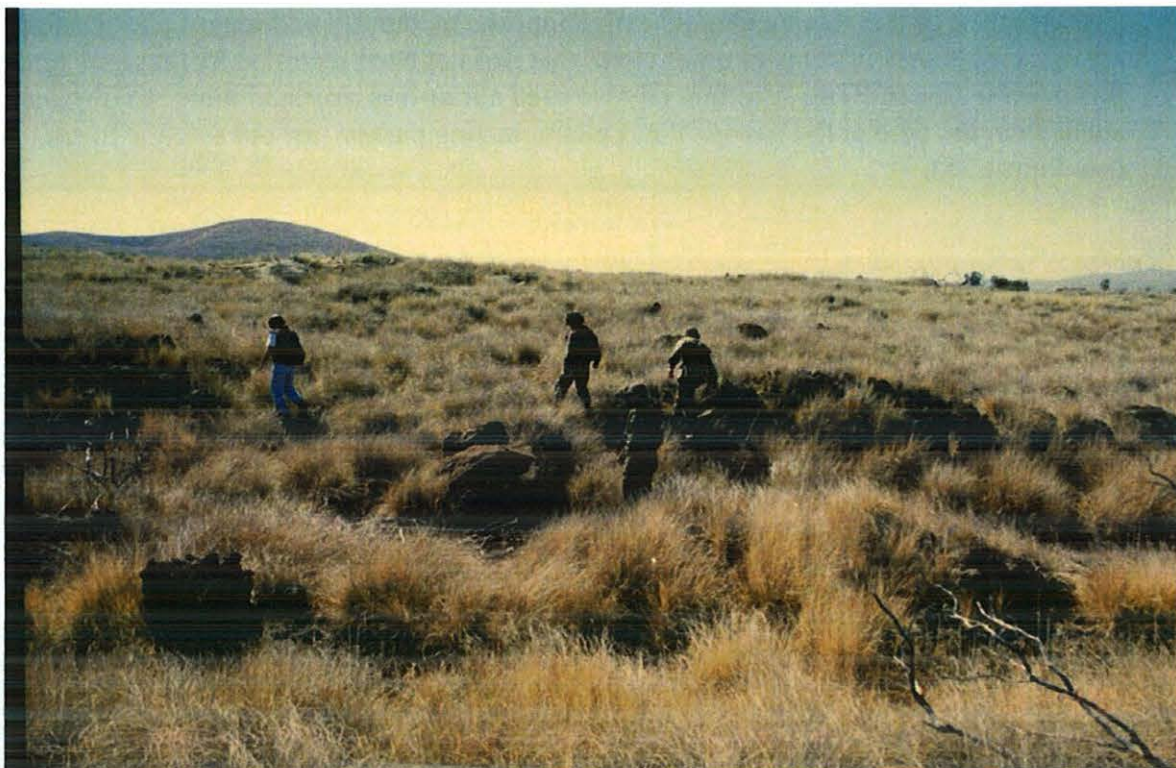


Figure 56. On the Open Grassy Pahoehoe Area. Half of the Crew Fanning out for the Sweep, with the top Puu Kulua in the Distance.

The open plain section closest to and including the slopes of the two Puu is entirely cinder covered. This section has numerous shell and bomb craters, a variety of UXO, old targets and lots of scrap metal – spent munitions. There is a recent fifteen acre burn patch between the two Puu (see Figure 57). This southern most segment of the survey area supports a fairly thick cover of various grasses, including some patches of moderately dense growths of the invasive exotic fountain grass. The ten of us returned by way of the Kulua Road, along the west edge of the planned maneuver area and then back to the Marine's Hummers parked on Solomons Road.

Sunday we took a different route south into the Impact Area. We started at a point one+ kilometer further to the east than the day before, parking the single Humvee near the concrete helicopter landing pads on Lava Road. Our line of travel was again due south, but this time in the direction of the eastern foot of the eastern cone of Na Puu Kulua. The initial 500 meters south were across a rough older Aa flow (refer to Figure 58). We then reached a section of a pahoehoe flow and generally followed the west edge of the scattered large O'hia trees on that

flow. This very open stand of mature trees extends some distance to the east, and on well to the southeast of Na Puu Kulua. Some of the pressure blisters and ridges in this section are much larger than were seen the previous day, but again the small overhangs and sinks noted were not useable as shelters, nor did there appear to be any tube systems along our route. We were able to return north on Moana Road, back to the vehicle. Moana Road will serve as the east edge of the Marines proposed 'maneuver box'.

None of the blisters, ridges or sinks seen either day had any indication of modification or use. There were no entrance steps or 'improved' ramps into the few sinks that were seen. At no time did we note any extensive accumulation of soil, ash or other deposits or any cultural material other than UXO in any of the natural features in this area. There were three areas noted that had shiny pahoehoe outcrops of the sort that were almost but not quite chill glass quality.

No freestanding features constructed of stone, no walls, no ahu, no trails (other than WW II era or newer Jeep and rough bulldozer paths) were seen.



Figure 57. Burned Section Between the Puu, with Marines on Jeep Trail.



Figure 58. The Aa Flow area, with Scattered Naio, Patches of Fountain Grass, the Edge of the O'hia Trees to the East, & Puu Kulua and Mauna Loa in the Distance.

With our wide effective sweep width we were able to physically survey at the minimum one fifth of each of seven and a half square kilometers in this section of the Impact Area, all with negative results. It can therefore be safely assumed that training in this area will not be likely to impact significant cultural resources in this area. Further UXO sweeps and UXO clearance are needed before the on the ground training gets under way, and those clearance activities could provide an opportunity to field check an even greater portion of this area.

Those using this location for combined live fire exercises will have to fully understand the requirement that no activity can be allowed that might affect the nearby features of Site 5000, just 500 meters to the west of the proposed maneuver box.

Surveys within Makua Military Reservation (MMR)

A number of individual field projects and actions were performed at MMR this last year. The vast majority of our field time at MMR was in direct support of the Army's live fire training. Other efforts of our office were assisting the Range Office crew in their program of improvements to the training area and facilities, and providing escort duties during the twice-monthly cultural accesses to the valley by member of Malama Makua. This later kind of activity and the live fire support are covered in following sections of this report. Much of the remainder was in the form of support to other groups, primarily collecting data for the development of the Draft EIS. What follows here are subsections summarized from the Trip Reports / Memorandum For Record (MFR) for the remaining field activities.

A Planning Level Report on methods, results, and management recommendations derived from new field surveys was completed for Makua Military Reservation (MMR) in the previous year. The manuscript that went to printers in December 2001 has been used to guide much of the subsequent work we have done at MMR since. Three research topics guided the direction of this study. First, we needed to accurately locate and record the content and extent of the known or 'existing' sites with sub-meter GPS equipment. During this phase of the fieldwork additional features and new (previously unidentified) sites were found and added to the inventory. Once this data was collected it was entered into both the Cultural Resources Database and GIS database. At this point the information is available for use by the Army in meeting various compliance and training requirements, and sharing with others within the Army community. The second research objective of the study was to closely examine all the cultural resources in areas of MMR where active training exercises actually occur. This information was used to develop mitigation and protection strategies for these potentially impacted sites and features. The ground area needed for the ongoing live fire field training exercises is less than one fifteenth of the total MMR acreage. The final major element of the research design for the December 2001 Planning Level Report project was to identify the extent of the sections of disturbed soils in MMR, or areas that have modified sufficiently that further study is probably not warranted.

A series of projects were undertaken by outside contractors this year. Those programs involved initial detailed survey of areas that had not been previously swept for ordnance, and a subsurface testing project (that was developed based partially on our December 2001 MMR Report). The later research project was designed to meet the research requirements set out by the State Historic Preservation Office. It is anticipated that the subsurface testing will provide additional detailed data on the extent, function, and age of the known sites within Mākua and Kahanahāiki Valleys. We were available at various times to the contractors at their request to provide field support, maps and other data as needed.

Firebreak Improvements at MMR

An archaeological reconnaissance survey of proposed Firebreak (training area access roads) Improvements at Makua Military Reservation (MMR) was performed by Loren Zulick on 25 July 2002, accompanied by Gayland Enriques, Fire Protection Manager, Range Division,

USAG-HI; and Louis Kalani, Maintenance Work Inspector, Service Contract Inspection Branch, DPW, USAG-HI, following a meeting held at MMR Range Control. This meeting was to address the Makua Firebreaks and identified the location and purpose of six proposed firebreak improvements (see Figure 59, Map of MMR). These sub-projects are in support of a planned prescribed burn that was scheduled for 9-13 September 2002, with a backup window of 16-20 September. These projects are designed to help compartmentalize the individual controlled burn areas. Three of these improvements (#1, #3, and #6) had originally been proposed two years ago (see Trip Report by this author Dated 27 July 2000). A site visit to each of the five firebreak improvements and the clearing of potential fuel along the western fence line was undertaken after the meeting. The following are outlines of each of these proposed project sub-elements:

- 1) Re-establish a firebreak that extends from Fox Objective, across a gulch bottom, and connects up to an interior firebreak east of Coyote Objective (labeled #1 on Map, Figure 59). This route has been surveyed on foot by DPW Cultural Resources Specialists. The existing firebreak is overgrown, but relatively easy to follow with soil and rock berms at either edge. This route passes closely to features in State Site 50-80-03-4537. Previous ground disturbance is evident adjacent to the western features in Site 4537, and it is essential that future improvements do not extend any further to the east than what already exists. The firebreak lies within 10m to the west of Site 4537 Feature 6 (mound) and Feature 9 (wall). It is extremely important that State Site # 50-80-03-4537 Feature 6 and Feature 9 are not impacted by ground disturbing activities. These features will be well marked for avoidance. (This project element was again deferred and not undertaken).
- 2) Re-establish a firebreak that extends beyond Buffalo Objective, across Kalena Stream, and connects to the south firebreak on the south side of Ko'iahi Gulch (labeled #2 on Map, Figure 59). It has been suggested that there is an existing firebreak at this location with a bridge that crossed Kalena Stream. However, no bridge remnants were observed during reconnaissance. The previous firebreak is poorly defined, and it is likely that a new route will need to be created. The northern portion of this firebreak bisects State Site #50-80-03-4543. There are concerns that previously unidentified subsurface cultural deposits from Site 4543 may be inadvertently discovered during ground disturbing activities. The route lies within an area that has been previously surveyed by DPW Cultural Resources Specialists. (This project element was again deferred and not undertaken).
- 3) Improve the roadway that extends from Elk Objective through the demo pit area to the interior North/South running firebreak (labeled #3 on Map, Figure 59). This road exists as an access route to the demo area. (This road section was completed, as planned, but has since been washed out again).
- 4) Re-establish a firebreak at the northeast corner of the north firebreak (labeled #4 on Map, Figure 59). This cut is still evident, however overgrown especially with guinea grass. State Site #50-80-03-5928 (single feature site) described as a short agricultural retaining wall is approximately 45m north of the firebreak. This feature

should not be impacted by improvements to the firebreak. (This project element was again deferred and not undertaken).

5) Re-establish a firebreak that extends from the northwest corner of the north firebreak to the MMR western boundary fence line. This firebreak has a drivable surface on relatively flat ground, but the scrub growth is closing in on the route. The firebreak actually extends to the south and parallels the fence line down to Troop Gate. Only the northern section that extends in an east/west orientation will be re-established. (This road section was finally completed, as planned, in May this year).

6) One additional project is the clearing of koa haole and other shrubs between the MMR western boundary fence line and Farrington Highway. The intent is to reduce fuel along the western boundary of MMR. This area has been disturbed during road construction activities. (This project was completed under an outside contract in April this year).

In summary, once the route that crosses Kalena Stream is defined, it will be thoroughly examined for cultural resources. Special care needs to be taken during the re-establishment of the road from Fox Objective to Coyote Objective to avoid impacts to Site 4537 Features 6 and 9. The author has been informed that these projects are considered part of the prescribed burn EA, and will be included in Section 106 actions for the burn EA. (In fact they were not done, though their completion some time in the future is still a possibility)

Map removed to protect rare resources. Available upon request

Reconnaissance of a Debris Filled Crater

A Cultural Resources Reconnaissance was made by L. Zulick of a proposed Access Route to a debris filled Crater at MMR, on 12 August 2002, at the request of Mr. Husemann, Supervisor, Makua Range Operations. The purpose of this mission was to assess potential impacts to cultural resources resulting from the cleanup of a large pit currently filled with historic metal rubbish (Figure 60). The crater (possibly a bomb crater) is located on the south side of the center firebreak, somewhat behind the “flash pan” burn cage. A crane needs to be driven to the crater to extract metal scraps and other historic rubbish. Reconnaissance was undertaken to protect known cultural sites from the crane entering and departing the crater area.

The Cultural Resources Specialist traveled downrange along the center firebreak to where the “flash pan” cage is located. After turning right onto another firebreak, the vehicle was parked at State Site #50-80-03-4541 Feature 2 (wall). The wall was followed in to the location of the crater. From the crater, the most direct route to the central firebreak was surveyed. There are two large craters between the firebreak and the crater that is to be cleaned out. An alternative route to the west was chosen that circumvented the empty craters. This route was walked several times from the crater to the center firebreak and back (approximately 50 meters) to look for surface indicators of cultural resources. No cultural resources were observed during the survey. A total of fourteen yellow flags were placed along the “cleared” route from the center firebreak to the crater. Four red flags were placed at Site 4541 Feature 2 (wall remnant) in an attempt to show what area to avoid. Figure 40 shows the condition of the wall remnant prior to cleaning out the crater. After conducting an archaeological reconnaissance of the navigable route, it is the determination of the Cultural Resources Specialist that no cultural resources will be impacted by ingress or egress of the crane. Protective measures (red flags) were placed at the closest cultural resource to alert the operator of an area to be avoided.



Figure 60. Photo of Crater with Rubbish, View to West (photo taken prior to reconnaissance).



Figure 61. Photo Showing Condition of State Site #50-80-03-4541 Feature 2 (wall remnant) Prior to Reconnaissance.

A Cultural Resources Site Inspection of Clearing and Grubbing for Water Quality and Monitoring Wells at MMR

A Cultural Resources / Archaeological site inspection and monitoring of the mechanical clearing and grubbing operations was performed by David Cox. He accompanied Danny Harrelson, Research Geologist for the Army Corp of Engineers (the Corps) Waterways Experiment Station, Vicksburg Mississippi and Ben Meinze (EOD Specialist) of Donaldson Enterprises on Tuesday, 25 September 2002. An initial series of six water quality and monitoring wells are being sunk into the four streambeds that drain MMR.

The location of four of the sampling wells have been selected near or just inside the West Boundary fence, with two additional wells to be located about a hundred meters further inland along the two central streams. These test wells will be monitored regularly with samples being collected for identification and analysis of any evidence of explosive materials and their break down products that might have entered the subsurface water system of the two valleys. It should be noted that no appreciable surface flow (for longer than a day) has actually been observed at any of these points in the last decade. In the two wells that have been completed to the east the water table was below fifteen feet in depth.

The location of Monitoring Well Number 2 (MW-2) was selected to test the water column and lower drainage of the Punapohaku Stream. A short distance inland (about 200m) this stream cuts through some rather steep terrain. The area immediately inshore of the MMR fence near the bridge under Kamehameha Highway however is very flat with the look of a wide alluvial fan. There is no indication of a dry flow channel, any defined or scoured stream bottom here, as is found near where the other three streams to the east cross under the main fence.

The drilling at MW-2 will be done at a later date, in a spot about three meters to the southeast of the streams' floodgate in the main fence (see Figure 62). The drill rig is mounted on a large flatbed truck and a path for this vehicle to get to the well site was required. A medium sized John Deere 310E hop toe was used to grub and clear the route and open up the wellhead area (refer to Figure 63). MW-2 is going to be about 250 meters to the south of the main structures of Ukanipo Heiau, a nationally registered site (see Figure 64). Associated features are known to be located in the intervening flat section, nearer the heiau. With the thick cover of shoulder high Guinea grass, scattered Koa haole and a few tall castor bean bushes obscuring the ground surface in this general area it was felt prudent to do a pre clearing inspection for remnant walls or other features and then monitor the clearing and grubbing operations in this potentially sensitive area.

The wellhead area and access path (see Figure 65) were cleared and leveled by mid afternoon. No evidence of cultural remains of any kind was noted during this session, no shell or bone material or other midden was seen at all. The soil in the wellhead area is loose sandy red-brown to gray loam, with occasional patches of ash and charcoal from old burned out Kiawe trees. In the area to the east near the extension of the North Firebreak Road down to the fence the excavations are in loose dusty red dirt. There is a

mix of scattered water worn and semi-angular vesicular basalt cobbles found throughout, with the addition of a few small boulders in the wellhead section. These stones showed no organization or clustering, rather appearing to be randomly deposited by past heavy stream wash.

This field inspection indicates that the location of this well and access path at MMR do not contain any evidence of extant surface or near surface cultural or archaeological objects, structures or remains.



Figure 62. Clearing at MW- 2 Drill Site Area on Punapohaku Stream at the West Boundary Fence, MMR, viewed to the South.



Figure 63. Hop Toe on Access Route to Wellhead Area, viewed to North.



Figure 64. View North along Fence, with Equipment Finishing Wellhead, and Ukanipo Heiau in Distance.



Figure 65. Access Route from Extension of North Firebreak Road, viewed to NW.

A Cultural Resources Site Inspection on an Inland Trail in Kahanahaiki

A Cultural Resources / Archaeological site inspection of the clearing done on an inland trail in Kahanahaiki ahupua`a was performed by David Cox on Tuesday, 8 October 2002. The trail is the remnant of part of an extensive system of emergency firebreaks at the back of Kahanahaiki valley. Bulldozers were used to cut many of these firebreaks during and after the large range fire of 1995. This series of old and over grown dozer tracks are located in the area to the east and north of the well maintained North Firebreak Road. The trail section that was cleared of grass the previous week, and investigated at this time drops off the main North Firebreak into the large gulch and stream (presently dry) that drains the eastern most section of Kahanahaiki. The clearing was done using gas powered weed whackers to provide access to areas that will be saturated with fire retardant just prior to the proscribed burns planned for the end of the month.

This route leaves the firebreak just past the bend above 400 foot elevation, loops to the south paralleling the road above and the dry stream below for a distance of 150 meters. It then crosses the main / north stream (also dry) at a large washout and climbs up to the east into the south branch of the drainage, eventually crossing over to almost 800 ft. elevation on the north slope of 'C' ridge, the narrow spur that separates the back of Makua and Kahanahaiki valleys (refer to Figure 66, a portion of Ka`ena Quad.)

Map removed to protect rare resources. Available upon request

Figure 66. Trail to North Slope of 'C' Ridge, Kahanahaiki Valley, MMR.

The trail has been cut to an average width of three meters, with most of the smaller koa haole (*Leucaena leucocephala*) in the path also removed. The cover to the sides of the trail is grassy, with a preponderance of low Guinea grass, but with other types showing in patches. There are scattered small to medium Java plumb trees, apparently regrowth since 1995, scattered mostly in the dry stream beds in this area.

Once above the main stream the trail is cut into the north side of moderately steep 'V' bottomed terrain. There are no flat areas in this upper section of the valley at all. The rocky soils in this area are generally shallow and what growth is present is reliant on the limited rainfall, and is not robust. A series of photos were taken from near the top of the cut trail on down slope to indicate the pre burn condition of the area (see Figures 67, 68 & 69). These will be compared to post burn photos of the same area.



Figure 67. Upper Most Section of Trail over to North Slope of 'C' Ridge.



Figure 68. Upper Section of Cleared Trail, viewed down slope to SW



Figure 69. Middle Section of Trail, with North Firebreak Road in distance.

No evidence of cultural remains of any kind was noted during this field inspection. It is possible that low lying rock structures may be present in the waist high guinea grass, but will be not visible until after the planned controlled burn. Indications are that this section of MMR does not contain much evidence of extant surface or near surface cultural or archaeological objects, structures or remains. It is expected this will be confirmed following the planned controlled burn.

Site Inspection of Stream Flow Monitoring and Recording Equipment

A Cultural Resources / Archaeological reconnaissance and site inspection of four areas where Stream Flow monitoring and recording equipment is being installed was performed by David Cox on the morning of Tuesday, 25 November 2002. Steven Spengler and the crew of Environet Inc. pointed out the proposed locations of the installations in the morning Tuesday, 25 November 2002, and the partially completed installations were checked on Monday, 2 December 2002.

Drilling for the six new water quality and monitoring wells was started earlier at four locations near the western edge of MMR. Now the location of the three flow monitoring devices and the base for a more sophisticated flow recording unit have been selected, along the same three intermittent streambeds that drain near the West Boundary fence.

The location of Monitoring Well Number 2 (MW-2) was selected to test the water column and lower drainage of the Punapohaku Stream. This will also be the site for one of the simple flow monitoring devices. It will be placed just in land of the fence, near the bridge under Kamehameha Highway. This area is very flat, with the look of a wide alluvial fan extending some distance inland. There is no indication of any material of cultural significance of any kind in the immediate vicinity of this test well (see Figure 70. -The Stream Monitoring Device will be installed near Fence, to Right Foreground).



Figure 70. Initial Clearing (in September) at MW- 2 Drill Site Area on Punapohaku Stream, viewed to the South

A second set of simple flow monitoring devices will be sited at the concrete ford where the North Firebreak Road crosses the central or Makua Stream, between Range Control and the Troop Gate bivouac area. The installation here consists of a pair of steel pipes each set in a small concrete base. The pipes have a simple rule attached to one face that indicates the maximum height of flow past the pipe. One of the pipes is set just in valley of the existing concrete pad and the other immediately down stream (see Figure 71). No evidence of cultural remains of any kind was noted at this location, no shell or bone material was seen at all. The soil to the sides of the stream here is loose sandy red-brown loam. The stream bed is a mix of scattered water worn and semi-angular vesicular basalt cobbles and smaller material found throughout, all appearing to be randomly deposited by past stream wash.

The third simple flow monitoring device will be located at the large concrete ford that crosses Kalena Stream. This is the stream that drains the southern most section of Makua



Figure 71. Simple Flow Gauge Pipes in Stream Crossing

Valley and all of Koiahi Gulch. The general area here has been bulldozed and modified extensively during the construction of the South Fire Break Road. The field inspection here indicates that this location does not contain any evidence of extant surface or near surface cultural or archaeological objects, structures or remains.

The final site is situated along the north bank of the central Makua Stream, in the general area of a long wall that may have pre-existed the ranch era, but is shown on early maps as the south edge of the main Makua Ranch House compound. It is possible that this wall served as a Kuleana era boundary wall. It has been designated Feature 2 of Site 5927, a low wall along the top of the north bank of a portion of Makua Stream. The wall here extends almost 100m overall, from near the MMR West Boundary Fence on to the northeast, to just a couple of meters from the cross valley North – South access road. The equipment that will be installed here will be bolted to a shallow concrete pad or base approximately one meter square in an area opened up to three and a half meters square (see Figure 72) and as high as possible above the expected water level. In addition a small pad is needed in the stream bottom for an anchor for the connecting sensor pipe (see Figure 73). The spot that has been selected for the former is about two meters from the present edge of a section of the two meter high eroded bank. This location happens to be right in the middle of a twenty meter gap in the wall caused by natural stream meander erosion. Again the field inspection indicates that in this section of the Feature 2 the wall has been eroded away in the past and the immediate area does not contain any evidence of extant surface or near surface cultural or archaeological objects, structures or remains.



Figure 72. Large Equipment Pad and Shelter Footings on Bank, for Flow Meter.



Figure 73. Small Pad in Stream Bed for Flow Meter Unit.

Site Inspection of Clearing for a New Ammunition Holding Area

A Cultural Resources / Archaeological site inspection of mechanical clearing being done on a section of previously little used trail in Kahanahaiki ahupua'a was performed by David Cox the afternoon of Wednesday, 19 March 2003. Thomas Husemann, the Makua Range Manager escorted me to the work area where a road to a new Ammunition Holding Area (AHA) will be established. The old trail is the remnant of part of an extensive system of interior firebreaks found through out parts of Kahanahaiki Valley. Bulldozers were used to cut these emergency firebreaks during and after large range fires, especially that of 1995. The trail is one of a series of old over grown dozer tracks that are located in the area to the east of the western most section of the well maintained North Firebreak Road. This specific trail section had also been used occasionally in the past for access to an improved mortar pit / firing point. That old firing point is situated inland of the existing AHA, at the crest of a bluff that ends in a steep east facing drop to the lower stream bottom flats. This ridge top position provides a clear view inland down into the large ox bow in the main Makua Stream (dry) and on to east and southeast into the central and rear sections of both Kahanahaiki and Makua Valleys.

The route being cleared to the new AHA runs inland to the east and up the gentle slope from the western most section of the North Firebreak. The area that has been cleared and grubbed is the same as the distinct track indicated on the Ortho provided by ITAM. That false color Ortho was taken in Feb. 1998 (refer to Figure 74). The existing AHA that is being replaced is located in the clearing just to the west, or to the left of Feature 8, as shown on the Ortho. The newly grubbed roadway (indicated in orange on the Ortho) starts from a point opposite the cleared area where the MMR's big dumpster is kept. The dumpster is situated at the high spot about 400 meters north of the Central Firebreak Road. The trail has now been cut and grubbed to down to bare red soil, with an average width of four meters. At the top the trail ends at a small roughly triangular clearing of less than an acre, along the ridge just to the north of the old firing point. The 300 m long trail and the triangular clearing (about 50m on a side) for the AHA will be graded and then both will be covered with a layer of crushed coral and rolled.

This whole lower section inside the firebreak is primarily covered in chest high koa haole (*Leucaena leucocephala*), with a mix of some klu (*Acacia farnesiana*), a verity of lower stature grasses and occasional burned out stumps and root castings of what were once some sizable kiawe (*Prosopis pallida*) trees. The soil in the area that has been opened up is rich, fairly deep, red-orange soil with no rock or other intrusive material what ever.

This office conducted series of surveys through this area in April and May 2001. These surveys were reported on in some detail in our *Phase I Inventory Survey of Cultural Resources on Makua Military Reservation*, of December 2001, with this general area covered specifically on pages 115 through 147. The nearest element of the multi featured Site 50-80-03-5775 is at least 80m to the north of the closest section of the new AHA trail. Site 5775, with 73 features identified in the original survey by Cleghorn (2000), was limited to the north side of the North Firebreak Road. In our December 2001 report we added 50 more with some of the features obviously proving to be southern extensions

Map removed to protect rare resources. Available upon request

Figure 74. Ortho of Area of Newly Re-Cleared Trail and Clearing for AHA at MMR, in Orange, with nearby Features of Site 5427 in Yellow.

of some of Cleghorn's features. These had been cut with construction of the main firebreak. That firebreak was made in the mid 1980's. To the south of the cleared AHA trail features of our Site 5927 are in closer proximity. Feature 4 is a low wall ca. 20m south of the cleared trail and was described as follows:

"Feature 4 is a core filled rock wall. It extends for 61m in length in an east/west orientation. The wall measures 10-45cm (2 courses) high, and 65cm wide. It is located just south of an overgrown road cut." (Dec. 2001:119).

Another feature that is near the cleared trail is Feature 8, another low wall, this one extending north/south, and with its north end ca. 45m to the south of the trail (for both again refer to Figure 74, the Ortho).

To the east and down a steep bank is the large flat area where an old steam channel and the current main Makua Stream surround Feature 11. This massive wall has a well-finished entrance at the southwest corner and probably served as a corral during the ranching era, according to informants (see Figure 75). This feature also corresponds in general to the location and outline of one of the two 1850 claims awarded to KALAULI. This parcel - LCA #5556: 1, in Kapalai and is listed as 'kula land' or farm land. Apana 1

measures 3.3 acres, and is slightly larger than the area of the enclosure itself (again refer to Figure 74, the Ortho).

A series of record photos were taken, with conditions noted before the area was covered with the crushed coral road surface. No evidence of cultural remains of any kind was noted in the immediate vicinity of the actual trail or upper clearing during this field inspection. Indications seem to point to a series of multiple dozing events over time here. The implication being that perhaps this trail area has been inadvertently cleared of any cultural remains, if there in fact had been any in the past. The newly cleared area does not contain evidence of extant surface or near surface cultural or archaeological objects, structures or remains in its present state.



Figure 75. Old Corral, Feature 11 (Site 5427), in heavy Cover, from Bluff above.

Surveys within Schofield Barracks, Cantonment Area (SBC)

Reconnaissance and Monitoring of Soil Analysis Excavations at JOC Yard (Duck Field Area), Schofield Barracks

An archaeological reconnaissance and the monitoring of soil analysis excavations at JOC Yard (Duck Field Area), Schofield Barracks, Oahu Island, Hawaii was undertaken by Loren Zulick on 29 October 2002. He accompanied Lynne Nakamoto, Dean Shirota, and Ed Boyette of DPW Environmental, Rick Chan, Project Superintendent for PER, Inc., and Frank Erice, Recycling Facilities Supervisor for Unitek Solvent Services, Inc. The area was investigated as it had been possibly contaminated with spilled or leaking Petroleum, Oil and Lubricants (POL) that had been stored at this location in the past. The soil was excavated in an effort to primarily identify any contaminants and clean up the site and secondarily identify any subsurface cultural resources at the JOC yard on Schofield Barracks. The author was on site to mitigate the possible inadvertent discovery of a cultural deposit.

The JOC yard is located close to Lyman Gate in the open area across from the Veterinarian Building (Bldg. 936) at the southern end of Duck Field Road (see Figure 76). The project area is at the west edge of an open field area that has been graded in the past. The area is covered by a mix of gravel and mowed grass / weeds.

Reconnaissance began at the project area with a general survey for remnant surface cultural indicators. Cut stone blocks were observed nearby, but not on the surface within the immediate project area its self. Three locations where stained soil on the surface was observed were mechanically excavated (Table 2 and Figures 77 and 78). This mechanical digging was performed by a backhoe. Excavations were monitored for cultural indicators. Previous archaeological investigations in this general area have revealed an early historic rubbish deposit nearby, but that deposit was not encountered during the present excavations. The excavations revealed fairly simple stratigraphy with the top 50cm (Layer I) being introduced fill (mixed) material with a second layer of red loamy clay below that (Layer II), depth not confirmed. In each spot tested the POL staining disappeared just below the existing surface, and digging was stopped upon reaching the apparently uncontaminated red soil of Layer II. Soil samples were taken at bottom of excavation (BOE), and were to be tested for POL content. This analysis process will take approximately five days. The three opened sample areas were backfilled or covered, and will be re-excavated further only if test results indicate that POL contamination is present.

Table 2 **Description of Sample Areas**

Sample Area	Horizontal UTM	Vertical UTM	Dimensions (LxWxd)
1	598345.21	2375584.73	3m x 3.5m x .60m
2	598342.37	2375585.63	2.5m x 2m x .50m
3	598346.83	2375589.77	3m x 2.25m x .40m

No cultural resources were observed on the surface of the ground in the area or within the three excavated sample pits at the project area. The author recommends that a Cultural Resources Specialist be on site to monitor any additional excavations in the event these are necessary.

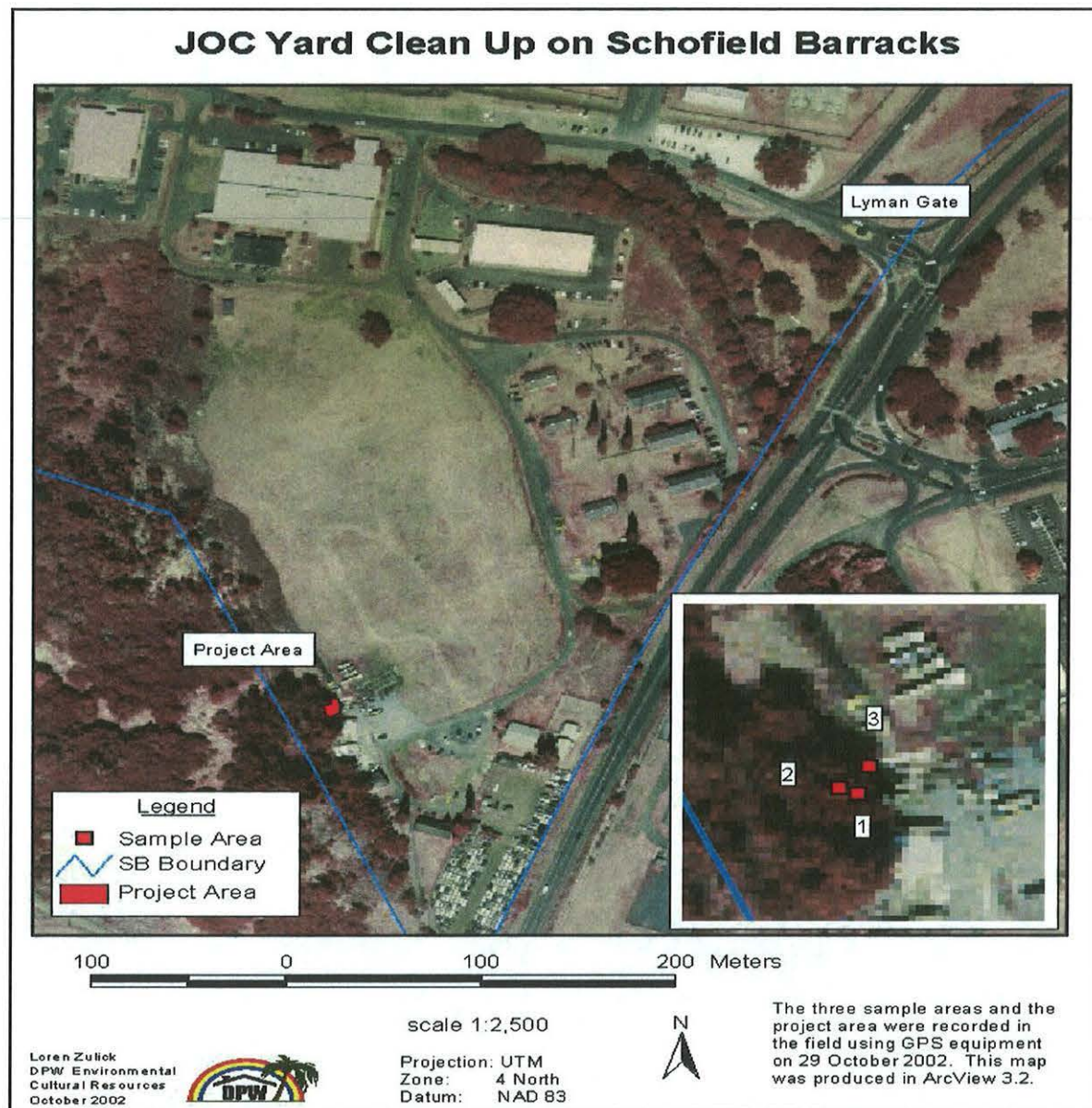


Figure 76. Ortho of The JOC Yard area at Duckfield, SBC.



Figure 77. BOE at Sample Area #2. Photo of Sample Collection.



Figure 78. Photo of Sample Area #3, BOE at 40cmbs. View to West.

Surveys within Schofield Barracks West Range (SBW)

Survey of Burned Areas at Schofield Barracks West

An Archaeological Reconnaissance and GIS Survey of Burned Areas at Schofield Barracks West Range (SBW), was performed on 21 June 2002. Loren Zulick accompanied Alvin Char, Chief, Environmental Division, DPW, USAG-HI, Matthew Burt, Natural Resources Specialist, Environmental Division, DPW, Fred Amidon, Biologist, and Greg Koob, Botanist, both of the U.S. Fish and Wildlife Service (USFWS). A team of EOD support troops from the 706th Explosive Ordnance Detachment lead by SSG George escorted the environmentalists into SBW. The purpose of this reconnaissance was to map the perimeter of burned areas located outside the main impact area on Schofield Barracks. Maps were produced to assess possible impacts the fire may have had upon federally listed species and proposed critical habitat for endangered Oahu 'elepaio, evaluate impacts to cultural resources, and to GPS the perimeter and create a map of the fire's extent. The fire had begun on the evening of 16 June 2002, as a result of an over shot or 'long round' of artillery landing in a forested section out side the firebreak. A reconnaissance had been scheduled for 20 June, but had to be postponed while the firefighting crews "mopped up hot spots".

The team of observers with EOD support drove out the firebreak to marker NFB 9. The team was then lead to the SW corner of the burn area and began recording location information with GPS equipment. The perimeter of the main fire was then walked. From where we began, the crew observed that the fire extended only about 15-20m downslope from the ridge of the northern face of Haleauau drainage (also known as Guava Gulch). This gulch is the closest to the burn area with known cultural resources. Upon continuing along the edge of the burn area it was observed that the fire had fingered out and spread part way up some of the small ridges that extended upslope from the firebreak. The main fire reached an elevation of just above 1800 feet in places.

A map showing the initial assessment of the main burn area indicated that this fire extended from the firebreak road down into the gulch bottom where it crosses Haleauau Gulch (Figure 79). This initial best guess was created four days earlier from estimations of extent as viewed from a distance, from the firebreak while the fire was still burning. The additional maps (Figures 80 and 81) were produced from the actual walk through of the perimeter of the 14.5 acre burned area after the fire was controlled. These two later maps super-cede the preliminary assessment map dated 17 June 2002. Figures 59 and 60 were used by the DPW Natural Resources Team to support consultation with USFWS in assessing potential impacts the fire may have had upon both federally listed plant species and proposed critical habitat for Oahu 'Elepaio.

The general environment in which this fire occurred consisted of primarily introduced or exotic species, dominated by a stand of mature *Eucalyptus robusta*, and with an open under story of strawberry guava (*Psidium cattleianum*). In most of the area observed there remains a good deal of unburned leafy canopy in the tops of trees. It appeared that

mainly the under-story, plus bark on lower trunks of trees and root systems were the primary source of fuel for this fire.

Due to time constraints, the previously recorded cultural sites in closest proximity to the primary burn area were not investigated in any detail at the time of this reconnaissance. Those sites are listed in Table 3. A quick investigation of Site 5517 indicated no obvious damage had occurred as a result of the fire.

Table 3 Cultural Sites Closest to June 2002 Burn Area

State Site Number	Type	Description
50-80-04-5514	mound & enclosure	possible habitation site
50-80-04-5515	mound	single agricultural mound
50-80-04-5516	mound	single agricultural mound
50-80-04-5517	mounds	2 agricultural mounds

A number of smaller fires were started from flying embers spread from the initial blasé. Fire #1 occurred to the north in the vicinity of Pu'u Pane. That fire crossed the firebreak near the North Fire Break (NFB) 14 sign. The fire extended from the firebreak (at 1,680 feet in elevation) to approximately 1,840 feet on the ridge top. This fire burned a total of approximately 1.66 acres. The vegetation burned in this section consisted of primarily introduced species and is dominated by *Eucalyptus robusta*. Natural Resource Staff have found that a *Eucalyptus* dominated environment does not support populations of either the endangered *Achatinella mustelina* (the Oahu tree snail) or 'Elepaio. According to the Hawaii Natural Heritage Program, endangered plants have not been documented in this part of West Range within the last fifty years.

Fire #2 occurred on the ridge between two forks of the West Pule'e drainage. It was the largest of the smaller four burn areas, with a total of 6.98 total acres being affected. The fire extended from 1,640 feet to approximately 2,000 feet up the ridge crest. Primarily, it burned introduced vegetation (*Eucalyptus robusta*) although some native plants were also burned in this section. As with Fire #1 there is a very low probability that this type of forest would support populations of *Achatinella mustelina*, 'Elepaio or endangered plants.

Fire #3 occurred on the ridge between West Pule'e and Haleauau drainages. This fire burned a total of 6.43 acres. The burn area extended along the crest of the ridge from 1,840 feet in elevation to approximately 2,160 feet in elevation. A noteworthy feature of this fire is that it began at 2,160 feet and burned down the slope to the lower edge at 1,840 feet. This fire also burned primarily introduced vegetation, mainly strawberry guava (*Psidium cattleianum*) although some native plants were burned. This area was surveyed by Natural Resources Staff (NRS) for 'Elepaio in May 2000. No 'Elepaio were detected here at that time.

Fire #4 occurred on the ridge that separates Haleauau drainage from North Mohiakea drainage. It ranged in elevation from 1,900 feet near SFB sign # 5, up to 2,250 feet. This fire burned approximately 6.23 acres. Primarily introduced vegetation was burned, however a significant number of native tree and shrub species were also affected. Natural Resources Staff do not believe that any Oahu tree snails were burned, but this cannot be confirmed. Due to the fact that the habitat was already rather degraded, and no endangered plants are known in this area, NRS believe there is a low probability that any federally listed plant species were burned. Two 'Elepaio were detected on the periphery of this burn. One third-year male bird and one juvenile bird were called in to the edge of the burn using a playback (recording). Based on this survey result it can be assumed that a portion of one and possibly two 'Elepaio territories was burned. Approximately 20 feet of the affected vegetation at the edge of the burn perimeter appeared appropriate for 'Elepaio. It seems that this fire did not adversely impact the birds detected, but multiple fires affecting the forest edge in the same manner could adversely impact these birds.

The only federally listed species detected near the burned area was the Oahu 'Elepaio. It must be noted that only the area in proximity to Fire #3 was surveyed for federally listed species prior to the burn. The other areas had not been previously surveyed because of the low expectation for rare species in those sections. No cultural sites were observed within the burn areas. These fires did not impact known cultural resources within Schofield Barracks.

Map removed to protect rare resources. Available upon request

Map removed to protect rare resources. Available upon request

Map removed to protect rare resources. Available upon request

SITE MONITORING AND DATA SHEETS: SECTION 5.c (1)(c and g)

Section 5.c (1) (c) of the SOW established a system for periodic monitoring and documenting impacts to selected known archaeological sites located on O`ahu Sub-Installations. The purpose of Section 5.c (1) (g) was to develop and prepare monitoring and data sheets that are used for this documentation process. As initially envisioned this periodic monitoring program was expected to take up between ten and fifteen percent of the contract time per year. The last two years saw the resumption of Company sized combined arms live fire training at the Makua range after a complete training hiatus there the previous five years. This resumption of training of course followed the events of 11 September 2001. The ramifications of the Settlement Agreement that made this return to training activities possible again are discussed following that of the general or periodic monitoring program.

Periodic Monitoring

The goal of the general monitoring program is to determine the range and severity of the impacts that may possibly affect cultural resources. It was hoped that periodic field checks at a few selected sites would indicate what the various effect(s) of human activity, animal activity (primarily ungulates), soil erosion, root intrusion and other natural events might have on archaeological sites. With the regular field collection of the monitoring program findings being entered on monitoring data sheets (refer to a copy of the Field Recording / Monitoring Form, Figure 82) a history of impacts at each monitored site can be compiled. The goal is to eventually arrive at recommendations for appropriate management measures that need to be taken to improve the protection and preservation of all the cultural resources found on Army lands.

Damage to sites or individual features is assessed primarily by measuring physical changes as they are noted, in feature height and width, as well as the depth of holes or pits or other identified impacts. The presence of animal feces, human introduced trash and any other noted impacts are also recorded. The periodic monitoring findings are also entered into a monitoring database and linked to the existing Archaeological Sites Database (A S db) as they are collected.

The sites that have been selected for periodic monitoring are visited biannually. The authors performed the initial monitoring field reconnaissance at South Range - Schofield Barracks (SBS) in August 1999. The authors performed the first follow-up monitoring in May 2000, and have been returning more or less regularly since. Site conditions are compared to notes taken on the initial and any subsequent reconnaissance, as well as the original site maps and initial field descriptions. Regular photographic documentation of the monitored sites is also collected. General area photos are taken to record the over all existing conditions from the established photo points on each visit. Photos are also taken of details of any noted changes and impacts to the sites.

Monitored Sites

State Site #50-80-08-5392 and State Site #50-80-08-5448 were chosen for the initial monitoring program. Both sites are found on O'ahu, located at mid elevation in Schofield Barracks South Range (SBS). These sites were chosen because they are within areas directly impacted by frequent military training and other kinds of activities, have a variety of extant surface remains, and are relatively easy to access for purposes of monitoring. In addition, these two sites have had features that have been test excavated, thus providing firm data on temporal and functional designations.

State Site Numbers 50-80-02-2358, and 2359, in Training Area B1 at KTA, were added to the monitoring program two years ago for similar reasons. A selection of typical sites will be chosen for periodic monitoring from those at MMR in the future, once the present training regime has been completed.

Table 4 Sites Monitored Periodically

State Site #	Training Area	Site Type	Feature Number	Feature Type
			(Photo Sta.)	
50-80-08-5392	SBS	terrace complex	18	terrace
			19	terrace
50-80-08-5448	SBS	habitation complex	1	enclosure
			3	depression
			6	two-tiered terrace
50-80-02-2358	KTA	habitation		platform
50-80-02-2359		terraces		terrace

Field Recording / Monitoring Form				DPW Cultural Resources	
Project		Date		Recorder	
Training Area		Rover File			
Temporary Site # _____		Site Function		Site Kind	
State Site # _____		<input type="checkbox"/> Agriculture <input type="checkbox"/> Habitation <input type="checkbox"/> Ceremonial <input type="checkbox"/> Military		<input type="checkbox"/> single feature <input type="checkbox"/> complex <input type="checkbox"/> # of features _____	
Site Tag: <input type="checkbox"/> temporary <input type="checkbox"/> permanent <input type="checkbox"/> none					
Site Condition: <input type="checkbox"/> excellent <input type="checkbox"/> good <input type="checkbox"/> fair <input type="checkbox"/> ruins		comments: _____			
Temporal Designation: Historic Prehistoric Undetermined					
Site Dimensions length _____ width _____ height _____		Orientation <input type="checkbox"/> tape / compass <input type="checkbox"/> pacing <input type="checkbox"/> estimate <input type="checkbox"/> GPS		GPS Description UTM/elev _____	
Excavation Potential: good fair poor excavated					
Artifacts _____					
Flora _____					
Fauna _____					
Human Remains _____					
Human Impact: <input type="checkbox"/> excavation <input type="checkbox"/> trampling <input type="checkbox"/> trash <input type="checkbox"/> modification <input type="checkbox"/> ordnance <input type="checkbox"/> vehicle:					
feature # _____					
measurements _____					
comments _____					
Animal Impact: <input type="checkbox"/> pig <input type="checkbox"/> goat <input type="checkbox"/> cattle <input type="checkbox"/> horse <input type="checkbox"/> other:					
feature # _____					
feces _____					
damage _____					
comments _____					
Natural Impact: <input type="checkbox"/> erosion <input type="checkbox"/> fire <input type="checkbox"/> wind <input type="checkbox"/> water					
feature # _____					
damage _____					
comments _____					
Damage Assessment / Comments: _____					

Sketch Map on back <input type="checkbox"/> <input type="checkbox"/> Additional Map <input type="checkbox"/> profile included Photo _____					

Figure 82. Copy of Field Recording/Monitoring Form, (Cross Section Grid on Reverse).

Monitoring , Discussion and Findings

State Site #50-80-08-5392, SBS

This site is located in Waiele Gulch in South Range at Schofield Barracks (SBS). The relatively narrow stream flat here in the upper reaches of this watershed close to Kolekole Pass has been extensively modified. Robins and Spear (1997a) describe Site 5392 as a lowland irrigated agricultural complex comprised of 20 terraced fields, mounds, and landscape modifications. The individual field plots vary in size from 64m² to maximum of 225m². The soil berms, stone alignments and stepped terracing features making up this complex run perpendicular to or completely across the flat bottom of each of the now raised old stream meander loops or cut off 'ox bows'. These meanders now extend to the north of the intermittently flowing Waiele Stream bed. Just to the east of this site area, where the gulch bottom noticeably widens out the stream course seems to be actively meandering and carving new banks and channels when it flows heavily as was seen again this fall.

Robins and Spears divided the site area thus described into two sub-areas, designated Areas A, and B. Area A refers to five features in the smaller, more western 'gulch' and confined knoll. Area B, the larger of the two refers to those features on the southeast side of the 'inverted W'. The 15 distinguishable fields and other features in Area B begin approximately 30m southeast of Area A. The Area B features are characterized by an intricate pattern of fields delineated by stone and earthen facings which retain level soil surfaces inside the level bottomed hollow (Features 6 through 21) and various modifications on the central knoll (Features 22 and 23) (Robins *et al.*, 1997a: 129, 131).

Robins and Spears excavated four test units at Site 5392. Test unit (TU) 1 was placed in Feature 23, TU 2 in Feature 13, TU 3 in Feature 18, and TU 4 in Feature 19. Test unit 1 yielded volcanic glass flakes and a calibrated radiocarbon age of AD 1795-1940. Test unit 2 yielded volcanic glass flakes and two datable soil strata. Stratum III produced charcoal that has a calibrated radiocarbon age of AD 1430-1650. Stratum IV produced charcoal that has an older calibrated radiocarbon age of AD 1290-1470. These consecutive date ranges suggest that the pond fields were being cultivated over a long period of time. The later calendric date range from TU 1 suggests that the site may have had different occupational periods, including historic (Robins *et al.*, 1997a). Features 18 and 19 have been selected for the periodic photo-monitoring program.

The following impacts were observed at Site 5392 on the initial reconnaissance:

Human Impact:

Old military excavation measuring 1.2 x 1 x .25m on north side of Feature 3

Old military excavation measuring 2.5m² x .3m located 13m north of Feature 3

Old military excavation measuring 2.5 x 2 x .4m on edge of knoll near Feature 23

Foot path through Features 1,2, and 3

Foot paths through east side of Area B

Foot path below Feature 21

Excavated test unit at Feature 18

Excavated test unit at Feature 19
Discarded ammo container at Feature 3
Discarded ammo container, rusted 55 gallon drum, MRE, and a tire at Feature 5
Discarded MRE packaging at Feature 15

Animal Impact:

Pig grubbing and feces at Feature 5
Pig grubbing, feces, and trails throughout Area B

Natural Impact:

Additional erosion was noted along the intermittingly active (following heavy seasonal storms only) streambed immediately to the south, but is still not affecting archaeological sites. This erosion process has continued with new stream cut faces showing this most recent season (fall of 2002) as well.

Follow-up monitoring of features at Site 5392 has revealed only additional pig grubbing activity, and the nearby minor stream erosion.

We backfilled the open test pits found at Features 18 and 19 in 2002.

State Site #50-80-08-5448, SBS

Robins and Spear (1997a) describe site 5448 as a permanent habitation complex comprised of enclosures, mounds, terraces, and a stone lined depression. There are nine single features plus another feature comprised of ten scattered simple mounds to the west of the main concentration of features. The complex is located on a gently sloping upland ridge, south and well above the Waiele Stream in the South Range of Schofield Barracks. This site has dryland agricultural components, platforms, enclosures and a burial associated with it.

“The ridge top is flat and slopes gently to moderately [down] to the northeast. A network of military access roads extend along the [southeast edge of the] ridge top. The immediate landscape is composed of disturbed soil and scattered rocks. The site area has been adversely impacted from past and ongoing military training activities and probably from earlier ranching. Several foxholes and practice ordnance [shell casings from small arms, and small caliber ammo cases only] were observed in the vicinity and a bulldozed berm (possibly an old road) extends along the west [actually it's the southeast] edge of the ridge top. Vegetation at the site includes monkeypod, [the large trees here are *Albizia*, not monkeypod] Christmas-berry, Schefflera, Strawberry Guava, *ti*, and *laua'e fern*” (Robins *et al.*, 1997a: 129, 131), [our comments and corrections in brackets].

The ‘bulldozed berm’ mentioned above is the remains of a large ‘U’ shaped ‘dug in’ semi concealed firing position, for use by either a tank or an artillery piece. This type of hasty field protection measure was dug by a piece of field equipment with a dozer blade, and consists of a short ramp leading down into the open end of the U, giving the armor unit or howitzer a

'hull down' partially protected firing point. In this instance the opening and ramp lead directly to the existing access jeep trail, with the Impact (target area) Area of West Range in the distance to the north and northwest. There has been no armor (tank) training at Schofield Barracks since the 25th Inf. went 'Light' in the mid 1980's, so this large temporary military excavation feature is possibly at least 15 years old, or older.

Subsurface testing by Robins *et al.* established the functional and temporal framework of Site 5448. Feature 1 is a rectangular enclosure with an attached terrace. Test Unit 1 here revealed lithic flakes, a possible adze fragment, a buried pavement matrix, a posthole, and charcoal. The charcoal produced a calibrated calendric date range of AD 1440-1650. Test Unit 2 yielded a volcanic glass core, a volcanic glass flake, two basalt interior flakes, the same buried pavement matrix, and charcoal. The charcoal from TU 2 produced a calibrated calendric date range of AD 1290-1450 thus establishing a definite prehistoric context for the site. A third test unit was excavated in the upper tier of a two-tiered rectangular terrace designated Feature 6. This test unit exposed human remains at 50cmbs (Robins *et al.*, 1997a: 279).

Two additional features (Features 9 and 10) were discovered in the Phase II section of the follow up Robins and Spear survey. Test Unit 4 was placed inside Feature 10, a permanent habitation terrace. Fire-altered rock and charcoal were collected from the test unit. The more likely calibrated calendric date range for the charcoal associated with Feature 10 is AD 1647-1886 (Robins *et al.*, 1997b: 87).

Subsequent testing within Site 5448 was performed in June of 1998 by SCS. Three test units were placed in Feature 1: a 1m² x .55m unit, a 1m² x .25m unit, and a 2 x .5 x .25m trench. A test unit measuring 1.7 x 1 x .65m was placed in Feature 3, a rock lined depression. Results from these test units are still forthcoming from SCS.

The following impacts were observed at Site 5448 on the initial reconnaissance:

Human Impacts Noted (during initial visit):

Military excavation measuring 1.6 x .7 x .5m deep at east end of Feature 7;

'Road cut', that is most probably an excavated tracked vehicle firing point extending off the existing access road near Feature 5;

Three open excavated test units at Feature 1;

Excavated test unit (left open) at Feature 3;

Excavated test unit (left open) at Feature 10;

Military signpost (#406) inserted into TU, Feature 3, (and subsequently moved to the 'Road side firing point cut');

Military foot paths at Features 2, 3, and 4, all leading to Military signpost #406;

Discarded ammo containers and MRE packaging north of Feature 6; and

Discarded MRE packaging at Feature 3.

Animal Impact:

Pig grubbing and feces around Features 1, 6, and 7.

Natural Impact:

Large fallen *Albizia* tree with a diameter of 1m +, and other wind damaged tree limbs down through out area with some haven fallen on features.

Follow-up monitoring of Site 5448 in December 2000 revealed increased pig activity in the area. In addition, Features 3 and 4 showed signs of continued heavy foot traffic as was expected. An alternate location for the land navigation signpost (#406) was established in an area of disturbed soil, to the southeast of the features, nearer the access jeep trail. This sign is used as a waypoint in regularly scheduled individual Land Navigation Training exercises over an established course in the sections above South Range 1, SR2 and SR3. The relocation of the sign to the 'bulldozed berm' firing point area appears to have been successful in reducing the foot traffic across features 5 and 6.

All the open test units at Site 5448 have now been back filled to existing ground level. Most of the excess flagging tape found at Sites 5392 and 5448 has been removed. In the third year a series of semi permanent photo points was established.

Sites 50-80-02-2358 and 2359 KTA

As a result of access difficulties due to a new system of internal gates and not having been given the proper keys these two sites were not monitored this year. The monitoring here will be resumed in the next season.

Recommendations

Developing and maintaining a consistent record of the selected sites and features from year to year is important for documenting natural and cultural impacts. Monitoring of these and other sites should continue in the future. The availability of additional in house crew will make periodic monitoring more efficient and timely. The following recommendations are intended to make the next year of monitoring even more successful:

In addition to photographing general views of each site and identifying the range and extent of existing impacts, photo points have been established for a regular record of selected features at each monitoring site. A Photo Point is a specific spot or location from which photographs can be taken during each site inspection visit. The marked photo points allow for consistency in photographic documentation, and will make long-term comparisons easier and it is hoped more meaningful. Some discrepancies between field designations of features and final report Site maps have been noted during field visits. The feature designations within these sites still need to be rectified.

Monitoring Training at Makua Military Reservation

Shortly after the events of 11 September 2001, a Settlement Agreement with Earth Justice (representing Malama Makua) was reached in Federal Court that made Army use of Makua Military Reservation (MMR) for live fire training possible again. With the resumption of Company sized Combined Arms Live Fire training Exercises or CALFEX in October 2001 a major commitment of time was made by the Cultural Resources Section in meeting both the tight schedule implemented by 25th ID (L)'s General Staff, and the specific stipulations for the protection of cultural resources in the valley that had been set down by the terms of the Settlement Agreement. The major element of our input to the process was a complete photo record of ALL the features of those cultural sites previously identified within the South Fire Break Road. This effort alone took the equivalent of ten percent of the crews annual work time, setting the Photo Points and taking the Record Photos.

The CALFEX is an exercise that each Company sized unit in the 25th Division (L) must pass annually to remain qualified as combat ready. The agreement reached with Malama Makua allowed this level of training to be completed on O'ahu for the first time in over three years, with the agreement running for three years, through 2004. October of 2001 was also the first training use of any kind at MMR since the Army's voluntary closure of the facility in 1998.

CALFEX typically involves the movement of a Company of Infantry, or about 120 troops, plus the coordination of firing from a stationary battery each of heavy mortars (three each) and 105mm howitzers (two or three 'tubes'), plus the supporting heavy machinegun fire (and simulated rockets) from two or three assault helicopters. The main focus and object of this kind of exercise is to give the field unit's officers and non commissioned officers (NCOs) practice in the 'Phasing' of the heavy support elements fire. This phasing has to be done in close coordination with the movement of the various advancing troops as they reach a series of intermediate objectives that are spaced out over a distance more than two kilometers of the live fire range. The whole point is to successfully take the main or final objective (a trench system) without any chance of having caused casualties from friendly fire at any point along the way (refer to Figure 83, Map MMR with the CALFEX area and Cultural Sites).

For the troops that are involved a CALFEX training cycle takes a total of five days in the field. Their first day is spent departing Schofield and setting up bivouac at MMR. The second day consists of general orientation and a non-weapons (called Dry) walk through of the maneuver route from 'jump off point' to the final objective. The third day is a blank fire (no live ammunition for the ground troops) walk through rehearsal, this is done with live supporting ranging fire for the artillery and choppers only. The fourth day is the full on live fire (Hot) exercise, followed by a field review of the exercise. The fifth is spent in detailed after action review (mainly for the officers and senior NCOs) and breaking down bivouac and departure for Schofield.

There are a total of seventeen multi featured cultural sites found within the loop of the south firebreak road that encompasses the western half or lower elevation section of the valley of Makua. Five of the seventeen known sites are within an area that is presently completely off limits due to possible presence of sensitive UXO. These are Sites 4540, 5587, 5588, 5589,

and 5590, located in the 'ICM Area' in the upper loop at the extreme east end or in valley section of the firebreak. These sites will not be documented until that area is cleared of UXO. The remaining twelve archaeological sites that required detailed photo-documentation under terms of the Settlement Agreement are found in three clusters:

Figure 83. Map MMR with the CALFEX area and Cultural Sites.

—The Main Maneuver Corridor – Sites 4541, 4537, and 4538 with a total of 31 features. These three sites are the only ones that the troops actually pass near or through on foot during this training. This group of sites is normally the minimum that have to be monitored and inspected following each training session, a call made in the field by the Malama Makua observer. The usual required time to inspect and photograph this group under best conditions is one and a half hours or slightly more.

Prior to the resumption of training the individual features at these sites were protected at our direction. The protective measures were taken by either completely covering the feature with a layer of sandbags (two features), stacking sandbags up one side of a wall and alignment, or by surrounding them individually (three walls) or the general site area with a continuous barrier of concertina wire (four areas). These razor wire barriers are set about two meters out from the protected feature. The wire barriers were then marked with standard 'Mines' flags and additional red flagging tape, indicating 'no go' minefield areas. The grass and other growth in the areas around these protected features are then regularly cut.

—The Kalena Stream Complex – This is a series of contiguous Sites, 4542, 4543, 4544, 4545, 4546 and 4547 (with a total of 112+ features) that forms a wide band along the north bank of the Kalena Stream gulch. The required time to photograph all Photo Points in this group of sites is at least ten hours. For the most part this group of sites is outside the area of maneuver, well to the south. As a result it will only need to be photographed for record quarterly, as per the pre-existing and separate MMR Programmatic Agreement.

—Sites on and near ELK Objective – Sites 5456, 4539, 4536 with a total of 7+ features remaining are very spread out in the area to the south of the main objective - the trench system and the only impact area, both on DEER Objective. The designated two hundred meter square impact area (for all the artillery targeting) on DEER Objective is 'down range' beyond or in valley of the large trench system that is the primary objective of the CALFEX. The three cultural sites are all to the south of DEER and require one and a half or more hours to photograph. The extant features of Site 5456 are located 200 meters from the impact area, in the roadway leading out on to the east end of the narrow plateau that is ELK Objective. The other two sites are located further to the south of 5456. All three were directly under the original flight path and the 'approach to target' of supporting 50-caliber fire from the assault helicopters. This 'approach to target' was quickly modified after our monitoring of the first few sessions. Our review showed that a number of 50-caliber rounds were hitting short, on ELK. The approach was modified by the planners, bringing the choppers in directly from the west, over the top of the troops, from the vicinity of FOX Objective. As a protection measure the last remaining known *imu* (ground oven) features (two) at 5456 were covered with a double layer of sandbags, the other two sites are thought to be far enough away to avoid being affected, but are checked during monitoring in any case.

The normal training session starts with a Leaders Brief covering the safety, fire and environmental precautions that must be adhered to while using the range at Makua. This brief is given in the week before the session for the officers and Sr. NCOs at their unit's Headquarters and followed with a walk through of the Range in Makua. We usually are on hand at the MMR Range Control Office the morning of the live-fire exercise, and perform our site monitoring and photography, in accompany with volunteer observers (representatives of Malama Makua) immediately following the completion of the Un-Exploded Ordinance (UXO) clearance that has to be done in and around the Impact Area. The 706th Explosive

Ordnance Disposal Team typically accomplishes this removal of any dud artillery or mortar rounds by the late morning to mid afternoon of the fourth (hot) day of the training cycle.

For each CALFEX the official record photos are only required for the features of the four sites actually on or near the troop's ground maneuver route – Sites 4541, 4546, 4538, 4537, and the three that are near the artillery impact area - 4539, 5456 and 4536. In the first year it took another 15% of the total annual effort labeling and assembling the individual sets of the official Photo Record Volumes. The original record volumes were assembled and presented to the Staff Training Officer / S-3 of the respective Brigades that had completed the training. Each volume contains copies of the appropriate field photo log for each roll, the Memorandum of Record or Trip Report of that monitoring session, a complete set of labeled/captioned prints and the original negatives. In addition a backup reference set (less negatives) was made for retention by the Cultural Resources Section.

In the second year of training we were able to shorten the time needed for monitoring following each of the 16 training cycles slightly. We are now into the last six months of the Settlement Agreement period.

The following is a listing of all the monitoring sessions performed for CALFEX during the period covered by this report, occurring on:

29 January 2003, XIV - Company B, 1st Brigade of the 27th Regiment;
31 January 2003, XV - Co. C, 1st / 27th;

10 April, 2003, XVI - Co. B, 1st / 14th ;
12 April, 2003, XVII - Co. A, 1st / 14th ;
14 April, 2003, XVIII - co. C, 1st / 14th;

25 April, 2003, XIX - Co. C; 2nd / 5th;
29 April, 2003, XX - Co. B, 2nd / 5th ; and
3 May 2003, XXI - Co. A, 2nd / 5th .

To date this complete series of CALFEX's numbers twenty one live-fire training sessions that have been completed as planned. Each was done with our monitoring in company with Malama Makua observers, documenting that there has been no significant impact or any damage of any kind to date noted to any of the monitored cultural resources of the valley.

CRM DATABASE & GPS SITE PLOTTING: SECTION 5.c (1)(d and b)

The purpose of sections 5.c (1)(b) and (d) of the SOW was to establish a database compiled of the available data on the cultural resources on Army Sub-Installations. The intent of subsection (b) is to define the level of treatment of various features and specifies the methods to be used when recording various classes of features during pedestrian surveys. Reference is made to recording the GPS coordinates of all prehistoric features (and selected military features) on Army lands. These exact site locations are needed for various uses by what amount to the Cultural Resource Section's clients: the Range Office - Hawaii (ROH), ITAM the 25th Infantry Division's training planners (G-3) and now the SBCT Transformation Office.

Site Plotting with GPS

The GPS coordinate system used by the military is called the Universal Transverse Mercator (UTM) system, as opposed to State Plane, or other possible coordinate reference systems. UTM coordinates are based on a system of 1000m² grids placed over representations of the entire earth's surface. The coordinates for a specific geographic location are given as an eight digit number. The first four digits reflect the X coordinate (easting) and the second four digits represent the Y coordinate (northing). The actual X coordinates (easting) are collected and recorded in the field using the Trimble GIS, as a six digit number (not counting possible decimals). The first digit (it will be either a 5 or 6 on O'ahu) and the final full digit are dropped. The actual Y coordinates (northing) are recorded as a seven digit number (no decimals). The first 2 digits (23 or 24 on O'ahu) and the final whole digit are dropped. For example: X coordinate (easting) 581709.799376725 and Y coordinate (northing) 2379766.08573137 is read as UTM 81707976. This eight-digit UTM coordinate describes a point within a 10m² grid, somewhere near the 'Ōhikilolo – Mākua ridgeline above Koiahi Gulch. With the Trimble GPS repeatable accuracy of less than a meter, or into the first digit below the decimal point is possible when using post-processing corrections. Site locations (expressed as UTM's) are required by Army planners and cultural resource personnel working to manage resources on Army lands.

Having stated that, specific or detailed Site location information (the actual UTM coordinates) are not presented in this report. This type of detailed site location information is considered to be sensitive data by the Army. The UTM coordinate data shall only be released to members of the public under the provisions of Section 9 of the Archaeological Resources Protection Act (ARPA) and Section 304 (a) of NHPA.

Cultural Resources Management Database

Section 5.c (1)(d) establishes the primary components of the Archaeological Sites Database or Cultural Resources Management db. This database was created in Microsoft Access. It consolidates and organizes the pertinent data collected and compiled from cultural resource

reports on research performed on Army lands. Presently thirty fields are included in the primary database. This is substantially more than the nine fields called for in the SOW. The original SOW required that only ten sites from each Priority 1 area be included in the database. By the time this was completed it was decided that to be at all useful, all the previously recorded, or known sites within and in close proximity to active training ranges - DMR, KLO, KTA, MMR, SBE, SBS, and SBW should be included. The resulting database and associated GIS layers are maintained and are presently kept on file at the DPW Environmental Divisions third floor Offices, Building 105, WAA.

The initial data entered into the Cultural Resources Database was obtained from the several older published survey and excavation contract reports written for various Army Sub-Installations on O'ahu. Subsequent data about these and additional cultural sites has been added through the in-house field reconnaissance process, and from more recent reports produced by outside contractors. Known sites have been revisited by back-navigating, using available location and descriptive information gleaned from the numerous inventory survey reports. All new in-house field collected UTM coordinates are produced with a Trimble Pro XR GPS Beacon using real-time differential correction, and based on the NAD 83 datum. The GPS unit is accessed through a Trimble TSC1 Data Logger, with Asset Surveyor software. The data logger is capable of recording a variety of detailed information about each site or feature directly in the field, using a customized Data Dictionary. Collected field data is subjected to post-processed differential correction, through base station files downloaded from the Leeward Community College Community Base Station utilizing Pathfinder Office software.

Some of the corrected data is exported to ArcView version 3.2 and entered as various layers in the Archaeological Sites GIS system. Several GIS layers for corrected sites have been created in ArcView. The resulting information gets compiled in ArcView and exported to the Access CRM database. We are in the process of preparing for the transition over to ESRI's newer and much more versatile version, ArcGIS 9, with the intention of eventually developing an interactive GIS Database for in house research use.

The Cultural Resources Program's Archaeological Sites Database or Cultural Resources Management Database (CRM db) maintains a growing list of sites for which detailed UTM coordinate and a range other data has been collected. This database contained 45 records for relocated sites at the end of the first year. An additional 53 Sites were relocated, plotted, and added to the database the next year. In the third year 16 more sites were located, bringing the total then to 114. Since that time data on an additional 44 sites have been included in the CRM db, now totaling 158 listings. Most of the new sites were located during contracted projects by outside contract firms and others by this office. These 88 new sites are presented below in Table 5.

Table 5 Sites Located and Plotted in Fourth Year

SUB- INSTALATION (w/ # of Sites previously located)	State Site # (50-80-XX- YYYY)	Site Type	# of Feature s	Source
MMR (54)	Temp. #s / 1	report	11	Ganda, draft map, (Nov. 2002)
	2	not	2 +	
	3	available	1 +	
	4	yet	1	
	5		1	
	6		5	
	7		23	
	8		1	
	9		1	
	10		2	
	11		1	
	12		1	
	13		2	
	14		1	
	15		1	
	16		1	
	17		1	
	18		1	
	19		1 +	
	20		1 +	
MMR	5226, f 12	puna	1	Cox & Zulick (field notes)
	F13	well	1	
KLO (xx)	State ID 50-80-05-			Whitehead, Cleghorn & McIntosh (Oct 2002)
"		Bridge & Stream crossing w/ retaining wall	3	
	6429			
	6430	Bridge & stream crossing	2	

	6431	Freestanding walls	
“	6432	Retaining walls	
KLO	6433	Buried road bed	1
KLO	6434	Retaining wall	1
KLO	6435	Bridge & stream crossing	2
		155mm ‘Panama	
KTA (xx)	6436	Mounts’	2
“	6437	Building foundation	1
	6438	Concrete bases	
“	6439	Retaining wall	1
		Concrete	
KTA	6440	rectangular pit	2
KLO	6441	Texas Swale	1
“		Stone/brass plaque	
	6442	monument	1
		Bridge & stream	
	6443	crossing	2
	6444	Texas swale	1
	6445	Texas swale	1
	6446	Texas swale	1
		Possible	
	6447	agricultural terrace	1
	6448	Concrete slabs	2
	6449	Metal cross	1
	6450	Texas swale	1
KLO	6451	Texas swale	1

At the end of the forth year of this project, the past conclusions regarding the maintenance and use of the Archaeological Sites / CRM Database still stand with some minor revisions:

The database does require periodic updating with new information, as it is gathered through continuing archaeological surveys, both ours and those done by contract firms for the Army. This still means the additional sites should be regularly added into the database as they are identified. Consultation with outside cultural resource contractors working for the Army, as well as on projects undertaken on near by properties is necessary to keep the database current and useful.

Due to the inconsistencies and gaps in information found in some of the previous site recording projects and reports, all sites that have been found to have limited or incomplete records should be re-surveyed in an effort to collect the missing data

elements, with the specific intent of filling out each item of the database if possible. In the forth year this is still an ongoing in-house project.

Ultimately, the information in the CRM database and the GIS layers should include coverage of all the Sub-Installations, and track new features as they are discovered, creating a sole source reference for cultural resources on Army lands in Hawaii.

SHARING INFORMATION & DATA: SECTION 5.c (2)

The information that is gathered on the Army's cultural resources is used in several ways. DPW Environmental's Cultural Resources Section maintains collected information in a variety of forms including a reference Archaeological Sites Database that is accessible to interested parties. Processed data from that database and new data collected on request has been converted to GIS layers in ArcView and then shared in various formats with G-3's Range Division and ITAM, the Army Engineering units within the 25th DI(L), other elements of DPW Environmental, DPW Engineering, DPW Real Estate, the various Stryker Brigade Combat Team / Transformation planners (both in house and on contract), elements of the Corps of Engineers and the State's Historic Preservation Office (SHPO). Consultation with the DPW Cultural Resources Manager prior to releasing such data ensures maintaining proper confidentiality.

DPW

Interested parties and units within various DPW Divisions (Engineering, Real Estate and Environmental) have requested certain data collected in the field during our past reconnaissance surveys. They require information on setting and distances to complete their reports. Maps have been produced and shared with each of these offices.

ITAM

Tom Kelly, LRAM Coordinator for ITAM, has requested our presence on some of his field reconnaissance investigations. We have also provided him with archaeological data plotted on ArcView GIS data layers in an effort to coordinate areas of resource sensitivity on Sub-Installations as they relate to troop field training activities. A series of maps and individual GIS layers with information such as the locations of known archaeological resources, areas with completed surveys and areas that have not yet been surveyed were provided for ITAM's use. With these basic data sets ITAM is producing a 'Dig Map' for each of the major training facilities. When completed these maps will become an integral part of the new command wide Dig SOP that is going through a process of major revision.

The raw site and other location data we are providing are primarily based on previous reports (mostly from outside contract projects). The bulk of that data however are not GPS confirmed positions, especially from the older reports. It is one of this office's specific responsibilities to continually upgrade this body of basic data. The completed layers of GIS data are sent to ITAM both via e-mail and on disk. Ultimately, this information will be provided to Range Division - Hawaii in the form data for the Standard Dig SOP Maps for mitigation of all Army training exercises on O'ahu. It is anticipated that eventually all the Garrison's Sub-Installations that are used for training field exercises will require similar data, for production of these Dig SOP maps. Therefore, work needs to continue on accurate site location data collected with GPS equipment for the most accurate and reliable and data.

The following map of DMR (Figure 84) is a sample of one of the data sets and graphics that have been provided to ITAM this year. Maps like this were produced for each Installation (Training Areas).

Map removed to protect rare resources. Available upon request

SBCT/ Transformation

The planning for the 'Transformation' or conversion of one of the two existing Brigades of the 25th ID (L) into a Stryker Brigade Combat Team (SBTC) went into full gear last year. Formally called the Interim Brigade Combat Team or IBCT this transformation process calls for the upgrading of the 2nd Brigade here at Schofield Barracks with the change over into a strengthened rapid response force. The augmented Brigade will be about 3500 troops in size and will eventually be equipped with 300 plus medium weight (19 tons) wheeled armored vehicles. This force is designed so that troops and equipment can all be moved by a squadron of Hawaii based C-17's / heavy air transports to any theater of operations (global) in a maximum of four days. Most of the base facilities that will be needed to support and train this completely new type of force will have to be constructed here in the next two and a half years. The whole DPW Environmental Division has been involved in assisting the planners and the various contractors that are involved in the NEPA / EIS and other planning processes from early in the planning stages. The Cultural Resources Section has been tasked to provide direct assistance of various kinds to the Transformation Team on a number of occasions.

FTI / SBCT Communication Towers

A series of archaeological field reconnaissance's were done on a handful locations being proposed for Stryker Brigade Combat Team (SBCT) Communication Towers. Loren Zulick and David Cox accompanied Mike Sato of the Directorate of Information Services Command (DISCOM) and an Engineer for Northrop Grumman on these field visits. Zulick investigated the first batch of proposed tower locations on 23 December 2002, and Cox the second set of proposed tower sites on Thursday, 22 May 2003 (also refer to page 30, above). The purpose of these field surveys was to indicate findings of the presence or absence of cultural resources at or near specific locations that are being considered for new UHF antennas.

The communication towers will be constructed (or piggybacked on existing ones) for a network of advanced UHF command control and communication equipment associated with the planned SBCT Transformation project. The antenna sites are being proposed at fourteen (14) scattered locations on Oahu. This early effort represents a survey of four of the fourteen proposed locations (see Figure 85). At two of these locations (Mt. Kaala - West and DMR) an alternate spot was also considered for a total of six areas reviewed. The author recorded these locations with GPS equipment (Table 6), and photographs (Figures 86 - 91). These reconnaissance surveys were performed to ensure that cultural resources would not be impacted by tower construction. Additionally, these six locations were assessed by the author in support of natural resource considerations.

Table 6 Coordinates of Areas Surveyed as Recorded on 23 December 2002

Location	Horizontal UTM	Vertical UTM	Elevation (feet)
Mt. Kaala East	588887	2378548	4,022
Mt. Kaala West 1 st choice	588236	2378666	3,962
Mt. Kaala West backup	588247	2378644	3,960
Pahole / Dillingham Ridge (Nike)	583373	2382745	2,025
Dillingham Air Port	582019	2386304	17
Dillingham P1	582742	2386248	20

The field survey began at the Mt. Kaala East site. Access was finally granted to enter the fenced restricted access area of the FAA / National Guard Station air traffic control facility at the summit even though permission had not been requested in advance. For future access to the Mt. Kaala East site permission will need to be obtained in advance. Mr. Sato suggested that the best antenna location here would be one attached to the existing PACMERS tower (see Figure 86). This location is within a well-developed and regularly maintained area. The facility consists of a large radome, various structures and a variety of antenna towers built over a graded asphalt ground surface.

Survey continued at the Mt. Kaala West location. This area is approximately half a kilometer west of the main FAA facility and has a paved access road leading to a utility building and two FAA radio towers 60+ feet tall. The area is well defined by a wire fence around the perimeter. A portion of the area inside the fenceline is paved and the rest is grass. Three possible scenarios for the Mt. Kaala West antenna placement were considered. The primary choice for the antenna location is to attach it to the northernmost existing FAA tower. The second option would be to build a new tower just behind or beyond the FAA towers (see Figure 87). The third, and least desirable possibility is to build a new tower in the grass between the two existing FAA towers (see Figure 88). No conflicts with natural or cultural resources were observed at locations within the fenced area.

From Mt. Kaala, reconnaissance moved to the Pahole Nike Site ('Dillingham Ridge'). There are a number of existing towers at this location in various condition or stages of disrepair. Mr. Sato suggested that the westernmost existing tower would be most suitable to attach an antenna to (see Figure 89).

The final area of survey on this day was DMR. Two areas were surveyed; the first choice and a backup. Only one antenna will need to be installed at DMR. Mr. Sato's first choice is to construct a new tower in a grassy area behind or inland of the existing flight tower near the runway (see Figure 90). This location provides good accessibility to electrical hook up. The backup location is at 'Dillingham P1'. The spot that was chosen is located just inside 'Charlie' Gate at DMR (see Figure 91). Ground disturbing activities from recent military activities are still evident here.

The Cultural Resources Specialist did not observe any extant cultural resources on the surface of the ground at any of the six proposed project areas that were surveyed. Furthermore, no surface indicators that would suggest subsurface deposits were observed. At Mt. Kaala East, Mt. Kaala West, Dillingham Ridge (Nike Site), and Dillingham Air Port the ground has already undergone modification through grading activities and/or paving. It is the opinion of the author that it is unlikely any cultural resources will be impacted by antenna installation at these six sites. However, based on previous findings, the author recommends that a Cultural Resources Specialist monitor any excavations at DMR. Additionally, due in part to the ground disturbance previously described, no species requiring protection were observed at any of these six locations.

Map removed to protect rare resources. Available upon request



Figure 86. First Choice Location for Mt. Kaala East is Attached to this PACMERS Tower.



Figure 87. Kaala West: Attached to this FAA Tower Would be Ideal. Or New Tower at Subject's Location.



Figure 88. Third Choice for Mt. Kaala West is Construction of a New Tower at Subject's Location.



Figure 89. First Choice Location for Pahole/ Dillingham Ridge is Attached to the Tower at Left.

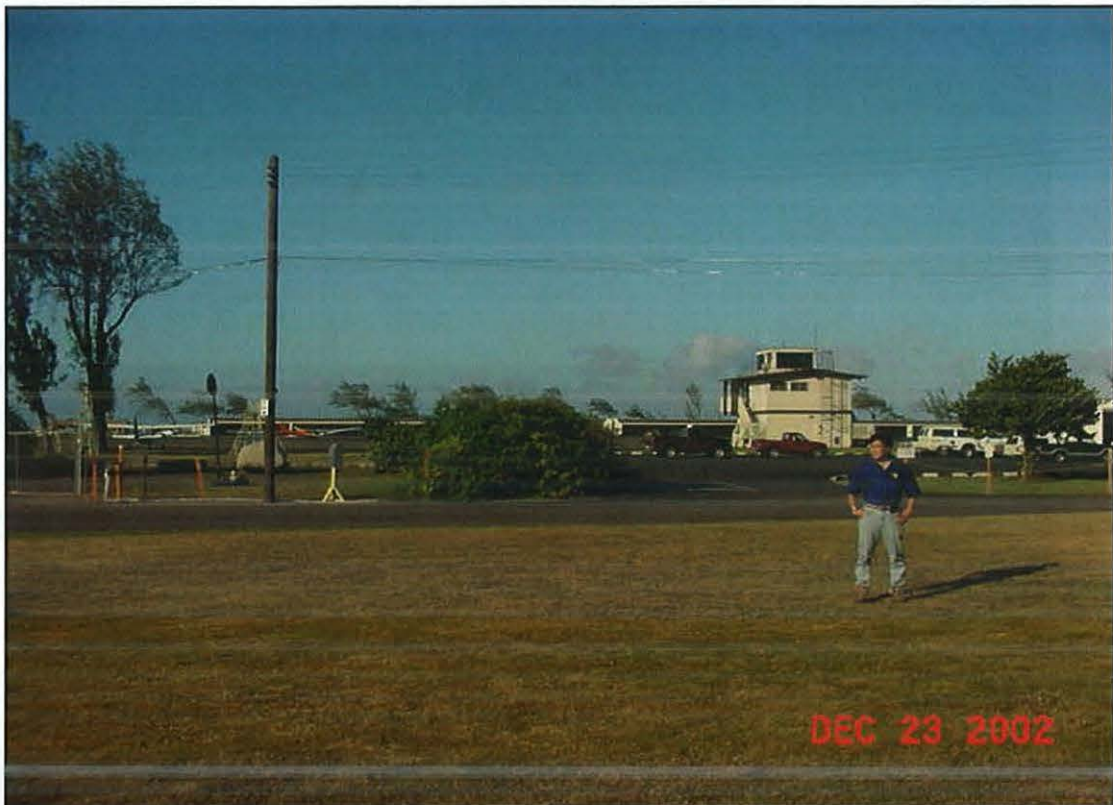


Figure 90. First Choice Location for Dillingham ARPT is a New Tower at Subject's Location.

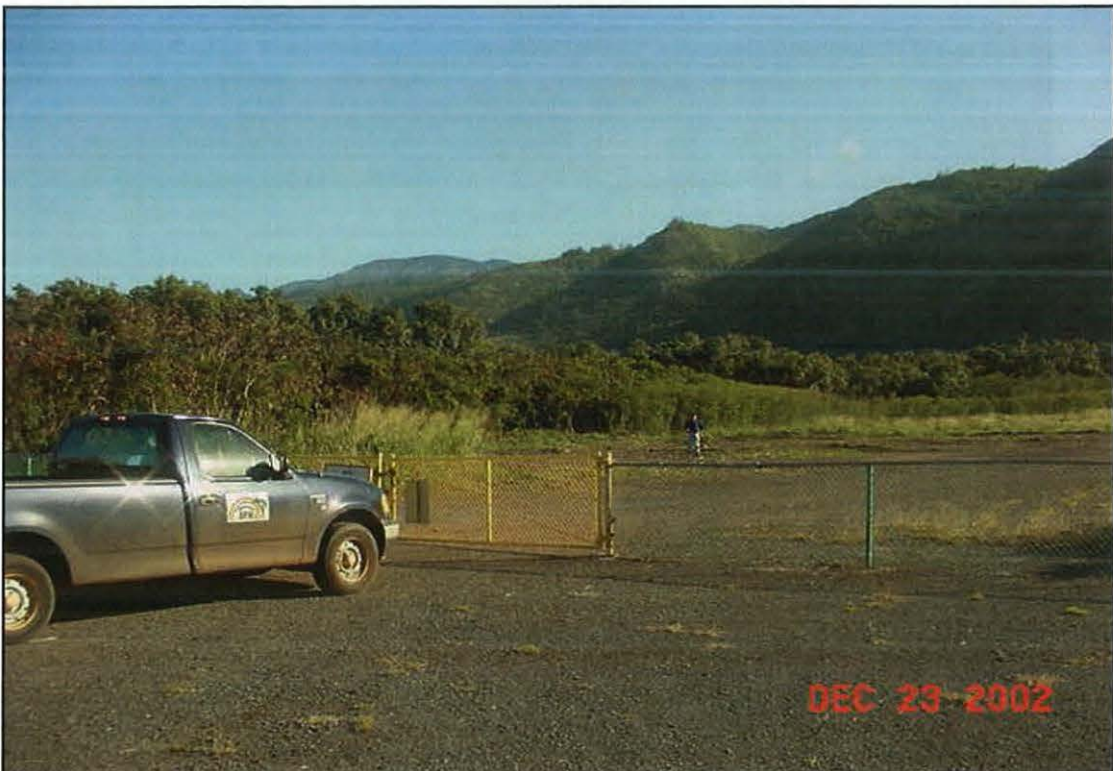


Figure 91. Backup Location is at Dillingham P1 just Inside 'Charlie' Gate (See Subject at Location).

RCI

A meeting was convened by Loren Zulick to Discuss the status of Contract Number DAPC50-02-C-0030, the Historical Assessment Survey for the Residential Communities Initiative (RCI), USAG-HI on 6 June 2003. In attendance were Judy Stevens, Contracting Officer, Regional Contracting Office, Hawaii, and representing Anonui Builders, Inc. (ABI) were Berni Paik-Apau, President, and Nora Vela, Contract Administrator.

The purpose of this meeting was to address the feasibility of completing the contract as written. Under the original terms, the final report was due 1 July 2003. All in attendance agreed that given the current status this was not possible. The proposal to extend the final report due date to 1 August 2003 (one month) was accepted by all. Modifying the number of units to be surveyed was also discussed. There were 131 dwellings remaining to be surveyed. These were broken down into "high" and "low" priority. The high priority units are considered significant historic housing, and are expected to be preserved for the next 50 years. The low priority houses that remain unsurveyed will be consulted on for possible demolition or modification. The RCI office scheduled the remaining 44 high priority units by the end of June (Schofield:27, Wheeler:16, and Shafter:1). Additionally, the low priority units, of which there are 87, were scheduled through the end of June - completing survey of as many of the remaining 87 low priority units as possible. The first week of July was reserved for scheduling last minute priority units, and the second week of July reserved for scheduling emergencies. RCI scheduled six appointments in the morning (8am-noon), and four appointments in the afternoon (12:30-3pm). It is our goal to have a completely full schedule for the last two weeks of June. Anonui has requested advanced notice of two days or more for the upcoming schedule. In the past they were provided with a schedule the day before.

Two draft copies of the report were to be provided in July prior to printing off multiple final drafts. RCI was to provide comments on the first draft report to Anonui by Friday, 13 June. The contract may have to be modified one more time (first time to extend the completion date) to reflect the final number of units surveyed (at this point that number is unknown).

The invoice dated 5/19/2003 (labeled HS-005) for \$23,706.53 is actually the sixth invoice, and should be HS-006. L. Zulick spoke with Mimi Unangst at DFAS on Monday, 9 June. She was to process the invoice with an expected payment date of 19 June (10 days from now). Payment date should show on the DFAS website www.dfas.mil/money/vendor this Wednesday. Both RCI and Anonui are working together to achieve the best product possible.

Additional Research in Support of CEMML

Our office provided research assistance in collecting and producing additional written material, maps and graphics for CEMML, Colorado State University's Center for Environmental Management on Military Lands. The latest batch of material was assembled and delivered between the 20th and 22nd of August. The additional resources provided will be used to update and expand their Cultural Resource Management Plan for U. S. Army Garrison Hawaii (USAGHI).

Inter Agency Consultations

Over the past years most of our contacts and consultations have been with DPW offices and various Army units and personnel stationed at Schofield Barracks. There has also been consultation with a variety of other agencies and individuals outside USAG-HI. Some exchange has been with the Environmental and Real Property Divisions of the Army Corps of Engineers, Pacific Ocean Division. Other Army facilities and groups that have been contacted include Tripler Army Medical Center and the Fort Shafter Public Affairs Office. Regular communications are made between this office and other military service's cultural resource personnel. These include the Navy PacNavFacEngCom's Environmental Planning Division, the Marine Corps G-4 Environmental Office, and the Hawaii Army National Guard. Other Federal agencies providing assistance are personnel from the US Department of Agriculture's Animal Damage Control Service, archaeologists at the Honolulu Regional Office of the National Park Service, and the Washington D. C. and the Denver offices of the Advisory Council on Historic Preservation.

Research investigations in areas currently being studied regularly rely on various contract reports that have been produced for projects on Army lands in the past. Many of the personnel that worked on these reports are still in Hawaii and are still available to help with specific research questions. Representatives from private consulting firms such as AMEC Earth and Environmental (previously Ogden Environmental and Energy Services), Pacific Legacy Inc., Scientific Consultant Services / Cultural Resource Management Services, Garcia and Associates (GANDA), Social Research Pacific Inc. and Social Research Systems Coop have been very helpful.

The Cultural Resources Specialists are responsible for providing the Army's Cultural Resources Manager, Dr. Laurie Lucking, with information and graphics as needed to meet the Army's Section 106 and Section 110 compliance and consultation requirements (see Appendix B). To do this, discussion and direct consultation with various State and Federal agencies is frequently necessary. At the State level, contacts with staff from the State Historic Preservation Office (SHPO), State Forestry and Wildlife's Na Ala Hele / Trails and Access Program, and members of the Natural Areas Reserve team have assisted this program immeasurably. Research collections and services of other State agencies such as the Hawaii State Archives; the Archive's Record Center; the Judicial History Center; and the Hamilton Library of the University of Hawaii at Mānoa (UH-Manoa) are frequently utilized. Also providing assistance has been the Hawai'i Natural Heritage Program and its Center for Conservation Research & Training (UH-Manoa). On going Administrative support for the DPW Cultural Resources Section is ably provided by the Pacific Cooperative Studies Unit (PCSU) of the Department of Botany, UH-Mānoa, through the Research Corporation University of Hawai'i (RCUH).

Private groups and institutions have also contributed time, advice, and information to these projects. They include the Archaeology Department of the Bishop Museum, the Anthropology and Geography Department of Chaminade University, the Nature Conservancy, Donaldson Enterprises (UXO), and Mason Architects. Most helpful of all has been the crew of the Army Natural Resources Center. Their knowledge, assistance, support, and exemplary program have proved invaluable.

ADDITIONAL PROJECTS & ACTIVITIES OUTSIDE THE SOW

The Cultural Resources Specialists have been tasked to perform various projects for the DPW Environmental Division, activities in direct support of Army training and for other organizations during this fourth year (June 2002 to the end of May 2003). The following information briefly summarizes these activities.

Field Reconnaissance for 'Dig Requests' in Potentially Sensitive Areas

An archaeological field reconnaissance for a Dig Request at Primary Assembly Area 2 (PAA-) in Training Area B-1 in Kahuku Training Area (KTA) was performed by Loren Zulick on 1 October 2002. He accompanied Thomas Kelly LRAM Coordinator, Integrated Training Area Management (ITAM), and members of F Battery, 7th Field Artillery (FA). The purpose of this field reconnaissance was to identify and clear the area that F Battery 7th Field Artillery (FA) wished to utilize for training as part of their dig request. The reconnaissance team drove to Primary Assembly Area (PAA) #2, an area on higher ground to the south of, and adjacent to Landing Zone (LZ) Canes in KTA. PAA 2 was originally presented as a 1-acre permanent dig area by ITAM on 22 May 2002. Since then, the 2nd Battalion -11th Regiment has requested to excavate at PAA 2. The 2-11th used a one acre section of PAA 2 on 23 September 2002 for a similar exercise. The original 1-acre dig area defined for PAA 2 was not large enough to accommodate the new request. An enlarged, 9.4-acre usable area was walked and recorded with GPS equipment (Figure 92). This 9.4-acre area was then grubbed and is now mostly denuded. The surrounding vegetation is all a remnant or abandoned sugarcane field (see Figures 93 and 94). The larger area (1-acre section that was increased to 9.4-acres) was approved for use and was used by the 2-11th. Follow-up photos were taken of PAA 2 after use by the 2-11th (see Figures 95 and 96).

The F Battery 7th Field Artillery using the same 9.4-acre area (PAA 2) that the 2-11th had. The 7th FA created a six-foot high berm around the perimeter of the 9.4-acre area (PAA 2). Ten large 10-foot deep excavations measuring 20-foot long by 15-foot wide dug to conceal the Battery's six 155mm howitzers, and four command vehicles. The guns were placed in a circular fashion around the inside periphery of PAA 2. These relatively large excavations were done by a 'deuce' (tracked bulldozer). In addition twenty-four separate crew served fighting positions (Crew SER) were established within the proposed berm to protect the heavy artillery from hostile infantry attack. These Crew SER positions typically measure four feet deep, six feet long, and four feet wide, and are designed as firing points to accommodate two soldiers operating a large (.50 caliber) automatic weapon. Usually, the positions are "L" or "T" shaped.

The Cultural Resources Specialist made the following recommendations. At PAA #2 in KTA, the open in question has been in commercial cultivation and regularly plowed for over 100 years, first in the production of pineapple then sugar. With this amount of ground disturbance the area is unlikely to yield subsurface cultural deposits that retain any integrity. In an effort to accommodate future training at the Canes field area, it is recommended that the entire sloping upper plateau section that was formerly in sugarcane be transitioned into a permanent dig area. While the lower more level section to the north be retained as a no dig area, as the main Landing Zone in the area. Previous ground disturbance throughout this plateau is extensive, and it is unlikely to yield intact cultural deposits.

Map removed to protect rare resources. Available upon request



Figure 93. Distance Photo of PAA #2 Showing General Condition in June 2002. Viewed to East.



Figure 94. Photo of PAA #2 Showing General Condition in June 2002. Viewed to East.



Figure 95. LZ Canes (in foreground, & to left) and 9.4-Acre PAA 2 in Background.



Figure 96. Photo of PAA 2 on 30 Sept 2002, After Use by 2-11th. Viewed to West.

Providing Escort for Cultural Access Visits to Makua Military Reservation

One of the stipulations agreed to in Federal Court that allowed training to resume at Makua Military Reservation (MMR) in 2001 was that the Malama Makua group could have cultural access to the valley twice a month, training permitting. This office has been assigned the responsibility of acting as part of the Army's escort team for each of these events. The access requests from Malama Makua are presented to the Schofield Public Affairs Office (PAO). PAO then coordinates with Division Plans and Training (G-3) and DPW's Environmental Div. and others as needed. The groups attending have varied in size from as few as three members of the Malama Makua core group to occasions when University or community college class groups are involved when as many as 55. The following are short descriptions of some of these Malama Makua sponsored Cultural Access Visits.

A Cultural Resources / Archaeological Site Orientation and Botanical Inspection tour of a portion of Koiahi Gulch was conducted for a group (16 individuals) made up primarily of members of Malama Makua on Sunday, 23 June 2002. David Cox acted as field guide to the archaeological resources, while Kapua Kawelo and Joby Rohrer (Natural Resource Specialists, DPW) served as guides to the biological resources found. Personnel from the 706 EOD Co. supplied our Explosive Ordnance Disposal (EOD) escort, and CPT Roger Miranda represented G-3 (Division Plans and Training) staff. This area is out side the south fire break and has not been officially cleared of UXO (Un-exploded Ordnance / none were seen) thus it was required that we wear Kevlar helmets and flack jackets on this hike.

The field inspection of the cultural and natural resources of this section of Makua was organized at the request of Malama Makua members. This was primarily to familiarize them with the then recently identified site complex in this small side valley. The site complex the Malama Makua representatives were most interested in investigating first hand was State Site Number 50-80-08-5923, the Upper Koiahi Gulch Complex. This site is comprised of a variety of 37 features - terraces, walls, alignments, platforms, mounds, and an enclosure. The site is located in Koiahi Gulch to the southeast and out side of the South Firebreak. After investigating this site the group continued up slope in the narrow gulch in search of native plants that might be growing in this sheltered area. Once back to the South Firebreak, some in the party investigated the upper portion of Site 4542.

The group then moved down the firebreak to access the trail leading up slope where they viewed the area being maintained around the population of endangered hibiscus, *Brackenridgiei brackenridgiei*.

The tour for the members of Malama Makua introduced them to a site that has only been documented in the last year, as well as allowing them to revisit other sites they have seen in the past, but are now with regular grass cutting in much different condition. It is hoped that this field inspection will assist them in their understanding and review of the Military's stewardship of MMR's Natural and Cultural Resources.

A Cultural Resources / Archaeological Site Orientation visit and Inspection tour of a portion of Makua Valley was conducted for a group (35+ individuals) made up primarily of members of Malama Makua and Students from University of Hawaii at Manoa, on Saturday, 27 July 2002. David Cox acted as field guide to the archaeological resources. We were supported by an EOD escort (three personnel, plus equipment) supplied by the 706 EOD Co., the Garrison's G-3 staff was represented by Major Jeff Butler and CPT Roger Miranda, and the 25th Div. PAO (Public Affairs Office) was represented by Spc Stephanie Carl.

This field inspection of the cultural resources of this western section of Makua was organized at the request of Malama Makua members, and served as one of their monthly visitations to MMR. This event was requested primarily to familiarize their group with the large wall and modified natural dike system, State Site Number 50-80-08- 9525. This is a site that was identified in surveys done in 1977. The massive double-faced wall first extends south directly up slope from the south firebreak road to a point where it meets a section of a prominent natural lava dike. The dike protrudes to varying heights above the surface on the steep slope of the hill. From the juncture with the dike the walled sections fill in the gaps in the natural barrier that angles diagonally up to the northwest to the ridge top at the 385-foot elevation (see Figure 97). This part of the tour required the assistance of the three EOD escorts, with everyone being required to wear protective gear consisting of heavy Kevlar helmets and Flack jackets. For the EOD escorts much of the morning was spent shuttling small groups of visitors up to the summit of the *puu* and back.

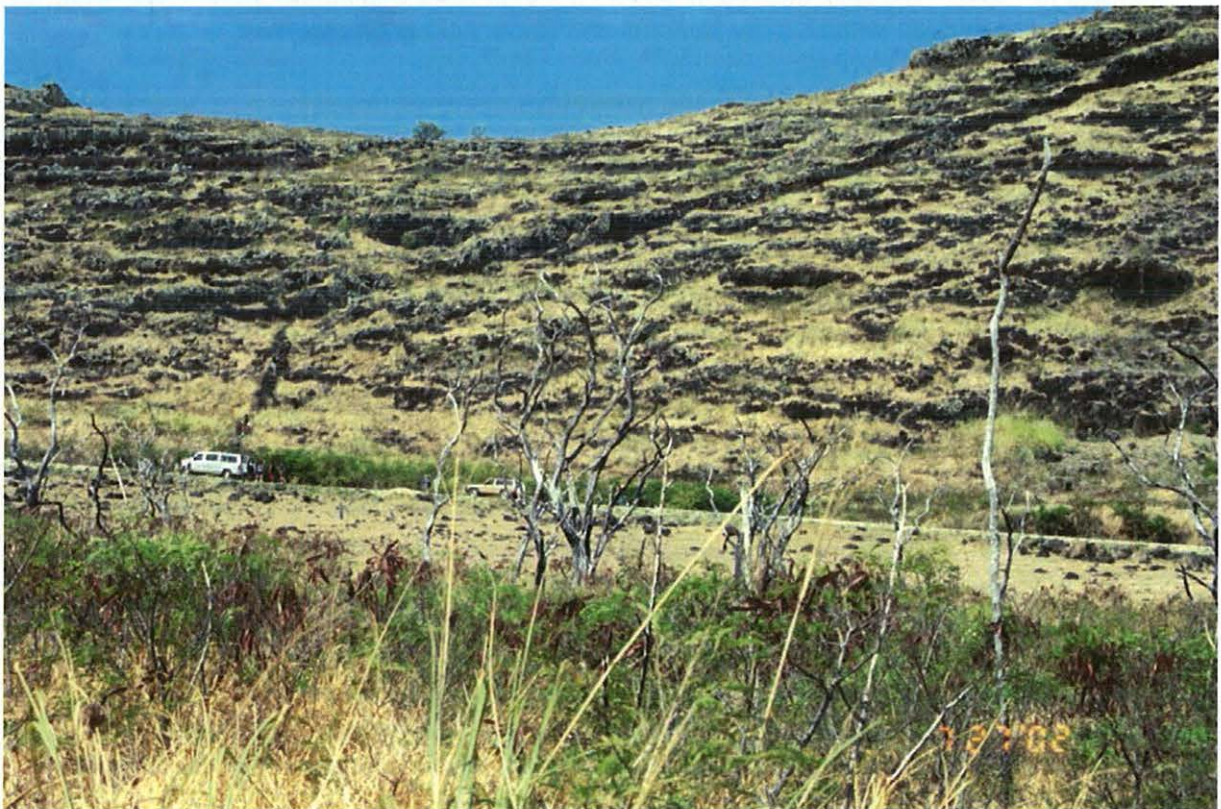


Figure 97. Site 5625, Wall and Natural Dike, with Wall starting upslope just beyond White Van. Taken from Site 4546, viewed to WSW.

other sites the Malama Makua representatives were interested in investigating first hand were the nearby Site 4546 in lower Kalena Stream with its possible small heiau, and selected features in Site 5926, including the sandstone slab with petroglyphs, and one of the shallow lined wells.

The day's tour for the members of Malama Makua and the Ethnic Studies class introduced both groups to a few features that have only been documented in the last year, as well as allowing them to revisit other sites that some may have seen in the past, but are now being maintained in much different condition. It is hoped that this field inspection will assist them in their understanding and ongoing review of the Military's stewardship of MMR's Natural and Cultural Resources.

This office supported a scheduled cultural access to Makua Military Reservation (MMR) by Malama Makua on 8 March 2003. Loren Zulick met with attendees at 0700 hrs Saturday morning. A total of forty-one (41) participants plus SFC Thornton (representing G-3 Training) and the author were in attendance. Four "regular attendee" members of Malama Makua are among the guests that the author recognized (Leandra Wai, Fred Dodge, Vince Dodge, and Pat Paterson). Introductions revealed that most of the guests were first time visitors with approximately thirty-one (31) members of the Hawaii Trail and Mountain Club (HTMC) present. Everyone took the tour on foot; no one had a need for the vehicle so it was not taken down range. Pat Paterson was the only attendee that did not go down range. She left MMR after the entrance protocols were observed.

The group walked the center firebreak past Deer Objective to the North/South extending firebreak that bisects the eastern end of the CCAAC. The original request was to walk the entire South firebreak until Site 4542 was reached. However, due to the presence of UXO, the group was informed they would have to walk along this route to its intersection with the South firebreak loop. The group walked down slope to Site 4536. Everyone walked in to the features at this site and gathered around the well (see Figure 98). From there the South firebreak loop was followed to the top (eastern end) of Site 4542. Ms. Wai discussed the interpretation of Site 4542 as a possible fishing *heiau*, and expressed her belief that a high protocol was in order. The group walked down slope, through the grass past Sites 4542 and 4543. A few features were pointed out at Site 4544 including the smaller petroglyph that is covered with sandbags, and the platform just below. This platform had been recently excavated with the 1m² test unit outline quite evident. This prompted a bit of discussion about the need for testing. Everyone then walked along the firebreak back out to the petroglyph rock at Site 5926 (refer to Figure 99). At the petroglyph, Ms. Wai offered the following insight: The (general) area that makes up Site 5926 including the large sandstone outcropping is being referred to as Papahanaumotu (sp?). This name gives reference to the tendency of sedimentary rock to erode, exposing intact pebbles, cobbles, and boulders. Ms. Wai informed the group that petroglyphs were created only by travelers, and that this rock represents a place of recordation. The large slab of sandstone that the petroglyphs are on is a type of *mo'o* rock which changes color at different times of the year.



Figure 98. Cultural Access Group at Site 4536, Improved Puna (Spring).

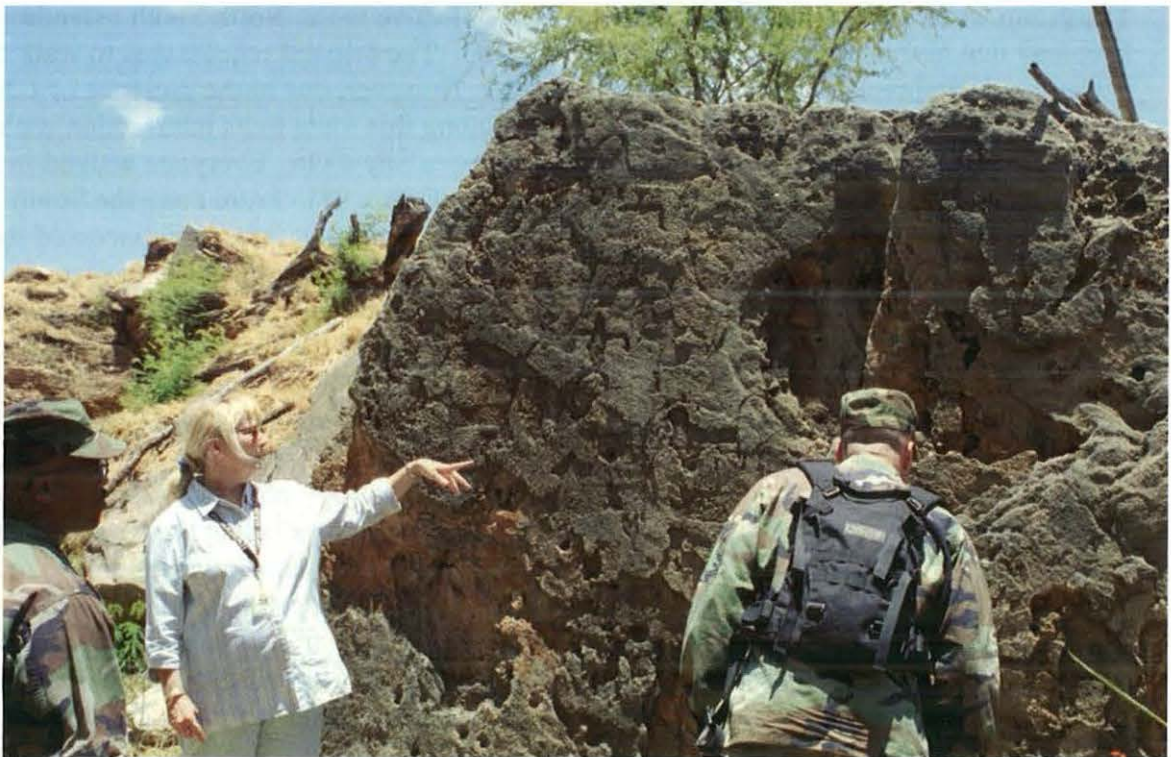


Figure 99. Dr. Lucking Pointing out The Petroglyphs on Large Vertical Sandstone Slab.

Topics that were brought up during the cultural visit:

- A couple of the guests were upset that the platform feature at Site 4544 had been excavated. They are generally opposed to subsurface testing of features.
- Suzanne Marinelli (sp?) identified cackober, a small shrub, along the firebreak in two places. In the low flat between Sites 4536 and 4542, and at the fork below Wolf Objective. She suggested that this was a nasty invasive weed that needs to be controlled.

The tour was over by 1200 hrs, and people began to go home.

A Cultural Access and Cultural Resources / Archaeological Site Orientation visit and Inspection tour of a portion of Makua Valley was conducted for a group (35 individuals) made up primarily of members of Malama Makua and Students from University of Hawaii, at Manoa, on Saturday, 5 April 2003. David Cox acted as field guide to the archaeological resources. Members of the Garrison's G-3 (Plans and Training) staff, represented by CPT Nathan Minami, and SFC James Thornton, supported us.

This field inspection of the cultural resources of the western section of Makua was organized at the request of Malama Makua members, and served as one of their two monthly visitations to MMR. This event had been requested primarily to familiarize their group with the sites that are found along the western most section of the North Firebreak Road. Of specific interest was the possible location of the Kaahihi Heiau State Site Number 50-80-08- 180. This is a raised section of land that is the general location of a site that was identified by informants as having been previously destroyed during a survey done in 1930 by McCallister. Our subsequent investigations in the area have found introduced stone including large boulders at the foot of the northwest slope of the high area. This material may possibly be remnants of that heiau. At the present time the thick re-growth of koa-haole, castor bean and guinea grass made it unsafe to walk through, preventing entry to this site. As a result we were only able to view the raised area to the side of the graded firebreak.

The hike around the rest of the north firebreak followed, up and around to the east and back down the middle of the valley. Some excitement was expressed on finding a steady stream flowing across the ford at the top of the road (see Figure 100). Later even heavier flow was noted at the ford crossing for Makua Stream in the central part of the valley (see Figure 101).



Figure 100. Water flowing across upper ford, unnamed stream on North Fire Break.



Figure 101. Moderate flow across lower ford, Makua Stream, North Fire Break.
Viewed to west.

The other items the Malama Makua representatives were interested in investigating first hand were features in Site 5926, including the sandstone slab with petroglyphs (see Figures 102 & 103), and one of the shallow lined wells.



Figure 102. Visitors on Cultural Access going down trail to Petroglyph Slab



Figure 103. Visitors on Malama Makua Cultural Access, viewing Petroglyph Slab.

The day's tour of lower Kahanahaiki introduced the members of Malama Makua and the UH students to areas where a few features have been documented only in the last year, as well as allowing them to revisit other sites that some may have seen in the past, but are now being maintained in much different condition. It is hoped that this field inspection will assist them in their understanding and ongoing review of the Military's stewardship of MMR's Natural and Cultural Resources.

A Cultural Resources / Archaeological site inspection of portions of ELK Objective and other sections within the South Firebreak in Makua ahupua'a was performed by David Cox on Saturday, 10 May 2003 during a Malama Makua Cultural Access at MMR. There was a small contingent of eleven visitors accompanied by the official escort Major Butler (of G-3). Leandra Wai, Pat Paterson, Phillip Naone and Dr. Fred Dodge represented Malama Makua, also in attendance were Jan Becket and two students from Kamehameha Schools, as well as two kupuna kane with family connections to the valley and two others making up the small group.

The main object of this trip was to start the clean up and re capping or covering of the imu features at Site 5456. The two remaining imu at this site are located in the middle of the dirt roadway that leads out onto ELK Objective, in the upper section of the South Firebreak. The imu had been covered with a double layer of sand bags before the resumption of CALFEX training at MMR, now over one and a half years ago. This was done at that time to protect the features from possible damage from the supporting artillery fire that occurs during the live fire that is directed at the nearby impact area in the central portion of the adjacent DEER Objective. Recently these protective sand bags have begun supporting a robust growth of grasses, mostly Bermuda or *Cynodon dactylon*, and with some sandbur – kuku or *Cenchrus echinatus* mixed in (see Figures 104 & 105). The possibility of damage from the grass roots extending down into the remains of the imu features, and the general deterioration of the burlap material of the majority of the top layer of bags prompted the present action. The plan was to partially renew the protective layer by removing the rotten bags and replacing them with the remaining good ones, then adding a second new layer of bags later, just before the next scheduled CALFEX.

After retuning to the Range Office and borrowing some tools the removal of all the bags was done for the smaller of the two features. A large burlap sack was split open and spread over this feature. The imu was then covered with a single layer of sand bags that had been salvaged from among those removed. The growth on the bags covering the larger imu was however somewhat better established. It was also found that almost all the bags on the top layer here were in much worse condition. Attempting to remove them just left us with hands full of burlap rags and tatters plus a big pile of sand. Finally, about noon we decided that more hand tools and new replacement bags were going to be required to properly complete this project. Having neither at hand or available at MMR we finished off by removing all the existing growth and leaving the lower layer untouched.

Approximately 80 new empty bags will be needed to complete the renewal of the double cover of the larger imu feature. These will be filled with the sand we left on the feature at the site. It is also advised that a base of plywood be set under these sand bags to act as a barrier to grass and other plant roots. Roots were noted going through the double bag layer and into the red soil when we got down to the original surface under the smaller imu feature.



Figure 104. Two Imu at Site 5456. Photo taken in January '03, viewed to NE



Figure 105. Two Imu at Site 5456. Photo taken in early May '03, viewed to W.

It is also suggested that these protective sand bag covers and the ply be removed and checked annually, as its obvious that 18 months is too long in this exposed position for the material these bags are made of. After finishing up at Site 5456 the group then proceeded to Site 4536, and inspected the puna / well there. This was followed by a walk through of part of Site 4537, further down the valley. The final visit was to the large sandstone petroglyph slab at Site 5926.

A Cultural Resources / Archaeological site inspection of portions of ELK Objective and other sections within the South Firebreak in Makua ahupua'a was performed by David Cox, on Saturday, 14 June 2003 during a Malama Makua Cultural Access at MMR. There was a large contingent of 43 visitors accompanied by the official G-3 escort Sergeant Conners. Dr. Fred Dodge represented Malama Makua. The majority of those in attendance were a group of students from Kapiolani Community College

The main object of this trip was to complete the clean up and re-capping of the imu features at Site 5456, a project started the previous month. The two remaining imu at this site are located in the middle of the narrow dirt roadway that leads out onto the flats of ELK Objective. This objective is located in the upper section of the South Firebreak on the ridge to south of the impact zone used by the artillery during the CALFEX training. The imu here had been covered with a double layer of sand bags before the resumption of CALFEX training at MMR, now over one and a half years ago. The two features were covered at that time to protect them from possible damage from the supporting artillery fire that occurs during the live fire that is directed at the nearby central portion of DEER Objective. Recently the protective sand bags have begun degrading and were supporting a robust growth of grasses, mostly Bermuda or *Cynodon dactylon*, and with some sandbur – *kuku* or *Cenchrus echinatus* mixed in. The possibility of eventual damage from the grass roots extending down into the remains of the imu features, and the general deterioration of the burlap material of the majority of the bags prompted the present action. The original plan that was partially implemented on the previous visit in May was to renew the protective layer by removing all the disintegrating bags and replacing them with the remaining good ones, then adding a second new layer of bags later, just before the next scheduled CALFEX. It was noted that the growth on the bags covering the larger imu was somewhat better established and it was also found that almost all the bags on both layers were in much worse condition. When we attempted to remove the old bags we were left with hands full of burlap rags and tatters plus a big pile of sand.

With the extra hands available on this visit the new bags were filled with the now loose sand in just under an hour. The feature was then swept clear of loose sand and about a third of the fire darkened soil ring and some charcoal fragments were again discernable. The use, function and dating of this feature was then explained to the group and questions were answered. A base layer of two sheets of plywood were set over the feature and the newly filled sand bags (68 were needed) were replaced in a double layer on top of the ply. A few photos of the process and the results were taken (see Figures 106 and 107). After finishing up at Site 5456 most of the group then proceeded to Site 4536, and inspected the puna / well there. While they were en route to Site 4536 I had to take one of the students back to the Range Office to cool off, as she was feeling nauseous and faint from the heat. After cooling off in AC in the cab of the pickup and taking some juice she felt much better. A dozen others had to leave early and rode down with us. The remaining group then hiked out by way of the south side of the firebreak road, and down through Site 4547, then past Site 4537 and down the valley. The final visit was to the large sandstone petroglyph slab at Site 5926. The last visitors left MMR just after 1300.

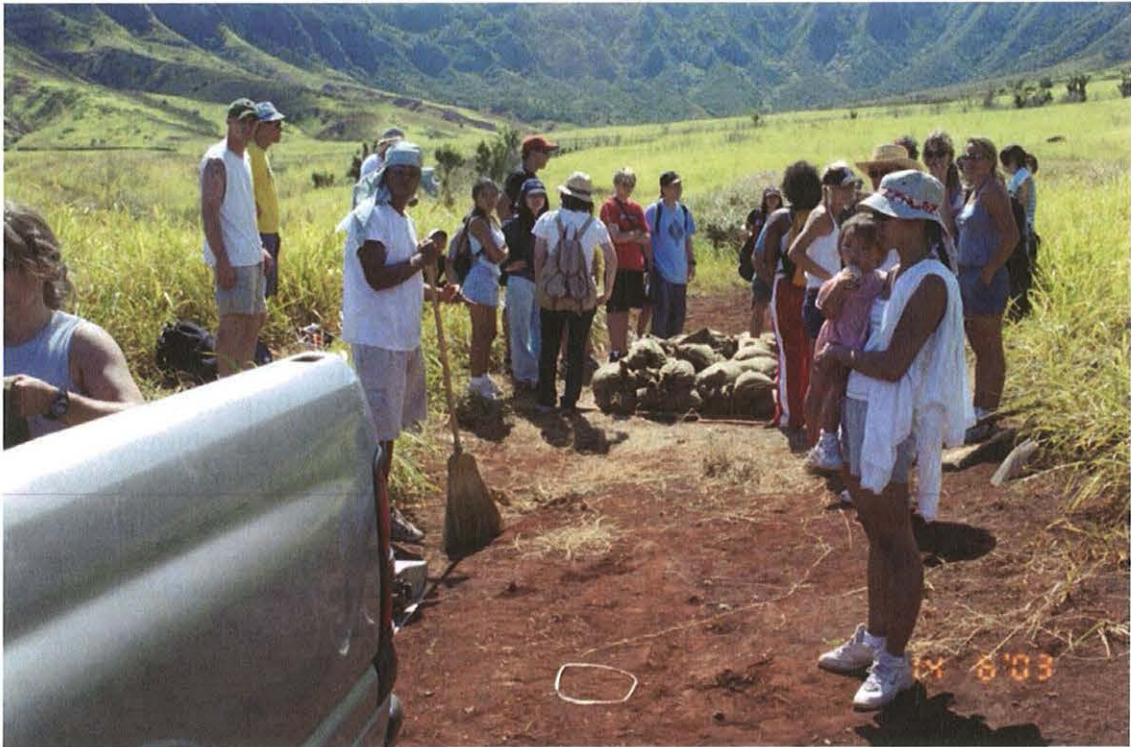


Figure 106. Malama Makua crew cleaning up after last sand bags are down.

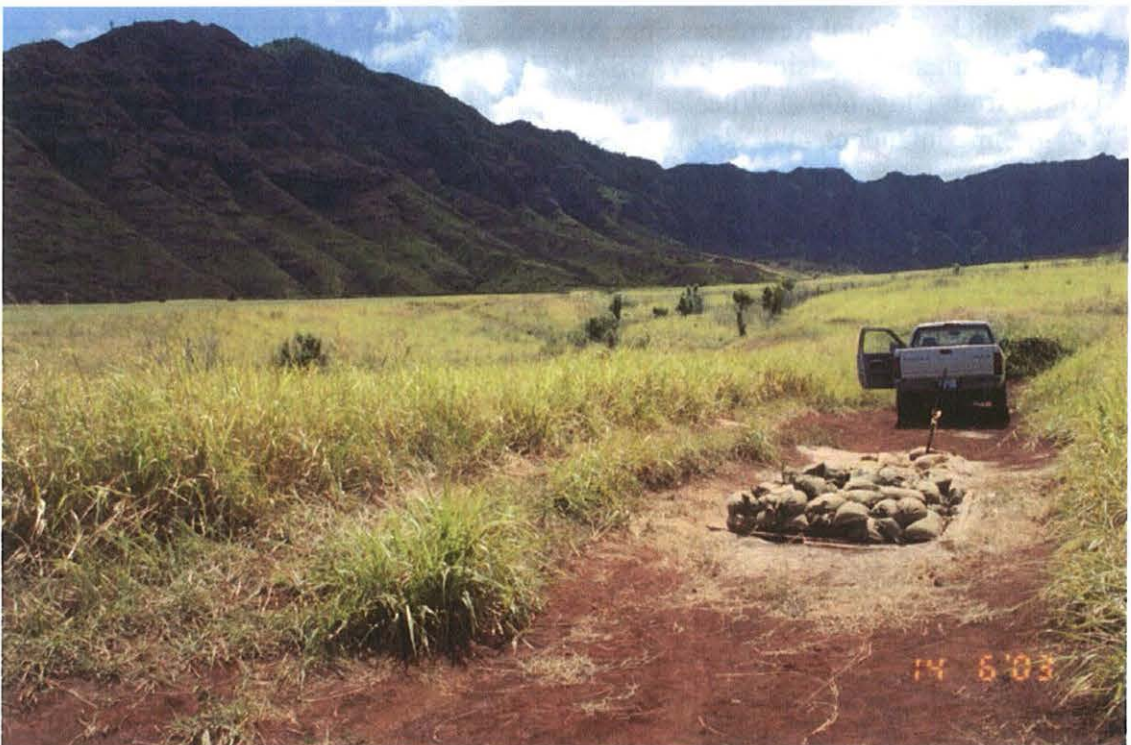


Figure 107. Imu at Site 5456 after re-capping with ply and new sand bags. CALFEX impact area is in distance to left.

Assistance Provided when Chartered Helicopter Went Down

On the morning of the 29th of October 2002 we (Vince Costello and D. Cox) received a phone call at Bldg. 1595 from Naomi Arcand. She had just been inserted by helicopter to start work on the Koolau Summit Ridge Line. As she watched the Hughs 500 lift off to drop others in her crew to their work sites the helicopter rolled over and then cart-wheeled a couple of hundred feet into a gulch at the east edge of Schofield's East Range. After finding someone to stand by on the line to Arcand, we made a series of calls on other lines, getting in touch with the main Range Office at Schofield, the Honolulu Fire & Rescue 1 Helicopter Office (through 911), the other scattered Natural Resources field crews and the PCSU Office. Then Vince and I went over to the Operations Office of the Aviation Brigade's MEDEVAC unit at Wheeler Field to coordinate directly with their radio dispatcher. On returning to Bldg 1595 an hour later we monitored the VHF radio traffic and more cell phone calls until our two coworkers and the pilot in the downed chopper were brought out of the mountains and taken to Wahiawa General Hospital for initial checks. The whole remaining Natural Resources crew and I stayed at the office until the recovery operation and initial accident review was completed about seven thirty that night.

Construction Inspection and Salvage of Historic Fixtures During Renovations at Wheeler Army Air Field

Loren Zulick, Cultural Resources Specialist, and Ken Hays, Architectural Historian, both of the Environmental Division, DPW, USAG-HI performed an inspection, and removed historic fixtures from Bldg. 600 at Wheeler Army Airfield (WAA), on 30 April 2003. Lyle Lui-Kwan, Superintendent, and Wayne Thrasher, Quality Control from LYZ, Inc. assisted them on the jobsite. Also present was Katie Slocumb from Mason Architects, who assisted in interpreting the Mason Architects historic preservation plan for Bldg. 600. Building 600 was constructed in the early 1930's as the Bachelors Officers Quarters (BOQ) and dining hall (Officers Mess) for the aviation units stationed at Wheeler Field, as it was called then. The purpose of this inspection was to collect selected items salvaged by the contractor for curation and storage by DPW, and to ensure that historic items that were supposed to remain within the building were not being removed. Ms. Slocumb reviewed the blueprints and explained the contractor's work. Upon arriving at Bldg. 600, the authors were met by Mr. Thrasher who took the time to review plans and address the concerns of DPW Environmental. Points of interest gleaned from the conversation with Mr. Thrasher include:

- LYZ, Inc. has made somewhere in the neighborhood of 57 Requests For Information (RFIs). RFIs are made when there are questions about or contradictions in the plans.
- Two or three pedestal sinks to be used in the renovated bathrooms were purchased used, online. New sinks matching in design could not be located.
- All bathroom fixtures (lights, sinks, toilets) were removed during renovation. Ms. Slocumb pointed out that she was under the impression these fixtures were going to be left in place during renovation - which explained leaving a 1970's era sink in Room 113 (per page 17 of the Contract Specs.). Since the sink has now been removed, it should be replaced with a pedestal sink.
- DPW Environmental raised concerns over the treatment of the original acid washed concrete floors. Mr. Thrasher indicated that Hirota Painting was contracted to refinish

these floors. They will be using the products listed in the specifications. The authors pointed out that these floors should not be waxed, even though it says to do so in the specifications (page 18). There will be a spot test of the floors that DPW Environmental should be present at to ensure quality of product.

The plans were reviewed for items that were supposed to be salvaged for DPW Environmental to curate and store. A “Property Transferred to Army” sheet on LYZ, Inc. letterhead was generated. Eight line items were recorded on that property transfer sheet. Representatives from LYZ, Inc. and DPW Environmental both signed the form. The items recovered by DPW Environmental are listed in

Table 1. Points of interest on items that were to be salvaged for DPW Environmental include:

- Item 7, page 13: The doors on the North side of the building remain in place. DPW Environmental will be notified by LYZ, Inc. when these doors have been removed and are available for pick up.
- Item 7, page 13: Four doors along the East side of the building; the screen doors will be re-used at the entrance to the Dining Hall, and DPW will be contacted when the solid doors are available for pick up.
- Item 7, page 13: DPW will be contacted when the six doors along the front (South side) of the building are available for pick up. An attempt will be made by the contractor to re-use the four additional doors at either end of that same entrance. If they cannot be re-used, they will be returned to DPW.
- Item 7, page 13: The exterior door on the west side of the building was wheather damaged beyond repair, and will be discarded. The screen door on the interior will be salvaged. DPW will be contacted when this door is available for pick-up.
- Item 25, page 13: The sink was removed for curation, and the wooden cabinet will be discarded.
- Item 26, page 13: Metal safety casings and a frosted glass light fixture were salvaged.
- Item 28, page 13: The contractor did not salvage either window.
- Item 4, page 14: The contractor did not salvage light fixtures.
- Since all the toilets have been removed for renovation, the authors don’t feel that any should be salvaged, or reused (this includes the hopper toilet slated for reuse in room 119, referenced on page 17 of the blueprints). Brand new replacement hopper toilets could be found that match this style. If the old toilets are to be re-used we will have to address whether or not they function, whether or not they will be cleaned to like-new condition, and whether or not they will receive new seats.
- The objects salvaged from Bldg 600 were brought to the storage facility in front of Bldg. 1123 on Schofield Barracks for curation.

Table 7

Items Removed from Bldg. 600 for possible Curation

Quantity	Description	Page Reference
1	Frosted glass light fixture	p. 13, #26?
1 small trashcan	Metal protective light fixtures	p. 13, #26?
Multiple (@10)	Cast metal door stops	None
1	Steel/enamel sink	p. 13, #25
2	Recessed 5-panel wooden doors w/ filleted edge	p. 13, #7
1	Recessed 5-panel wooden door w/ ¼ round edge	p. 13, #7
2	10-light wooden doors	p. 13, #3?
1	Single recessed-panel wooden door	None
4	Round, metal fire alarm bells	p. 13, #28

The point of contact from USACE is Tom Maruyama (655-2307 and 655-2313 fax). He should be reached immediately to discuss the following:

- DPW Environmental (Dr. Laurie Lucking 656-2878 ext. 1052, or the authors listed below) needs to be informed of RFIs and modifications to the contract.
- DPW Environmental needs to be notified and present when the spot test for the acid washed concrete floors is performed.
- Inquire about shop drawings for iron gates.

The DPW employees would like to thank Mr Lui-Kwan, Mr. Thrasher, and Ms. Slocumb for their time and assistance.

Reconnaissance and GPS Survey of proposed ungulate exclosures in the State Forestry's Pahole Natural Area Reserve (NAR)

Loren Zulick as Cultural Resources Specialist for the Environmental Division DPW performed an archaeological reconnaissance and GPS survey of multiple fence line routes for a group of proposed ungulate exclosures within the State Forestry's Pahole Natural Area Reserve (NAR), Wai'anāe Mountain Range, O'ahu Island, Hawaii. The field surveys were done on 20 March and 3 June 2003. He accompanied and was guided by Talbert Takahama, Natural Area Reserves Specialist, Oahu Division of Forestry and Wildlife, Department of Land and Natural Resources, State of Hawaii. This reconnaissance program was performed to assess potential impacts to cultural resources prior to construction of the exclosures. The author performed this fieldwork to determine impacts, if any, to known and or previously unrecorded cultural sites.

The intent of the planned fencing project is to construct four exclosures (exclosures numbered 1-4 on Figure 108). These fence lines will create four ungulate exclosures designed to keep out feral pigs, aid in securing a natural ecosystem, provide habitat for rare plants, and serve as

a site for rare species out planting. Three of the exclosures (1, 2, and 3) will consist of new fence lines that tie-in to existing fences. Exclosure 3 is the only proposed stand-alone exclosure. Exclosures 2 and 3 will be contained within the largest, exclosure 4. Exclosure 1 will abut exclosures 2 and 4 and tie-in to the existing "Pahole Gulch fence". Exclosure 2 will be contained within exclosure 4, abut exclosure 1, and tie-in to the existing "Pahole Gulch fence" to the west. Exclosure 3 will be contained entirely within exclosure 4. Exclosure 4 will intersect with exclosures 1 and 2 to the north, and tie-in to the Army's existing "East Rim fence" on the summit boundary of Makua Military Reservation (MMR). This reconnaissance was performed to assess potential impacts to cultural resources prior to construction of the exclosures.

To access the project area, the investigators drove to the Mokuleia Trailhead (see Figure 109). They walked into the NAR to the northwest corner of exclosure 1 where it will intersect with the "Pahole Gulch fence" (see Figure 110). From there, the proposed fence line was followed to the three-way intersection of exclosures 1, 2, and 4 along Mokuleia Trail (see Figure 111). The southerly route of exclosure 2 was followed to its intersection with "Pahole Gulch fence" (see Figure 112). Survey continued by following the existing "Pahole Gulch fence" to the north where exclosure 4 ties-in. From this point, the entire length of exclosure 4 was surveyed ending at the point where it ties-in to the "East Rim fence" (see Figure 113). There are two points along the Mokuleia Trail where exclosure 4 will cross the trail. In considering impacts to the Mokuleia Trail, the fence line routes were adjusted away from the trail whenever possible. The perimeter of exclosure 3 was surveyed on 3 June 2003.

The Cultural Resources Specialist did not identify any cultural resources or historic properties along the proposed fence line routes. The closest known cultural site is State Site #50-80-03-5920, a habitation/agricultural complex. This site is located within Makua Valley, 1,000 meters to the southwest. Site 5920 will not be impacted by the proposed project. During survey, the author looked for temporary shelters and other natural and constructed features on the proposed fence line routes. No extant cultural resources on the surface of the ground were observed within the project area. Construction of the proposed exclosures may impact the Mokuleia Trail, as the fence will cross the trail twice. One measure used to help minimize this potential impact is to align the fence line route at a distance from the trail whenever possible. Additionally, the building of crossovers will help mitigate access impacts. It is the determination of the author that no cultural resources will be impacted by the proposed project.

Map removed to protect rare resources. Available upon request



Figure 109. Mokuleia Trailhead at Pahole NAR entrance.



Figure 110. Photo of existing "Pahole Gulch fence" where exclosure 1 will tie-in, Viewed to North.



Figure 111. Photo of Mokuleia Trail. View to South



Figure 112. Photo of existing "Pahole Gulch fence" where exclosure 2 will tie-in. View to East.



Figure 113. Photo of typical forest setting along proposed fence line. View to Northeast.

Escorting Jan Becket, Photographer to Sites at MMR

Jan Becket, an English and photography teacher at Kamehameha Secondary School was accompanied by Loren Zulick, Cultural Resources Specialist, Environmental Division, Directorate of Public Works (DPW), to MMR on 12 August 2002. Mr. Becket is also the author of *Pana Oahu: Sacred Stones, Sacred Land*, a coffee table book that photo documents *heiau* on the Island of Oahu. *Pana Oahu* is translated as: “the celebrated place of Oahu”. Mr. Becket uses a K. B. Canham large format field camera to capture his images. After developing his own 4”x 5” negatives, he scans them to digitize the shot. To process digital images, he uses Photoshop software. One scanned 4”x 5” negative is approximately 100 MB in size. Mr. Becket says that usually one negative out of twelve is worth digitizing for the purpose of exhibition or publication.

The purpose of this field exercise was to perform photo documentation of cultural sites within MMR. Thirty exposures were taken at fourteen photo points within three sites on this day (see Figure 1). As a future project, he would like to explore the possibility of creating an exhibit on cultural sites within Mākua Valley. For this mission, the focus was on photographing some of the ceremonial sites (*heiau*), and possible shrine features found in

MMR. Mr. Becket sought specific indicators of ceremonial function. He shared the following information on the subject:

“Upright stones within or on some of the smaller ceremonial structures may have served as shrines to a craft or trade, or as a family alter (*pōhaku o Kāne*). These stones sometimes occur in pairs, one male (*kū* or *wakea*), and one female (*hina* or *papa*). The *hina* and *kū* are usually in close proximity. The male stone, *kū* (meaning upright, perpendicular, or erect in this instance), is usually an upright, smooth, small, basalt boulder. It will sometimes have a flute notched out of it near the top end to accept a *ho`okupu* (ceremonial offering). The flute allows the offering to be tied around the rock without sliding off. The female stone is sometimes flat (*papa*). It may be cracked or split, or have a hole (*puka*) in it. The *hina* may also be an upright, but with a rough, vesicular surface. Look for these two stones (male and female) in proximity.

Bowls carved out of rock (maybe within a large boulder) serving as ceremonial water catchments are sometimes found at religious sites according to one source Mr. Becket referenced, Kelou Kamakau.

Bell stones are boulders that are flat in the back and tapered towards the front. The front of the boulder must be partially propped up off the ground to allow for it to resonate. Such boulder might have a worn spot towards the rear where it is struck with a wooden implement wrapped in *tapa* (bark cloth).

On ceremonial sites the presence of white branch heads of coral suggests that the site may have been associated with the Hawaiian God, *Kāne*. Red basalt cobbles at a structure may sometimes suggest a connection with some manifestation of the God, *Kū*.”

The photo documentation of ceremonial features began at State Site #50-80-03-4546. Mr. Becket established four photo points to record Feature 1 (possible *heiau*). This site was chosen for its description as a possible *konohiki* (land manager for the *ahupua`a*) house site, or *heiau* (Williams *et al.*, 2000: 42). While clearly dilapidated, Feature 1 has the most intact structural remains of any of the features at Site 4546.

Photo documentation continued at State Site #50-80-03-5926, Feature 8 (wall). This feature is a core filled wall constructed primarily of rounded and sub-angular small basalt boulders and cobbles and faced (at one time) on both sides with limestone and coral blocks and slabs. The facing along portions of the north side of the wall is done with large vertical limestone slabs, some as high as 85cm. The wall is 40m long, and at its western end, extends up onto the south side of a large raised area. This nearly flat topped raised section is a large uplifted coral reef / consolidated beach sandstone outcrop that dominates this otherwise low area. This geographic description and general location coincide with that of State Site #50-80-03-178, Kumuaku`opio heiau. Mr. Becket has performed extensive research on sites identified by McAllister (1933), and was pleased to photograph this feature. Two photo points were established at Site 5926, Feature 8 (possible remnant of Kumuaku`opio heiau).

In pursuit of sites listed in McAllister's work, Mr. Becket was escorted to the general location of State Site #50-80-03-180, Ka'ahihi heiau. A mound of cobbles and boulders was identified. The ground had been bulldozed in the past, and scarring on the rocks was observed. No photos were taken at this location. A future controlled burn is planned here. A better look at ground features is advisable at that time.

Mr. Becket was then escorted to the lower (western) end of State Site #50-80-03-4543. The hillside leading up to State Site #50-80-03-4542 was surveyed for possible ceremonial indicators that could be photographed. Photographic documentation resumed at the upslope (eastern end) of Site 4542. Photographs were taken at the upslope boundary wall with a view into Ko'iahi Gulch. A stone bowl containing standing water, and an upright were aligned in an east/west orientation at Feature 5. These features were photographed. An upright stone at Feature 8 was photographed from several angles. A photo point at Feature 25 (platform) was established. The last two photo points for the day were set up at Feature 48. An upright located within the platform was recorded. A total of eight photo points were generated at Site 4542. Several other *kū* - type smooth stones were observed lying on the ground within Site 4542. Photo documentation ended at 1600 hrs due to fatigue.

All features that Mr. Becket wanted to photograph could not be recorded in a single day. It is suggested that future dates be worked out when Mr. Becket is available to continue documentation at MMR. Mr. Becket is willing to share the images he takes in MMR with the Army. In addition, he has offered to show Cultural Resources personnel the location of State Site #50-80-03-183 (Pua'akanoahoa fishing shrine), and Moka'ena heiau. He is also willing to help look for State Site #50-80-03-184 (Poha Cave).

It is the opinion of this Cultural Resources Specialist that a partnership with Mr. Becket to GPS sites recorded by Thrum and McAllister would make an outstanding community outreach project for the Environmental Division of DPW. In addition to locating cultural sites potentially impacted by Army training, current data on cultural site location could be shared with the State Historic Preservation Office to update their database. Mr. Becket possesses a vast wealth of knowledge that could greatly advance the Cultural Resources Program at DPW.

JOB RELATED STAFF TRAINING

The authors attended several classes, seminars and certification sessions during the fourth year of the contract.

We attended the annual 2002 Hawaii Conservation Conference on the 18th and 19th of July 2002. The HCC was held this year at the Hilton Hawaiian Village Hotel, in Waikiki. Approximately 550 participants and speakers were at this event. The major theme for the two days of panel discussions and presentations was The Forest Ecosystems. Pat Kirch, now Director of the Kroeber Museum – Cal, Berkeley was the keynote guest speaker this year.

A half-day seminar was held at the Ilikai Hotel, 14 August 2002, presenting a review of the highlights of the five day ESRI National Conference that was held in San Diego. The versatility of a number of new Trimble GPS products was also demonstrated to the local (O'ahu) GPS users group.

The annual all day ESRI conference was held at the Ilikai Hotel, 2 October featuring presentations of current applications of work being done here in the islands using the latest version of ArcView 8.2 and 'extension' applications. ESRI representatives from Redlands California also discussed the changes and enhancements that will be made with the next version, ArcGIS 9, that is now planned for release in 2003/4.

In October (24 and 25th) D. Cox and Ken Hays (DPW Architectural Historian) attended a National Preservation Institute (NPI) class on 'Photo-documentation for HABS / HAER'. William Lebovich - Architectural Historian, Professional Photographer and author of Design for Dignity and America's City Halls, presented the class. The Historic American Buildings Survey (HABS) was established in 1933, administered by the National Park Service, to record the 'Antique' architecture of America. The Historic American Engineering Record (HAER) program, using the HABS format for documenting the historic built industrial, engineering and transportation resources, was added in 1969. The NPI class first covered these agencies basic requirements and standards for presenting photos as part of the documentation of historic buildings and other structures. This was followed by a day and a half of the introduction to and hands on use of large format 4x5 inch monorail cameras in a variety of situations. The classroom instruction and interior photo sessions were done at the East-West Center, and the outdoor photo sessions were held at various locations on the U H Manoa campus.

Regular ArcView / ESRI Hawaii Users Group (HUG) seminars were attended on three occasions – 14 and 21 November 2002, and 14 May 2003, all held at the Radisson Hotel, Waikiki. The first of these presented examples of local agencies current projects done using ArcView. One C&C of Honolulu project involved implementation of bar coding and GPS to record and track scheduled maintenance, repairs and changes in the storm drain and sewage systems. Another project involved the establishment of a GIS database that will be used to track near shore reef conditions and coral 'health'. John Hodge (C&C Honolulu) demonstrated the manipulation perspective views of 2-D maps when used in addition with data from 'Digital Elevation Models' utilizing ArcScene in ArcView 8.2.

The second session in November was held to serve as an introduction to the changes being planned and additional capabilities that will be possible with the new ArcView version, which will be renamed ArcGIS 9.0 when it is made available sometime in 2004.

The session in May demonstrated the use ArcView 8.2 and 8.3 for a variety projects using ESRI extensions to produce simulations and Geo-databases for studies such as establishing management units in Marine Protected Areas, as is being done out of U C Santa Barbra.

On the 21st of April we attended our annual Explosive Ordnance Disposal / Unexploded Ordnance (EOD / UXO) Refresher Session at the 706th EOD units' classroom at Schofield Barracks.

RECOMMENDATIONS

Sites Database

The accumulation of findings from the growing variety of sources that have been developed both in house and by out side contracts lead the authors recommend that the current Archaeological Sites Database be expanded to include coverage of the data at the archaeological feature level. It is suggested that this expanded Microsoft Access "Sites and Features" database will inventory all features associated with their respective archaeological Sites on and near all the Army Sub – Installations. The data exists in the sources and this increased depth of information would make it easier to query for specific types of data classes. At present the format is limited to listings of Sites only. Many if not almost all of the known Sites are multi feature clusters, with a range of feature types. With the proposed expansion of the database one could input a query for rather simple analysis such as the "number of religious structures identified at KTA", for example.

REFERENCES

Anderson, Lisa

- 1998 *Assessments and Analysis of Historic Properties at U.S. Army Training Ranges and Areas, Island of O`ahu, Hawaii, for Preparation of a Cultural Resources Management Plan*, Ogden Environmental and Energy Services Co., Inc., Honolulu, HI.

Anderson, Lisa and Scott Williams

- 1996 *Historic Preservation Plan for the Kahuku Training Area, O`ahu, Hawai`i Energy Services, Honolulu, Hawaii and I, Revised Draft Report Prepared for the U.S. Army Corps of Engineers, Ogden Environmental.*

Barrera, William Jr.

- 1981 *Cultural Resources Reconnaissance of the Kahuku Agricultural Park Project Area.* Prepared for Wilson Okamoto & Associates, by Chiniago Inc. Honolulu, Hawaii.

Becket, Jan and Joseph Singer

- 1999 *Pana Oahu: Sacred Stones, Sacred Land*, University of Hawaii Press, Honolulu, Hawaii.

Beckwith, Martha

- 1970 *Hawaiian Mythology*, University of Hawaii Press, Honolulu, Hawaii.

Bordner, Richard M.

- 1995 *Contested Images of Place in a Multicultural Context*, Ph. D. Dissertation, Department of Geography, University of Hawaii at Mānoa, Honolulu, Hawaii.

Carlson, Ingrid K., Paul Cleghorn, Frank Eble, Tom Jackson, and Marshall Weisler

- 1996 *Archaeological Reconnaissance Survey of Proposed Firebreak Road at Mākua Military Reservation, Wai`anae District, Island of O`ahu, Hawai`i*, Prepared for U.S. Army Corps of Engineers, BioSystems Analysis, Inc./GANDA, Kailua, Hawaii.

Center for Ecological Management of Military Lands

- 2001 *DRAFT Integrated Natural Resources Management Plan and Environmental Assessment, 2002-2006, O`ahu*, Prepared for 25th INF DIV (LT) and U.S. Army Hawaii, by CEMML, Colorado State University, Fort Collins, Colorado.

Chapman, Peter

- 1970 *Field Notes and Site Form for Site 50-80-02-2501, Hanakoa Platform*, Department of Anthropology, Bishop Museum, Honolulu.

- Chinen, Jon J.
1958 *The Great Mahele: Hawaii's Land Division of 1848*, University of Hawaii Press, Honolulu, Hawaii.
- Clarke, Steven and Robert Drolet
May 2000 *Archaeological Inventory Survey of Area A1, Training Area, O'ahu Island, Hawai'i, Final Report*
- Cleghorn, Paul L., Jennifer Robins, Tony Torres, Stephan D. Clark, and Tara E. Moorman
2000 *Initial Implementing Activities for the Historic Preservation Plan at Ukanipo Heiau and Intensive Survey and Mapping of Archaeological Sites, Ukanipo Heiau Vicinity, Makua Military Reservation, Makua Valley, O'ahu Island, Hawaii*, Draft Report Prepared for U.S Army Corps of Engineers, Honolulu, by Ogden Environmental and Energy Services Co., Inc., Honolulu, HI.
- Cox, David and Loren Zulick
September 2002 *Cultural Resource Management of Army Sub-Installations at U. S. Army Garrison Hawaii*
- 2001 Tripler Army Medical Center and Moanalua Ahupua'a, ms report, in prep.
- Cox, David W.
1983 Trip Report for Field Reconnaissance to Makua Military Reservation, Makua Valley, O'ahu, to Investigate Possible Archaeological Resources, Dated 22 November 1983.
- Cox, J. Halley and William Davenport
1974 *Hawaiian Sculpture*
- Cunningham, James
1961 *'Copters, Road Builders Fight 'Nightmare' Kaala*, Article from Honolulu Advertiser dated 15 July 1961.
- Dagher, Cathleen
1998 *Inadvertent Discovery of Human Skeletal Remains at Campbell Estate Property, Kahuku, Ko'olaupua O'ahu*. (TMK: 5-6-03:010) Letter Report, SHPO, Honolulu, Hawaii.
- Davidson, Lisa P. and Martin J. Perschler
2003 *The Historic American Buildings Survey During the New Deal Era*. Article in CRM: The Journal of Heritage Stewardship. Vol. 1, Num. 1 / Fall 2003. The National Center for Cultural Resources, National Park Service, Washington D.C.

Davis, Bertell D.

- 1981 *Archaeological Reconnaissance Survey of Hawaiian Wind Farm Project Area at Kahuku, O`ahu, Hawai`i*, Department of Anthropology, Bishop Museum, Honolulu.
- 1982 *Archaeological Reconnaissance of Four Proposed Wind Turbine sites at Kahuku, O`ahu Island*. (TMK: 5-6-03:10) Prepared for Pacific Analysis Corporation, Bernice P. Bishop Museum, Honolulu, Hawaii.

Dega, Michael F. and Leann McGerty

- 1998 *Cultural Resources Inventory Survey and Limited Testing of the Kawaihoa Training Area for the Preparation of a Cultural Resource Management Plan for U.S. Army Training Ranges and Areas, O`ahu Island, Hawai`i*, Prepared for U.S. Army Corps of Engineers, Scientific Consultant Services/Cultural Resource Management Services, Honolulu, Hawaii.
- 2002 *A Cultural Resources Inventory Survey, Phase II, of the U.S. Army Kawaihoa Training Area (KLOA), for the U.S. Garrison, Hawai`i, Ecosystem Management Program, O`ahu Island, Hawai`i*, Prepared for U.S. Army Corps of Engineers, Scientific Consultant Services/Cultural Resource Management Services, Honolulu, Hawaii.

Department of the Army

- 1994 *Unexploded Ordnance (UXO) Procedures*. Field Manual (FM) 21-16. Washington, D. C.

Directorate of Public Works (DPW)

- 1997 *Programmatic Environmental Assessment and Finding of No Significant Impact for Tripler Army Medical Center Real Property Master Plan, Volume IV*, Prepared for the U. S Army Corps of Engineers, Ft. Shafter, HI, Directorate of Public Works, USAG-HI.

Dorrance, William H.

- 1993 *Fort Kamehameha: the Story of the Harbor Defenses of Pearl Harbor*, White Mane Publishing, Shippensburg, PA.

Drolet, Robert P.

- 2000 *Archaeological Inventory Survey of Area A1, Kahuku Training Area, O`ahu Island, Hawai`i*, Prepared for the U.S. Army Corps of Engineers, Ogden Environmental and Energy Services, Honolulu, Hawaii.

Eblé, Francis, Paul Cleghorn, and Thomas L. Jackson

- 1995 *Archaeological Investigations at Proposed MK-19 Range Mākua Military Reservation Wai`anae District, O`ahu, Hawaii*, Prepared for U.S. Army Corps of Engineers, BioSystems Analysis Inc., Kailua, HI.

Farrell, Nancy and Paul Cleghorn

- 1995 *Archaeological and Historical Investigations at U.S. Air Force Punamano Communication Station Kahuku, O`ahu Island, Hawaii*, BioSystems Analysis, Inc., Honolulu.

Gaines, William C.

- 1995 *U.S. Army Coast Artillery Corps Posts, Reservations, and Other Installations on the Island of O`ahu, Territory of Hawaii 1907-1946*. Pre-publication manuscript, partial copy.

Grant, Glen

- 1991 "Braced for Invasion: Civilian Life in Wartime Hawai`i", in *Hawai`i Under Martial Law: 1944-1949*, Published by the Judiciary History Center, Hawai`i State Judiciary.

Green, Roger C.

- 1980 *Mākaha before 1880 A. D.: Makaha valley Historical Project, Summary Report No. 5*, Pacific anthropological Record, No. 31, Bernice P. Bishop Museum, Honolulu, Hawaii.

Griffin, Agnes and George W. Lovelace

- 1980 *Patterns of Coastal Adaptation in the Ahupua`a of Keawa`ula: The Archaeology of Site 50-80-03-2802*, Prepared for the Department of Land and Natural Resources, Division of State Parks, Outdoor Recreation and Historic Sites, Honolulu, Hawaii.

Griffin, Agnes and Martha Yent

- 1977 *Results and Recommendation of the Archaeological Survey in the Interim Development Portion of Mākua Beach*, Department of Land and Natural Resources, Honolulu, Hawaii.

Hammatt, H., D. Borthwick, and D. Schideler

- 1986a *Archaeological Sub-surface Testing for a Four-Inch Water Main, Kea`au Beach Park to Makua Military Reservation, Wai`anae, O`ahu*. US Army Engineer Division, Pacific Ocean, Honolulu.

- 1986b *Archaeological Reconnaissance of Four Target Areas US Army Makua Military Reservation, Makua Valley, Wai`anae, O`ahu (Proposed Company Combined Arms Assault Course)*. US Army Engineer Division, Pacific Ocean, Honolulu.

Handy, E.S. Craighill

- 1940 *The Hawaiian Planter, Volume 1*, Bishop Museum, Bulletin No. 161, Honolulu.

Hawaii Heritage Program

- 1994 *Biological Inventory of the Makua Military Reservation O`ahu, Hawaii*, report prepared for 25th Infantry Division (Light), by the Nature Conservancy of Hawaii, Honolulu, Hawaii.

Hawaii, Kingdom of

- 1848 *Laws of Hawaii*, Statutes of the Kingdom, Honolulu, Hawaii.

Hommon, Robert J.

- 1980 *An Intensive Cultural Survey of Ukanipo Heiau and Kahanahāiki Terrace, Kahanahāiki, Makua Military Reservation, O`ahu*, Hawaii Marine Research, Inc., Hawaii.

Hurst, Gwen and Scott Williams

- 1994 *Archaeological Surface Survey of Proposed VA Medical Regional Office Center Project Sites, Tripler Army Medical Center, O`ahu, Hawaii (TMK: 1-1-12:5)*, Prepared for the U.S. Department of Veteran Affairs, Washington, D.C., Ogden Environmental and Energy Services Co., Inc., Honolulu, HI.

Indices

- 1929 *Indices of Awards made by the Board of Commissioners to Quiet Land Titles in the Hawaiian Islands*, Territory of Hawaii, Honolulu, Hawaii.

Juvik, Sonia P. and James O. Juvik, editors

- 1998 *Atlas of Hawaii, 3rd Edition*, University of Hawaii Press, Honolulu Hawaii

Kelly, Marion and Sidney Michael Quintal

- 1977 *Cultural History Report of Makua Military Reservation and Vicinity, Makua Valley, O`ahu, Hawaii*, Department of Anthropology Bernice P. Bishop Museum, Honolulu, Hawaii.

Kennedy, Joseph and Mark D. Merlin

- 1993 "Aboriginal Sweet Potato Farming in the Hawaiian Dry Forest". in *Hawaiian Archaeology*, Volume 2: 72-82, Society for Hawaiian Archaeology, Honolulu, Hawaii.

Kirch, P.V.

- 1992 *Anahulu: The Anthropology of History in the Kingdom of Hawaii: Volume Two The Archaeology of History*, University of Chicago Press, Chicago.
- 1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*, University of Hawaii, Honolulu, HI.

- 1974 *Archaeological Fieldwork in the Anahulu Valley, O`ahu Island*, MS report 110674, B.P. Bishop Museum, Honolulu.
- Komori, Eric
 July 1992 *Inadvertent Discovery of Burial, Kahuku, O`ahu, TMK: 1-5-6-02:009*, Letter Report, SHPO, Honolulu, Hawaii.
- McAllister, J. Gilbert
 1933 *Archaeology of O`ahu*, Bernice P. Bishop Museum, Honolulu, Hawaii.
- McGerty, Leann and Robert L. Spear
 1997 *Cultural Resources Inventory Survey of Dillingham Military Reservation (DMR) Ahupua`a of Mokulē`ia, Kawaihoa, Keālia, and Ka`ena, Wailua District, O`ahu Island, Hawaii*, Prepared for U.S. Army Corps of Engineers, Scientific Consultant Services/Cultural Resource Management Services, Honolulu, Hawaii.
- Moniz Nakamura, J.
 1998 *Cultural Resources Management Projects Performed Under the Ecosystems Management Program at the Pōhakuloa Training Area, Island of Hawaii, Hawaii*. On file at the PTA Environmental Office, Pōhakuloa, Hawaii.
- Onyx Group
 2000 *Supplemental Environmental Assessment for Routine Training at Makua Military Reservation and PFC Pilila`au Range Complex*. Prepared for G3 Range Division 25th Infantry Division (Light) and US Army-Hawaii by The Onyx Group, San Diego, and Greenhorne and O`Mara Inc., Greenbelt, Maryland.
- Pukui, Mary Kawena, Samuel H. Elbert, and Ester T. Mookini
 1974 *Place Names of Hawaii*, University Press of Hawaii, Honolulu, Hawaii.
- Pukui, Mary Kawena and Samuel H. Elbert
 1986 *Hawaiian – English Dictionary, Revised and Enlarged Edition*, University of Hawaii Press, Honolulu, Hawaii.
- 1965 *Hawaiian – English Dictionary*, University of Hawaii Press, Honolulu, Hawaii.
- 1964 *Hawaiian – English Dictionary*, University of Hawaii Press, Honolulu, Hawaii.
- Robins, Jennifer
 1998 *Final Archaeological Report, Phase I Reconnaissance Survey, Naval Radio Transmitter Facility Luahualei (RTF Luahualei), O`ahu, Hawaii*, Prepared for the Pacific Division Naval Facilities Engineering Command, Ogden Environmental and Energy Services Co., Inc., Honolulu, Hawaii.

Robins, Jennifer J. and Robert L. Spear

1997a *Cultural Resources Inventory survey and Limited Testing, Phase I, of the Schofield barracks Training Areas for the Preparation of a Cultural Resource Management Plan for U.S. Army Training Ranges and Areas. O`ahu Island, Hawaii (TMK 7-6-01 and 7-7-01)* [in Two Volumes], Draft Final Report Prepared for the U.S. Army Corps of Engineers, P.O.D, Scientific Consultant Services/Cultural Resource Management Services, Honolulu, Hawaii.

1997b *Cultural Resources Inventory Survey and Limited Testing, Phase II, of the U.S. Army Schofield Barracks Training Areas for the U.S. Army Garrison Hawaii Ecosystem Management Program, Island of O`ahu, Hawaii*, Draft Summary Report Prepared for the U.S. Army Corps of Engineers, P.O.D, Scientific Consultant Services/Cultural Resource Management Services, Honolulu, Hawaii.

Rosendahl, Paul

1977 *Archaeological Inventory and Evaluation Report for Installation Environmental Impact Statement for U.S. Army Support Command Hawai`i (USASCH)*, Part 1: Report and Text, and Part 2: Tables, Prepared for the U.S. Army Engineer Division, Pacific Ocean, Honolulu, Department of Anthropology, Bernice P. Bishop Museum, Honolulu, Hawaii.

Sterling, Elspeth P., and Catherine C. Summers

1978 *Sites of O`ahu*, Department of Anthropology, Bernice P. Bishop Museum, Honolulu, Hawaii.

Somers, Rebecca

2000 "GIS Stalled? Getting Past the Mapping Phase", in *Geo Info Systems*, March 2000

Tenbruggencate, Jan

1999 "Archaeologists Suggest More Recent Settling of Hawaii", in *Honolulu Advertiser*, dated 25 October 1999, page A1.

Thrum, Thomas G.

1906 *Heiaus and Heiau Sites throughout the Hawaiian Islands*, *Hawaiian Annual*, Thomas G. Thrum, Publisher, Honolulu.

Titchen, Kathy

2000 *The Battle of Makua*, Article from MidWeek dated 10 May 2000.

Titcomb, Margaret

1952 *Native Uses of Fish in Hawaii*, University Press of Hawaii, Honolulu, Hawaii.

Williams, Scott S.

1998a *Evaluation of Remote Sensing Techniques for Identifying Potentially Significant Cultural Resources at the U.S. Army Makua Military Reservation, Mākua Valley, Island of O`ahu, Hawaii*, Draft Report, Prepared for the U.S. Army Corps of Engineers, Ogden Environmental and Energy Services Co., Inc., Honolulu, Hawaii.

1998b End of Field Letter Report for Delivery Order 0030

1995 *Archaeological Inventory Survey of the Kahuku Training Area and Preparation of a Historic Preservation Plan*. Prepared for the Legacy Resource Management Program, O`ahu Island, Hawaii.

Williams, Scott S., and Tomasi Patolo

2000 *Intensive Archaeological Survey and Monitoring for Proposed Modifications to the Company Combined Assault Course (CCAAC) and Construction of a Fire Access Trail at the U.S. Army Makua Military Reservation, Makua Valley, Island of O`ahu, Hawaii*, Prepared for the U.S. Army Corps of Engineers, Ogden Environmental and Energy Services, Honolulu, Hawaii.

1998 *Intensive Archaeological Survey and Monitoring for Proposed Modifications to the Company Combined Assault Course (CCAAC) and Construction of a Fire Access Trail at the U.S. Army Mākua Military Reservation, Mākua Valley, Island of O`ahu, Hawaii*, Draft Report, Prepared for the U.S. Army Corps of Engineers, Ogden Environmental and Energy Services, Honolulu, Hawaii.

Williams, Scott, Tomasi Patolo, and Jim Landrum

1995 *Archaeological Inventory Survey of Selected Areas at United States Army Support Command Hawai`i (USASCH), Kahuku Training Area (KTA), Ko`olaupia District, Island of O`ahu, Hawai`i*. Prepared for U.S. Army Corps of Engineers, Honolulu District, Ft. Shafter, by Ogden Environmental and Energy Services Company Inc., Honolulu.

Williams, Scott, Jennifer Robins, and Mary Riford

1999 *Historic Preservation Studies and Investigations for Firebreak Road Improvements at the U.S. Army Makua Military Reservation, O`ahu Island, Hawaii*, Draft Report, Prepared for the U.S. Army Corps of Engineers, Ogden Environmental and Energy Services, Honolulu, Hawaii.

Yent, Martha

1987 *Archaeological Monitoring of Makua Well Construction Project, Kaena Point State Park, Waianae, O`ahu*, Department of Land and Natural Resources, Honolulu, Hawaii.

Zulick, Loren and David Cox

2000 *Cultural Resource Management Army Sub-Installations U.S. Army Garrison Hawaii*, Annual Report, Volume 1 of 2, PCSU, Honolulu, Hawaii.

Zulick, Loren and David Cox

2001 *Phase I Inventory Survey of Cultural Resources on Makua Military Reservation, Island of O`ahu, Hawaii*, The Pacific Cooperative Studies Unit of the University of Hawaii, Honolulu, Hawaii.

APPENDIX

APPENDIX I Helemano Ungulate Control Fence CDUA

APPENDIX II Helemano Ungulate Control Fence Draft EA
(with additional Appendixes)

APPENDIX I

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P.O. BOX 621
HONOLULU, HAWAII 96809

CONSERVATION DISTRICT USE APPLICATION FORM

FOR DLNR USE ONLY

Reviewed by _____
Date _____
Accepted by _____
Date _____
Docket/Fine No. _____
180-Day Exp. _____
EIS Required _____
PH Required _____
Board Approved _____
Disapproved _____

SUMMARY PAGE

I. LANDOWNER

Name : Kamehameha Schools
Address: 567 South King St.
Honolulu, HI 96813

Tel. No.: (808) 534-3866

Signature: _____

Date: _____

II. APPLICANT

Name : Kamehameha Schools
Address: 567 South King St.
Honolulu, HI 96813

Tel. No.: (808) 534-3866

Interest in Property: Landowner

AGENT

Name: N/A

Address: _____

Tel. No.: _____

III. TYPE OF PERMIT

- (1) Departmental permit (see section 13-5-33); (2)
Board permit (see section 13-5-34)
(3) Emergency permit (see section 13-5-35)
(4) Temporary variance (see section 13-5-36)
(5) Nonconforming uses (see section 13-5-37)
(6) Site plan approval (see section 13-5-38); or (7)
Management plan (see section 13-5-39)

IV. LAND PARCEL LOCATION

Island:	Oahu
County:	Honolulu
District:	
TMK:	6-3-001:001
Area:	11,504 acres
Term:	N/A

V. SUMMARY OF PROPOSED IDENTIFIED LAND USE:

The project involves the creation of a pig free ecosystem of approximately 200 acres. It involves hand clearing of a corridor no more than ten feet wide and erecting a fence line. The outside of the fence will be skirted along the base with a hogwire apron. After fence construction, the project will conduct ongoing feral pig control and natural resource monitoring and management to determine the impacts of the fence on the vegetation and track the recovery of endangered plant species.

VI. ENVIRONMENTAL REQUIREMENTS:

Environmental requirements are covered in the attached Draft Environmental Assessment: Helemano Watershed Management Project.

VII. DESCRIPTION OF PARCEL

A. Existing structures/use:

The parcel contains no existing permanent structures within the project area. A portable canvas tent structure created in accordance with CDUA OA-2973 however, is in the process of being upgraded to a more stable wooden cover. The parcel is currently leased by the U.S. Army Garrison Hawaii as a training area.

B. Existing utilities:

The parcel contains no existing utilities.

C. Existing access:

Existing access to the area is via the Ko'olau Summit and Pe'ahināi'a Trails. These trails area not open to the general public. Trail locations can be seen in Appendix A (p. 16) of the attached DEA. Access for personnel to the project area during the fence construction and monitoring phases of the project will be via helicopter. A helicopter landing site already exists near the project site.

D. Flora and Fauna.

Refer to the attached DEA, APPENDIX A (p.16), "MAP OF PROPOSED FENCE ROUTE," APPENDIX C (p.18), "ENDANGERED, CANDIDATE AND SPECIES OF CONCERN KNOWN TO EXIST IN THE PROJECT AREA," and APPENDIX D (p.19), "NATIVE VERTEBRATES AND INVERTEBRATES KNOWN TO EXIST IN THE PROJECT AREA," for a listing and map location of the known rare and endangered species in the project area.

E. Topography

Refer to Page 6, "Summary of Affected Environment" in the attached DEA for a description of the topography and Appendix A (p.16) for a contour map of the parcel.

F. Shoreline

Project Area is located in the upland areas of the Ko'olau Mountains, O'ahu.

G. Existing covenants, easements, restrictions

None

H. Historic sites affected

No historic sites are known in the project area.

VIII. COMMENCEMENT DATE: April 1, 2003

COMPLETION DATE: March 31, 2004

IX. PROPOSED IDENTIFIED LAND USE:

P-7 SANCTUARY: The proposed project plans to create a 200-acre plant sanctuary by construction of a fence designed to control feral pig populations. Details of the project are described in the DEA, pages 4-6, "II. PROJECT DESCRIPTION".

X. AREA OF PROPOSED USE: Approximately 200 acres

XI. NAME AND DISTANCE OF NEAREST TOWN OR LANDMARK:

Five miles from Wahiawa, O'ahu.

XII. LAND USE COMMISSION BOUNDARY INTERPRETATION:

The project area is not within fifty feet of the boundary of the Conservation District, and therefore does not require an interpretation of the boundary by the State Land Use Commission. Map of the project within the Protective subzone is located in Appendix A (p.16) of the DEA.

XIII. SUBZONE BOUNDARY DETERMINATION:

The proposed project area does not lie within 50 feet of a subzone boundary.

XIV. FEES

Fees for this application total \$350.00: \$100 for the Board of Land and Natural Resources Permit, and \$250.00 for the public hearing triggered by the requirement of this project for a board permit in the protective subzone.

XV. PLANS

- A. Location Map and Proposed Fence Line can be found in Appendix A (p. 16) of the Project DEA.
- B. APPENDIX B (p. 17) of the DEA contains "FENCE DESIGN DETAILS". A description of the fence construction is contained on page 5 of the DEA
- C. Nearly all components for management plan described in Section 13-5-39, HAR, and Exhibit 3, "Management Plan Requirements, dated September 6, 1994," are all covered within the project DEA. The only aspect not addressed in the DEA is a Reporting Schedule. A report describing accomplishments and progress will be filed after the completion of the fence line and on a yearly basis thereafter.

XVI. DEMONSTRATE THAT THE PROPOSED USE IS CONSISTENT WITH CONSERVATION DISTRICT:

Pages 11-14, "VII. FINDINGS AND REASONS SUPPORTING THE DETERMINATION" of the proposed project Draft Environmental Assessment demonstrate that the proposed use is consistent with the criteria listed in the application.

Pages 8-10 of the DEA, "IV. IDENTIFICATION AND SUMMARY OF ENVIRONMENTAL IMPACTS & PROPOSED MITIGATION MEASURES" provide a description of potential impacts. None of the impacts are inconsistent with the purpose of the Conservation District.

APPENDIX II

**DRAFT
ENVIRONMENTAL ASSESSMENT**

**HELEMANO WATERSHED MANAGEMENT
PROJECT
O‘AHU, HAWAI‘I**

in accordance with

CHAPTER 343, HAWAII REVISED STATUTES

Proposed by

**Kamehameha Schools
U. S. Army Garrison – Hawai‘i
U. S. Fish and Wildlife Service
Division of Forestry and Wildlife,
Hawaii Department of Land and Natural Resources**

October 2, 2006

I. SUMMARY

CHAPTER 343, HAWAII REVISED STATUTES (HRS)
DRAFT ENVIRONMENTAL ASSESSMENT

Project Name: Helemano Watershed Management Project
Proposing Agency: Kamehameha Schools
Approving Agency: State Department of Land and Natural Resources
Project Location: Helemano Stream Drainage, Ko'olau Mountains, O'ahu
TMK Oahu: 6-3-001:001
Property Owner: Kamehameha Schools
LU Classification: Conservation, Subzone P1 (Restricted)

Anticipated Determination of Environmental Assessment:

A Finding of No Significant Impact (FONSI) is expected for the proposed project.

Agencies Consulted During EA Preparation:

Federal: U. S. Department of Agriculture
Natural Resources Conservation Service
U. S. Department of Interior
U. S. Fish and Wildlife Service
U. S. Department of Defense
U. S. Army Garrison, Hawaii

State: Department of Health
Environmental Planning Office
Department of Land and Natural Resources
Commission on Water Resources Management
Division of Forestry and Wildlife-O'ahu
Division of Land Management-O'ahu
Historic Preservation Division
University of Hawaii
Hawaii Tree Snail Laboratory-Dr. Michael Hadfield

City and County: Honolulu Board of Water Supply
Department of Land Utilization
Neighborhood Boards:
North Shore Neighborhood Board

Wahiawa Neighborhood Board

Private: Audubon Society
 Bishop Museum
 Conservation Council of Hawaii
 Hawaiian Trail and Mountain Club
 Pig Hunters Association of O‘ahu
 The Nature Conservancy of Hawaii
 Sierra Club

Summary of Project Actions:

Kamehameha Schools (KS), in a cooperative effort with the State of Hawai‘i, Division of Forestry and Wildlife (DOFAW), Natural Area Reserves program, the U.S. Army Garrison, Hawai‘i and the U.S. Fish and Wildlife Service (USFWS) propose the construction of an ungulate exclosure fence encircling the upper reaches of the Helemano Stream Drainage, Ko‘olau Mountains, Oahu (See Map Appendix A). The ultimate goal of the project is to remove feral pigs (*Sus scrofa*) from within the fence, aid in securing the section as a natural ecosystem, provide habitat for rare plants, and serve as a site for rare species outplanting. This project builds upon the efforts of the ‘Ōpa‘eula Fencing Project, an adjacent 250-acre exclosure completed in May 2001.

The project involves the creation of a pig free ecosystem of approximately 200 acres. It involves hand clearing of a corridor no more than ten feet wide and erecting a fence line. The outside of the fence will be skirted along the base with a hogwire apron. After fence construction, the project will conduct ongoing feral pig control and natural resource monitoring and management to determine the impacts of the fence on the vegetation and track the recovery of endangered plant species.

The anticipated start date for the project is the second quarter of the 2003 calendar year. Clearing common native and introduced vegetation for the entire length of the fence corridor will take approximately three (3) months to complete. Fence installation will take an estimated nine (9) months, pending weather conditions. The entire project will take approximately twelve (12) months.

Project funding originates from a variety of sources, including private, state, and federal funds. An estimated budget for the project is found in Tables 1 and 2. State of Hawaii contributions to the project come from funds given to the State by the U.S. Fish and Wildlife Service under Section 6 of the Endangered Species Act of 1973. These monies, provided for management of endangered species, are given on a 3 to 1, federal to state dollar match. The State of Hawaii contributions also include the monetary value of Division of Forestry and Wildlife employees’ time contributed to the project. Kamehameha Schools and the USFWS are sharing the cost of construction through a conservation partnership program.

Table 1. Cost Estimates, Helemano Watershed Management Project

FENCE CONSTRUCTION (2750 meters or 9075 feet)	ARMY	DLNR	FWS	KSBE	TOTALS
Supplies/fencing materials (approximately \$3 per foot)		\$7,093	\$10,132	\$10,000	\$27,225
Clearing (approximately \$1 per foot)	\$7,575	\$1,500			\$9,075
Helicopter for fenceline clearing personnel (4 trips, 3 hours each trip @ \$686/hour)	\$8,232				\$8,232
Helicopter sling loads (2 five-hour days @ \$686/hour)		\$6,860			\$6,860
Helicopter for fence construction personnel (8 trips, 3 hours each trip @ \$686/hour)	\$16,464				\$16,464
Construction (\$8 per foot)			\$39,734	\$32,866	\$72,600
Subtotals	\$32,271	\$15,453	\$49,866#	\$42,866*	140,456

* \$15,000 of the \$42,866 KSBE contribution for this project was brought forward from prior years.

\$24,886 of the \$49,866 FWS contribution for this project was brought forward from prior years.

Table 2. Cost Estimates for Operations and Maintenance of Helemano Watershed Management Project

Operations and Maintenance	ARMY	DLNR	FWS/KSBE	TOTALS
Ungulate control/Snaring/Fence Maintenance (3 Army personnel \$12/hour, 4 trips/yr. for 30 hrs. each trip)	\$4,320	--	--	\$4,320
Helicopter for Army management trips (4 trips, 3 hours each trip @ \$686 per hour)	\$8,232	--	--	\$8,232
Annual Cost	\$12,552	--	--	\$12,552
10 yr projection	\$120,552	--	--	\$120,552

Project Purpose and Need:

This project is directed at the protection of ecosystems as well as rare and endangered species. If long-term viability of rare and endangered organisms is to be achieved, large tracts of land need to be protected.

The approach of this project is consistent with the objectives of many entities. It is in accord with USFWS policy for the management of natural communities using an "ecosystem approach". It is also in alliance with the State of Hawaii's long-term environmental policies, goals and guidelines outlined in Hawaii Revised Statutes, Chapter 344. Watershed protection is an identified land use for Conservation District Protective ("P") subzone and exclusion of pigs will enhance the areas' functionality as watershed by reducing vegetation damage and alteration caused by feral pig activity. This project is consistent with a second designated land use of the "P" subzone: "preserving natural ecosystems of native plants, fish and wildlife, particularly those which are endangered" (HAR, 13-5-11-4).

The project also strives toward the provisions of the City and County of Honolulu General Plan Objectives and Policies, Chapter III, Objective A, Policies 1-11, by “protect[ing] and preserv[ing] the natural environment” (Objective A) as well as the “plants, birds, and other animals that are unique to the State of Hawaii and the Island of Oahu” (Policy 8). The North Shore Sustainable Communities Plan is also supported by this project, as section 3.1.1, General Policies for “the preservation of open space and the natural environment” seek to “protect significant natural features” and “ecologically sensitive lands”.

All project partners are full members of the Ko‘olau Mountains Watershed Partnership (KMWP), which includes the Helemano Watershed Management Project as one its priority objectives in its Management Plan and Action Plan for 2002-2003. Plans are underway for the KMWP to develop an overall master ungulate management strategy for the entire Ko‘olau Range. Conservation projects will continue in the interim, proceeding piecemeal on a case by case basis until such a plan is completed.

Installation of the proposed fence will help to more effectively and efficiently control populations of feral pigs in the project area. Feral pigs pose the greatest threat to existing areas of native wet forest resources on the Ko‘olau summit. Pigs consume and destroy understory plants, create conditions favoring non-native plant establishment and infestation, prevent the establishment of native plants, and disrupt soil nutrient cycling. Their wallows create breeding areas for mosquitoes, which transmit avian malaria and pox virus to native forest birds. The cumulative effect is the decline of native forest ecosystems that serve as habitat for threatened and endangered forest birds, plants, and invertebrates. In addition to feral pig control, a comprehensive threat management program will be implemented including control of rats, weeds, mongooses and human disturbance.

The summit of the Ko‘olau mountains in this area receives some of the highest rainfall on O‘ahu, with greater than 200 inches per year, making the area crucial to the production of clean, fresh water for O‘ahu. Such high rainfall and unpredictable weather pattern can also function as a constraint in project implementation, as many project components are contingent upon cooperative weather conditions.

Degradation of native forest ecosystems has a direct impact on the forests’ value as a watershed. By eliminating the destructive impact of pigs in the project area, this project will also help protect surface and ground water quality. The protection of the watershed in the upper reaches of the Helemano drainage will also benefit the North Shore community on O‘ahu by protecting nearshore ocean habitats, which are impacted by Helemano stream water quality.

II. PROJECT DESCRIPTION

General:

The project will be located in the Army’s Kawaihoa Training Area in the northern Ko‘olau Mountain Range on the island of O‘ahu, an area leased from Kamehameha Schools. The

Army currently uses the area for helicopter over-flight training and occasionally for foot maneuvers between other training areas. The proposed fence project would not conflict with the area's use for training. The proposed fence ranges from roughly 2400-2800 feet elevation and will encompass roughly 200 acres. The route currently proposed is about 2750 meters long and transverses a diversity of terrain types. This project utilizes existing resources from the 'Ōpa'eula Fencing Project, an adjacent fence enclosure of 150 acres. A new weatherport will not be created for the construction and maintenance of the fence project. Instead, the project will utilize an upgraded portable canvas tent structure built with the 'Ōpa'eula Watershed Management Project for fence construction and natural resource management and monitoring purposes.

Starting at the northeast corner at the junction of the summit and Pe'ahināi'a trails, the fence follows the Summit Trail for 800 meters south. The fence then turns west down a large ridge for 840 meters. Next the fence descends for 300 meters (250 feet vertical distance) to the Helemano stream. After crossing the stream the fence climbs to the Pe'ahināi'a trail for 210 meters (250 feet vertical distance). Finally the fence follows the Pe'ahināi'a trail for about 300 meters before cutting across the gulch to the north for 300 meters to rejoin the Pe'ahināi'a fence (Appendix A). The fence may cross the Summit Trail at a few junctures. At these sections, the U.S. Army Garrison, Environmental Division will work with the Hawaiian Trail and Mountain Club and/or other concerned groups to minimize the impacts of the fence on the Summit Trail.

The proposed fence line will utilize 42 inch-high beznal coated hogwire fence fabric with a basal strand of beznal coated barbwire. The fence fabric will be supported by beznal coated steel fence posts and treated wood posts placed no more than 10 feet apart the entire length of the fence line. Shorter beznal steel pins will be used as anchors within the 10-foot span. The fence will have an apron of hogwire laid horizontally along the ground outside the fence to prevent pigs digging under. The fence alignment will be cleared by hand to a width of no more than 10 feet.

Project Schedule:

The progression of this project can be divided into three (3) phases as follows, with the approximate time to completion for each phase noted.

Phase 1: Fence Corridor Construction (3 months)

- The fence corridor of width no more than ten feet wide will be cleared with hand tools and small power tools.

Phase 2: Fence Installation (9 months)

- Materials will be flown in by helicopter.
- Construction work will be done with hand tools, driving steel and wood poles into the ground along the corridor no more than 10 feet apart, attaching one strand of galvanized barbed wire along the post at ground level and stretching 42-inch beznal coated hogwire along the posts and clipping it on with wire clips. Where necessary,

shorter anchor posts will be used along the fence, between the posts, to ensure the hogwire remains close to the ground.

- A 24-inch horizontal hogwire fence apron will be placed along the ground, attached to the upright fence and secured to the ground.
- The construction of the fence will take place over a six-month period, construction schedule being dependent on weather conditions.

Phase 3: Feral Pig Control and Natural Resource Monitoring and Management (ongoing)

- Pig populations will be monitored during the clearing and construction phases to determine population level.
- If feral pigs remain within the fenced area upon completion of the fence, Resource Management staff from the U. S. Army Garrison-Hawaii will employ an appropriate combination of methods to eliminate them, including staff hunting, use of volunteer hunters, or selective snaring within the fenced area. Specific control methodology will depend on the number of pigs remaining within the fenced area. The activities of the fence construction crew may drive pigs from the area and no control may be necessary.
- Following initial control, Army Resource Management staff will regularly monitor pig activity transects to detect feral pig ingress and assess the integrity of the fence.
- Vegetation will be monitored within the enclosure through a series of plots. Plots will be read before completion of the fence to obtain a baseline. Plots will be monitored annually following completion of the fence. Plots will be specifically designed to measure changes in native and non-native cover before and after fencing to help demonstrate the impacts of feral pigs and guide future management.
- Rare plants have been individually monitored for five years within the project area and will continue to be monitored at least annually once the fence is complete. Funds budgeted for pig control and natural resource monitoring are primarily for helicopter time to support these activities.

III. SUMMARY DESCRIPTION OF AFFECTED ENVIRONMENT

The terrain of the proposed area is of similar topography and adjacent to the previous 'Ōpa'eula fence. The area is generally characterized by precipitous gulches, dense vegetation and steep cliffs as elevation increases. However, the upper reaches near the summit are much more gently sloped, with more short-statured and open vegetation. This more gently sloped area has been a focal management area for the U.S. Army due to a combination of factors:

1. The extremely remote nature of this site in combination with its topography has resulted in this area being a haven for feral pigs. This situation is in contrast to mid- to lower-elevation areas where more extreme terrain, dense vegetation and occasional visits by hunters have lessened the impacts of pigs.
2. Feral pig impacts are worse in this area because the vegetation is more susceptible to pig damage.
3. Proximity of this area to the summit trail makes it a focal point for pig movement.

4. Gentle topography in the area allows for easier access and more effective management of the resources in the area.

Flora:

This area is rich in native plant diversity and home to at least nine species of listed endangered, candidate or plant species of concern (Appendix C). As comprehensive botanical surveys have not been conducted, the area likely harbors other undiscovered resources. Most of the habitat is fairly pristine, as there has been minimal invasion by human-vector weed species because of the remote nature of the area. In some areas however, pig damage has led to the spread of some alien species such as Axonopus fissifolius, Pterolepis glomerata and Psidium cattleianum.

Fauna:

Animal life in the area consists of native and non-native bird species, invertebrates such as snails and insects, and both large and small mammals such as feral pigs, mongooses, and rats. One species of endangered tree snail can be found within the proposed fence area (Appendix D). Comprehensive faunal surveys have not been conducted in the area.

Sensitive Habitat:

The entire project area should be considered sensitive habitat, particularly with regard to listed endangered plants and the resident Achatinella tree snails. The long term management goal for the area is protection of the intact native plant and animal communities. To ensure that this long-term goal is carried out, the agencies involved in this project are entering into a cooperative agreement under which long-term protection of this area is a goal.

Cultural Resources:

The history of the project area and use by native Hawaiians is not well documented. Although the project area has not yet been surveyed for archeological sites, few features are known to exist in the area, since ancient Hawaiians did not use the *mauka* portions of the Ko'olau Mountains for residence. The area may have been used for activities such as bird hunting and medicinal forest plant gathering. An archaeological survey of the fenceline is scheduled for February, 2003.

Other Uses:

The project area, located on private property, is not open for public use at this time. It does contain a portion of the Ko'olau Summit Trail, entry to which requires permits from the U.S. Army and Kamehameha Schools. None of the trails found within this project area are maintained by or have ever been a part of the State of Hawaii's maintained trail network.

IV. IDENTIFICATION AND SUMMARY OF ENVIRONMENTAL IMPACTS & *PROPOSED MITIGATION MEASURES*

Environmental Impacts		Project Actions				
		Pig monitoring	Cutting fence corridor	Fence installation	Pig Control and Eradication	Vegetation Monitoring
~ insignificant impact ○ potential negative impact + positive effect <blank> no impact						
Environmental Resources	Soils		~	~	+	
	Vegetation and ecosystems	~	○	⊕	+	+
	Visual quality and aesthetics		~	○		
	Water Resources			+	+	
	Rare & endangered species	~	○	○	+	+
	Employment and the local economy			+	+	
	Summit Trail Use		~	○	~	
	Archaeological and historic resources	~	○	⊕	+	
	Cultural Practices			○	⊕	

The major positive and negative impacts are summarized in the table above and discussed in the following paragraphs. Areas with potential negative impacts (○ symbol) include a description of the anticipated mitigation. The primary potential negative impacts resulting from this project are associated with the cutting of the fence line and the installation of the fence. These aspects are discussed below and mitigation provided in italics.

1. Cutting a fence corridor is necessary to permit efficient installation of the fence and remove hazards to work crews. In this process, some soil disturbance and harm to native vegetation is unavoidable.

Mitigation: A survey of the ridges in the upper Helemano drainage has yielded a route based on the ease of installation and maintenance, long-term survival of the fence from vegetative encroachment, erosion and slides, and the need to limit the impact of construction on native plant communities and cultural resources. Trails are corridors for disturbance, and rather

than creating a new disturbance, the use of a preexisting trail is a natural choice for a fence route. Soil disturbance is expected to be short-term and no changes in the normal runoff or percolation are expected. Botanists will search for rare and endangered plants along the proposed route. Only common native vegetation will be cut if necessary for fence line construction and the fence will be routed along existing trails to minimize damage. If necessary, the alignment will be shifted to avoid individual rare plants.

2. Workers could be agents for the unintentional introduction and/or spread of weedy or invasive plants along the corridor.

Mitigation: *Gear cleaning procedures to reduce the introduction of noxious plant seeds and propagules will be strongly enforced. Species such as Juncus planifolius and Andropogon virginicus found to pre-exist along the proposed route and considered susceptible to spread from human activity will be removed prior to fence construction. The Army contracted Natural Resource staff will ensure that these gear cleaning procedures are followed by contractor.*

3. Initially after completion, any pigs residing in the fence would be penned, egress from the area being closed. This could result in a period of amplified pig damage from animals that might otherwise be transiting out of the area.

Mitigation: *Following the completion of the fence, intensive control efforts will immediately be implemented to eliminate those pigs remaining in the enclosed area. Control will be conducted using ground-based technique and will be carried out by Army and Kamehameha Schools contractors with assistance from others as necessary. These control techniques will not have a negative effect on rare species. No further recruitment of feral pigs into the area is anticipated. Intensive monitoring will be performed to ensure all pigs are removed.*

4. Fence line clearing and construction could affect vegetation that harbors endangered O'ahu tree snails, causing the snails to leave their preferred location and become more susceptible to predators such as rats and introduced predatory snails.

Mitigation: *The chosen fence line corridor has been chosen to minimize impacts to native species by following the existing corridors of disturbance. We will enlist the support of recognized tree snail experts and have them survey the proposed fence line corridor for tree snail populations prior to any doing any clearing work. Sizable 'ōhi'a trees that represent good snail "habitat" will not be removed. Any trimming or cutting of trees or shrubs will be done only after vegetation has been inspected carefully for snails. U. S. Army resource management staff knowledgeable about tree snails will oversee the fence line corridor clearing. Finally, vegetation that is cleared will be placed upon other native vegetation so that if native snails were present and not detected by personnel doing the clearing, snails would have an opportunity to reach another host without having to cross the ground.*

5. Construction of the fence line along the Ko'olau summit trail will restrict travel along the trail, prohibit access for native Hawaiian gathering rights, and disrupt the integrity of the Ko'olau summit trail for recreational hiking.

Mitigation: The integrity of the Ko'olau summit trail will be kept intact. Fence construction will not restrict travel on the trails. Wherever possible the proposed fence will be routed off the trail through areas that are already disturbed or sparse with native vegetation. Fence crossovers are planned wherever the fence crosses the trail. These crossovers can provide access for native gathering if necessary, although the area is extremely remote and unlikely to be used by collectors. In areas where the fence and trail run side by side, the 24-inch hogwire apron portion of the fence will stabilize the substrate and improve traction for hikers. Visual, aesthetic impacts of the fence will be minimized as much as is practical, however the fencing materials -- class III galvanized or bezenal coated wire and fence posts selected for their durability -- come in a dull gray color, and are not available in green or dark brown. The portion of the Ko'olau summit trail affected by this project is on private land owned by Kamehameha Schools and is not currently open to the general public for hiking without landowner permission.

6. Construction of fence could affect unknown cultural sites.

Mitigation. Research written records and historic maps relevant to the project area. Inquire regarding known archaeological sites with the State Historic Preservation Division and the State Division of Forestry and Wildlife, Na Ala Hele Trails and Access Program. Conduct a survey by a qualified archaeologist along the proposed fence route. If cultural sites are found, avoid all impacts to any sites by re-routing fence line.

V. ALTERNATIVES CONSIDERED

Alternative 1: No action

This alternative effectively accepts the deterioration of this unique resource over time by allowing feral pigs to remain. Without a physical barrier like fencing to achieve a pig free unit, it is doubtful animal population numbers can remain low enough to allow these native natural communities to remain viable. This alternative goes against participating parties' goals and mandates.

Alternative 2: Build small exclosures around existing rare plants.

This alternative is impractical, expensive and damaging. In part due to selective pressure from pigs, most of the rare plants have been relegated to very steep slopes. Fences in these areas would not only be very difficult to build, but also damaging to the sensitive slopes which we are striving to protect.

Alternative 3: Utilize strategic (non-enclosed fencing) and hunting to reduce pig populations.

The softly undulating topography of the upper Helemano drainage area does not provide many natural barriers to pig movement. The nature of this landscape renders this alternative as infeasible. Strategic fencing is ineffective in an area such as this where the goal of the project is to secure a pig free ecosystem. Hunting may be an effective mechanism to lower pig populations in some areas, but it is virtually impossible to eradicate pigs from hunting alone in an unsecured or unfenced area.

Alternative 4: Build proposed fence around upper portion of Helemano drainage

This approach is recommended because constructing a large-scale fence will minimize the ratio of area impacted by the fence line clearing to the area protected by the fence. It will be more cost effective to build one large fence rather than many small enclosures. In order to effectively control pig impacts to natural resources on the Ko'olau Summit, large-scale fencing is needed in conjunction with feral pig control.

VI. ANTICIPATED DETERMINATION

Based on the assessment above we conclude that the Helemano Watershed Protection Project will not have any significant adverse impacts on the environment. Therefore, we feel preparation of an environmental impact statement is not required.

VII. FINDINGS AND REASONS SUPPORTING THE DETERMINATION

The environmental impacts of the Helemano Watershed Protection Project have been evaluated in relation to the thirteen significance criteria listed in the Guidebook for the State Environmental Review Process. The criteria and the effects this project will have are listed below.

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.

The purpose of this project is to protect watershed values and benefit native ecosystems and rare and endangered species. The project intends to better manage endangered ecosystems. Therefore, it will not destroy or cause the loss of natural or cultural resources and will improve environmental quality.

2. Curtails the range of beneficial uses of the environment

The project will increase the range of beneficial uses of the environment by increasing water quality in a portion of the Ko'olau Mountains. The project will also increase public awareness in the importance of watershed protection as well as protecting native Hawaiian ecosystems for future generations.

3. Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

The aim of this project is to protect watershed values by protecting native ecosystems, or plant and animal communities as opposed to a particular species. If long-term viability of rare and endangered native organisms is to be achieved, protection of large tracts of land is essential. This is in keeping with the USFWS "ecosystem approach" policy which focuses on management of natural communities, and with the Hawaii Natural Area Reserve Law, which states a system of reserves be established to "...preserve in perpetuity specific land and water areas which support communities, as unmodified as possible, of the natural flora and fauna..." (Chapter 195D, Hawaii Revised Statutes). Protection and enhancement of endangered species is also mandated by both Federal and State Endangered Species Acts (16 U.S.C. 1531-1543, as amended; Chapter 195, Hawaii Revised Statutes).

4. Substantially affects the economic or social welfare of the community or state.

The project has a positive impact on the economic welfare of the community and state by protecting a valuable watershed and insuring high quality water from this drainage for the future. The project will probably not have a significant effect on the social welfare of the community or state.

5. Substantially affects public health.

The project may have a small positive impact on public health. Controlling the population of feral mammals will likely reduce the incidence of Leptospirosis and other diseases carried by these animals into the Helemano drainage.

6. Involves substantial secondary impacts, such as population changes or effects on public facilities.

The project focuses on watershed enhancement and protection of native forest habitats in a remote area of the Ko'olau Mountains. Therefore, the project will not have any impact on population increase in North shore communities or elsewhere on O'ahu.

7. Involves a substantial degradation of environmental quality.

The purpose of this project is to protect watershed values and benefit native ecosystems and rare and endangered species. The project intends to better manage endangered ecosystems. Therefore, the project will provide a long-term improvement in the environmental quality of the upper Helemano watershed. The fence will curtail the environmental degradation caused by pigs in the sensitive area enclosed by the fence.

8. Is individually limited but cumulatively has considerable effect upon environment or involves a commitment for larger actions.

The project will not involve a commitment for a larger action. The effects of the project are limited to the fence area and the immediate surroundings. The cumulative effect of the fence will be positive for the environment by protecting about 200 acres of native Ko'olau wet forest from the destructive effects of feral pigs. This project, along with the adjacent 'Ōpae'ula fence, comprise the only fence exclosures currently in progress for the entire Ko'olau Range.

9. Substantially affects a rare, threatened, or endangered species, or its habitat.

This project will positively affect five endangered plant species, one candidate plant species, and three plant species of concern. In addition, this project will positively affect one endangered tree snail species. The central goal of this project is the protection of these species and their native ecosystems from the long-term consequences of the detrimental feral pig activity. Exclusion of feral pigs has been shown to be the most important resource management activity that can be done to protect rare, threatened, or endangered plant species in Hawaii.

10. Detrimentally affects air or water quality or ambient noise levels.

Helicopter and fence construction noise will be minor and short-term. Air quality will not be affected significantly. Clearing of vegetation may produce a short-term increase in sedimentation and runoff. Water quality however, will be improved in the long-term by reducing erosion and limiting the input of disease causing organisms into stream water by feral animals.

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, fresh water, or coastal waters.

The project is in an upland area and will not detrimentally affect any coastal areas or bodies of water. The project is not located in any sensitive flood plain areas. The project is likely to have a positive effect on coastal areas by reducing the erosion of soil into the ocean. No geological hazards are present in the project area.

12. Substantially affects scenic vistas and viewplanes identified in county or state plans or studies.

The fence will be located in a remote area not be visible from any public viewing sites, and therefore will not affect any scenic vistas or viewplanes identified in county or state plans or studies.

13. Requires substantial energy consumption

The project will consume only a small amount of energy and only during the construction of the project.

The long-term benefits of fencing and complete feral pig (*Sus scrofa*) removal inside the fenced area far outweigh the limited short-term effects of fence construction. Installation of the proposed fence will help to more efficiently and effectively control feral pigs in the project area. Feral pigs pose the greatest threat to existing intact native wet forest areas. The cumulative effects of feral pigs are the deterioration of intact native forest ecosystems, including the decline of threatened and endangered plants and invertebrates. Removal of feral pigs has been demonstrated to result in the recovery of native vegetation. Feral pig removal also controls or significantly reduces the spread of alien plants.

The possibility for introduction of new weed species as a result of human activity exists. Ensuring that the equipment, tools, and construction materials are clean and free of weed seeds can minimize this. Natural resource management and fence construction crews will be instructed in protocol to prevent weed distribution involving their personal gear and movements. This protocol will be strictly enforced.

VII. PERMITS REQUIRED

This project will require a board permit from the Board of Land and Natural Resources (Section 13-5-22 Hawaii Administrative Rules) because the project falls in a Protective (P) subzone. This permit will be requested in January 2002. A management plan (Section 13-5-22 Hawaii Administrative Rules) and a public hearing (Section 13-5-40 Hawaii Administrative Rules) are also required.

VIII. EA PREPARATION INFORMATION

This Environmental Assessment was prepared for Kamehameha Schools in coordination with U.S. Army Garrison, Hawaii by:

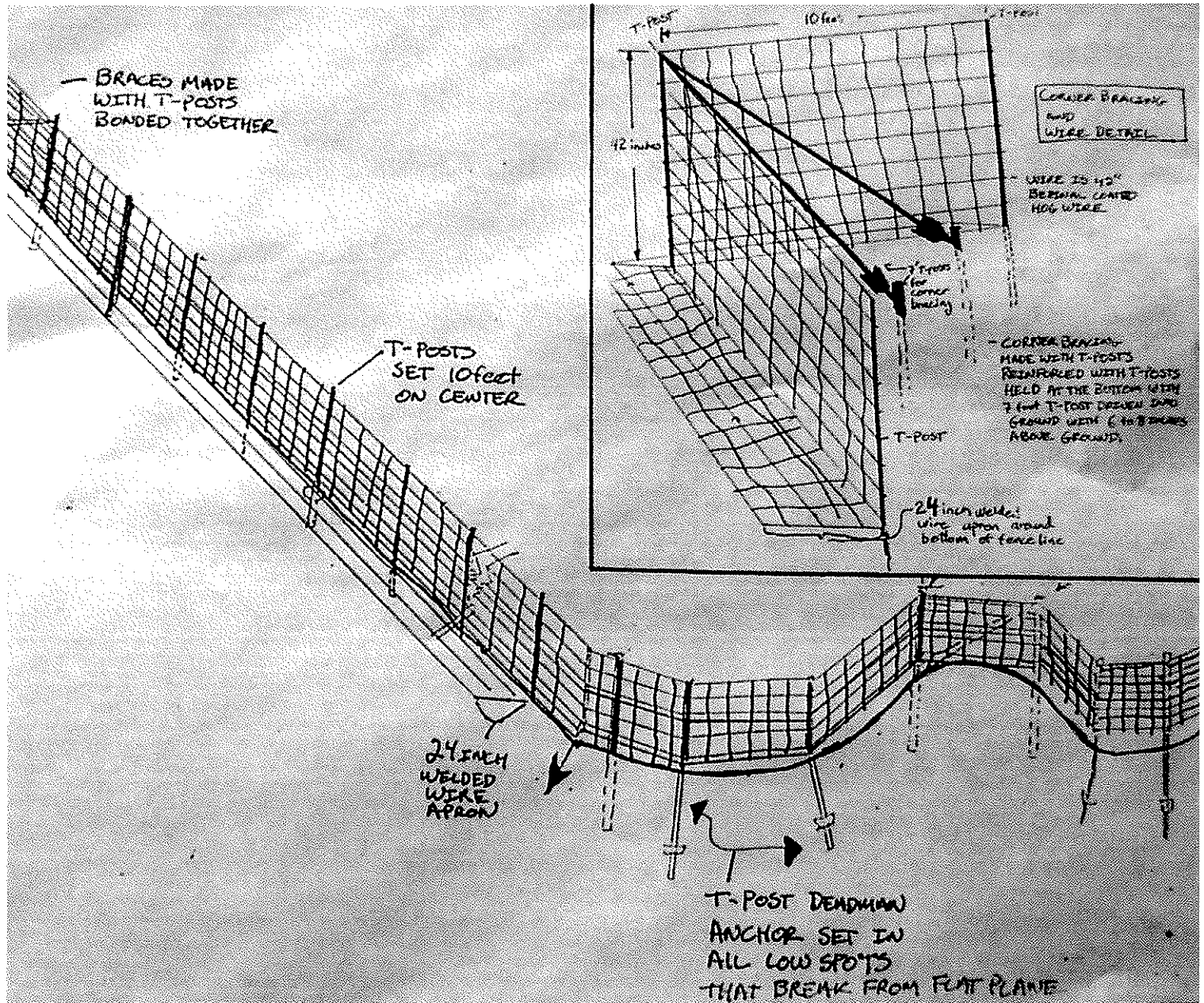
Jason Y. Sumiye
Ko'olau Mountains Watershed Partnership
Waimano Home Road, Bldg. #202 96782
TEL. (808) 453-6110, FAX 453-6113

LIST OF APPENDICES

APPENDIX A.	MAP OF PROPOSED FENCE ROUTE
APPENDIX B.	FENCE DESIGN DETAILS
APPENDIX C.	ENDANGERED, CANDIDATE AND SPECIES OF CONCERN KNOWN TO EXIST IN THE PROJECT AREA
APPENDIX D.	NATIVE VERTEBRATES AND INVERTEBRATES KNOWN TO EXIST IN THE PROJECT AREA
APPENDIX E.	HELEMANO WATERSHED COOPERATIVE AGREEMENT
APPENDIX F.	DRAFT EA COMMENTS AND RESPONSES

Map removed to protect rare resources. Available upon request

APPENDIX B. FENCE DESIGN DETAILS



APPENDIX C Endangered, Candidate and Species of Concern Plants Known to Exist in Project Area

ENDANGERED SPECIES

Cytandra viridiflora

Chamaesyce rockii

Viola oahuensis

Mysine judii

Cyanea st-johnii

Common Name

Ha'iwale

Akoko

None known

Kolea

Haha

CANDIDATE SPECIES

Zanthoxylum oahuensis

None known

SPECIES OF CONCERN

Joinvella ascendens

Myrsine fosbergii

Cyanea lanceolata calycina

None known

Kolea

Haha

APPENDIX D.

**NATIVE VERTEBRATES AND INVERTEBRATES
KNOWN TO EXIST IN THE PROJECT AREA**

<u>VERTEBRATES</u>	<u>Common Name</u>	<u>Federal Status</u>
<i>Himatione sanguinea</i>	Apapane	None
<i>Hemignathus virens</i>	Amakihi	None
<i>Pluvialis fulva</i>	Golden Plover	None
<i>Awaous guamensis</i>	O'opu nakea	None
 <u>INVERTEBRATES</u>		
<i>Achatinella sowerbayana</i>	Kahuli tree snail/O'ahu tree snail	Endangered
Tornatellides	None known	None
Succinides	None known	None
Auricullelides	None known	None
<i>Atyoida bisulcata</i>	'Opae kala'ole	None

APPENDIX E. HELEMANO WATERSHED COOPERATIVE AGREEMENT

APPENDIX F. CONSULTATION REVIEW COMMENTS

APPENDIX I

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P.O. BOX 621
HONOLULU, HAWAII 96809

CONSERVATION DISTRICT USE APPLICATION FORM

FOR DLNR USE ONLY

Reviewed by _____
Date _____
Accepted by _____
Date _____
Docket/Fine No. _____
180-Day Exp. _____
EIS Required _____
PH Required _____
Board Approved _____
Disapproved _____

SUMMARY PAGE

I. LANDOWNER

Name : Kamehameha Schools
Address: 567 South King St.
Honolulu, HI 96813

Tel. No.: (808) 534-3866

Signature: _____

Date: _____

II. APPLICANT

Name : Kamehameha Schools
Address: 567 South King St.
Honolulu, HI 96813

Tel. No.: (808) 534-3866

Interest in Property: Landowner

AGENT

Name: N/A

Address: _____

Tel. No.: _____

III. TYPE OF PERMIT

- (1) Departmental permit (see section 13-5-33); (2)
Board permit (see section 13-5-34)
(3) Emergency permit (see section 13-5-35)
(4) Temporary variance (see section 13-5-36)
(5) Nonconforming uses (see section 13-5-37)
(6) Site plan approval (see section 13-5-38); or (7)
Management plan (see section 13-5-39)

IV. LAND PARCEL LOCATION

Island:	Oahu
County:	Honolulu
District:	
TMK:	6-3-001:001
Area:	11,504 acres
Term:	N/A

V. SUMMARY OF PROPOSED IDENTIFIED LAND USE:

The project involves the creation of a pig free ecosystem of approximately 200 acres. It involves hand clearing of a corridor no more than ten feet wide and erecting a fence line. The outside of the fence will be skirted along the base with a hogwire apron. After fence construction, the project will conduct ongoing feral pig control and natural resource monitoring and management to determine the impacts of the fence on the vegetation and track the recovery of endangered plant species.

VI. ENVIRONMENTAL REQUIREMENTS:

Environmental requirements are covered in the attached Draft Environmental Assessment: Helemano Watershed Management Project.

VII. DESCRIPTION OF PARCEL

A. Existing structures/use:

The parcel contains no existing permanent structures within the project area. A portable canvas tent structure created in accordance with CDUA OA-2973 however, is in the process of being upgraded to a more stable wooden cover. The parcel is currently leased by the U.S. Army Garrison Hawaii as a training area.

B. Existing utilities:

The parcel contains no existing utilities.

C. Existing access:

Existing access to the area is via the Ko'olau Summit and Pe'ahināi'a Trails. These trails area not open to the general public. Trail locations can be seen in Appendix A (p. 16) of the attached DEA. Access for personnel to the project area during the fence construction and monitoring phases of the project will be via helicopter. A helicopter landing site already exists near the project site.

D. Flora and Fauna.

Refer to the attached DEA, APPENDIX A (p.16), "MAP OF PROPOSED FENCE ROUTE," APPENDIX C (p.18), "ENDANGERED, CANDIDATE AND SPECIES OF CONCERN KNOWN TO EXIST IN THE PROJECT AREA," and APPENDIX D (p.19), "NATIVE VERTEBRATES AND INVERTEBRATES KNOWN TO EXIST IN THE PROJECT AREA," for a listing and map location of the known rare and endangered species in the project area.

E. Topography

Refer to Page 6, "Summary of Affected Environment" in the attached DEA for a description of the topography and Appendix A (p.16) for a contour map of the parcel.

F. Shoreline

Project Area is located in the upland areas of the Ko'olau Mountains, O'ahu.

G. Existing covenants, easements, restrictions

None

H. Historic sites affected

No historic sites are known in the project area.

VIII. COMMENCEMENT DATE: April 1, 2003

COMPLETION DATE: March 31, 2004

IX. PROPOSED IDENTIFIED LAND USE:

P-7 SANCTUARY: The proposed project plans to create a 200-acre plant sanctuary by construction of a fence designed to control feral pig populations. Details of the project are described in the DEA, pages 4-6, "II. PROJECT DESCRIPTION".

X. AREA OF PROPOSED USE: Approximately 200 acres

XI. NAME AND DISTANCE OF NEAREST TOWN OR LANDMARK:

Five miles from Wahiawa, O'ahu.

XII. LAND USE COMMISSION BOUNDARY INTERPRETATION:

The project area is not within fifty feet of the boundary of the Conservation District, and therefore does not require an interpretation of the boundary by the State Land Use Commission. Map of the project within the Protective subzone is located in Appendix A (p.16) of the DEA.

XIII. SUBZONE BOUNDARY DETERMINATION:

The proposed project area does not lie within 50 feet of a subzone boundary.

XIV. FEES

Fees for this application total \$350.00: \$100 for the Board of Land and Natural Resources Permit, and \$250.00 for the public hearing triggered by the requirement of this project for a board permit in the protective subzone.

XV. PLANS

- D. Location Map and Proposed Fence Line can be found in Appendix A (p. 16) of the Project DEA.
- E. APPENDIX B (p. 17) of the DEA contains "FENCE DESIGN DETAILS". A description of the fence construction is contained on page 5 of the DEA
- F. Nearly all components for management plan described in Section 13-5-39, HAR, and Exhibit 3, "Management Plan Requirements, dated September 6, 1994," are all covered within the project DEA. The only aspect not addressed in the DEA is a Reporting Schedule. A report describing accomplishments and progress will be filed after the completion of the fence line and on a yearly basis thereafter.

XVI. DEMONSTRATE THAT THE PROPOSED USE IS CONSISTENT WITH CONSERVATION DISTRICT:

Pages 11-14, "VII. FINDINGS AND REASONS SUPPORTING THE DETERMINATION" of the proposed project Draft Environmental Assessment demonstrate that the proposed use is consistent with the criteria listed in the application.

Pages 8-10 of the DEA, "IV. IDENTIFICATION AND SUMMARY OF ENVIRONMENTAL IMPACTS & PROPOSED MITIGATION MEASURES" provide a description of potential impacts. None of the impacts are inconsistent with the purpose of the Conservation District.