

1994-09-23-HI-FFA-West Hawaii Veterans
Cemetery

FINAL SEP 23 1994
ENVIRONMENTAL ASSESSMENT

West Hawaii Veterans Cemetery

TMK: 3-7-2-04: 4

Prepared for

State of Hawaii
Department of Defense

September, 1994

JOHN WAIHEE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF VETERANS SERVICES

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September 12, 1994

EDWARD V. RICHARDSON
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LAWRENCE S. K. LEE
DIRECTOR

Engineering Office

Mr. Bruce Anderson, Interim Director
Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96814

Subject: West Hawaii Veterans Cemetery

Dear Mr. Anderson:

The State of Hawaii Department of Defense has reviewed the draft environmental assessment for the West Hawaii Veterans Cemetery and received no comments during the 30-day public comment period which began on January 23, 1994. The agency has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the September 23, 1994 OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA. Please contact Lt. Col. Jerry Matsuda at 735-3522 if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Jerry M. Matsuda".

Jerry M. Matsuda
Lieutenant Colonel
Hawaii Air National Guard
Contracting & Engineering Officer

cc: M & E Pacific, Inc.

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I. APPLICANT

The applicant for the proposed West Hawaii Veterans Cemetery is the State of Hawaii Department of Defense. The State of Hawaii owns the site of the proposed cemetery. According to §343-5 of the Hawaii Revised Statutes (HRS), the preparation of an Environmental Assessment (EA) is required because of the use of State lands and funds [§343-5(1)] and because the project area lies within Conservation District Lands [§343-5(2)].

II. APPROVING AGENCY

The approving agency for a determination of significance for this Environmental Assessment is the State of Hawaii Department of Defense.

III. AGENCIES CONSULTED

Federal:

Department of Veterans Affairs, National Cemetery System

State of Hawaii:

Department of Business, Economic Development and Tourism:

Land Use Commission

Department of Land and Natural Resources:

Office of Conservation and Environmental Affairs

Division of Water and Land Development

Commission on Water Resources Management

Historic Preservation Division

Forestry and Wildlife Division

Office of Environmental Quality Control

County of Hawaii:

Department of Water

Planning Department

IV. GENERAL DESCRIPTION OF THE ACTION'S CHARACTERISTICS

The West Hawaii Veterans Cemetery project consists of the construction of a new cemetery on the island of Hawaii. The census of 1990 indicated that 119,256 veterans live in Hawaii with 13,655 on the island of Hawaii. The West Hawaii Veterans Cemetery would provide interment space for West Hawaii veterans and their families.

Figures 1 and 2 show the location of the proposed Veterans Cemetery site. The site is identified as an approximately 96 acre portion of Tax Map Key (TMK) 3-7-2-04:4, and the owner is identified as the State of Hawaii. The subject project is in the North Kona District in the County of Hawaii, approximately twelve (12) miles north of Kailua-Kona and one mile east of Highway 19.

The subject property is 96 acres in area. However, the proposed development of the cemetery site will be limited to approximately 14 acres of the subject property (see Figure 3). Burial sites, gravesite access roads, administration/maintenance support facilities, and ceremonial/memorial facilities will be included in the development plans. The plans also include a 0.5 mile access road constructed to the cemetery site from Queen Kaahumanu Highway. The additional 82 acres of land is not scheduled for development.

The proposed development will provide approximately 10,000 available gravesites and should provide sufficient interment capacity for at least 20 years. The cemetery will also include facilities designed to accommodate a peak visitor load of 100 persons during funerals, Memorial Day activities and Veterans Day activities. Construction of all facilities shall be to current Veterans Affairs, Occupational Safety and Health Administration, and accessibility requirements.

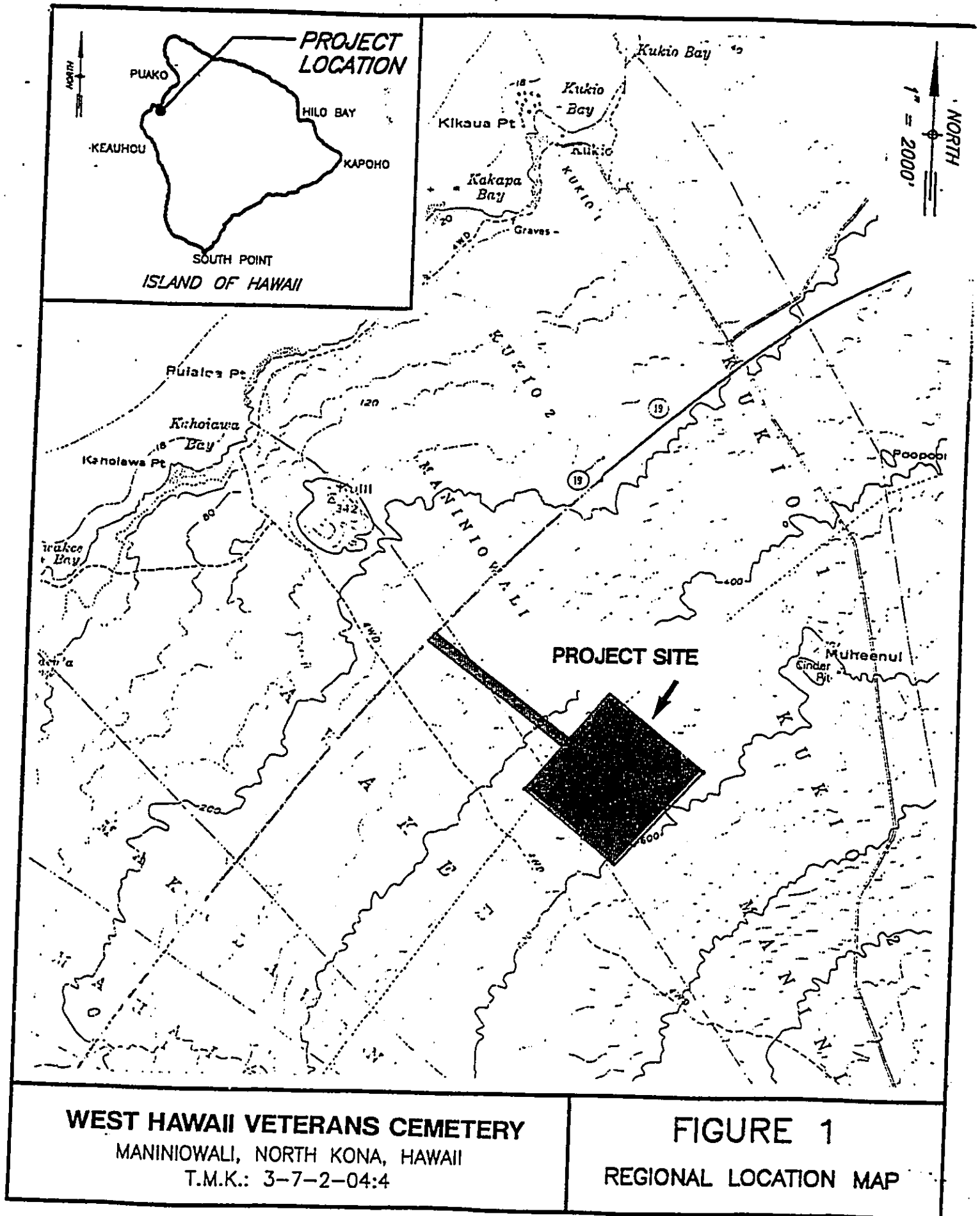
V. ENVIRONMENTAL CHARACTERISTICS OF THE PROPOSED ACTION

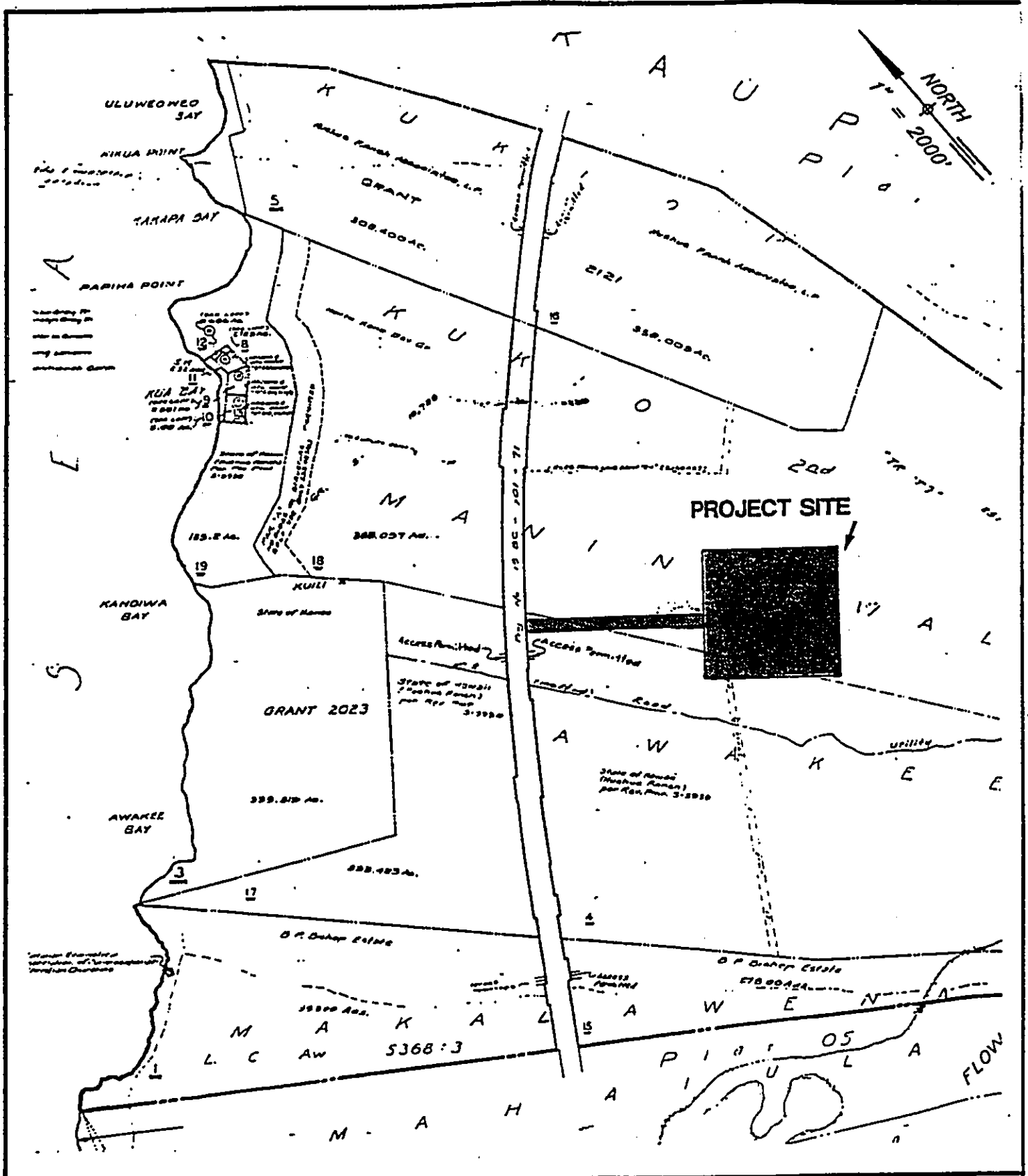
Water and Wastewater

Due to the remoteness of the proposed site, the development will utilize an on site non-public water source and septic tank/leach field system for its water and sewerage demands. Potable bottled water will be delivered to the site on an as-needed basis. The closest public water source to the project site is at the Keahole Airport, approximately 6 miles southwest. Public water sources are located at Kona Village and Huehue Ranch (under development). The proposed project will not access these lines.

The proposed project will have restroom facilities with plans for a 1,500 gallon holding tank for non-potable water. Non-potable water will be brought periodically to the site via tanker truck. The peak flow determined per Uniform Plumbing Code specifications is estimated to be 70 gallons per minute. Average daily requirement is estimated to be 250 gallons of non-potable water. The proposed project does not include irrigation of the cemetery grounds. Landscaping of the cemetery grounds will incorporate native vegetation based upon a non-irrigated xeriscape concept.

Approximately 500 gallons of wastewater per day will be generated from the cemetery facilities. Peak flow is estimated at 1,500 gallons per day. Wastewater generated from the restroom facilities will be directed to an on-site septic system. The location of the septic drain fields will be based upon the recommendations of a soils investigation and geotechnical engineering report. Porous lava dominates the proposed development site. Thus, a wastewater holding tank may be installed in lieu of a septic drain system.





WEST HAWAII VETERANS CEMETERY
 MANINIOWALI, NORTH KONA, HAWAII
 T.M.K.: 3-7-2-04:4

FIGURE 2
 TAX MAP KEY LOCATION MAP

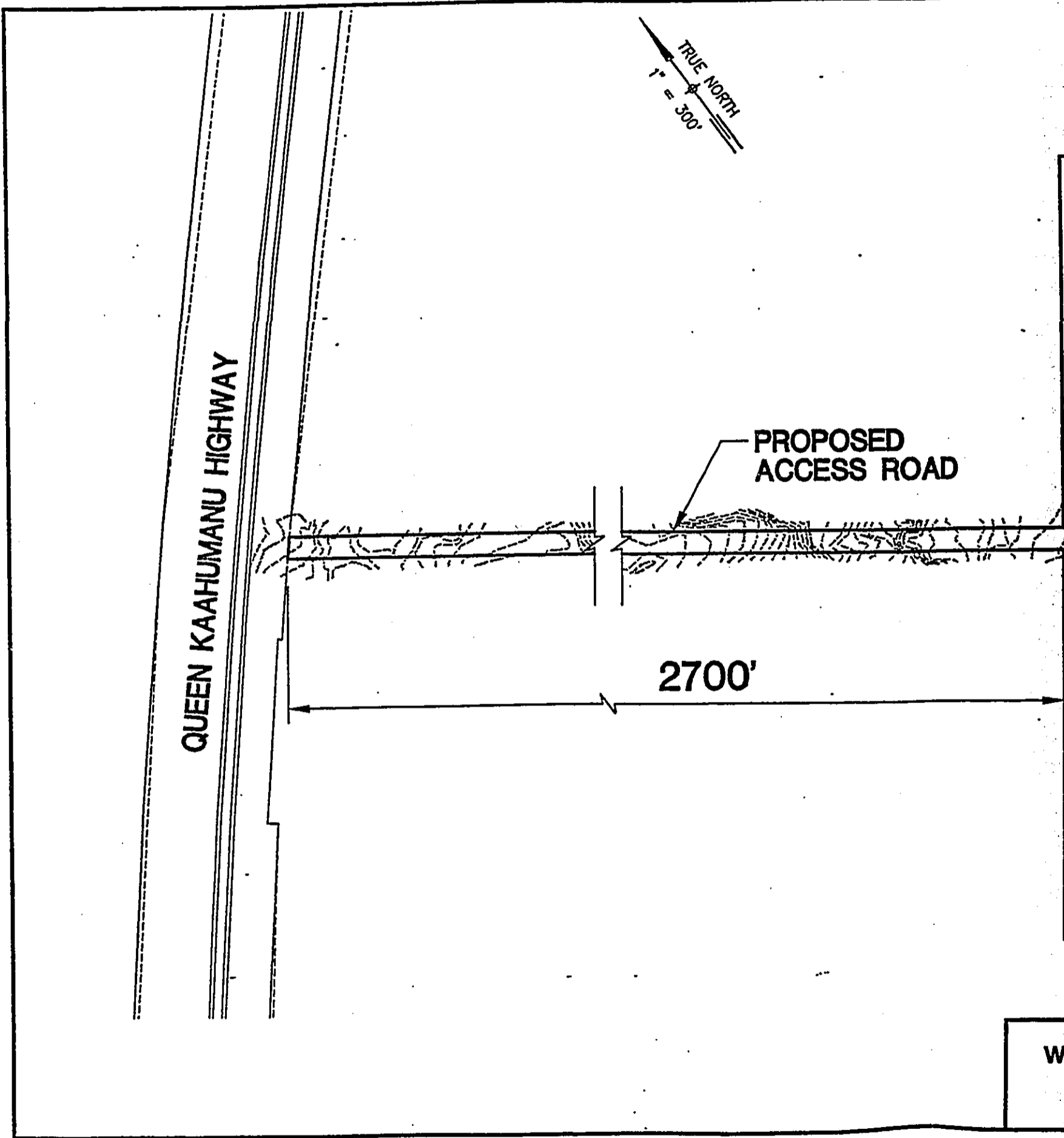
QUEEN KAAHUMANU HIGHWAY

TRUE NORTH
1" = 300'

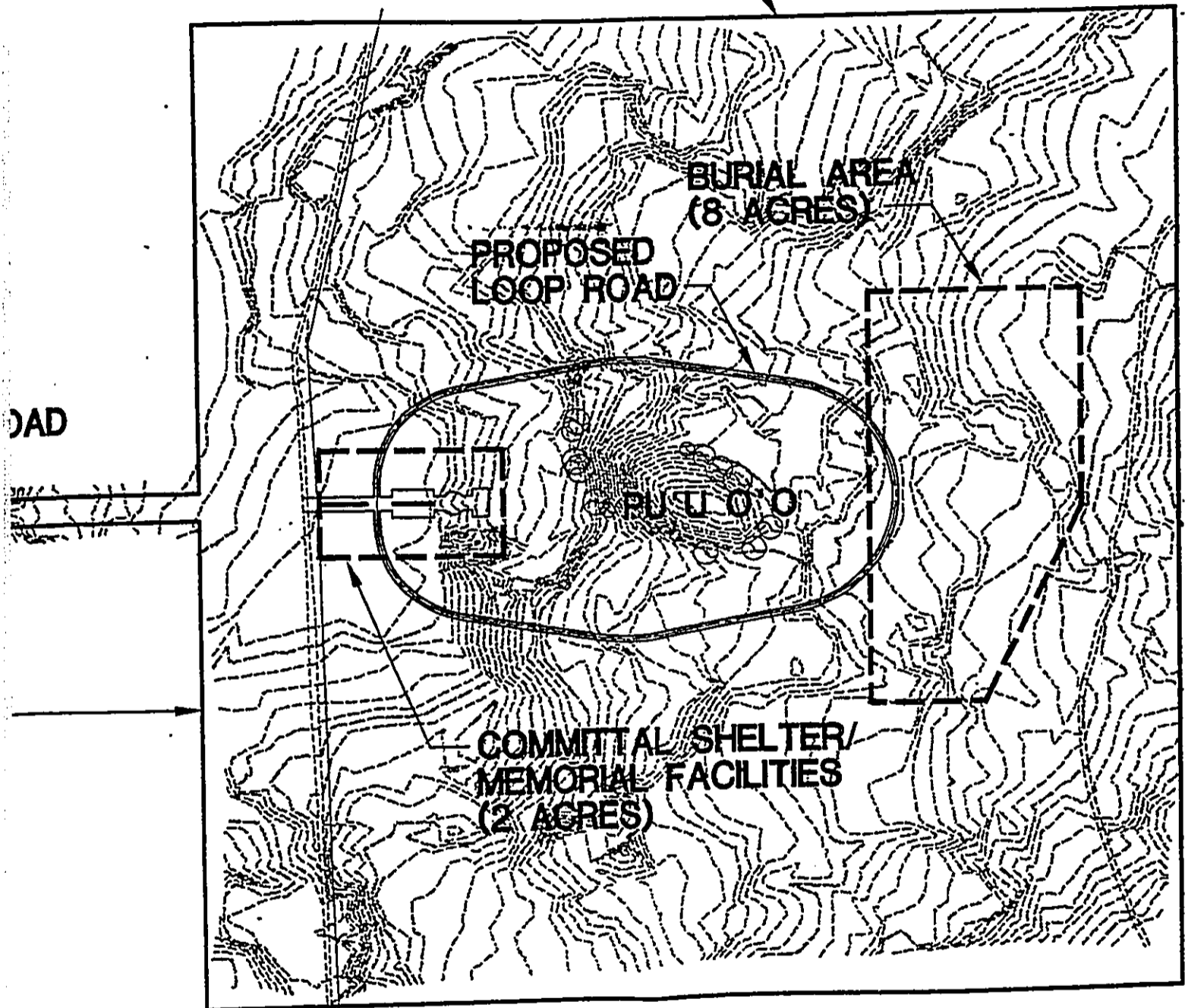
PROPOSED
ACCESS ROAD

2700'

WES



**PROJECT BOUNDARY
(96 ACRES)**



WEST HAWAII VETERANS CEMETERY
MANINIOWALI, NORTH KONA, HAWAII
T.M.K.: 3-7-2-04:4

FIGURE 3
SITE PLAN

Site Access

Access to the site will be via a 0.5 mile road constructed from Queen Kaahumanu Highway. The access road is included as part of this project, and for purposes of concept plan preparation, it has been assumed that new roads will conform to the County of Hawaii Subdivision Rules and Regulations.

Roads will be constructed on-site to provide access to gravesites. In accordance with the Veterans Administration Cemetery Program Guide, graves should not be closer than 10 feet from the edge of the road, and the maximum distance from any gravesite to the road should be 275 feet.

Grading and Drainage

The 10 acres proposed for cemetery development consists of A'a lava flows, typically hard, sharp, rough and broken rubble. The deposition of the volcanic rock at the project site was too recent for a soil profile to have developed. Thus, the proposed project includes extensive site preparation to ensure adequate burial conditions. The existing A'a will be cut in benches in preparation for placement of borrow and topsoil. Approximately six (6) feet of import borrow and one (1) foot of topsoil will be emplaced over the 10 acre area proposed for cemetery development.

Additional grading will be limited to the four (4) acres which will require grading in preparation for construction of the access road to the cemetery site. The remaining 82 acres of the subject property will remain undeveloped. However, a foot trail is planned leading from the committal service chapel to the summit of the cinder cone (Puu Oo).

The existing grade varies from 2% to 30%. The final grade of the cemetery will mimic the natural contours of the project area wherever possible. However, the grade will be worked to prevent the concentration of water during storm events. On-site roadways will not include gutters, and there will be no grassed swales or other structures designed to alter or concentrate the flow of stormwater. Thus, stormwater which reaches the developed cemetery area will either percolate into the subsurface or traverse the site via sheet flow across the surface. The low rainfall and highly porous lava prevents flood hazards from occurring. According to the Federal Emergency Management Agency Federal Flood Insurance Rate Maps the project site is located outside of the 500-year flood plain.

The Veterans Administration (VA) Cemetery Program Guide requires that all on-site roadways shall have a grade less than 10%, and all gravesites will be located on land with a grade less than or equal to 15%. A waiver increasing the 10% maximum to 18% along the "loop road" between the burial area makai of the Puu Oo and the burial area mauka of the Puu Oo (see Figure 3) will be sought.

Infrastructure

Hawaiian Electric Light Company (HELCO) electrical distribution lines traverse the western portion of the proposed site. The cemetery project will access these lines for electrical power.

No telephone service is currently available to the project area. Cellular telephone service will be included in the proposed project.

Solid waste generated from the project will be disposed of at the new regional landfill at Puu Anahulu.

VI. SUMMARY OF AFFECTED ENVIRONMENT

Land Use Zoning

The project site is classified as a Conservation District by the State Land Use Commission and is within the General subzone. The General subzone is the least restrictive classification and is "...to designate open space where specific conservation uses may not be defined, but where urban use would be premature." (HAR, Title 13, Ch. 2). Uses of this subzone include all uses as permitted under the Protective, Limited, and Resource subzones. The Conservation District classification requires submittal of a Conservation District Use Application (CDUA) to the Department of Land and Natural Resources.

The County of Hawaii zoning classification is Open. Development of Open lands requires the approval of the County Council by passage of resolution.

Geology and Soils

The site is comprised of sparsely vegetated vesicular volcanic A'a rock deposited during an eruption of the dormant Hualalai Volcano. The age of the volcanic rock at the project site is recent enough that an extensive soil profile has not yet developed. The USDA Soil Conservation Service classifies the volcanic rock as rLV, Lava Flows, A'a (Foote *et al.*, 1972). There is practically no soil covering, and vegetation is typically limited to mosses, lichens, ferns, and a few small ohia trees. A'a flows typically consist of hard, and sharp A'a rubble. The capability classification is VIII.

The Puu Oo cinder cone located in the center of the project area is classified as rCL, Cinder Land (Foote *et al.*, 1972). The cinder material consists of bedded cinders, pumice and ash with little or no evidence of soil development. Cinder Land is a common source of material for surfacing roads, and Muheenui, a cinder cone located approximately 0.75 miles northeast of the project site, has been used as a source for such materials. However, the cemetery development plans propose that the Puu Oo cinder cone remain intact.

The elevation of the site ranges from 280 feet MSL at the base of the access road to 625 feet MSL with an average grade of approximately 7%. The grade immediately

surrounding the cinder cone is approximately 30% to 50%. The cinder cone will not be developed, except for a foot trail leading from the committal service chapel area to the summit of the cone.

The Hualalai Volcano erupted as recently as 1801. The project area is located within Seismic Zone III of the Uniform Building Code and Zone 4 of the lava-flow hazard zones (DLNR, 1993).

Water

The interment area is approximately two miles from the ocean and occurs above ("mauka" of) the Underground Injection Control (UIC) line (DOH, 1984). Nearby wells tapping the unconfined basal aquifer indicate that depth to groundwater in the area is approximately 500 feet (DLNR, 1992). There are no surface waters in the area. The highly permeable nature of the A'a flow allows rapid infiltration of precipitation to the groundwater.

Climate

The site is on the leeward side of the island, sheltered from the rain and northeasterly tradewinds which affect the windward (Hilo) side of the island. The West Hawaii project area receives an average of 25 inches of rainfall annually. Typically, rainfall amounts tend to be higher during the winter months when Kona winds are more prevalent (Armstrong, 1983).

Typical wind speed at the project site ranges from 3 to 14 knots, and the relative humidity is usually between 71 and 77 percent (DLNR, 1993). The average annual temperature is 75° F with temperature ranges from a low of 54° F to a high of 93° F.

Archaeological Resources

An archaeological reconnaissance of the subject property was performed by Cultural Surveys Hawaii on November 22, 1993 to determine and document the presence of any archaeologically significant sites. This section summarizes the findings of the report (Cultural Surveys Hawaii, 1993). The report is presented in Appendix A - Archaeological Reconnaissance.

No known archaeological studies have been conducted previously within the project site. Other studies within the ahupuaa of Maniniowali and Awakee (see Figure 1 for relative locations) have generally concentrated on areas along the coast and inland only as far as the Queen Kaahumanu Highway. These studies documented permanent habitation sites along coastal portions of Awakee and Maniniowali. The coastal regions where marine resources were readily available and where potable water was obtainable from brackish springs were the most populous within the two ahupuaa.

The project site is located within an inland intermediate zone, characterized by broad expanses of lava. The intermediate zone is located away from coastal resources, and thus the inland environment can only support temporary activities such as transient habitation

and agricultural activities. While no previous archaeological studies have extended into the inland zone in which the project area is located, it is likely that within this zone activity consisted of limited travel from the coastal settlements to the resources available at the higher elevations of Hualalai, and to transient exploitation of portions of the expansive lava fields (e.g., for burial and quarrying activities).

The field survey of the project site encompassed approximately 53 acres (see Figure 4). The access road corridor was not included in the field survey. The remainder of the project site which was not surveyed is not being considered for cemetery development. This area will remain as an undeveloped open space buffer zone.

Two archaeological sites, a scoria quarry and a trail, were encountered within the proposed project boundaries. The locations are shown on Figure 4.

The scoria quarry (located outside of the 53-acre survey area) consists of a large boulder outcrop with a 2 cm thick layer of lava scoria encrusting almost the entire surface of the boulder. The outcrop shows definite signs of human use, particularly quarrying activities.

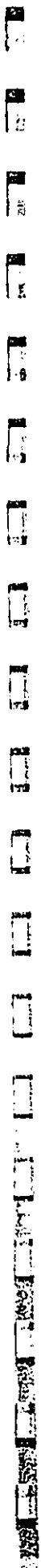
The trail shown in Figure 4 is designated as State site number 50-10-19-19430. The trail proceeds diagonally across the project area in a NW/SE-oriented direction. The trail has very localized curves but is generally oriented from 170° to 190° true north as it proceeds upslope.

Overall, the trail is characterized by the use of stepping stones, particularly at the north end, as well as long-term breaking down of the A'a cobbles into smaller gravel through constant usage. In general, the trail is in poor condition south of the cinder cone and in good condition north of the cinder cone. Figure 4 depicts the best preserved portion of the trail, located near the northern boundary of the surveyed area and marked by flat stepping stones resting on the rough A'a at intervals of 90 to 100 cm.

Based on present evidence and particularly the proximity of the scoria quarry, the trail is interpreted to be one which provided local access from mauka to scoria mining sites throughout an otherwise barren A'a landscape. The trail is assumed to follow a course across the top of the cinder cone, although the trail is not physically traceable due to the thick cover of fountain grass. A few isolated fragments of marine shell scattered on top of the cinder cone may indicate its use as a stopping point along the trail route. Informal shovel testing at the top of the cinder cone showed no cultural deposit.

Biological Resources

A botanical reconnaissance of the subject property was performed on November 22, 1993 to determine the floristic composition of the site. The study consisted of a survey of the cinder cone and a characterization of the sparse vegetated A'a interment area. This section summarizes the findings of the report (Nagata, 1993). The report is presented in Appendix B - Botanical Reconnaissance.



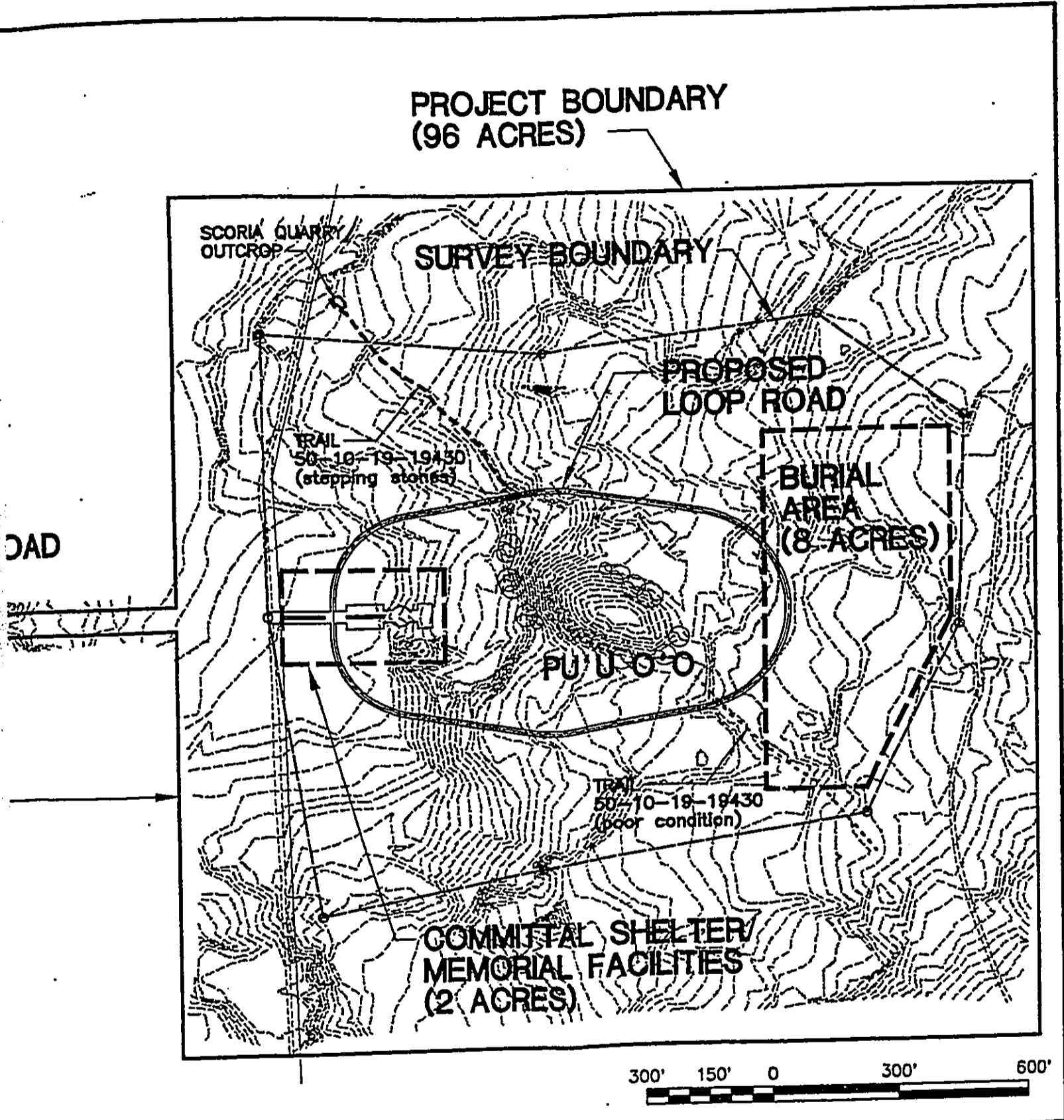
QUEEN KAAHUMANU HIGHWAY

TRUE NORTH
1" = 300'

PROPOSED
ACCESS ROAD

2700'

WE



WEST HAWAII VETERANS CEMETERY
 MANINIOWALI, NORTH KONA, HAWAII
 T.M.K.: 3-7-2-04:4

FIGURE 4
ARCHAEOLOGICAL SITES

The vegetation within the site was found to be a xerophytic grassland of fountain grass (*Pennisetum setaceum*) with few emergent kiawe (*Prosopis pallida*) trees. Vegetational cover is dominated by fountain grass. The fountain grass cover is approximately 90% on the cinder cone and on the makai apron of the cone. However, the cover on the A'a flow is very sparse.

Fifteen plant species were recorded from the cinder cone area - all but fountain grass and kiawe are present in only small or very small numbers. Kiawe trees 15-30' tall occur on the lower slopes and base of the cone, especially on the makai side. Stunted kiawe 2-3½' tall are occasional on the upper slopes. The predominant shrub is lantana (*Lantana camara*) which is prolific under the canopy of the kiawe but occurs only in small numbers on the slopes of the cone. Seedlings of *Emilia* sp., *Galinsoga* sp. and 'uhaloa (*Waltheria indica*) also occur in small numbers especially in exposed areas.

The vegetation immediately surrounding the cone is generally characteristic of the region. Fountain grass and lantana were observed on the A'a flow, and lama and sourbush (*Pluchea symphytifolia*) were observed on A'a located outside of the surveyed area. Fountain grass occurs primarily in scattered clumps on the A'a flow. Vegetational cover on the A'a is less than 20%, except for an extensive stand of fountain grass which occurs immediately makai of the cinder cone.

No native plant communities were recorded. However, three native species were recorded within the property. The indigenous 'uhaloa and 'ilima (*Sida fallax*) occur in small to very small numbers. Both are common lowland species. A colony of approximately 100 *Ophioglossum concinnum* was discovered in exposed areas on the upper makai slopes of the cinder cone.

Ophioglossum concinnum is a small terrestrial fern native to arid coastal, lowland or sand dune ecosystems on most of the major Hawaiian Islands. The fern is listed as a Category I candidate in the current list of species proposed for "Endangered" status. In recent years, however, numerous new populations have been discovered, particularly on the island of Hawaii. The statewide population of the species may be as many as 70,000. In addition, in a newly completed taxonomic revision of the genus, *Ophioglossum concinnum* was found to be identical to the pan-tropical *O. polyphyllum*. Thus, the species is now considered indigenous and correctly named *O. polyphyllum*. Consequently, the U.S. Fish and Wildlife Service plans to transfer the species to Category III (species no longer actively being considered for Endangered listing). Similarly, the State of Hawaii has no plans to pursue Endangered status for the species.

Visual Resources

The project site is located within a primarily undeveloped area. Unobstructed views of the ocean and of the slopes of Hualalai Volcano are offered from nearly all locations throughout the site. The landscape is dominated by pahoe-hoe and A'a lava flows. Two cinder cones, Kuili and Muheenui are visible from the proposed cemetery location. Kuili is located one (1) mile northwest of the project site, and Muheenui is located

approximately 0.75 miles northeast of the project site. Queen Kaahumanu Highway and a HELCO electrical distribution line are also visible.

VII. SUMMARY OF MAJOR IMPACTS

The proposed project includes a loop road around the cinder cone. This road will breach an historic Hawaiian trail twice (shown in Figure 4). Based on preliminary design information, approximately 50 feet of the trail will be destroyed on either side of the cinder cone.

Development of the burial area may impact the trail south of the cinder cone. Although the trail can be incorporated into the cemetery landscaping design, gravesite access roadways may cross the trail within this area.

Construction of the cemetery requires extensive site preparation to ensure adequate burial conditions. The existing A'a will be cut in benches in preparation for placement of borrow and topsoil. Soil erosion and fugitive dust will be an anticipated impact during the construction phase. However, the isolation of the site with respect to sensitive receptors, surface waters and downwind development minimizes the impacts of construction generated soil erosion and fugitive dust.

The proposed project includes imported borrow and topsoil to satisfy VA burial requirements. The large amounts of material required will result in off-site impacts. Also, the transportation of these materials will result in an increase in truck traffic in between the project site and the borrow location.

The project will result in a minimal impact on West Hawaii infrastructure. Electricity, telephone service and waste disposal will be included as part of the project. Additional services may be required during construction.

VIII. MITIGATION MEASURES

The West Hawaii Veterans Cemetery project will be designed to minimize disturbance of the existing natural setting. The project site was chosen because the undeveloped cinder cone and A'a lava flows are appropriate features for a new memorial burial ground on Hawaii Island. Therefore, site grading will be limited primarily to roads, burial grounds and facility locations.

Proper planning will minimize the impacts to archaeological sites located within the project boundaries. An Historic Site Preservation Plan will be submitted to the State Historic Preservation Division of the Department of Land and Natural Resources and approved prior to construction. The plan will address the preservation of the historic trail and scoria quarry located on-site.

Although the proposed cemetery development will not encroach upon the scoria site, the trail will be impacted by the proposed loop road circling the cinder cone and, possibly, by construction of the burial grounds. The plan will emphasize preservation of the best portions of the trail, including barricaded buffer zones to prevent damage from construction vehicles.

Suitable sources of required materials will be located during the design phase of the project to minimize potential off-site impacts. Included among options to be reviewed are future construction projects on Hawaii Island which may provide large amounts of borrow and topsoil material.

IX. ALTERNATIVES TO THE PROPOSED ACTION

No Project

The construction of the West Hawaii Veterans Cemetery will benefit veterans and their families by precluding the necessity for interment at a private cemetery. Presently, veterans are eligible for interment at two (2) existing Veterans Cemeteries at Hilo as well as the Hawaii State Veterans Cemetery at Kaneohe, Oahu. However, interment at these locations results in additional time and expense for West Hawaii veterans and their families.

Alternate Site

The project site was chosen by the West Hawaii Veterans Council. The site is ideal because it is already owned by the State of Hawaii, and it is centrally located along the West Hawaii coast. Also, the site and its environs are appropriate for a new memorial burial ground on Hawaii Island. An alternate site may involve costly land purchases and may not suit the needs of West Hawaii veterans and their families.

X. DETERMINATION

In accordance with Title II, Chapter 200, Environmental Impact Statement Rules, this Environmental Assessment has characterized the technical and environmental nature of the project, identified potential impacts, evaluated the potential significance of these impacts, and provided for detailed study of the major impacts during the design phase of the project.

It is anticipated that the proposed West Hawaii Veterans Cemetery will not significantly impact the environment. Therefore, a Negative Declaration has been issued for this project.

XI. REFERENCES

Agencies and individuals consulted during preparation of this Environmental Assessment:

State of Hawaii:

Department of Business, Economic Development and Tourism:

Land Use Commission, Fred Talon

Department of Land and Natural Resources:

Office of Conservation and Environmental Affairs, Steve Tagawa

Division of Water and Land Development, Niel Fujii

Commission on Water Resources Management, Glen Bauer

Historic Preservation Division, Kanalei Shun

Forestry and Wildlife Division, Dr. Carolyn Corn

Office of Environmental Quality Control, Jeyan Thirugnanam

County of Hawaii:

Dept. of Water, Kirino Antonio

Planning Department, Donald Tong

Other

Hawaii Electric Light Company (HELCO), Engineering Division

GTE Hawaiian Tel, Engineering Division

Documents reviewed during preparation of this Environmental Assessment:

Armstrong, R.W., editor, 1983, *Atlas of Hawaii*, second edition. Department of Geography, University of Hawaii. University of Hawaii Press, Honolulu.

Cultural Surveys Hawaii, 1993, *Archaeological Inventory Survey of a 53-Acre Parcel in the Ahupua'a of Manini'owali and Awake'e, North Kona District, Island of Hawai'i*, prepared for M&E Pacific.

Federal Emergency Management Agency (FEMA), 1988, *National Flood Insurance Rate Map*

Foote, D.E., Hill, E.L., Nakamura, S., Stephens, F., 1972, *Soil Survey of islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*: U.S. Dept. of Agriculture, Soil Conservation Service.

Hawaii Department of Health (DOH), 1984, *Underground Injection Control Program, Map H-1, Makalawena, Hawaii, and Map H-6, Kiholo, Hawaii*, Scale 1:24,000.

Hawaii Department of Land and Natural Resources (DLNR), 1992, *Groundwater Index and Summary*.

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APPENDIX A
Archaeological reconnaissance

ARCHAEOLOGICAL INVENTORY SURVEY
OF A 53-ACRE PARCEL
IN THE AHUPUA'A OF MANINI'OWALI AND AWAKE'E,
NORTH KONA DISTRICT, ISLAND OF HAWAII
(TMK 7-2-04:4)

by

Hallett H. Hammatt, Ph.D.
and
Rodney Chiogioji, B.A.

DRAFT

Prepared for
M&E PACIFIC, INC.

CULTURAL SURVEYS HAWAII
December 1993
Revised December 26, 1993

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I. INTRODUCTION, NATURAL SETTING, AND PROJECT AREA DESCRIPTION

At the request of M&E Pacific, Inc., Cultural Surveys Hawaii has conducted an archaeological inventory survey of an approximately 53-acre parcel (TMK 7-2-04:4) in the *ahupua'a* of Manini'owali and Awake'e, North Kona District, island of Hawai'i (Figure 1). The parcel is a portion of lands held by the State of Hawai'i and is located 8000 ft. inland from the coastline at Pulaloa Point, between the elevations of 450 ft. and 582 ft. above mean sea level. It has been proposed as the site for a West Hawaii veterans' cemetery.

Natural Setting

Most of the *ahupua'a* of Manini'owali and Awake'e - located on the northwest rift zone of Hualalai volcano - is rockland, composed of prehistoric a'a lava flows except for portions at their *mauka* extent which is pahoehoe lava from 1801 (MacDonald and Abbott 1970:290). Within this a'a landscape are a series of prominent cinder cones - also of prehistoric age - which mostly predate the a'a landscape and which are the results of flank eruptions on the north and northwest side of the Hualalai volcano.

At the coastline are narrow fringes of sand beach that extend up to 100 meters inland.

Project Area Description

The majority of the parcel is located within the *ahupua'a* of Manini'owali; a small portion at the parcel's west corner extends into Awake'e. A Hawaii Electric Light Company transmission line and a utility road follow the northwest boundary of the parcel. The parcel comprises mostly unvegetated rough a'a terrain. The parcel is marked by eight survey stakes set at intervals along the boundaries in the open a'a. At the center of the project area is a prominent geologic feature: a grass-covered cinder cone known as Pu'u O'o. The deposits on

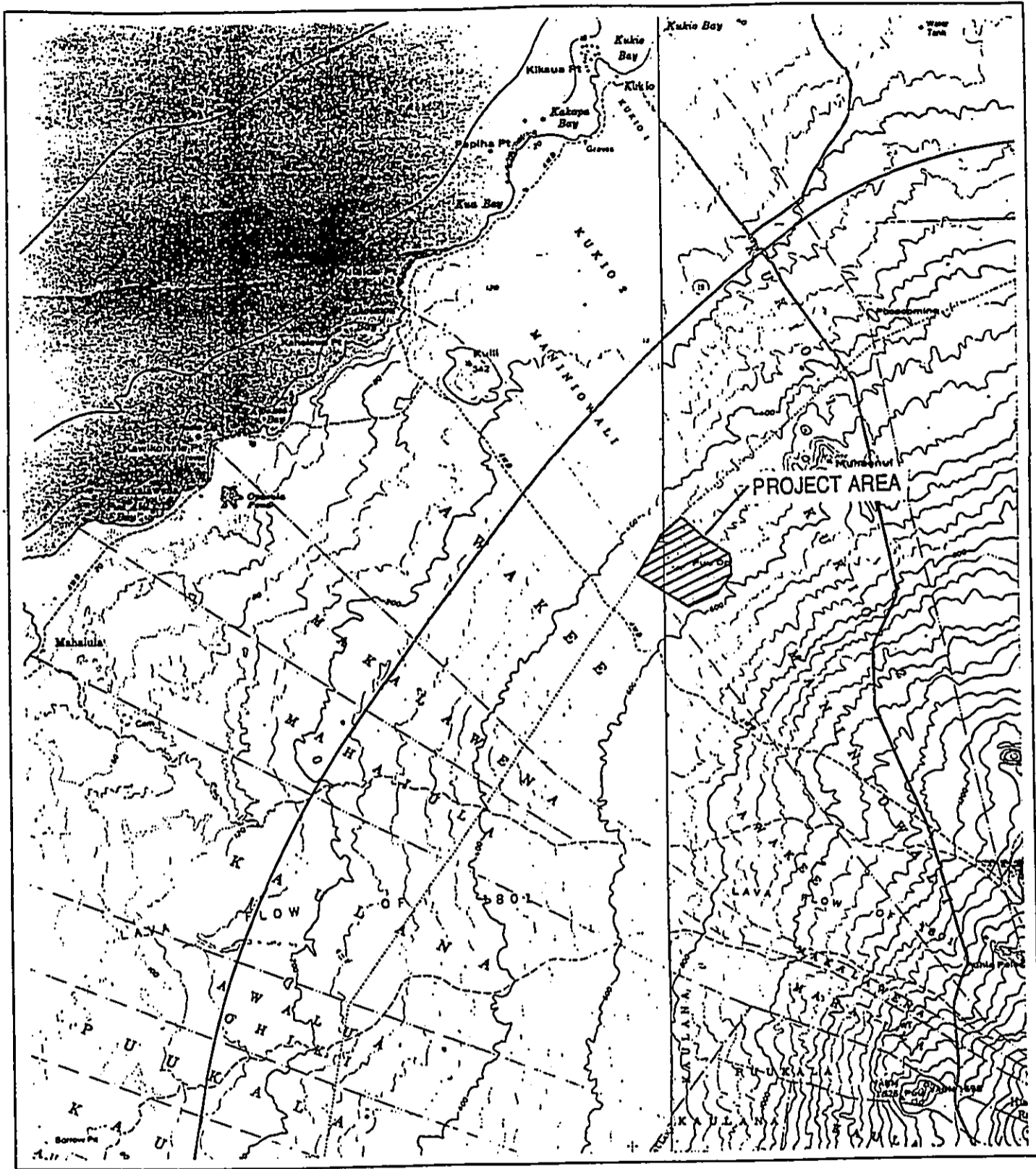


Figure 1 Portions of USGS 7.5 Minute Series Topographical Map, Makalawena and Kiholo Quadrangles, showing Project Area

kiawe trees, particularly at the base of the slope. Thinner intermittent patches of fountain grass grow in the depressions *makai* of the *pu'u*.

II. PREVIOUS ARCHAEOLOGY

No previous archaeological studies have been conducted within the present study parcel. Previous archaeological studies within the *ahupua'a* of Manini'owali and Awake'e have generally concentrated on areas along the coast and inland only as far *mauka* as the Queen Ka'ahumanu Highway.

John E. Reinecke (1930) surveyed the shoreward portions of *ahupua'a* from Kailua to Kawaihae and recorded only limited descriptions of sites encountered. He recorded four sites in Awake'e (nos. 100-103) features of which included house platforms, ponds, and "hut sites". In Manini'owali, Reinecke identified another four sites (nos. 104-107) comprising house platforms, pens, and "hut sites".

More detailed and intensive studies of portions of the two *ahupua'a* would occur in modern times. Ross Cordy (1981) surveyed and mapped sites in Manini'owali in the course of his study of "prehistoric social change" in the Hawaiian islands. Cordy recorded 12 sites (some of which apparently correspond to those reported by Reinecke) including platforms, enclosures, walls and caves.

Within Manini'owali and the adjacent Kukio 2 *ahupua'a*, Lloyd Soehren (1982) surveyed a proposed road and utility corridor (50 yards wide) extending from a land parcel above the coastline (TMK 7-2-04:10) *mauka* across the Queen Ka'ahumanu Highway to a point on the Hawaii Electric Light Company transmission line just north of the present project area. Soehren recorded an "old Hawaiian foot trail leading to Kua Bay from *mauka*, probably Huehue" that crossed the corridor 100 yard *makai* of the highway. Near the *makai* terminus of the corridor, Soehren noted a "small lava blister shelter cave and ruins of a three sided stone wall windbreak open to seaward." He recorded no sites *mauka* of the Queen Ka'ahumanu Highway in the vicinity of the present project area.

In Awake'e *ahupua'a*, Theresa Donham (1987) conducted an archaeological

reconnaissance survey of a 350-acre parcel for the proposed Awake'e Resort Development. The study area covered most of the coastal region of Awake'e, extending 950 meters inland. Donham recorded 84 sites (most of which were located within the immediate coastal zone [i.e. within 303 meters inland]) which included permanent habitation features, trails, agricultural features, and possible burials.

The most comprehensive survey of a substantial portion of Manini'owali (and Kukio 2) was accomplished by the Public Archaeology Section, Applied Research Group of the Bishop Museum (Pantaleo *et al.* 1992). During an inventory survey of 388 acres extending *makai* from the Queen Ka'ahumanu Highway to within 450 meters of the coast, 25 sites comprising 1,305 features were recorded.

Fifteen feature types ranging from naturally-formed lava tubes to man-made structural features were represented. Pits excavated into pahoehoe flows were the predominant feature type, totalling 1,196...

Results of the current investigations indicate human occupation in the project area by the eleventh century A.D. More than the anticipated temporary or transient activities associated with transportation along the trails to inland areas has been documented from the intermediate zone, including semi-permanent or seasonal habitations, human burials, and possible extensive agricultural or quarrying activities. (Pantaleo *et al.* 1992:viii)

III. AHUPUA'A SETTLEMENT PATTERN BASED ON PREVIOUS ARCHAEOLOGICAL STUDY.

The archaeological studies summarized above documented permanent habitation sites along coastal portions of Awake'e and Manini'owali. These coastal regions - where marine resources were readily available and where potable water was obtainable from brackish springs - were the most populous within the *ahupua'a*. Moving *mauka* to the intermediate zone - away from the coastal resources and entering into the broad expanses of lava that characterize Awake'e and Manini'owali - the environment can only support more temporary activities - including transient habitation and agricultural activities - though these may occur over extensive areas (as was indicated by the many quarried pits recorded in Pantaleo *et al.* 1992).

While no previous archaeological studies within the two *ahupua'a* have extended into the inland zone in which the present project area is located, it is likely that within this zone activity was limited travel from the coastal settlements to the resources available at the higher elevations of Hualalai, and to transient exploitation of portions of the expansive lava fields (*e.g.* for burial and quarrying activities).

IV. SURVEY METHODS AND RESULTS

The inventory survey of the 53-acre parcel (Figures 2-4) was conducted on November 22, 1993 by Hallett Hammatt accompanied by Charles Stone and Wesley Geertsema of M&E Pacific, Inc., and Ken Nagata, botanical consultant. Access to the project area was gained by a utility road that follows the Hawaii Electric Light Company transmission line at the northwest boundary of the parcel. The boundaries of the study area had been previously surveyed and marked in the field with stakes.

The fieldwork took place over the entire day and consisted of northwest/southeast-oriented survey sweeps beginning along the northwest boundary and proceeding *mauka*. On each sweep a visual corridor measuring 30 meters on each side of the archaeologist was inspected. Visibility was excellent as the majority of the project area consists of bare a'a lava. Particular care was taken to discern isolated petroglyphs, trails, and possible lava bubbles and tubes.

The area around Pu'u O'o cinder cone - particularly on the *makai* slope - contained fountain grass and a few kiawe trees, virtually the only vegetated portion of the project area. This terrain was carefully inspected for any stone alignments occurring under the grass cover.

Because of the thin vegetation and excellent visibility of the ground surface as well as the well-staked project boundaries, there is confidence that the entire project area was covered.

One archaeological site - a trail - was encountered in the project area. The site was located on a topographic map (1 in.=200 ft. scale) provided by M&E Pacific, Inc. Field notes were taken along with photographs documenting the trail and the project area in general.

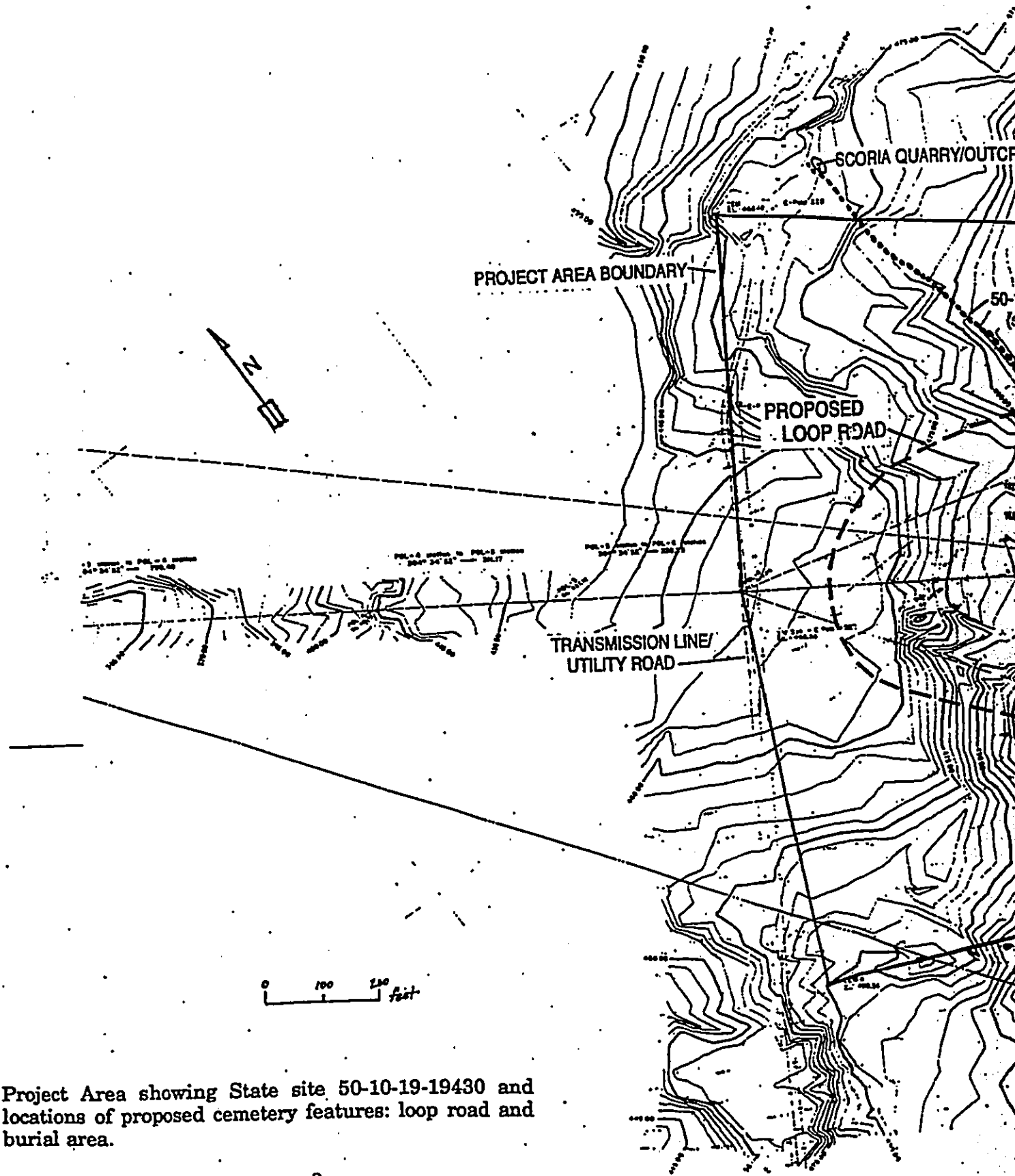
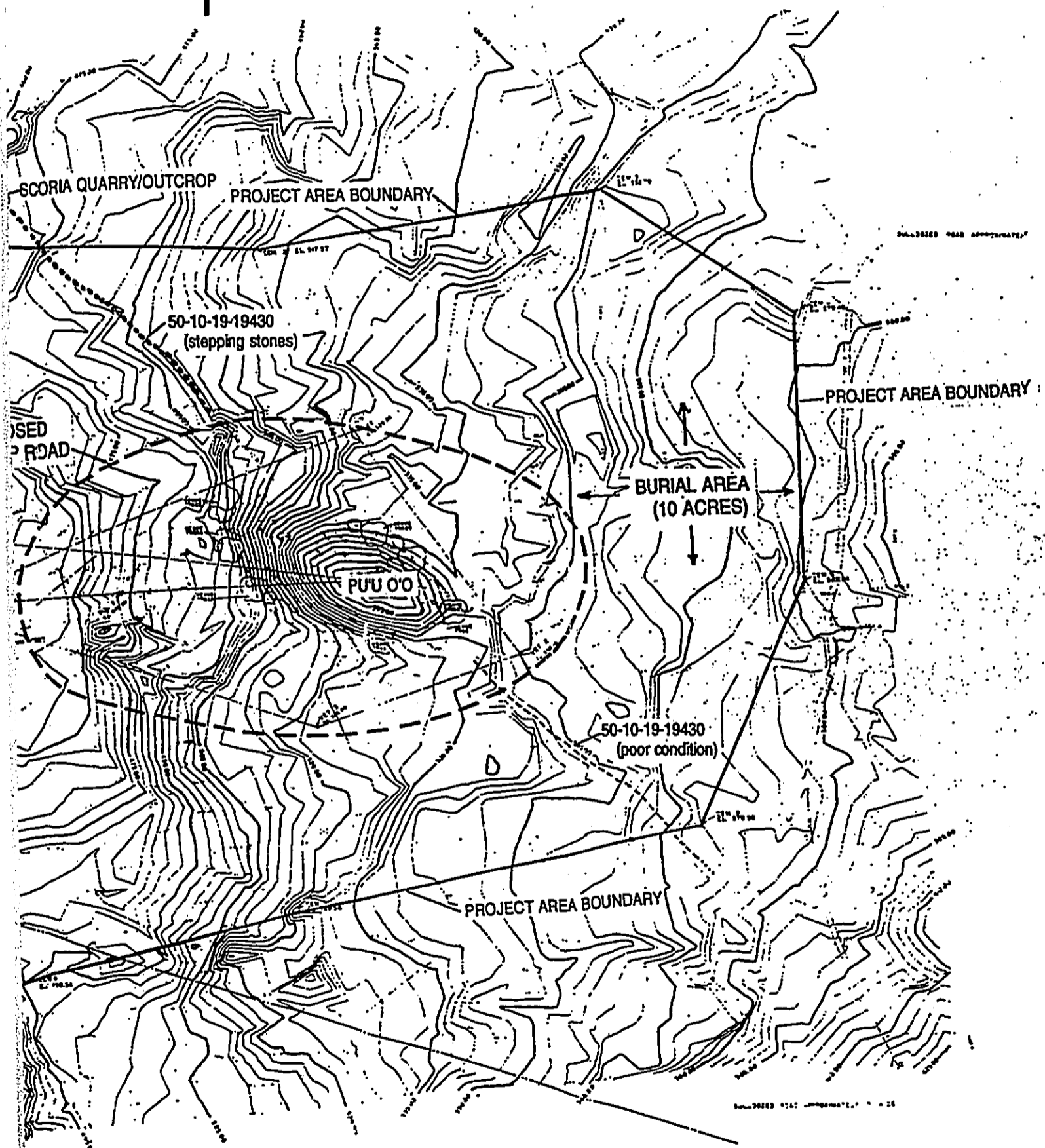


Figure 2 Project Area showing State site 50-10-19-19430 and locations of proposed cemetery features: loop road and burial area.



The site is described as follows:

State site no. 50-10-19-19430

State site 50-10-19-19430 trail (Figures 5 & 6) proceeds diagonally across the project area in a NW/SE-oriented direction. As it enters the project area at the northwest end it is in good condition and marked by flat stepping stones resting on the rough a'a at intervals of 90 to 100 cm. The trail in this condition is traceable for 600 feet, oriented between 170° and 180° true north.

As the trail approaches Pu'u O'o, into the area of fountain grass and cinder, it is not traceable physically but it assumed to follow a course across the top of the *pu'u*. (A few isolated fragments of marine shell scattered on top of the *pu'u* may indicate its use as a stopping point along the trail route. Informal shovel testing at the top of the *pu'u* showed no cultural deposit.)

On the southern side of the *pu'u*, the trail is again visible in poor condition with only occasional stepping stones for a distance of 450 feet until it proceeds out of the project area.

The trail has very localized curves but is generally oriented from 170° to 190° true north within the project area as it proceeds upslope. Overall, the trail is characterized by the use of stepping stones - particularly at the north end - as well as long-term breaking down of the a'a cobbles into smaller gravel through constant usage.

In order to possibly determine its function, the trail was further investigated outside of the project area. Two hundred feet north and outside of the project area, the trail terminates adjacent to a large prominent outcrop the top surface of which shows definite signs of human use (Figures 7 & 8). This outcrop has a uniform layer of lava scoria - 2 cm. thick - which encrusts almost the entire top surface of the outcrop. This scoria crust has been quarried and many fist-sized segments have been removed by pounding on the crust. Residue of this mining process lies scattered about the outcrop as well on the top surface. In addition,



Figure 5 State site 50-10-19-19430 trail: showing stepping stones at north end of trail; view to southeast.



Figure 6 State site 50-10-19-19430 trail: south end showing wear on a'a (delineating the trail); view north toward Pu'u O'o.

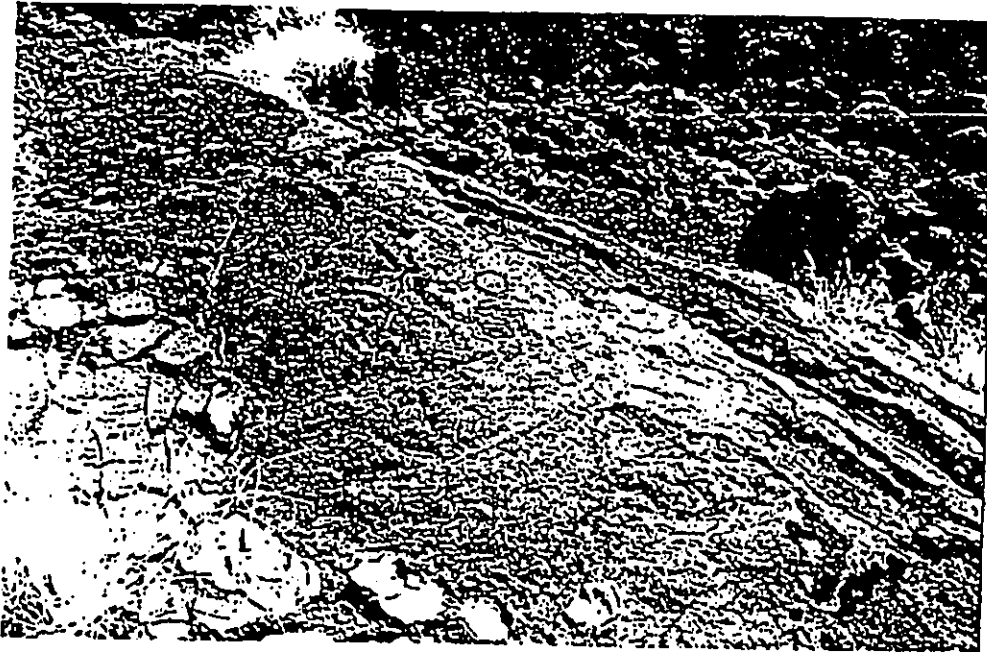


Figure 7 Outcrop (outside project area) at north terminus of State site 50-10-19-19430 trail: showing petroglyph circle and quarried scoria at east end of outcrop.



Figure 8 Outcrop (outside project area) at north terminus of State site 50-10-19-19430 trail: showing abrading area at northwest end of scoria quarry.

there are two adjacent rubbing/abrading surfaces approximately 40 cm. in diameter at the north end of the outcrop. At the southern end of the outcrop is a petroglyph mark in the shape of a circle approximately 8 cm. in diameter and 1 cm. deep. Scattered about the outcrop are a few fragments of marine shell indicating traditional Hawaiian use of the area.

Where the trail approaches this outcrop there is a paved area approximately 1.5 m. in diameter with a few scattered basalt flakes and marine shell. This may represent a work area for pre-shaping of the mined scoria blocks.

This outcrop was not given a site number and is outside the project area but is described here because it is believed that the function of the trail is related to the activities that took place at this outcrop. Further explorations of the north of the outcrop did not show that the trail continues to the northwest although there has been bulldozer disturbance for the power line.

The trail does not appear by its orientation to the slope to be a *mauka/makai* (mountain to ocean) access trail. Based on present evidence and particularly the proximity of the scoria activity site, the trail is interpreted as one which provides local access from *mauka* to this and possibly other scoria mining sites throughout an otherwise barren lava landscape.

(It is of interest to note that there are no "pahoehoe clearings" or "pahoehoe holes" - excavated for agricultural use - in this project area. Trails connecting large numbers of these features have been recorded in *makai* areas of Manini'owali (see Pantaleo *et al* 1992: 116). The trail found in the present project area may function similarly, except that it connects scattered scoria quarry sites.)

V. SUMMARY, SIGNIFICANCE AND RECOMMENDATIONS

One archaeological site - State site 50-10-19-19430 trail - recorded within the 53-acre project area. Because of the presence of stepping stones and the trail's association with a scoria quarry (located outside the project area), it is deemed to be a traditional Hawaiian site of prehistoric age. It is considered significant - under National Register guidelines - for its information content (Criterion D) and also for its cultural value (Criterion E). Because of its variable condition, it is not considered an excellent example of a site type.

Since the trail is in the best preserved state along its route north of Pu'u O'o for a distance of approximately 500 ft. (150 m.), this segment is recommended for preservation. It should be possible to incorporate the trail alignment with an adequate buffer on each side of 10 meters into the design of the proposed West Hawai'i veterans' cemetery. The plans for the veterans's cemetery include a loop road that circles around the base of Pu'u O'o (see Figure 2). The alignment of this proposed loop road should have little or no impact on the section of the trail site designated for preservation. The loop road alignment is at the south end of the well-preserved section of the trail.

Care should be taken during construction activities to avoid damage to this trail. It is advisable to place highly visible fencing on both sides of the trail (including an adequate buffer zone) if heavy equipment will be operating in the vicinity. This particularly applies to the construction of the loop road.

Additionally, care should be taken to avoid the scoria quarry outcrop which is at the terminus of the trail, 200 ft. northwest of the project area boundary.

Plans for the cemetery include a ten-acre burial area at the *mauka* (southeast) end of the project area (see Figure 2). A grading of this area would have no impact on significant sites.

As for the remainder of the property, no archaeological sites were encountered and, if

the segment of the trail recommended for preservation is protected properly, there should be no impact to significant surface archaeological sites. It is recommended that a short interim preservation plan addressing the protection of the trail be prepared and submitted to the State Historic Preservation Division of the Department of Land and Natural Resources.

If major grading is planned within the cinder deposits of Pu'u O'o, subsurface archaeological deposits or unmarked human burials could be encountered. If any buried archaeological sites, including human interments, are discovered during construction, all activities should stop in that area and the State Historic Preservation Division should be notified immediately.

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APPENDIX B

Botanical reconnaissance

WEST HAWAII VETERANS CEMETERY
BOTANICAL RECONNAISSANCE

Prepared for: M & E Pacific, Inc.
By: Kenneth M. Nagata
Date: 30 November 1993

INTRODUCTION

The subject property is a 10 acre site mauka of Queen Kaahumanu Highway in the land of Maniniowale, North Kona, Hawaii. The site consists of a small cinder cone (Pu'u O'o) and the surrounding a'a flow.

Ripperton and Hosaka (1942) described the vegetation in the region as one of lowland xerophytic shrub. Vegetational cover in this zone is sparse and the conditions are arid. Very few trees occur in this vegetation type. Kiawe (Prosopis pallida) is common along the coast where it often forms dense stands and in areas where water is readily available. The main shrubs include koa haole (Leucaena leucocephala) which is mostly found in gullies and alluvial flats, klu (Acacia farnesiana) and 'ilima (Sida fallax). Lantana (Lantana camara) is of secondary importance. Among the very few grasses in this community are bristly foxtail (Setaria verticillata), swollen fingergrass (Chloris barbata), feather fingergrass (C. virgata) and pili (Heteropogon contortus).

Several surveys have been conducted in the region in recent years (eg. Nagata 1981, 1983, 1990, Phillips Brandt Reddick & Assoc. 1986, Helber Hastert & Kimura 1990). These surveys reveal the vegetation at least up to 600' elevation to be one of xerophytic scrub or grasslands dominated by fountain grass (Pennisetum setaceum). In some areas koa haole and Christmas berry (Schinus terebinthifolius) are scattered in small numbers and in other areas koa haole, maiapilo (Capparis sandwichiana), a'ali'i (Dodonaea viscosa), naio (Myoporum sandwicense) and alahe'e (Canthium odoratum) are the main associated shrubs. The smaller shrubs 'ilima, 'uhaloa (Waltheria indica), pidgeon pea (Chamaecrista nictitans) and indigo (Indigofera suffruticosa) are widespread throughout the region in small numbers. Native trees such as lama (Diospyros sandwicensis), 'ohi'a (Metrosideros polymorpha) and 'ohe (Reynoldsia sandwicensis) are generally widely scattered in very small numbers between 300 and 600' elevation.

METHODS

A field survey was conducted on 22 November 1993 to determine the floristic composition of the project site. A single more or less spiral transect was established originating from the periphery of the site and terminating at the summit of Pu'u O'o. Nearly 100% of the site was covered by the survey. Special

effort was made to seek out rare and endangered species and identify native plant communities. Plants whose identity could not be confirmed in the field were brought back to the lab for closer examination.

RESULTS

The vegetation in the site was found to be a xerophytic grassland of fountain grass with few emergent kiawe trees. Vegetational cover provided by fountain grass is approximately 90% on Pu'u O'o and on the makai apron of the pu'u. The cover on the majority of the a'a flow surrounding the cone, however, is very sparse. On the a'a fountain grass occurs mostly in scattered clumps and small patches. Fifteen plant species were recorded from the pu'u - all but fountain grass and kiawe are present in only small or very small numbers. Kiawe trees 15-30' tall occur on the lower slopes and base of the cone, especially on the makai side. Stunted kiawe 2-3.5' tall are occasional on the upper slopes. The predominant shrub is lantana which is prolific under the canopy of the kiawe but occurs only in small numbers on the slopes of the pu'u. Seedlings of Emilia sp., Galinsoga sp. and 'uhaloa also occur in small numbers especially in exposed areas.

Only fountain grass and lantana were observed on the a'a immediately surrounding the cone. With the exception of an extensive stand immediately makai of the cone, the fountain grass occurs only in scattered clumps on the a'a. Vegetational cover on the a'a is less than 20%. The vegetation immediately adjacent to Pu'u O'o is generally characteristic of the region. Two species observed in the distance which do not occur in the site are lama and sourbush (Pluchea symphytifolia).

Native species and native plant communities

Only three native species were recorded in the property. The indigenous 'uhaloa and 'ilima occur in small to very small numbers. Both are very common lowland species. The third native species, Ophioglossum concinnum, is of primary interest. A colony of approximately 100 individuals was discovered in exposed areas on the upper makai slopes of Pu'u O'o. No native plant communities were found in the project site.

Rare and endangered species

Ophioglossum concinnum is a small terrestrial fern native to the arid coastal, lowland or sand dune ecosystems on Oahu, Molokai, Maui, Lanai and Hawaii. It was listed as "endangered" in the Smithsonian Report (Anon. 1974)

and "very rare" and "endangered" by Fosberg and Herbst (1975). In 1976 it was proposed for Endangered status by the U.S. Fish and Wildlife Service (Fed. Reg. 1976). The list of species proposed for Endangered status was withdrawn in 1979 in accordance with the provisions of the Endangered Species Act of 1973 but a revised list was issued in 1980 (Fed. Reg. 1980). In this current listing O. concinnum is included as a Category I candidate, ie. "Taxa for which the Service presently has sufficient information on hand to support the biological appropriateness of their being listed as Endangered or Threatened species".

In recent years numerous new populations have been discovered, especially on the island of Hawaii. According to the U.S. Fish and Wildlife Service the statewide population of the species may be 50-70,000 (L. Meyeroff, pers. comm.). In addition, in a newly completed taxonomic revision of the genus Ophioglossum concinnum was found to be identical to the pan-tropical O. polyphyllum. Thus the species is now considered indigenous and correctly named O. polyphyllum. Consequently, the U.S. Fish and Wildlife Service plans to transfer the species to Category III, species no longer actively being considered for Endangered listing (L. Meyeroff, pers. comm.). Similarly, the State of Hawaii has no plans to pursue Endangered status for the species (C. Corn, pers. comm.).

SUMMARY

The vegetation in the project site is typical of the region - a xerophytic grassland dominated by fountain grass. On Pu'u O'o the vegetational cover provided by fountain grass is considerable but on the a'a which surrounds the cone it is sparse. Only three native species occur in the site. All are indigenous - two are very common and one was once considered rare but is now much more abundant than previously thought. Native species constitute an insignificant fraction of the total vegetational cover and no native plant communities were identified. The proposed project will have no adverse impact upon the native flora of Hawaii. Severe runoff and possible pollution of the coastal waters are not perceived as potential problems.

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