

JOHN WAIHEE
GOVERNOR



JOSEPH K. CONANT
EXECUTIVE DIRECTOR

93 DEC 28 11:11 AM
STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
QUALITY CONTROL
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587-0600

IN REPLY REFER TO:
93:PPE/6129

December 27, 1993

Mr. Brian J. J. Choy, Director
Office of Environmental Quality Control
220 S. King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Choy:

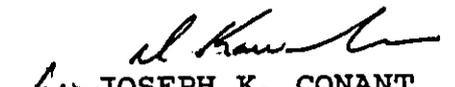
Subject: Negative Declaration for the Ouli Affordable
Housing Project, TMK: 6-2-01: Portion of 74,
Ouli, South Kohala, Big Island, Hawaii

The Housing Finance and Development Corporation (HFDC) has reviewed the comments received during the 30-day public comment period which began on November 23, 1993. 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 January 8, 1994 OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA.

Please contact Mr. Stacy Sur at 587-0576 if you have any questions.

Sincerely,


JOSEPH K. CONANT
Executive Director

c: Mr. Keith Kato, Nansay Hawaii, Inc.
Mr. Brian Nishimura, Planning Consultant

1994-01-08-HI-PEA-Ouli Affordable Housing Project JAN - 8 1994

ENVIRONMENTAL ASSESSMENT
and
NEGATIVE DECLARATION

FILE COPY

OULI AFFORDABLE HOUSING PROJECT
Ouli, South Kohala, Hawaii
Tax Map Key: 6-2-01: portion of 74

December 25, 1993

Brian T. Nishimura
Planning Consultant

Ouli Ekahi Limited Partnership

Housing Finance and Development Corporation

1. INTRODUCTION.....	1
1.1 Purpose.....	1
1.2 Identification of Applicant	1
1.3 Identification of Approving Agency	1
1.4 Agency and Public Consultation	1
2. DESCRIPTION OF THE PROPOSED ACTION.....	3
2.1 Technical Description.....	3
2.2 Socio-Economic Characteristics.....	6
2.2.1 Need for the Project.....	6
2.2.2 Target Population	6
2.2.3 Public Facilities and Services.....	9
2.2.4 Adjacent Land Uses.....	10
2.2.5 Land Use Designations	11
2.3 Environmental Characteristics	11
2.3.1 Drainage	11
2.3.2 Air Quality	12
2.3.3 Natural Hazards	12
3. SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT.....	13
3.1 Physical Environment.....	13
3.1.1 Geology and Soils	13
3.1.2 Groundwater.....	13
3.1.3 Climate.....	13
3.2 Biological Resources.....	14
3.2.1 Vegetation	14
3.2.2 Avifauna and Feral Mammals.....	14
3.3 Cultural Resources	15
3.3.1 Archaeological Resources	15
4. SUMMARY	16
4.1 Anticipated Impacts and Proposed Mitigation Measures	16
4.2 Alternatives Considered	16
5. DETERMINATION	18
5.1 Findings.....	18
5.2 Reasons Supporting Determination.....	18
6. COMMENTS	19
6.1 Comments	19

1. INTRODUCTION

1.1 Purpose

The purpose of this Environmental Assessment is to comply with Chapter 343, Hawaii Revised Statutes ("HRS"), in conjunction with an application submitted to the State Housing Finance and Development Corporation (HFDC) for construction financing to develop the Ouli Ekahi Affordable Housing Project. The request to utilize these State funds triggers the environmental review process as required by Chapter 343, (HRS).

1.2 Identification of Applicant

The Ouli Ekahi Limited Partnership is the applicant to HFDC for the Rental Assistance Revolving Fund construction financing. Mr. Thomas H. Yamamoto is the Chief Operating Officer of Nansay Hawaii, Inc., the general partner, doing business at the Kamuela Business Center, P.O. Box 111222, Kamuela, Hawaii 96743-0020.

1.3 Identification of Approving Agency

Chapter 343, HRS, requires that an environmental review process be initiated whenever one of eight actions or activities is proposed in the State of Hawaii. The use of State funds is one of the triggering activities for the environmental review process.

In accordance with Chapter 343, HRS, the HFDC is the appropriate accepting authority of the Environmental Assessment since it is the agency authorized to administer the Rental Assistance Revolving Fund, a loan for the use of State funds.

1.4 Agency and Public Consultation

The following public and private organizations were consulted during the preparation of this environmental assessment:

State of Hawaii
Department of Land and Natural Resources
Historic Preservation Division
Department of Health
Environmental Management
Department of Transportation
Highways Division

County of Hawaii
Planning Department
Department of Public Works
Department of Water Supply
Office of Housing and Community Development
County Council

2. DESCRIPTION OF THE PROPOSED ACTION

2.1 Technical Description

The applicant proposes to develop 50-70 single family for sale units on 5,000 square foot lots and 33 single-family rental units as part of the overall development package for the 15 acre Ouli affordable housing site. (See Figure 1- Site Plan) In addition to the housing units, the project will include a 2.5± acre park with restrooms and play fields, landscaping, access road and a package sewage treatment plant and leach field.*

The project site is located approximately midway between Kawaihae and Waimea, adjacent to, and to the south of the Kawaihae-Waimea Road, State Highway Route 19, District of South Kohala, County of Hawaii. The site consists of approximately 15 acres of land on a portion of TMK 6-2-01: 74.

Nansay Hawaii owns approximately 458 acres of land at the Ouli site. They plan to develop the Ouli Country Club subdivision project which includes a 18-hole championship golf course along with a 175-225 lot, Agricultural one acre subdivision on the property. The fifteen acre affordable housing project will be integrated with the golf course and one acre lot project and situated on the eastern or mauka end of the property. The 458 acre site is roughly rectangular in shape, and is bounded by the Kawaihae-Waimea Road and the Waimea Landmark Estates Subdivision to the north, the Anekona Estates Subdivision to the east, the Keanuiomano Stream and undeveloped State-owned lands to the south and privately owned undeveloped property to the West. (See Figure 2 - Location Map)

The 15 acre affordable housing site will be divided into two parcels, a 4.5± acre site for the 33 unit single family rental project and a 11.5± acre site that will include 50-70 single family for sale units. The two parcels will be bisected by a shared 50 foot wide roadway easement. The Ouli Country Club subdivision project proposed by Nansay Hawaii, will surround the affordable housing site on all four sides except for a portion of the park site which will share a boundary with the Anekona Estates Subdivision to the west.

Access to the site from the Kawaihae-Waimea Road will be provided with a intersection as required by the State Department of Transportation. The highway has a six percent grade at the proposed location of the project site access road. The sight distance is approximately 1,850 feet to the west and 1,700 feet to the east which greatly exceed the minimum sight distance requirements of 635 and 570 feet respectively.

Within the Ouli Country Club subdivision site, access to the 15 acre affordable housing project will be provided by a 50 foot wide access easement. The roadway will be improved to standards as required by the County of Hawaii and is intended for dedication to the county.

*Other sewage disposal alternatives may be pursued as permitted by the State Department of Health

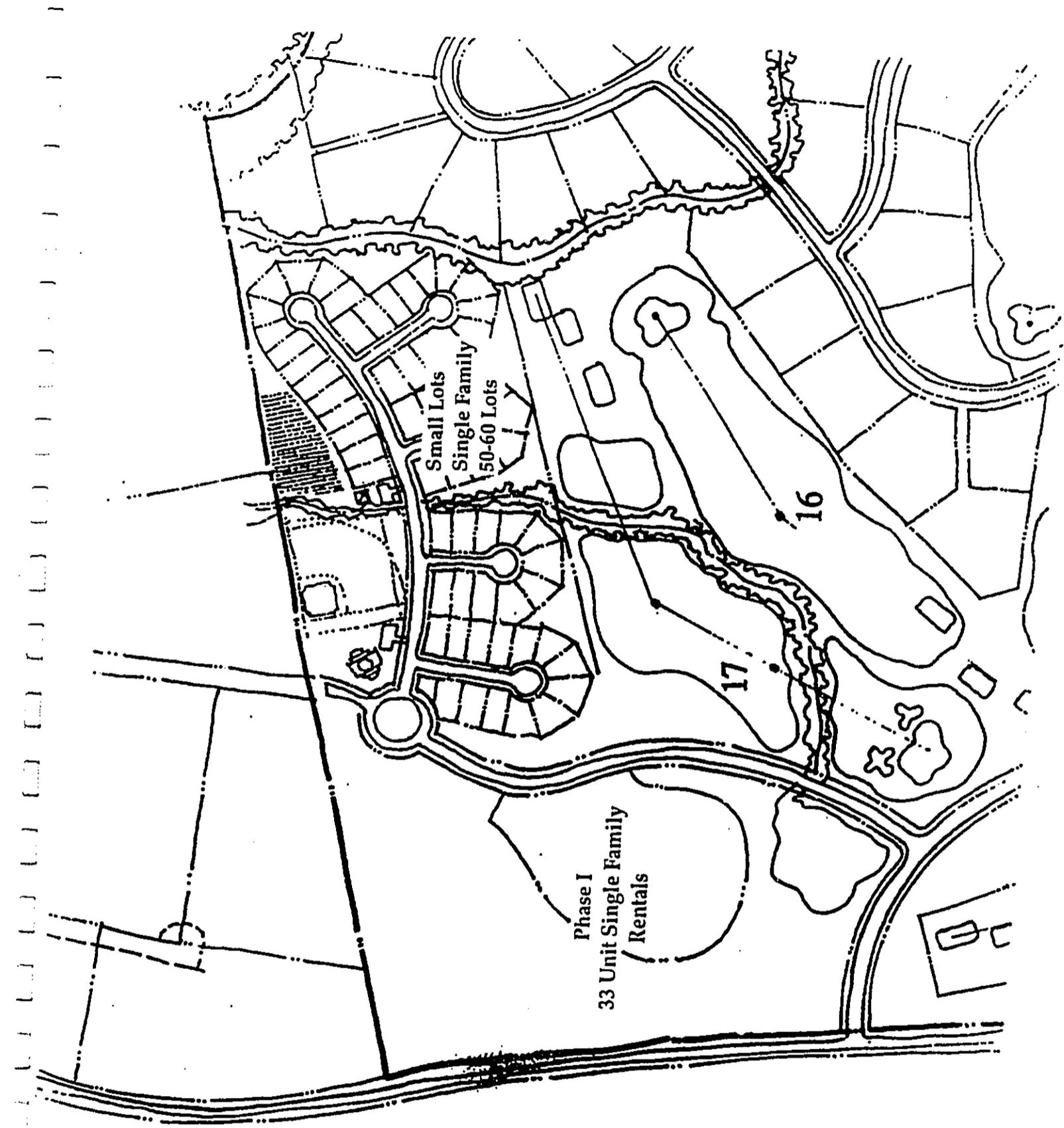


Figure 1: Site Plan

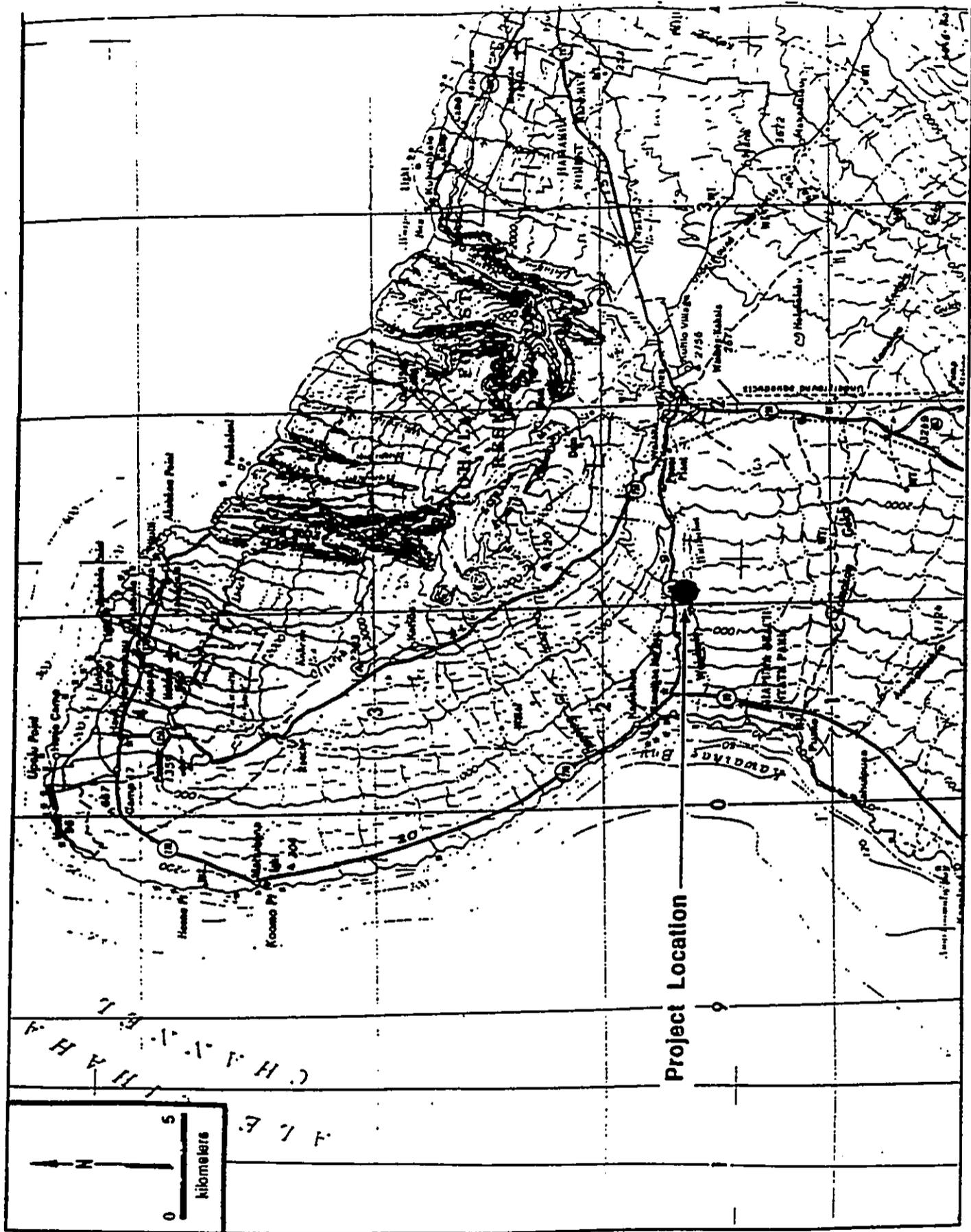


Figure 2: Location Map

The 33 single-family rental units will be developed as part of the first phase of the project along with the supporting infrastructure. The 2.5± acre park will be completed within 2 years of occupancy of the rental units while the single family for sale units will be developed at a later date.

Construction of the first phase is scheduled to begin in May, 1994 with occupancy of the units scheduled for July, 1995. The 33 single-family rental units will be constructed on a 4.5 acre site at a density of 7.3 units/acre. (See Figure 3 - Phase I Site Plan) The units will be one and possibly two story wood-framed units consisting of 3-bedrooms and 1 and 1/2 baths, with a gross floor area of 884 square feet. (See Figure 4 - Floor Plan) The units will include range, refrigerator, disposal and washer. There will be 66 parking spaces for tenants and 33 spaces for guests. One of the units will be built to accommodate the needs of handicapped persons and other units may be adaptable depending on finished grades. Landscaped yards will be provided around and between the units. The total development budget for the 33 unit first phase is \$5,836,738.

Detailed plans for the single family for sale units have not been developed as yet. Discussions with the Hawaii Island Community Development Corporation (HICDC) have been held regarding a possible "self help" project for the site. Since the plans for the single family for sale units have not been finalized, there is no development budget established for this phase of the project.

2.2 Socio-Economic Characteristics

2.2.1 Need for the Project

The proposed affordable housing units will address an existing affordable housing demand in the County of Hawaii and in West Hawaii in particular. A recent housing demand survey conducted for the "1992 Hawaii Housing Policy Study" indicated that there is an existing demand for 1,731 single family rental units and 5,588 single family for sale units in the County of Hawaii. Of this total single family rental demand, 35.7% of the households earn less than 80% of the County's median family income. As indicated by professionals in the business (See Exhibit F, letter from Charlene Sohriakoff of Hawaiian Dreams Realty, Inc.) there is a strong demand for affordable housing units in West Hawaii.

2.2.2 Target Population

The 33 single-family rental units will be developed as a low income housing tax credit project. All of the units will be rent restricted and occupied by individuals whose income is 60% or less of the area median income. In 1993, a family of four earning up to \$25,200 and a family of six earning up to \$29,230 would qualify as an eligible family in the project. Initial rental rates for the 3 bedroom 1 and 1/2 bath units are projected to be \$548/month.

As stated previously, detailed plans for the single family for sale units have not been developed. It is expected that the majority of these units will be targeted for families earning 80% or less than the area median income. In 1993, that figure for a family of four

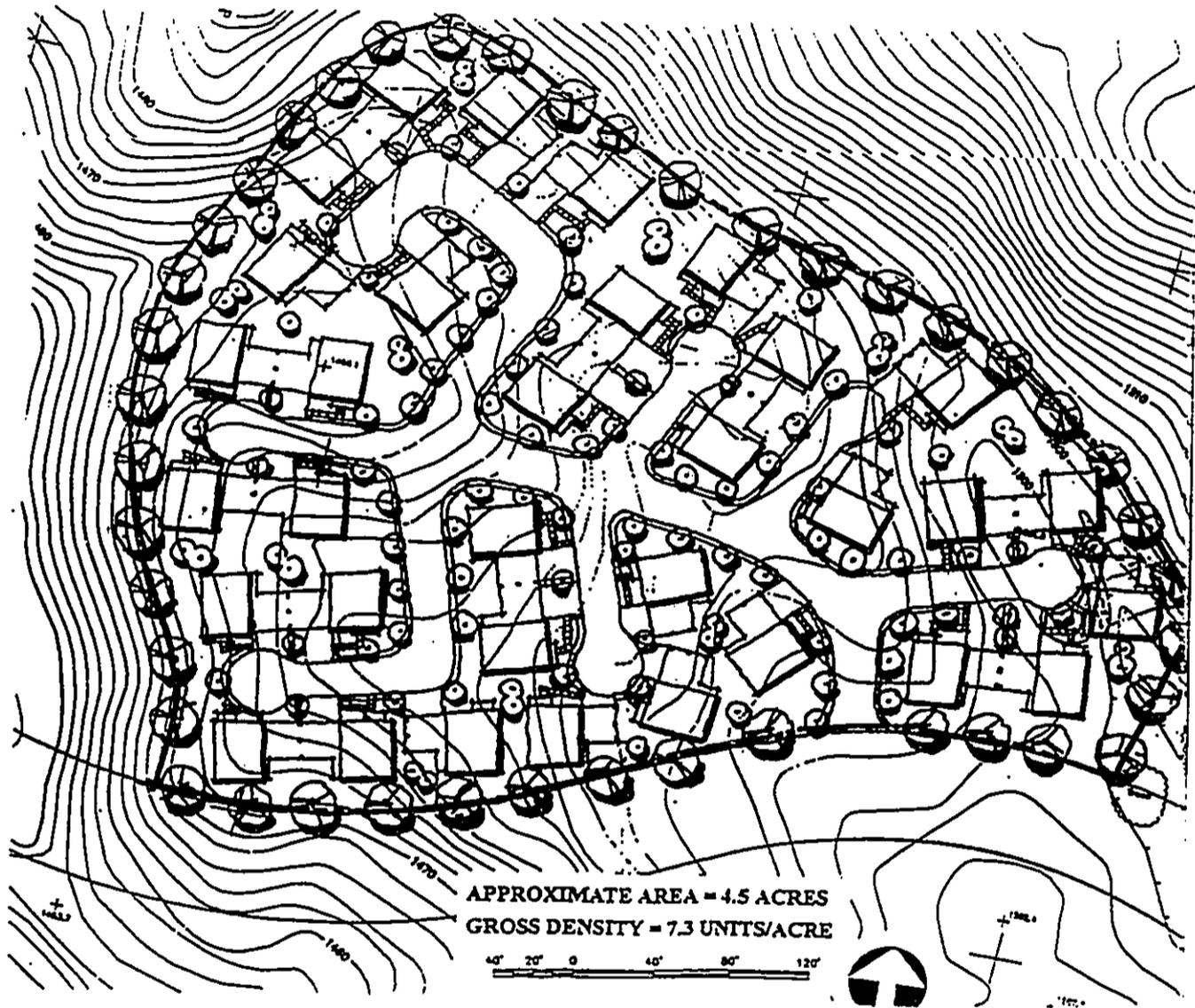


Figure 3: Phase I Site Plan

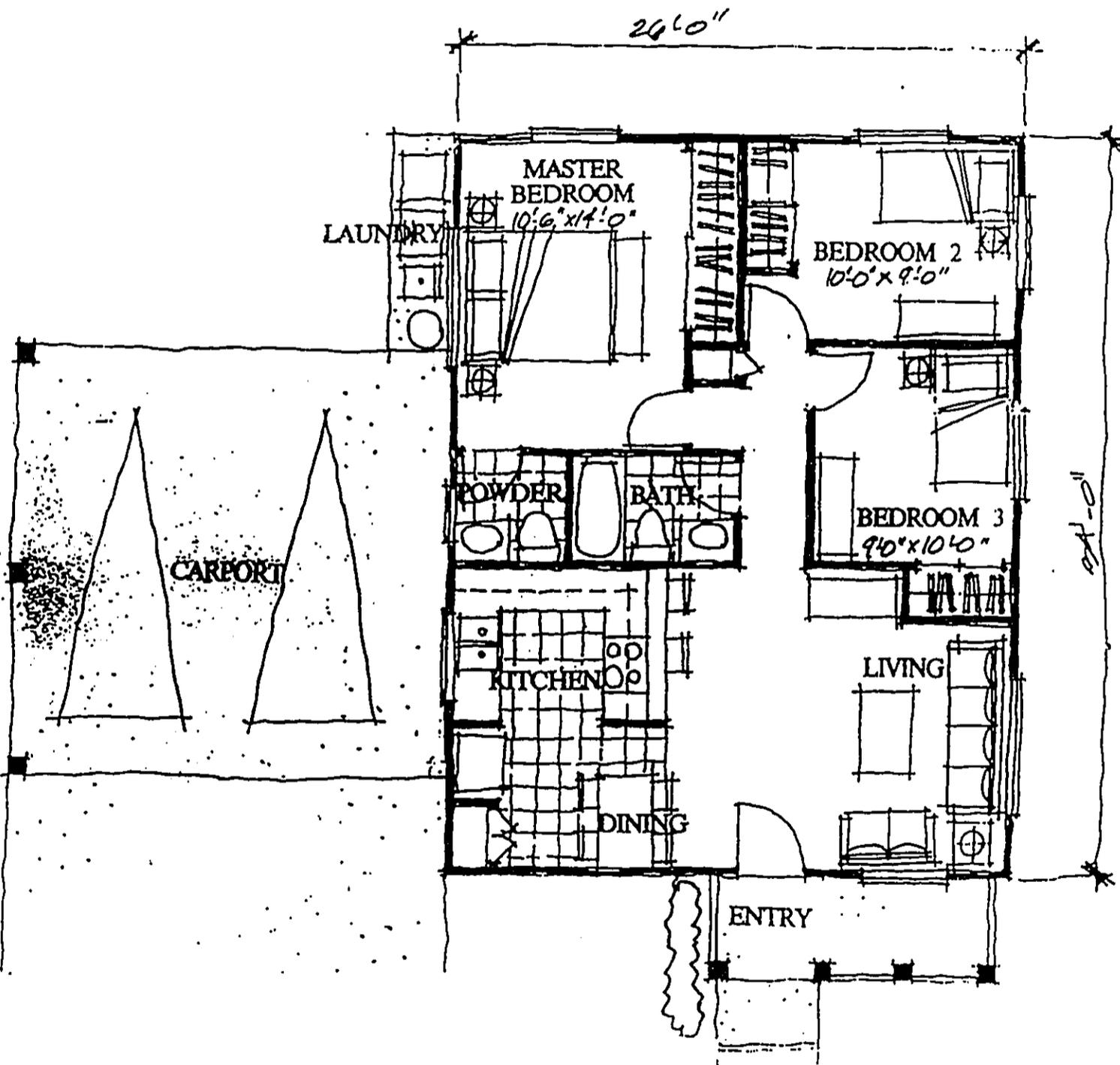


Figure 4: Floor Plan

is \$33,600 and for a family of six is \$38,980. The applicant has made a commitment to the County of Hawaii that 100% of the units will be affordable to families consistent with the objectives of Section 46-15.1 and Section 201E of the Hawaii Revised Statutes.

2.2.3 Public Facilities and Services

The public roadway providing access to the site is the Kawaihae-Waimea Road which is a two-lane State highway providing the only existing roadway link between Queen Kaahumanu Highway, the main coastal highway, and the town of Waimea, which is the principal urban center of the South Kohala District. The highway has a 24-foot pavement width and has a posted speed limit in the vicinity of the project site of 45 miles per hour.

A traffic impact analysis report prepared for the Nansay Ouli project, including the 15 acre affordable housing proposal, has been prepared by M&E Pacific, Inc. in April, 1993. (See Attached Exhibit B) The report provided the following conclusions:

The proposed project is expected to have a minor traffic impact on the local roadway system. The growth in regional traffic would have a greater impact to create the need for highway improvements at the Queen Kaahumanu Highway/Kawaihae-Waimea Road intersection with or without the project. The construction of the recommended Kawaihae By-Pass Road would reduce through volumes on Kawaihae-Waimea Road and minimize the need for any of the traffic improvements recommended in this study. Additional improvements will not be required at the existing Kawaihae Village access road. The proposed project access road intersection can be initially built without channelization at either Ouli or the Anekona Estates. Channelization is expected to provide adequate traffic operations from 1995 until 2000, when traffic signals may be warranted mostly due to the increase in ambient traffic. Traffic signals would not be required if the Kawaihae By-Pass Road were built.

A technical report identifying water resources and supply for the proposed Nansay Ouli project has been prepared by Water Resource Associates in April, 1993. The report estimates total average day demand for potable water as 180,000 gallons per day. The total maximum day demand is estimated to be 270,000 gallons. This is based on a maximum of 150 affordable housing units, 225 one-acre residential lots and a golf course clubhouse facility.

Based on prior agreements with the Department of Water Supply, the developer has a commitment for 46 units that will be served from the County system. This water will be provided from the Department of Water Supply's Waimea Water System which includes a 6-inch pipeline that passes along the Kawaihae-Waimea Road. The additional potable water required for the project will be provided from the developer's Ouli Well 1 which was drilled and tested in 1989. This well has a projected yield of 1.5 million gallons per day which is significantly more than the total maximum day demand of approximately 270,000

gallons. The on-site water sources will be developed in accordance with applicable State and County regulations.

There is no county wastewater collection and treatment system in South Kohala. The applicant will provide a sewage disposal system meeting with the approval of the Department of Health.

The nearest county solid waste transfer station to the subject property is approximately five miles to the east on the outskirts of Waimea. A new landfill facility at Puuanahulu, approximately 25 miles to the south, has recently opened to service the West Hawaii communities.

A three phased power line will be extended from an existing HELCO electrical substation a distance of approximately 7,000 lineal feet along the Kawaihae Road to service the 15 acre affordable housing site. The three phased power will be brought on to the Nansay Ouli project site via overhead lines. The lines will be buried underground within the affordable housing project area.

The nearest fire, police, emergency and medical services are located in the town of Waimea, six to seven miles to the east of the project site. These facilities and services adequately meet the needs that would be generated by the proposed project. Schools serving the proposed project are situated in Waimea, six to seven miles to the east of the property as well as Honokaa which is approximately twelve miles to the east of Waimea. The growth in West Hawaii is putting continuing pressure on school facilities in this region. Additional school facilities will be required.

2.2.4 Adjacent Land Uses

The Nansay Ouli project site is situated in an area that is sparsely developed. Pasturelands to the south and west of the site are either unutilized or only sporadically used for grazing of livestock. To the north of the site, on the north side of the Kawaihae-Waimea Road, is the "Waimea Landmark Estates" project, a small agricultural subdivision with lots primarily 3 acres in size. Besides a number of single family homes, a poultry farm has been established in the Waimea Landmark Estates subdivision. The 38 unit "Anekona Estates" subdivision has been developed to the east of the subject property. Lots in the Anekona Estates subdivision are approximately five acres in size.

The 15 acre affordable housing site will be surrounded in large part by open space buffers. The Ouli Country Club Subdivision will include a golf course and 175-225 one acre sized lots.

2.2.5 Land Use Designations

The subject property is situated within the State Land Use Agricultural District. Nansay Hawaii has filed an application with the County of Hawaii to re-designate the 15 acre affordable housing site from the Agricultural to an Urban designation. The Hawaii County Planning Commission scheduled a public hearing on the boundary amendment application for October 28, 1993.

The County General Plan Land Use Pattern Allocation Guide Map (LUPAG) designates this area as "Extensive Agriculture". Generally, Extensive Agriculture is suggested for pasturage and range lands on soils of poorer quality than those designated Intensive Agriculture. The county zoning designation for the site is "Unplanned". According to the County Zoning Code, this zoning district applies to "areas not subjected to sufficient studies to adopt specific district classifications."

Pursuant to Chapters 201E-201 and 201E-210, Hawaii Revised Statutes, the Hawaii County Council adopted Resolution No. 84 93 which preempted the County General Plan and Zoning requirements for the 15 acre affordable housing site. (See Attached Exhibit E) Detailed plans and specifications of the affordable housing project will be submitted to the Hawaii County Council for specific preemption approval prior to the development of the project. Resolution No. 84 93 further authorizes the Mayor or his designee to certify compliance with applicable laws and ordinances relating to the development of the affordable housing project.

2.3 Environmental Characteristics

The site lies at an elevation of approximately 1500 feet above sea level. Generally, the site supports dry grasslands and a variety of shrubs and trees that are typical of the area. There are no existing structures on the site. Slopes within the property are generally moderate, and most areas within the site have excellent ocean or mountain views.

2.3.1 Drainage

The topography and soils of the site combine to provide for a generally well-drained landscape. A drainage report was prepared in 1980 by Park Engineering, Inc. for the Ouli Signal Subdivision, a bulk lot subdivision which included the subject property. The only areas subject to inundation within the Nansay Ouli project site was confined to the Keanuiomano Stream channel which is relatively deep and well defined. The fifteen acre affordable housing site is situated more than 200 yards away from Keanuiomano Stream. As such, no flood plains or flood hazard area has been designated on the fifteen acre affordable housing site.

2.3.2 Air Quality

The prevailing trade winds generally provide for excellent air movement in the region. This factor, coupled with the very low density of development in the area, results in generally excellent air quality. It can be expected that there will be a temporary adverse impact on air quality within the project site during the construction phase, primarily due to dust and exhaust fumes from construction vehicles. After construction has been completed, the only negative impact on area air quality will be from exhaust fumes from the residents' vehicles. However, the volume of such vehicles will be relatively small, and therefore no significant adverse impact on air quality is expected.

2.3.3 Natural Hazards

The island of Hawaii is susceptible to a number of geologic hazards due to its volcanic origin and the fact that two of the volcanoes, Kilauea and Mauna Loa, are still active. A lava flow hazard zone map has been developed by the U.S. Geological Survey which divides the island into zones ranked from 1 through 9 based on the probability of coverage by lava flows. (Zone 1 is the area of the greatest hazard, Zone 9 is the least) The subject property is within lava flow hazard zone 8 which includes the lower slopes of Mauna Kea. Most of this area has not been affected by lava flows for the past 10,000 years.

The entire island of Hawaii is in earthquake zone 3 of the Uniform Building Code which establishes structural design standards for earthquake resistance for certain types of buildings. This zone is prone to major damages from potential earthquake activity.

The subject property is not situated within a coastal area and thus is not subject to Tsunamis. The Federal Flood Insurance Rate Map (FIRM) has not printed a panel for the subject area which indicates the area is not subject to flooding from the 100-year flood.

3. SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Physical Environment

3.1.1 Geology and Soils

The soils of the project site are of the Puu Pa series which is a extremely stony, very fine sandy loam, with 6 to 20 percent slopes. These soils are extremely stony, fine-textured soils with a stony/gravelly subsoil, moderately rapid permeability, moderate erosion hazard, and 20 to 40+ inches depth over fragmental aa lava.

The soils classification maps of the Land Study Bureau indicate that the soils of the site are designated as class "E" soils, the lowest on the scale. There are no class "A" or "B" soils on or near the site. The State Department of Agriculture's "Agricultural Lands of Importance to the State of Hawaii" maps indicate that the site and surrounding area are not classified -- i.e. not Prime, Unique, or Other Important agricultural lands.

3.1.2 Groundwater

The site lies in an area that is generally characterized as having basal groundwater floating on salt water. The aquifer that underlies the project site is in the Hamakua lavas of the Mauna Kea volcano. An exploratory well was drilled and tested on the Nansay Ouli project site in early 1989. Located at about elevation 1,300 feet, the well was drilled a total depth of about 1,360 feet, or 60 feet below sea level. The test pumping indicated the probable existence of a large aquifer that could easily support a one million gallon per day (1 mgd) well. Water samples showed a very low salinity -- approximately 55 to 60 mg/l. Federal standards for potable water require salinity to be within 250 mg/l. A well construction permit for a second well at Ouli was issued by DLNR in November, 1989. A pilot hole for the second well has been completed and the water quality has been found to be similar to the first well.

3.1.3 Climate

The project site lies within an area that is characterized by a relatively hot, dry climate. Mean annual rainfall is about 15 inches, and the mean daytime temperature is in the 80's. The predominant winds are land/sea breezes. Clear, sunny skies are the typical condition in this area and elevation.

3.2 Biological Resources

3.2.1 Vegetation

A botanical survey of the Nansay Ouli project site was conducted in October, 1990, by Evangeline J. Funk Ph.D., Botanical Consultants. (See Attached Exhibit D) The consultant described the subject area as "gently rolling grasslands with scattered forbs, shrubs, and trees with frequent, low, rock outcrops." The emergent vegetation is very widely distributed kiawe trees (*Prosopis pallida*). The shrub layer includes sandalwood (*Santalum ellipticum*), a'ali'i (*Dodonea viscosa*), akia (*Wikstroemia phillyreifolia*), Mauritius hemp (*Furcraea foetida*), and christmasberry (*Schinus teribinthifolius*). The forb or herb layer is made up principally of grasses, the most common of which are buffelgrass (*Cenchrus ciliaris*), fountain grass (*Pennisetum setaceum*) and bristly foxtailgrass (*Setaria verticillata*).

The botanical survey report concluded that, "Open grass scrub is found in many parts of the broad coastal plain from South Kohala to Kailua Kona. The native vegetation on this site is common in many other places. It would be laudable if some of the sandalwood trees and other native species can be incorporated into the landscaping of the site." The report further stated that, "No currently listed or proposed candidate endangered or threatened plant species were found within the study area (USFWS 1989

3.2.2 Avifauna and Feral Mammals

A survey of the avifauna and feral mammals on the Nansay Ouli project site was conducted in November, 1990, by Phillip L. Bruner, Assistant Professor of Biology, Director, Museum of Natural History, Brigham Young University - Hawaii. (See Attached Exhibit C) The findings of the survey are summarized below.

No resident endemic (native) land and water birds were observed on the site. The Short-eared Owl or Pueo (*Asio flammeus sandwichensis*) and the Hawaiian Hawk or 'Io (*Buteo solitarius*) are two potential endemics that could potentially forage in the area.

Two migratory indigenous (native) birds were observed on the site. A total of five Pacific Golden Plover (*Pluvialis fulva*) and one Wandering Tattler (*Heteroscelus incanus*) were recorded during the site survey. No other migratory shorebirds are likely to occur with any frequency at this site.

No resident indigenous (native) birds or seabirds were observed on the property. A total of 16 species of exotic (introduced) birds were recorded during the field survey of the site. The most abundant of which included the Zebra Dove (*Geopelia striata*), Northern Mockingbird (*Mimus polyglottus*) and Japanese White-eye (*Zosterops japonicus*).

Evidence of Small Indian Mongoose (Herpestes auropunctatus) and feral cat was found during the field survey. Mice and rats are also likely to occur at the site. The endemic and endangered Hawaiian Hoary Bat was not observed on the site.

3.3 Cultural Resources

3.3.1 Archaeological Resources

An archaeological survey was conducted on the Nansay Ouli project site in December, 1990 by ERC Environmental and Energy Services Co. (ERCE). Additional field survey work was also conducted in April, 1993. (See Attached Exhibit A) Although a total of 75 sites were located within the Nansay Ouli project site, no archaeological sites were found within the 15 acre affordable housing site. The sites that were found were characterized as follows: 46 sites reflecting military origin, 13 sites attributed to the ranching period, one of which apparently altered by military use, 7 sites of traditional Hawaiian origin, 2 of which have been altered by ranching activity and one altered by military use and 9 sites from the historic period.

Of the 75 sites located on the 458 acre property, 73 were considered significant solely for their information content. The two sites being recommended for preservation and protection are situated along the makai or western boundary of the Nansay Ouli project site, over 4,500 feet from the 15 acre affordable housing site.

4. SUMMARY

4.1 Anticipated Impacts and Proposed Mitigation Measures

The proposed development of a 15 acre affordable housing project consisting of 33 single family rental units and 50-70 single family for sale units is not anticipated to have any significant adverse environmental effects. The applicant intends to take necessary precautions to minimize the physical disturbance to the subject property and surrounding area through creative design and careful planning.

Temporary, short-term impacts may be generated by the construction activity on the site. These will include an increase in noise levels, dust and exhaust fumes from construction vehicles. Normal construction practices such as watering the area of disturbance will mitigate the potential dust problems. Given the site's relative remote location and sparse development of surrounding properties, any potential impact from these construction activities should be minimal.

Potential visual impacts will be minimized with careful architectural design as well as a combination of natural open space buffers and landscaping which is sensitive to the existing character of the area. This can be achieved through careful site planning of the structures to take advantage of natural topographic features, the choice of natural colors for the exterior elevations, architectural designs that will keep the dwellings at a low profile and effective landscaping.

The subject property does not serve as a habitat for any rare or endangered plant or animal species. As such, the proposed project will not have any adverse impact on any flora or fauna listed for protected status by the United States Fish and Wildlife Service.

Groundwater quality concerns will be addressed by the provision of a wastewater disposal system approved by the State Department of Health. At this time, the applicant intends to utilize a package sewage treatment plant and leach field system although other alternatives may be discussed with the State Department of Health.

Based on the foregoing, the potential short and long term impacts of the proposed project on the environment and surrounding community should be minimal. These impacts, if any, should be outweighed by the social benefit to be gained by the provision of these affordable housing units which addresses a pressing need in the community.

4.2 Alternatives Considered

Two options have been considered in place of developing a 15 acre affordable housing project on the subject property. The first is a no development option and the second is to develop more one acre lots as part of the Ouli Country Club subdivision project. It is unlikely that the no development option would be seriously considered since the landowner is pursuing the development of a golf course and one acre lot subdivision for the surrounding area. Creating more one acre lots on the 15 acre site would be more advantageous to the owner from an

economic stand point; however, this alternative would not meet the public and applicant's objective of providing affordable housing units for the community. The proposal to develop a 15 acre affordable housing project is the only alternative that addresses both a public need as well as a private sector desire to assist low and moderate income families in addressing their housing needs.

DETERMINATION

5.1 Findings

Based on the foregoing information presented, it is determined that the proposed development of a 15 acre affordable housing project on the subject property will not have a significant effect. As such, a determination of a Negative Declaration for the proposed action is appropriate.

5.2 Reasons Supporting Determination

The nature and scale of the proposed action is such that no significant environmental effects are anticipated. Potential impacts, if any, can be mitigated through sensitive site planning and architectural design, careful construction methods and compliance with all governmental requirements including those of the State Department of Health and the Department of Public Works.

COMMENTS

6.1 Comments on Draft Environmental Assessment Received

Notification of the official 30 - day review period was published in the OEQC (Office of Environment Quality Control) bulletin on November 23, 1993 and ended on December 23, 1993. Comments were received for Mr. Bill Graham. The comment letter and the response is attached.

Ms. Virginia Goldstein
County Planning Director
25 Aupuni Street
Hilo, HI 96720

Nov 26, 1993

Dr. Ms. Goldstein,

I write in regard to the application by Nansay Hawaii for zoning changes to accomodate their Ouli project in South Kohala. Recently I attended the Planning Commission hearing in Kona which resulted in a favorable recommendation for the project.

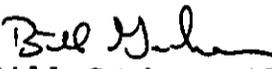
In the OEQC bulletin of November 23rd, notice is given that a draft environmental assessment has been prepared for the affordable housing part of the project, in conformity with HRS 343. I spoke briefly on the phone today with Stacy Sur of HFDC about the draft EA, and the Chapter 343 triggering process.

It appears to me that there are some substantial procedural issues here which need attention.

- 1) The Planning Commission hearing was premature since the Chapter 343 process had not yet been fulfilled.
- 2) The Draft Assessment is likely incomplete since it must assess all aspects of the full project, not just the affordable housing component. As was evident at the Planning Commission hearing, this is one project, not multiple unrelated projects.
- 3) Given that the full project falls under Chapter 343 once any component invokes 343 applicability, it is evident that the County Council Planning Committee would be premature if it were to consider the Ouli project at this time. I believe that the one acre Agricultural lot rezoning is scheduled for hearing next Tuesday.

I understand that haste is sometimes necessary in order to take advantage of financing opportunities, but proper process can not be abridged without potential harm to the public interest.

Sincerely,


Bill Graham (884-5557)
P.O. Box 155
Hawi, HI 96719

cc: Stacy Sur, Keith Kato, Takashi Domingo

10131

N A N S A Y
H A W A I I , I N C .

December 20, 1993

Bill Graham
P. O. Box 155
Hawi, HI 96719

**Subject: Draft Environmental Assessment - Ouli Affordable Housing Project TMK: 6-2-01:
por. of 74**

Dear Bill:

This is in response to your letter dated November 26, 1993, regarding procedural issues involving the Draft Environmental Assessment for the Ouli Affordable Housing Project. The three issues raised in your letter are addressed as follows:

- 1) *The Planning Commission hearing was premature since the Chapter 343 process had not yet been fulfilled.*

The planning Commission public hearing in question was held on October 28, 1993 for two requests. The first involved a change of zone application from Unplanned (U) to Agricultural one acre (A-1a) for 458 acres of land and the second was a State Land Use district boundary amendment application from Agriculture to Urban which involved a 15 acre area within the 458 acre site.

The Planning Commission's public hearing was not premature because there was no Chapter 343, Hawaii Revised Statutes (HRS), trigger that pertained to the State Land Use Boundary amendment application nor the change of zone application.

- 2) *The Draft Assessment is likely incomplete since it must assess all aspects of the full project, not just the affordable housing component. As was evident at the Planning Commission hearing, this is one project, not multiple unrelated projects.*

The affordable housing project is not related to the one acre lot subdivision project. For the record, Nansay Hawaii would like to clarify that the two projects are not related, other than by sharing a common boundary and the same development entity. The one acre lot subdivision project can proceed without the affordable housing project and this alternative would be more advantageous to the owner from an economic stand point. There is no existing or proposed affordable housing requirement attached to the subject property. Nansay Hawaii has chosen to develop the affordable housing project at this

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time and at this site to address an existing need in the community as well as to obtain affordable housing credits which they may be required to provide for other projects on other parcels in the future.

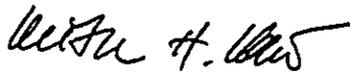
- 3) *Given that the full project falls under Chapter 343 once any component invokes 343 applicability, it is evident that the County Council Planning Committee would be premature if it were to consider the Ouli project at this time. I believe that the one acre Agricultural lot rezoning is scheduled for hearing next Tuesday.*

Chapter 343, HRS, requires that an environmental review process be initiated whenever one of eight actions or activities is proposed in the State of Hawaii. The use of State funds is one of the triggering activities for the environmental review process. An application has been submitted to the State Housing Finance and Development Corporation (HFDC) for construction financing to develop the first 33 units of the affordable housing project. The construction financing will be utilized exclusively for the affordable housing project and is in no way connected to the proposed one acre subdivision project. Should the application for the construction financing be denied, other financing alternatives could be utilized to develop the affordable housing project.

Based on the foregoing, it is clear that the 343, HRS, requirements apply only to the application for construction financing of the affordable housing project. The one acre subdivision project is an independent project which does not include any factors which would trigger the environmental review process. Proper procedures were followed in the handling of the change of zone and State Land Use boundary amendment applications and the public interest has not been compromised.

Thank you for this opportunity to respond to the concerns raised in your letter. Should you have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,



Keith H. Kato
Project Manager

KHK:db

cc: Stacy Sur - HFDC
Virginia Goldstein - Planning Department
Brian Choy - OEQC

Appendix A
Archeological Survey
and Evaluation

Final Report

Archaeological Survey and Evaluation

Land of Ouli

District of South Kohala

Hawaii Island, Hawaii

**Prepared for:
Nansay Hawaii, Inc.**

**Prepared by:
Ogden Environmental and Energy Services Co., Inc.**

**December 1990
Revised
May 1993**

Final Report
Archaeological Survey and Evaluation
Land of Ouli
District of South Kohala
Island of Hawaii, Hawaii

By
Allan J. Schilz

Submitted To:
Nansay Hawaii, Inc.

Submitted By:
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December 1990
Revised
May 1993

ABSTRACT

The results of a pedestrian survey and evaluation program of a 458-acre parcel within the Land of Ouli, South Kohala, Hawaii Island are presented (TMK 6:2:1-18,74, and 76). The initial field survey was completed between October 28 and November 6, 1990 with subsequent field visits to record and map the sites in more detail. A total of 75 sites are located within the parcel and are considered significant because they meet one or more of the criteria provided in Section 13-146-5 (b) of the Rules Governing Procedures for Historic Preservation. It is recommended that a data recovery program be completed at 7 of the sites recorded. This program should include detailed mapping and subsurface excavation. It is further recommended that 2 of the sites be preserved and protected.

TABLE OF CONTENTS

TITLE	PAGE
ABSTRACT	i
INTRODUCTION	1
Environmental Setting	1
Climate	1
Soils	5
Vegetation	5
Background	6
Historical Background	6
Previous Archaeological Studies	8
Settlement	9
METHODS	13
RESULTS	15
Military Period Sites	19
Ranching Period Sites	19
Historic Period Sites	23
Traditional Hawaiian Sites	23
Discussion	29
CONCLUSIONS	29
Significance	29
Impacts and Mitigation Measures	34
REFERENCE CITED	37
APPENDIX: Site Records	

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

<u>NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
1	Project Location Land of Ouli	2
2	Location of Survey Land of Ouli, Hawaii Island	3
3	Ouli 1935 Tax Map	4
4	Archaeological Site Locations	16
5	Military Period Sites	21
6	Ranching Period Sites	24
7	Historic Period Sites	26
8	Traditional Hawaiian Sites	28

LIST OF TABLES

<u>NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
1	Criteria Defining Military Shelters and Features	12
2	Site Types	15
3	Ouli Feature Summary	17
4	Military Period Sites	20
5	Ranching Period Sites	22
6	Historic Period Sites	25
7	Traditional Hawaiian Sites	27
8	Site Summary and Management Recommendations	32

INTRODUCTION

This report describes and evaluates the results of an intensive archaeological survey completed within the `ili *kupono* of Ouli, South Kohala, Hawaii (TMK 6:2:1-18,74,74) (Figures 1 and 2). The investigations were performed by Ogden Environmental and Energy Services Company (formerly ERCE), Honolulu, Hawaii, for Nansay Hawaii, Inc., Kamuela, Hawaii.

The `ili *kupono* of Ouli is located immediately south of Kawaihae Road (Highway 19) between Kawaihae and Waimea. The study area is bounded on the north by Kawaihae Road and Kawaihae 2 *ahupua`a* and on the south by Keanuiomano and Waikoloa streams and Lalamilo *ahupua`a* (Figure 3). The western, or *makai*, boundary is a historic stone wall. The eastern, or *mauka*, boundary is not as well defined by cultural or natural features. The elevation of the parcel ranges from approximately 1150 ft (350m) along the *makai* boundary to approximately 1570 ft (480m) along the *mauka* boundary.

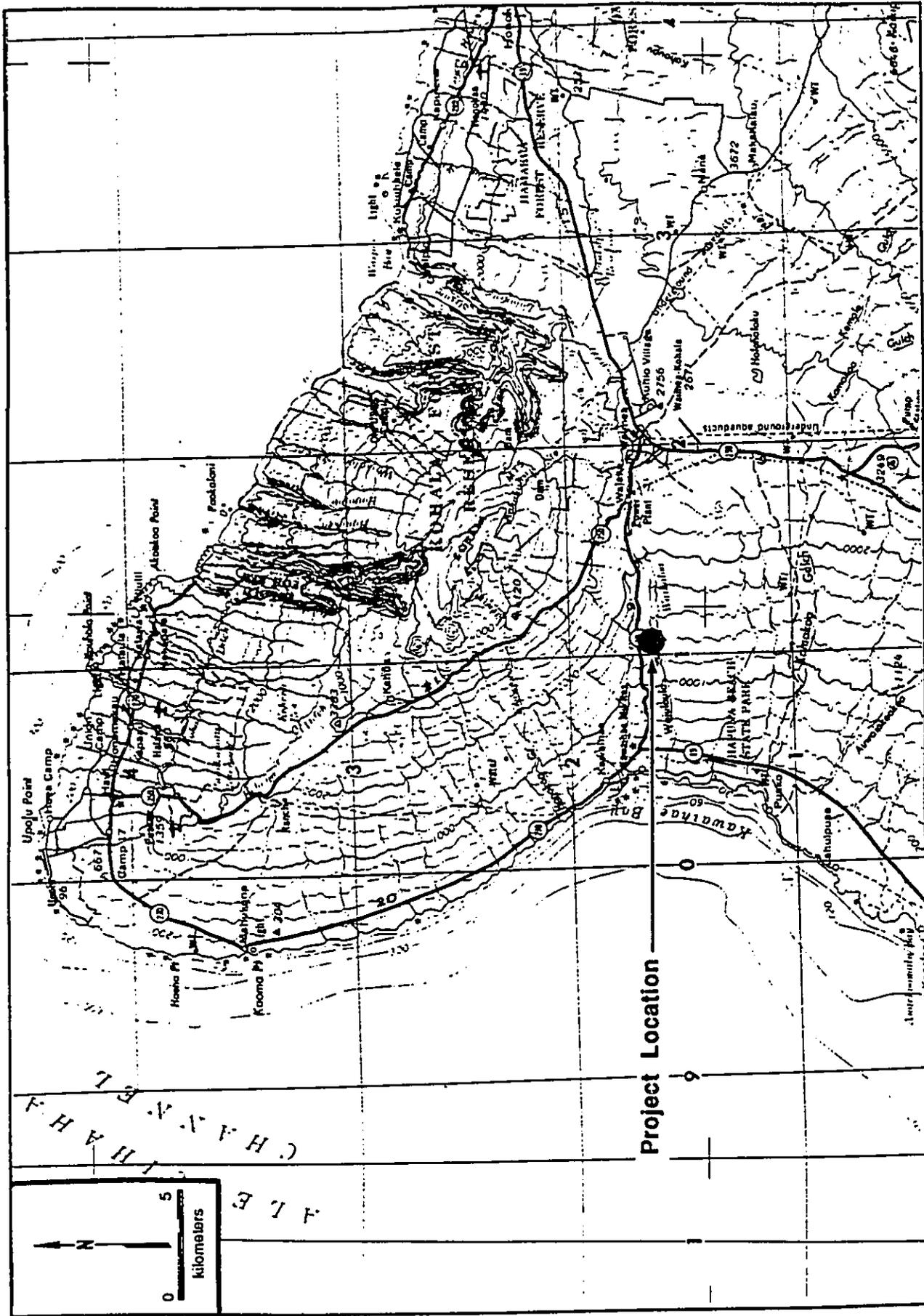
The scope of the program includes background research to establish the historic land use patterns and to review comparative archaeological literature; an intensive pedestrian field survey to record the cultural resources within the parcel; and an evaluation of the significance of the recorded resources. The specific goals of the program are to locate and identify significant cultural resources and to provide management recommendations to mitigate the impacts to those resources.

ENVIRONMENTAL SETTING

Climate

The Hawaiian archipelago enjoys a bi-seasonal weather pattern with summer between May and October and winter between November and April. Generally, the warmest months are August and September, with average temperatures between 79 and 80 degrees F; the coldest months are February and March, with temperatures between 74 and 76 degrees F (Armstrong 1983:53-58).

Rainfall throughout the state is variable. This variability is related to changes in temperature due to elevation and cloudiness due to the shadowing effect (Giambelluca et al.

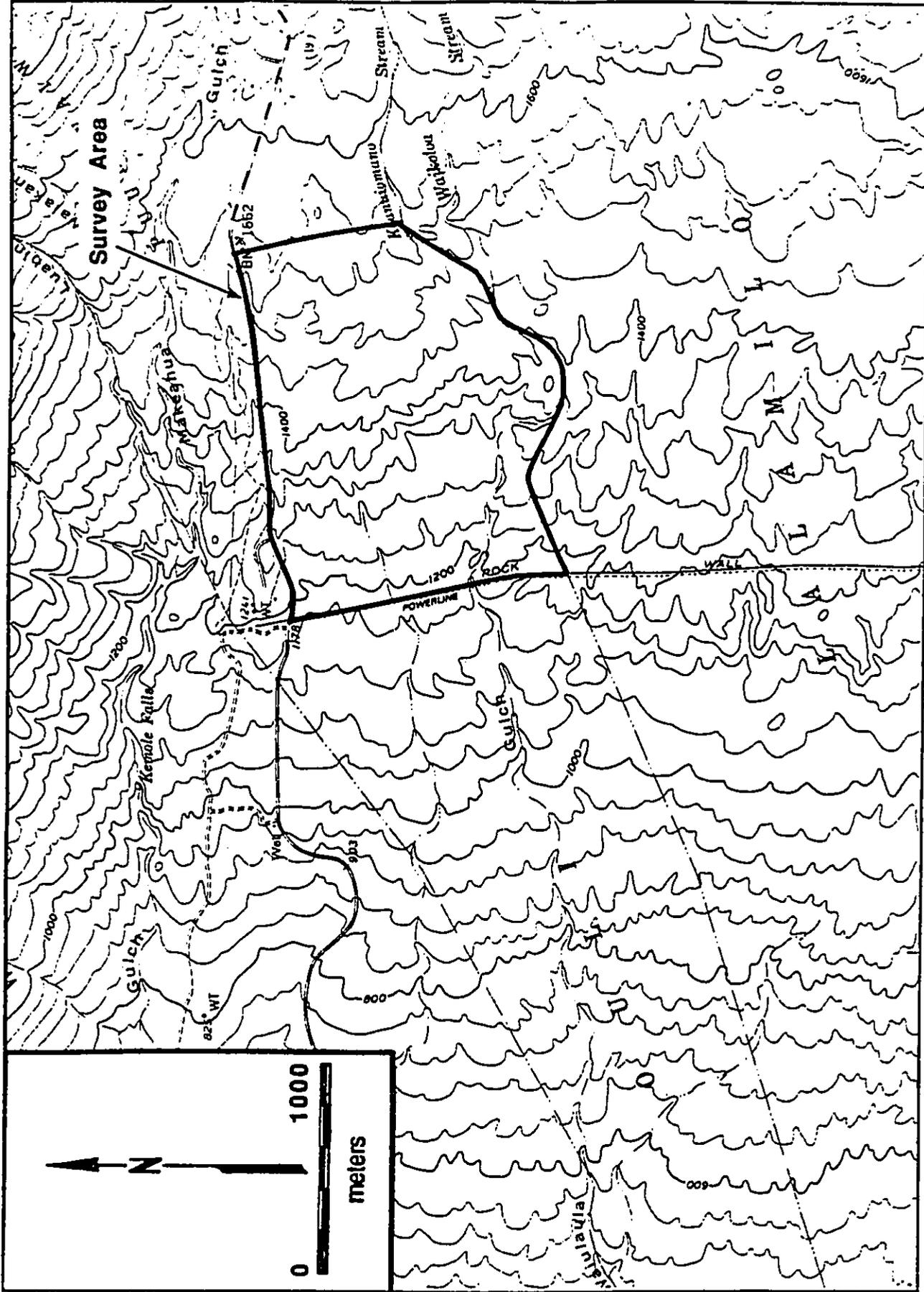


Project Location
Land Of Oahu

OGDEN

FIGURE

1

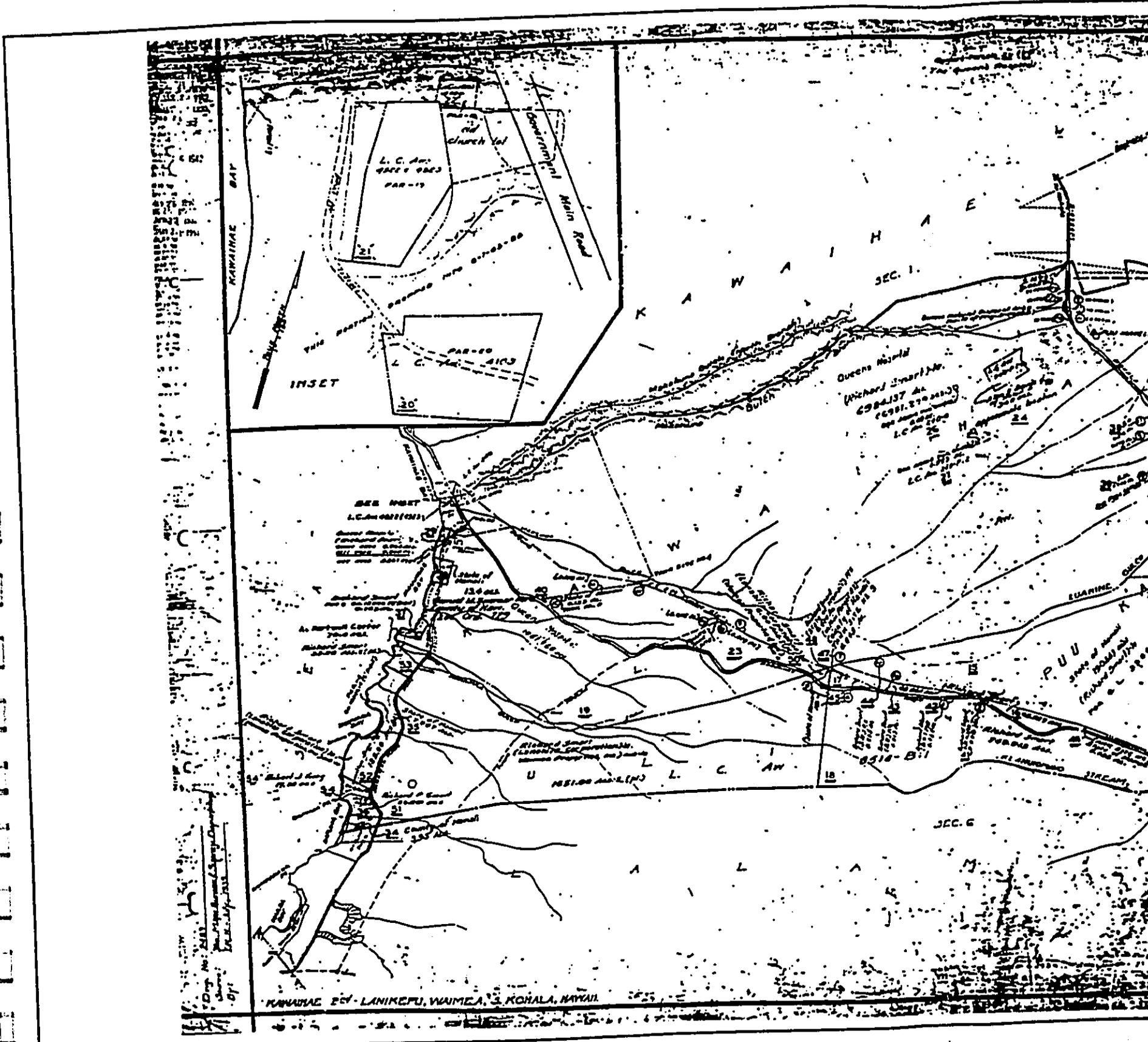


FIGURE

2

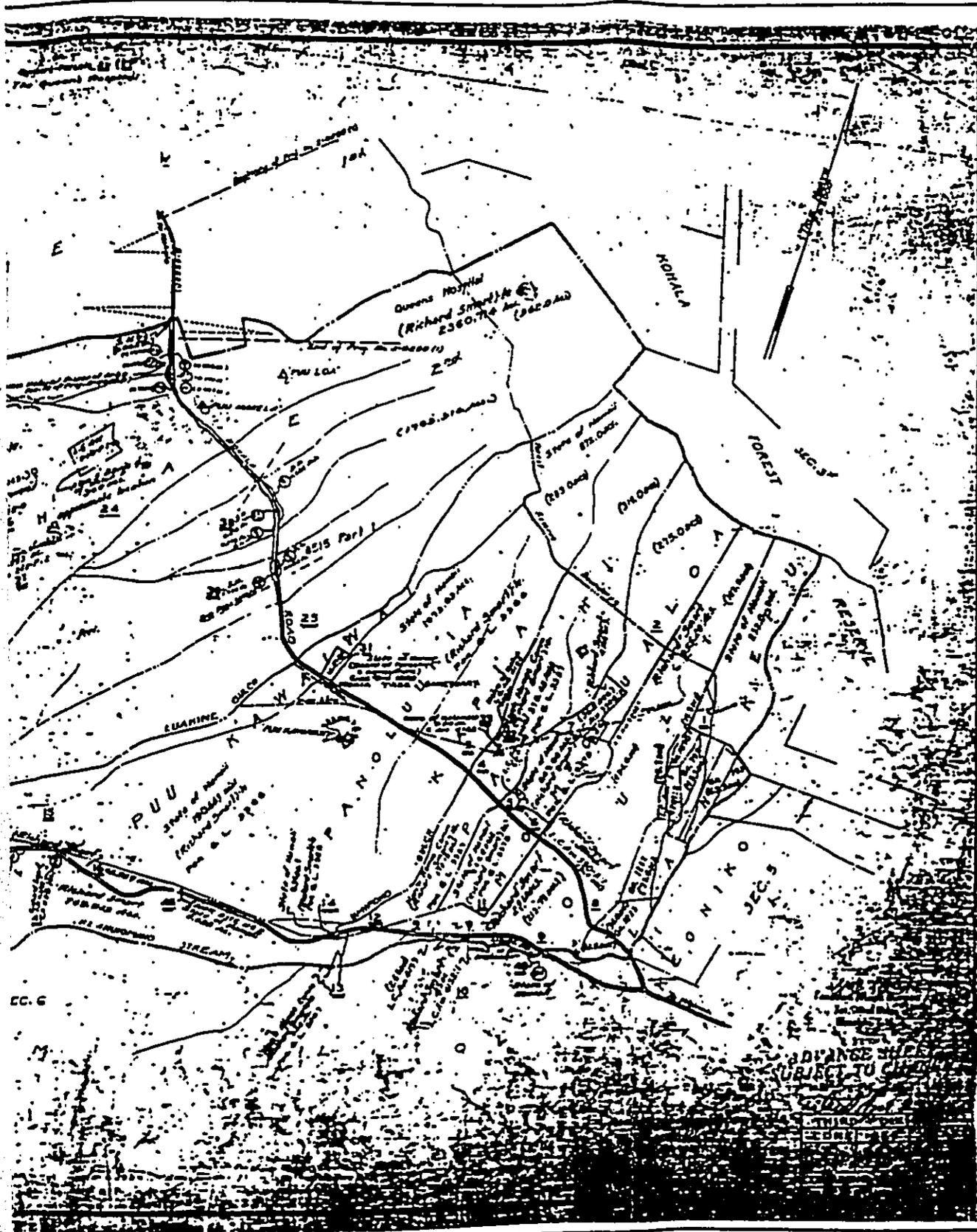
Location Of Survey
Land Of Ouli, Hawaii Island

OGDEN
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Oahu
1935 Tax Map

OGDEN
■■■■



FIGURE

3

Jullia
Tax Map

1986:1-2) Rainfall generally increases with the Kona storms during the winter months and decreases during the summer months when the northeast tradewinds prevail. Rainfall along the leeward coast near Kawaihae averages less than 250mm annually and rainfall at Kamuela averages approximately 1800mm annually (Armstrong 1983:57). Annual rainfall within the study area is approximately 500mm.

Soils

Two soils series are represented within the study area: the Kawaihae series and the Puu Pa series (Sato et al. 1973:26, 50, map 18). Kawaihae extremely stony very fine sandy loam occurs in the lower, or *makai*, portion of the parcel. The surface layer of the soil is described as "...dark reddish-brown extremely stony very fine sandy loam about 2 inches thick." Underlying the surface layer is "...dark reddish-brown and dusky-red stony silt loam and loam." Finally, pahoehoe bedrock occurs at a depth of approximately 33 inches (Sato et al. 1973:26).

The upper, or *mauka*, portion of the parcel consists of Puu Pa extremely stony very fine sandy loam. The surface layer of this soil is described as "...very dark brown extremely stony very fine sandy loam about 6 inches thick." Beneath this layer is "...dark brown and dark yellowish-brown very stony very fine sandy loam about 34 inches thick." Beneath this stratum is fragmental *a`a* lava (Sato et al. 1973:50).

Vegetation

In a study for the Mudlane-Waimea-Kawaihae road corridor, McEldowney (In Clark and Kirch 1983:407-448) describes 8 vegetation zones present in the area and proposes that 12 vegetation zones were present prior to AD 1850. Of interest to the current study is McEldowney's vegetation zone IV. The principal ground cover is fountain grass (*Pennisetum setaceum*), which has replaced most other grasses. *Pili* grass (*Heteropogon contortus*) is also represented, but is more common at lower elevations. *Kiawe* (*Prosopis pallida*) and *koa haole* (*Leucaena leucocephala*) are found primarily along the stream beds and in swales.

BACKGROUND

The following discussion focuses on historical and archaeological research that may provide information concerning land use patterns within study area. The purpose of such research is twofold: it provides advanced information on the types of archaeological resources that may be expected within the study area and it provides a context in which to interpret those resources. The primary sources of information for the present study included the Historic Preservation Division of the Department of Land and Natural Resources, the State Archives, the Bureau of Conveyances, and the Land Survey Division.

Historic Background

Kohala was one of the six original chiefdoms of the Island of Hawaii. When King Kamehameha I unified the island in 1790, the geographic divisions of these chiefdoms were retained as districts of his kingdom. It was not until after the Great Mahele of 1848 that the district boundaries changed significantly; Kohala and Kona were each divided into north and south districts in 1859 and Hilo was divided into north and south districts in 1886.

In 1790 the first American ships, the *Eleanora*, under the command of Captain Metcalf, and the *Fair America*, under the command of Metcalf's son, visited the islands. In retaliation for the humiliating treatment at the hands of the crew of the *Eleanora*, Kameeiamoku captured the *Fair America* and, with the exception of the mate Isaac Davis, killed the entire crew. Davis was captured and eventually became allied with Kamehameha in his conquest of the islands. John Young, of the *Eleanora*, was captured by Kamehameha because it was feared that he knew of the fate of the *Fair America* and her crew, and would warn Captain Metcalf of the *Eleanora*.

Davis and Young joined Kamehameha in his conquest to unite the islands and, upon his success, were given land as a reward. Young was given Ouli as an *'ili kupo* and the *ahupua'a* of Kawaihae 2. Davis was given the less productive lands of Waikoloa (Clark and Kirch 1983; Kelly 1974). The children of John Young and Isaac Davis received considerable land in the Great Mahele of 1848 (Kelly 1974:46; Native Register Vol. 3:708). Two of Young's sons, Keoni Ana and James Y. Kanehoa, received East

Kawaihae and Ouli, respectively. George Davis Hueu, one of Isaac Davis' sons, received Waikoloa.

The Kohala field system is perhaps the most intensively studied agricultural complex in leeward Hawaii Island (Kirch 1985). At one time, the Kohala field system was 3 km wide and 20 km long (Rosendahl 1972). In 1793, while sailing from Hamakua to Kawaihae with Vancouver, Menzies (1920) noted the extent and number of small fields visible from the sea.

Research conducted by Griffin et al. (1971) and Rosendahl (1972) has provided considerable information concerning the Kohala field system, particularly the *ahupua`a* of Lapakahi. The coastal region of Lapakahi was first settled around AD 1300 by people relied heavily on fishing for subsistence. As the population increased the uplands were developed for agriculture, and by about AD 1500 shifting cultivation using slash-and-burn techniques was widespread. By AD 1800 the agricultural system had expanded further and had become permanent (Rosendahl 1972). The principal crop grown was sweet potato (*Ipomoea batatas*).

The Waimea-Lalamilo field system was also an extensive system and was still in use as late as 1935 (Handy and Handy 1972; Barrera and Kelly 1974). In 1793 Menzies (1920) commented on the "plantations" and the fertile soil of the region, and in 1824, Ellis (1827) noted the large villages surrounded by plantations. Ellis estimated the population size as high as 1,200.

The Waimea-Lalamilo field system was composed of four complexes located south and west of the present town of Waimea. In contrast to the Kohala field system, the Waimea-Lalamilo field system was irrigated using *`auwai* to divert water from the streams (Clark 1983a). The principal crops were taro (*Colocasia esculenta*) and bananas (*Musa paradisiaca*), but stone mounds for the cultivation of sweet potatoes (*Ipomoea batatas*) and gourds (*Lagenaria siceraria*) have been found in the area (Clark 1983a; 1983b). This system dates from AD 1200-1300.

Mounds, cairns, and terraces indicating dryland cultivation of sweet potatoes and gourds have been found at the lower elevations between Waimea and Kawaihae (Clark 1983a; Welch 1983). Radiocarbon dates from sites between Kawaihae and Waimea indicate an occupation and use of the area from AD 1600 to AD 1800.

By AD 1850 the population of the region had grown considerably (Rosendahl 1972; Griffin et al. 1971). By 1900, however, the introduction of cattle had severely damaged the field systems, and cattle ranching and a cash economy had replaced the agricultural system.

Previous Archaeological Studies

The South Kohala District extends along the coast from the of Anaeho`omalo to approximately Kai opae Point, and includes the lower leeward slopes of Mauna Kea, the south Kohala Mountains, and the Waimea area.

A number of archaeological studies have been completed in the district. The Mudlane-Waimea-Kawaihae road corridor (Clark and Kirch 1983) is perhaps one of the more useful studies because it provided a transect across several elevation and vegetation zones from near sea level to 2800 ft. Most sites occur between 40 and 280 ft elevation, with the highest density near gullies and gulches. Density drops off, however, around 160 ft.

Sites found between 40 and 500 ft elevation include historic and possible prehistoric farming complexes, residential sites, and burial sites. Between 500 and 1300 ft elevation major site types include cairns, shelters, stone alignments, and historic military. A single cremation burial, open camps, field shelters, and agricultural features were found between 1300 and 1900 ft elevation. Clark (1986:334) refers to this region as the intermediate zone, rejecting the use of terms like transitional (Ching 1971), unoccupied (Griffin et al. 1971), and barren (Rosendahl 1972, 1973). The area was more of a transitional settlement zone between the coastal and upland settlements. It experienced limited, temporary occupation for specialized resources, agriculture, and later cattle ranching. The inland agricultural complexes are found between 1300 and 2600 ft elevation. Field shelters are found between 1300 and 1900 ft and residential sites are found between 1900 and 2800 ft elevation. Generally, there is a very low site density with no permanent habitation between 500 and 1900 ft. The arid zone between 1900 and 2000 ft is location of the lower component of the Lalamilo agricultural complex.

A total of 179 sites have been recorded in the lands of Kalahuipua`a-Anaeho`omalu, Waikoloa, and Lalamilo (Kirch 1979). Included are 449 features in 21 categories. The

sites reflect marine exploitation and it is expected that inland agricultural sites were maintained in a manner similar to that demonstrated by Rosendahl (1972) at Lapakahi.

Jensen (1989) surveyed 130 acres for the Mauna Lani Resort within the lands of Kalahuipua`a and Waikoloa. Eighteen sites with 46 component features were recorded. These include caves, surface habitation features (C-enclosures and linear wall segments), cairns, petroglyphs, abrader basins, a modified bedrock outcrop, a historic fence, and the Kiholo-Puako Trail.

An extensive agricultural complex is known to have existed in the area of Lalamilo and Waimea (Clark 1981). Located in the wet windward valleys were irrigated taro pondfields (lo`i). In contrast, the dry leeward slopes and table lands were not irrigated. The fields were dry (kula) and the major crops included sweet potato, dry taro, and yams. The two systems, wet and dry, can best be characterized as intensive and extensive, respectively.

The North Kohala District includes the windward and leeward slopes of the North Kohala Mountains. Virtually continuous settlement is known to have existed from the hanging Valley of `Awini to the district boundary of Waika (Tomonari-Tuggle 1981; Tuggle and Griffin 1973). Site types in the Lapakahi area include walls and shelters, large enclosures, habitation complexes, water catchment features, rock mounds, wall sections, and trails. Most of the sites are located between sea level and 165 ft elevation and are within 250 to 500 ft from coast. There are no sandy beaches within the ahupua`a of Lapakahi and habitation clusters appear to have been associated with canoe access (Tuggle and Griffin 1973).

An extensive upland agricultural complex existed at elevations between 500 and 2500 ft, and upland habitation extended inland approximately 2 miles to an elevation of 1000 ft. The makai boundary of the upland agricultural zone coincides with the *kiawe* belt, or the transition zone. *Kiawe* was introduced after the turn of the century; the transition zone was previously dominated by *pili* grass and *wiliwili* trees.

SETTLEMENT

An important initial step in the analysis of subsistence-settlement patterns is the development of a site typology. This classification must take into account the relationship

between time, space, and function (Flannery 1976:163; Spaulding 1960). Typologies that consider only spatial distribution of sites and the activities performed at the sites suffer because the time element has not been taken into account. Without temporal control, local regional interaction during a specific period, and the study of changes in these interactions cannot be studied.

Several chronological sequences have been posited for the Hawaiian archipelago (see for example Kirch 1985; Cordy 1981; Hommon 1976). Clark (1979; 1986) proposes a sequence consisting of six major phases: three prehistoric and three historic phases. Clark's sequence is used here because it provides a framework based on research closely related to the present project. Briefly, Clark (1986: 143-154) uses artifact typologies and assemblages along with chronometric data to develop his sequence.

Clark's earliest phase is termed the Settlement Phase and dates to between AD 300 and 1200. This phase is further divided into Early and Late. During the Early settlement Phase the islands were colonized by predominantly marine-oriented people who brought with them agricultural products, a simple chiefdom political system, and kin-based system of land tenure (Clark 1986: 146). These early settlers occupied the windward regions first.

While no dates are proposed, the Late Settlement Phase is distinguished archaeologically by a decreased emphasis on marine resources and a concomitant increase in the dependence on agricultural products. By the end of the Settlement Phase, Clark proposes that exploration of the archipelago had been completed and much of the usable area was settled, or at least explored; expansion into the uplands had begun (1986:146).

Clark's Developmental Phase dates from AD 1200 to 1600 and was marked by transition from a simple chiefdom to a more complex socio-political structure (1986:146, 149). While the basic concept of the *ahupua`a* may have come with the colonizers, it was during this period that the *ahupua`a* system became more pronounced. The importance of agriculture continued to increase and population continued to grow.

The Late Prehistoric Phase dates to between AD 1600 and 1778. Socio-political stratification increased as the commoners lost ownership rights to land and the chiefly classes dominated nearly all aspects of daily life. Warfare between chiefs for control of

land accelerated, and, once again, population and dependence on agricultural products was increasing.

Clark's historic period is divided into three phases: Early Historic, AD 1778-1819; Transformational, AD 1819-1855; and Late Historic, post-AD 1855. The Early Historic Phase began with the arrival of Captain Cook and ended with the death of Kamehameha the Great (Kamehameha I). During this period, with the help of European/American technology and men like John Young and Issac Davis, Kamehameha was able to conquer and unify the islands. Clark (1986: 152) maintains that, while the impact to the Hawaiian culture was 'profound', there is little difference archaeologically between this phase and the Late Prehistoric Phase. The population began to shift, however, toward areas frequented by the foreign traders.

The Early Historic Phase ended and the Transformational Phase began with the death of Kamehameha the Great and the breaking of *kapu* by Liholiho (Kamehameha II). The cattle industry began in earnest and foreign goods began replacing the traditional material culture. With the breaking of *kapu*, many of the traditional religious practices were abandoned in favor of Christian doctrines.

As Clark notes (1986:153) considerable changes took place during the Late Historic Phase. The Phase was marked by greater foreign influence and the general replacement of the Hawaiian material culture with foreign goods.

The current project is located in the uplands between 1100 and 1700 ft elevation. This is within Clark's Intermediate Zone (1986: 334-356). This zone includes Environmental Zone 2 and much of Environmental Zone 3; it may be characterized by a hot, arid climate with shallow soils. Water is generally available only during rainy periods. According to Clark's chronological sequence, this area would have been explored by the end of the Settlement Phase but was probably not used, or occupied, until the agricultural expansion in the Developmental Phase or the Late Prehistoric Phase.

Ethnohistoric sources indicate that human occupation of this zone was very limited (Clark 1986:335), and the archaeological information supports this thesis. The sites found within this zone typically reflect short-term occupation and are located near areas of soil accumulation suitable for growing. Radiocarbon dates from sites 8827 and 8828 indicate

late Prehistoric use of the area. Clark concludes that the zone was marginally used for temporary shelter and limited agriculture during the Late Prehistoric and Early Historic phases.

Clark also noted a number of features, which, after considerable fieldwork, he determined were military, i.e., the result of World War II training. Clark (1986: 196-199) provides several criteria for defining military shelters so that they can be distinguished from Hawaiian single-use or recurrent-use shelters. These criteria should not be taken as all-inclusive; that is, one or more criterion may be absent. These criteria are presented below in Table 1 followed by some suggested additions.

Table 1

CRITERIA DEFINING MILITARY SHELTERS AND FEATURES

Presence of military debris; e.g., cartridge casings, shrapnel, equipment.

Basal rocks of features are not embedded in the soil, but rest on the ground.

Military structures were more commonly placed in swales and other areas where soil was present. In contrast, Hawaiian structures were placed in areas of little or no soil.

The interior of the military structures are often slightly excavated to afford greater protection.

While C-shapes and L-shapes were used, military structures were typically U-shaped with a narrow interior, or oval to rectangular.

Military shelters are generally smaller than Hawaiian shelters, ranging from 1 to 9 sq m.

Hawaiian shelters occur as isolated features or in small groups, generally associated with agricultural features, while military structures usually occur in large numbers.

We propose two additional criteria which may help in determining the origin of a specific structure: differential patination (weathering) and recent fractures. It was noted that many

of the structures within the present study area were built with stones exhibiting a weathered surface indicative of considerable exposure to the elements and a ground-stained surface exhibiting little or no weathering. This difference is the result of selecting stones partially imbedded in the soil for construction, thereby exposing the un-weathered surface. A similar phenomenon was also noted at known military shelters within the U. S. Army Pohakuloa Training Area, Hawaii Island.

Recent fractures may also be indicative of historic, e.g., military, construction. As with the differential weathering noted above, the weathered surfaces are distinguishable from the more recent fracture planes or scars by color and surface texture.

Previous archaeological studies have documented a settlement configuration dated to the late prehistoric-early historic period that extended from the coastal zones to the interior valleys. A variety of archaeological sites are associated with this occupational network.

Messrs. William Akau and Clayton Bertleman, both lifetime residents of the area, were interviewed by Mr. Harvey Auna on February 23, 1991 to gather additional information concerning the use of the study area. Mr. Akau stated that his uncle, Abraham Akau, supervised the construction of the north-south wall to Waikoloa Village in the late 1800s. The principal use during the historic period was for cattle industry, the entire area between Kamuela and Kawaihae was no doubt used extensively. The study area was also used as a bivouac area by the Marine Corps between 1942 and 1945.

Based primarily on the research conducted for the Mudlane-Waimea-Kawaihae Highway corridor (Clark and Kirch 1983; Clark 1986), but also taking into account research at Lapakahi (Rosendahl 1972; Griffin et al. 1971) and Lalamilo (Kirch 1979), a limited variety of site types are expected to occur within the current study area. Specifically, small temporary shelters and agricultural features. More permanent dwellings and the extensive field systems found at Lapakahi and Lalamilo are not expected. It is also expected that military sites will be present.

METHODS

The initial field survey was completed by a crew of four between October 28 and November 6, 1990. The crew included Bert Rader, Dan Costello, Doug Reveley, and Dr. Fred Reinman. The pedestrian survey consisted of walking a series of north-south

transects over the project area with the survey crew spaced approximately 10-15 meters apart. The survey began at the *makai* boundary of the parcel, marking each successive transect with blue surveyors tape.

Sites were recorded on standard ERCE survey forms, which register observations regarding the formal type of site, the features present, site and feature dimensions, surface remains, the topographic setting and prevalent vegetation, and a field assessment of the significance of the site taking into account its integrity, function, chronological period and ethnic origin, and its value for scientific research and interpretation for the public. Sketch maps were made of all but the most simple and repetitive features and color slide photographs were made of most features. Occasionally probing was utilized as a method to assess soil depth. Sites were marked with orange flagging tape and given temporary field numbers, and their locations marked on a parcel survey map with a 1 inch = 200 feet scale. Isolated artifacts were not collected, their location and descriptions were noted and photographs taken.

Subsequent field visits were made in May 1991 and April 1993. Allan Schilz met Mr. Keith Wallis and Richard Stevens to investigate what Messers Wallis and Stevens believed to be Hawaiian trails. These trails were walked and it was determined that they were recent cattle trails and no evidence of Traditional Hawaiian trails were visible.

Messers Wallis and Stevens also noted two features that had not been mapped during the initial survey: a revetment along the old Kawaihae-Waimea Road and a lava tube shelter. These features were visited and recorded on May 22, 1991.

Also, Site 14713 was tested on May 14, 1991 to determine if a burial was present. The feature was disassembled and found not to contain a burial, but to be a historic fence post support.

On April 26 and 27, 1993, Mr. Allan Schilz and Mr. William Fortini performed a field check to collect additional information on the sites recorded. The principal purpose of this field visit was to confirm which sites could be attributed to military and ranching use.

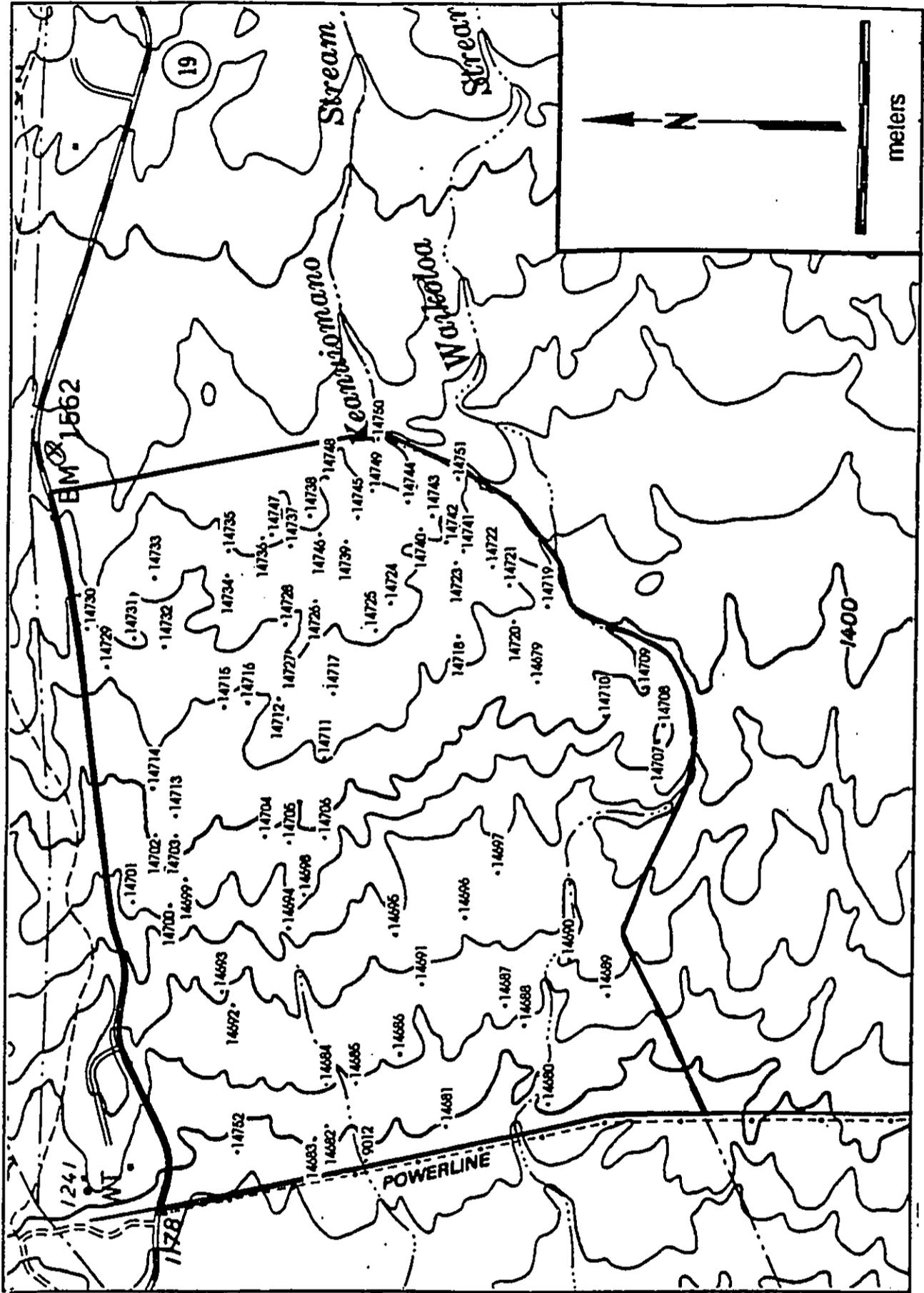
RESULTS

Seventy-five archaeological sites, including two sites previously recorded by Clark (1983:308-313), are located within the project area (Figure 4). Included are 115 component features comprising nine major site types (Tables 2 and 3). The sites are distributed throughout with some apparent clustering along the Keanuiomano and Waikoloa streams.

Table 2
SITE TYPES

Site Type	Number of Sites	Percent of Total	Recommended for Preservation
Military	45	60%	no
Ranching	14	19%	1
Historic	9	12%	no
Traditional Hawaiian	7	9%	1

A total of 75 sites were recorded within the project area; despite this relatively large number, many of the sites and features are very similar in form and construction, and represent only a limited range of functions. The sites can be grouped into four cultural periods, with a limited range of functional site types representing each period. The four periods are Military, Ranching, Historic, and Traditional Hawaiian. Military sites are the most common, followed in descending order by the next three categories. Military sites date to the period between 1942 and 1945; Ranching sites date from the 19th century to the start of military use of the area; Historic sites are those from the 19th or 20th centuries that could be either Military or Ranching, but which lack enough evidence to determine their specific function or cultural period but which do contain evidence that they are post-Contact or non-Traditional types of sites or features. Traditional Hawaiian sites are those that contain artifact or architectural evidence indicating they were used in the pre-Contact period (prior to 1778) or in the early part of the 19th century.



FIGURE

4

Table 3
Oull Feature Summary

Quadrangle	SHP Number	Modified Outcrop	Wall	Alignment	Overhang Shelter	Lava Tube Shelter	C-Shops	Rectangular Enclosure	Circular Enclosure	Irregular Enclosure	Midden	Pavement	Calm	Road	Burial
6	14679														
6	14680										x		2		
6	14681						1						1		
6	14682														
6	14683													1	
6	14684														
6	14685														
6	14686														
6	14687														
6	14688							1		1	x				
6	14689														
6	14690						1								
6	14691														
6	14692														
6	14693						1								
6	14694														
6	14695														
6	14696														
6	14697														
6	14698						1								
6	14699														
6	14700														
6	14701						1								
6	14702								1						
6	14703														
6	14704														
6	14705														
6	14706														
6	14707														
6	14708														
6	14709														
6	14710														
6	14711														
6	14712														
6	14713						1								
6	14714														
6	14715														
6	14716														
6	14717														
6	14718									1					

Table 3
Oull Feature Summary (continued)

Quadrangle	SIHP Number	Modified Outcrop	Well	Alignment	Overhang Shelter	Lava Tube Shelter	C-Shape	Rectangular Enclosure	Circular Enclosure	Irregular Enclosure	Midden	Pavement	Calm	Road	Burial
6	14719							1							
6	14720												1		
6	14721	1							1				1		
6	14722						1								
6	14723			1									3		
6	14724			1											
6	14725		1				2						1		
6	14726						1								
6	14727						1						1		
6	14728												1		
6	14729												1		
6	14730												1		
6	14731												1		
6	14732												3		
6	14733													1	
6	14734			1											
6	14735	1					4							1	
6	14736														
6	14737						1								
6	14738	1													
6	14739	2													
6	14740	1													
6	14741				1										
6	14742						1								
6	14743			2			4						1		
6	14744								1				6		
6	14745														
6	14746						1								
6	14747						1							1	
6	14748		2												
6	14749														
6	14750				1										
6	14751				1										
6	14752														
6	9012		1												

MILITARY PERIOD SITES

Forty-five sites (60% of the total) were interpreted as representing military related activities, primarily fortifications or targets, with some road berms (Table 4). Sites interpreted as fortifications included C-shapes, low walls, and alignments; these sites probably served as bivouac or training areas. The sites were characterized by military debris, poorly constructed features, and the presence of earth-staining on the rocks used as building materials, indicating that such features were relatively recent constructions. Sites interpreted as targets consisted of mounds of broken or shattered rock, often exhibiting bullet marks or spent bullets in the area. Military related sites tended to occur on the tops of ridges and are present throughout the project area, but are more common in the *mauka* portion of the area (Figure 5).

The military sites are indicative of training activities that involved the opportunistic construction of small features, rather than large-scale or pre-planned construction projects. Such small, opportunistic features were probably constructed by individuals or small groups on an as-needed basis, rather than according to any kind of master plan or design. Construction of these features probably impacted evidence of earlier use of the area, as rocks were moved around or constructed into new feature types; this is illustrated by Site 14726, a site containing two C-shapes constructed by the military and a scatter of marine shell midden, suggesting Traditional Hawaiian use of the area.

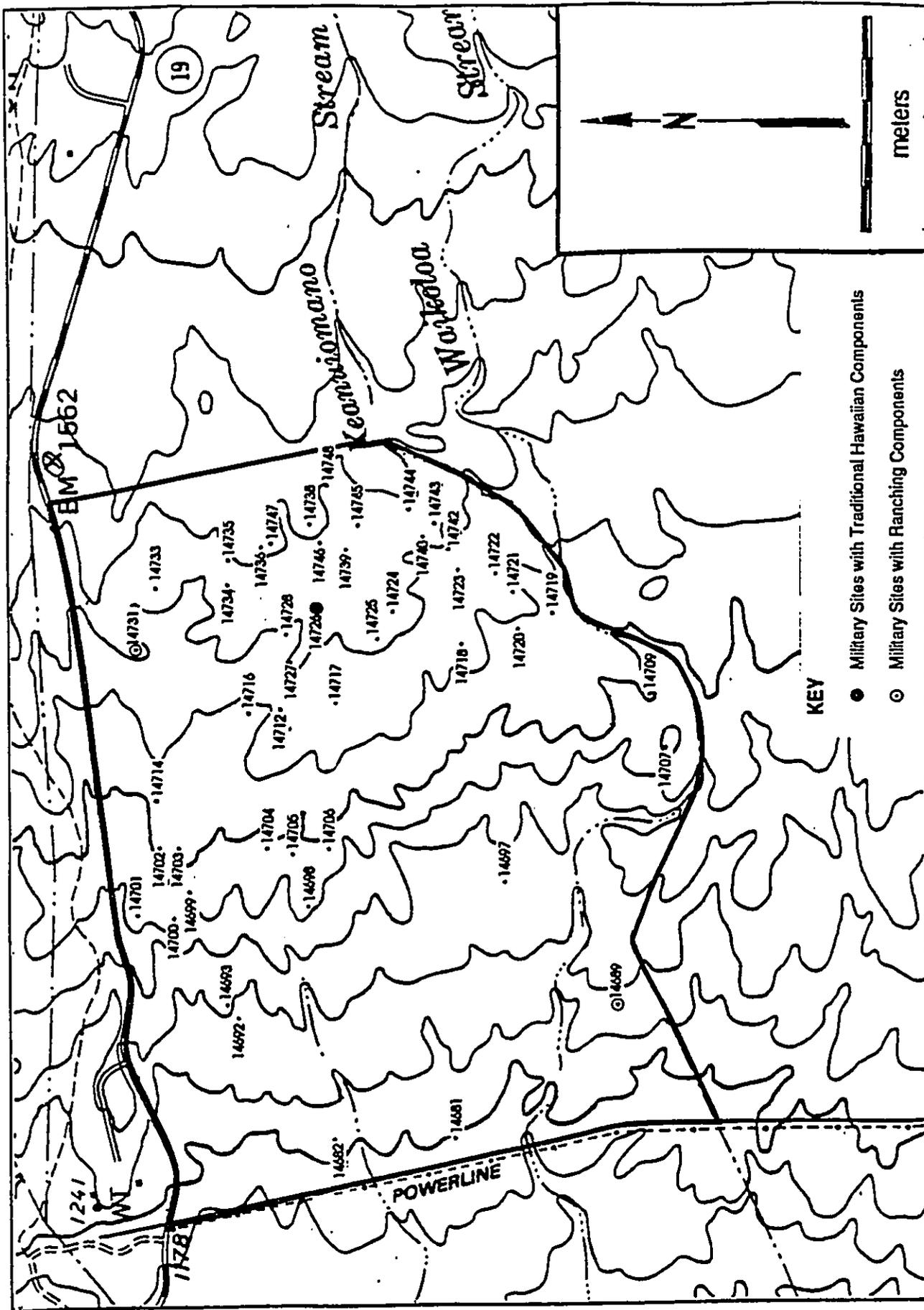
Military activities undoubtedly had a major impact on the archaeological record and are primarily responsible for the architectural features present within the project area today. Construction by military personnel adversely affected sites from the earlier cultural periods, making it difficult to determine the extent of pre-Military activities in the project area.

RANCHING PERIOD SITES

Fourteen sites (19% of total) relate to the Ranching period use of the project area (Table 5). The most common type of Ranching sites are small rock mounds used as fence post supports; these occur in straight lines and still often contain milled-lumber posts. Other Ranching sites include an animal enclosure with stacked stone walls and another enclosure that probably functioned as a field house or field shelter.

Table 4
Military Sites

Quadrangle	SIHP Number	Modified Outerop	Wall	Alignment	C-Shape	Rectangular Enclosure	Circular Enclosure	Irregular Enclosure	Caltn	Road
5	14681				1					
5	14682								1	
5	14689				1					
5	14692				1					
5	14693				1					
5	14697			1		1				
5	14698								1	
5	14699								2	
5	14700				1					
5	14701						1			
5	14702									
5	14703			1						
5	14704				1					
5	14705				1					
5	14706				1				1	
5	14707			1						1
5	14709									
5	14712		1		1					
5	14714					1				
5	14716				1					
5	14717				1					
5	14718	1						1		
5	14719					1				
5	14720								1	
5	14721	1					1			
5	14722				1					
5	14723			1	1					
5	14724			1					3	
5	14727				1					
5	14728				1				1	
5	14733									
5	14734			1						
5	14735	1								
5	14736				4					1
5	14737									
5	14738	1			1					
5	14739	2								
5	14740	1								
5	14742				1					
5	14743			2	4					
5	14744			1			1		1	
5	14745									
5	14746				1					
5	14747		2		1					1
5	14748									



FIGURE

5

Location of Military Sites

OGDEN

Table 5
Ranching Sites

Quadrangle	SIHP Number	Wall	Circular Enclosure	Irregular Enclosure	Midden	Pavement	Calm
5	14679				X		2
5	14680						1
5	14683						1
5	14684						1
5	14685						1
5	14686						1
5	14687		1	1	X	X	
5	14688			1			
5	14694						1
5	14713						1
5	14730						1
5	14731						1
5	14732						3
5	14749						1
5	9012	1					

The ranching sites also occur throughout the project area, but are more common in the *makai* portion (Figure 6). This pattern may be the result of military use of the project area and the impact of military activities on sites, since military sites are more common in the *mauka* portion of the project area and construction of such features may have destroyed previous ranching features.

HISTORIC PERIOD SITES

Nine sites (12% of total) were identified as Historic period sites (Table 6). These are sites that relate to post-Contact use of the project area during the 19th and 20th centuries, as determined from architectural elements, but for which no more definite period (e.g., Ranching or Military) could be determined. The Historic sites consist of cairns, with one exception (a road). These cairns are not Traditional Hawaiian features, as evidenced by the style of construction and the presence of rocks with earthen staining on them.

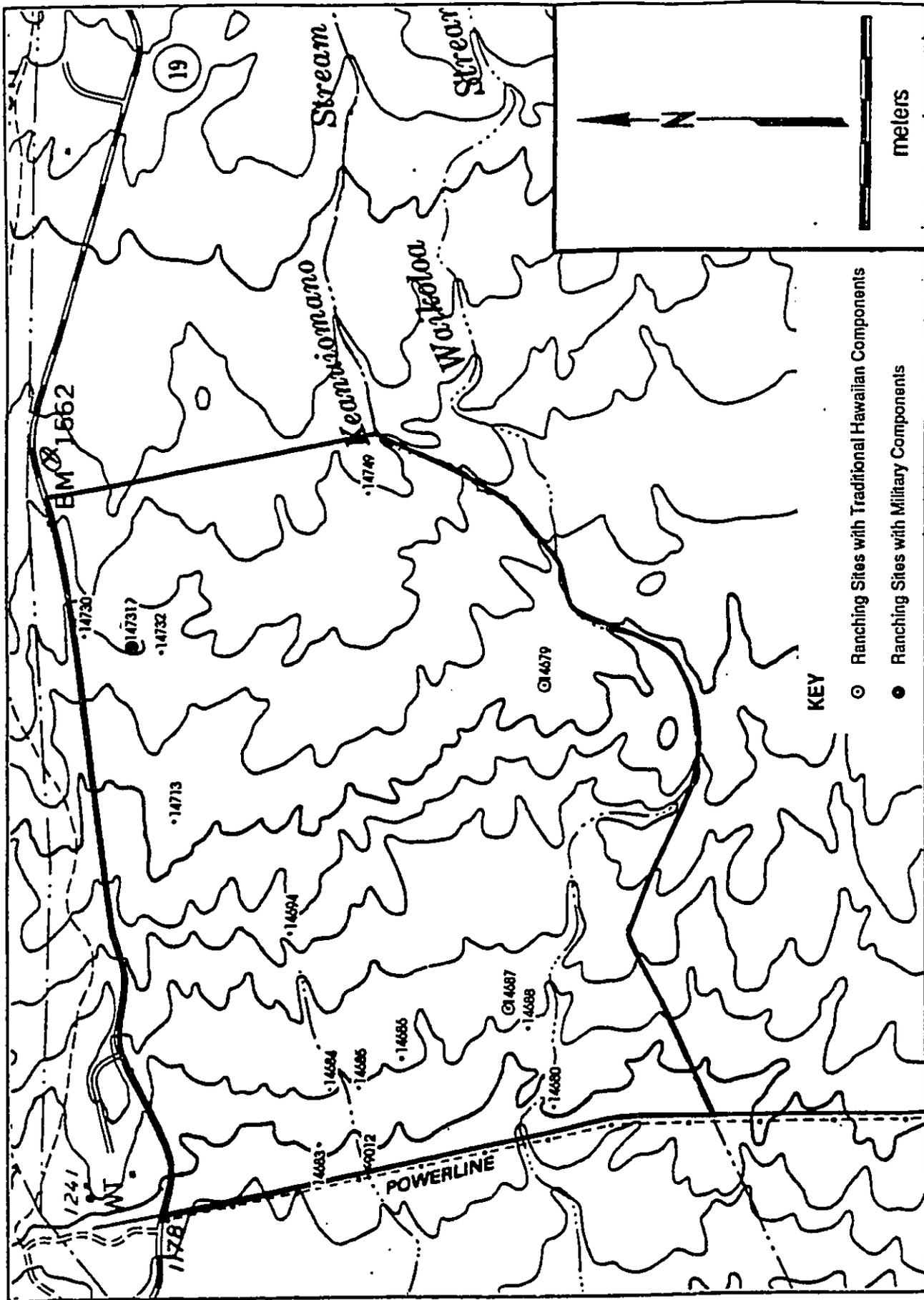
Although a more specific cultural period could not be assigned to the Historic sites, it seems more probable that they are Military period features, perhaps related to military trails or jeep paths that are no longer evident. No military debris were noted around the Historic sites, but little might be expected if they served primarily as road or trail markers. Alternatively, the Historic period sites could have functioned as road or trail markers during the Ranching period. The Historic period sites occur scattered throughout the project area (Figure 7), including in areas containing Military and Ranching sites.

The Historic period sites seem to have served as transportation aids during the 19th or 20th centuries, if the cairns served as markers for transportation routes. Based on the evidence gathered to date, this seems the most likely function for the cairns, since they contained no cached goods, nor appeared to have been used as targets during the Military period.

TRADITIONAL HAWAIIAN SITES

Seven sites (9% of total) relate to Traditional Hawaiian period use of the project area (Table 7). Traditional Hawaiian sites include overhang shelters, a lava tube burial, C-shapes, enclosures, and cairns. The majority of these sites (five of the seven) occur in or near Keanuiomano Stream gulch (Figure 8). Since Keanuiomano Stream provides a fairly dependable water source, it is not surprising that the Traditional Hawaiian sites are located

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



OGDEN
■■■■■

Location of Ranching Sites

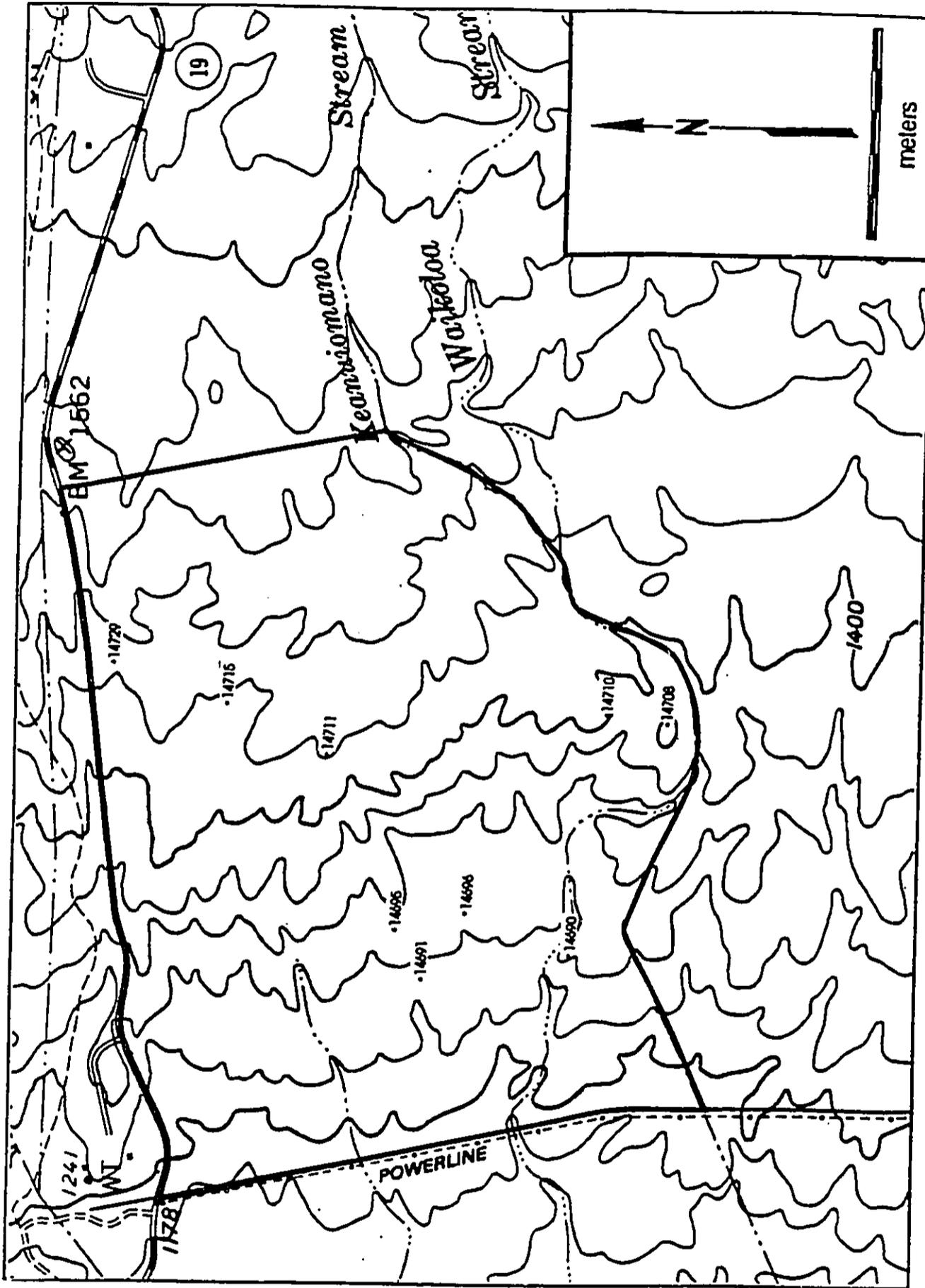
FIGURE

6

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Table 6
Historic Sites

Quadrangle	SHHP Number	Cal'n	Road
5	14690	1	
5	14691	1	
5	14695	1	
5	14696	2	
5	14708	1	
5	14710	1	
5	14711	1	
5	14715	3	
5	14720	1	1



OGDEN

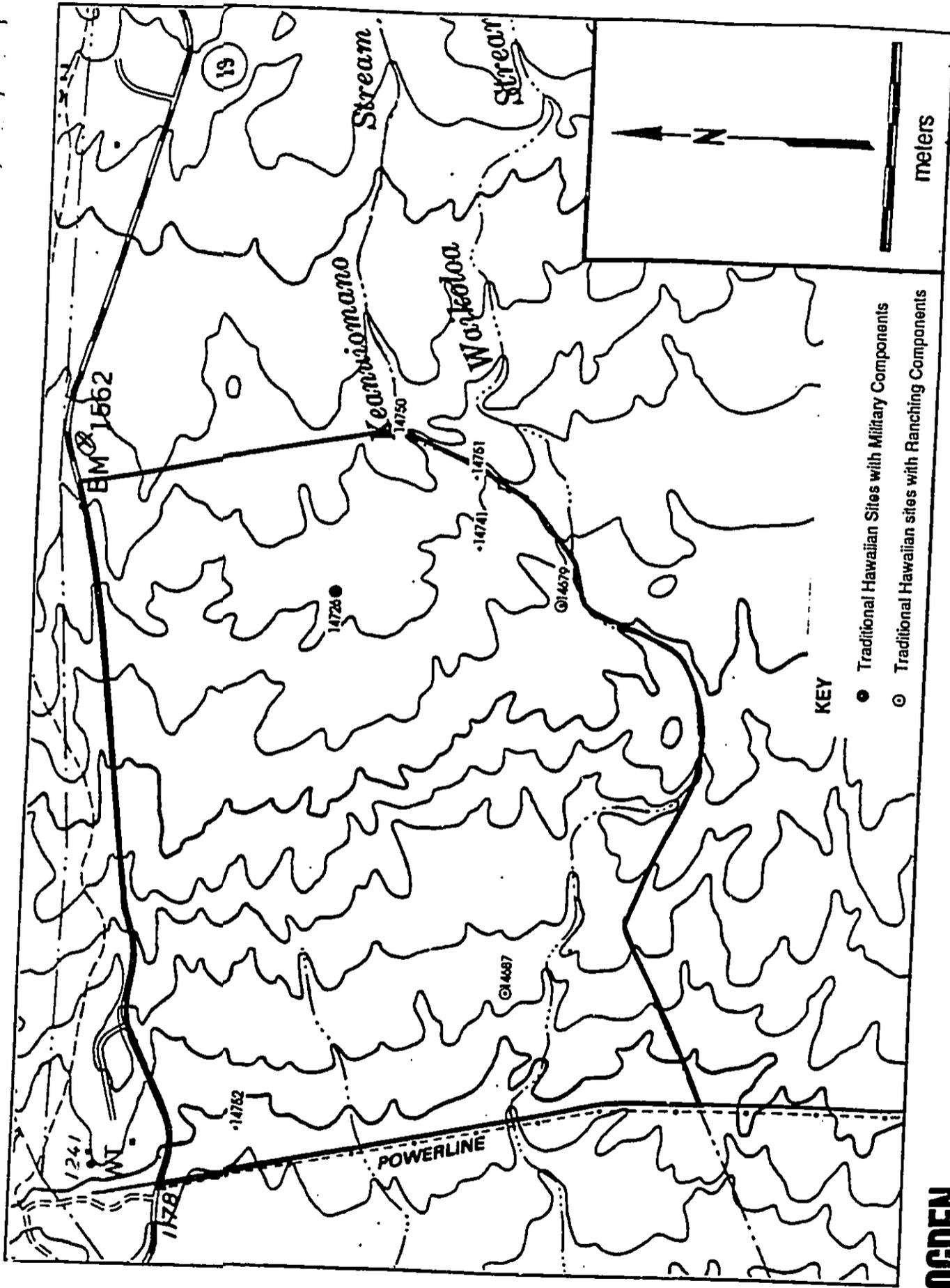
Location of Historic Sites

FIGURE 7

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00

Table 7
Traditional Hawaiian Sites

Quadrangle	SIHP Number	Overhang Shelter	Lava Tube Shelter	C-Shape	Circular Enclosure	Irregular Enclosure	Midden	Pavement	Cairn	Burial
5	14679				1		x		2	
5	14687					1	x	x		
5	14726			2					1	
5	14741	1								
5	14760	1					x			
5	14751	1					x			
5	14762		1							x



FIGURE

8

Location of Traditional Hawaiian Sites

near the stream. The exceptions to this pattern are Site 14752, a lava tube with a burial, and Site 14726, a midden scatter impacted by military activities.

Traditional Hawaiian sites were identified by the presence of midden or artifacts or by certain architectural characteristics, such as wall heights, quality of construction, and the lack of earthen staining on structural rocks. Marine shell midden was present in four of the seven Traditional Hawaiian sites.

All of the Traditional Hawaiian sites appear to be related to temporary exploitation of the project area during the pre-Contact or early post-Contact period; none of the sites represents permanent occupation. The lands within the project area may have been used for resource exploitation or Keanuiomano Stream may have formed a route leading *mauka* into the interior. If so, the sites identified as Traditional Hawaiian may have served as resting or camping points.

DISCUSSION

Military and ranching activities have greatly impacted the archaeological record within the project area, with military activities probably causing the most serious changes by probably destroying evidence for Traditional Hawaiian use of the area. Use of the area during pre-Contact times may have been primarily for temporary resource exploitation, but the presence of Keanuiomano Stream makes it possible that some more permanent or long-term occupation occurred within the project area; if this is true, however, the subsequent Ranching and Military period use of the area destroyed the evidence. Other than the occurrence of the majority of Traditional Hawaiian sites along Keanuiomano Stream, no other site patterning was obvious except for a greater concentration of Military sites in the *mauka* portion of the project. In general, though, Military, Ranching, and Historic sites occurred throughout the project area, without any clustering or grouping of site types.

CONCLUSIONS

SIGNIFICANCE

The recognition that historic and prehistoric archaeological sites, i.e., cultural resources, are valuable to society is reflected in the federal and state laws and regulations designed for their protection. Based on existing legislation, cultural resources are those historic and

prehistoric sites, artifacts, features, and other humanly produced elements that represent or reflect the heritage of the people within an area of affected environment. Prehistoric resources may vary from isolated rock features to site complexes that may include midden deposits, fish ponds, and any number of related features. Historic resources may vary from an individual structure, or remains of a structure, to a complex of structures encompassing an entire community.

As stated in Chapter 6E, paragraph 2 of the Hawaii Revised Statutes (H.R.S.),

"Historic preservation means the research, protection, restoration, rehabilitation, and interpretation of buildings, structures, objects, districts, areas, and sites, including underwater sites, significant to history, architecture, archaeology, or culture of this State, its communities or the nation."

Paragraph 6E-2 further states that,

"Historic property means any building, structure, object, district, area, or site, including *heiau* and underwater site, that is significant in the history, architecture, archaeology, or culture of this State, its communities, or the nation."

The Historic Preservation Division, Department of Land and Natural Resources has drafted rules and regulations (Title 13, Subtitle 6, Chapters 146-154, draft May 1989) to govern the procedures and standards for historic preservation. Chapter 146, Rules Governing Procedures for Historic Preservation Review, defines the criteria to be used in evaluating significance. Section 13-146-5 (b) states that, "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:

1. Criterion "a". Be associated with events that have made an important contribution to the broad patterns of our history;
2. Criterion "b". Be associated with the lives of persons important in our past;
3. Criterion "c". Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;

4. Criterion "d". Have yielded, or be likely to yield, information important for research on prehistory or history;
5. Criterion "e". Have an important historical cultural value to an ethnic group of the state.

Seventy-five archaeological sites were located and recorded during the inventory survey of the project parcel (Table 8). Seven of the 75 sites are classified as Traditional Hawaiian. Included are 14679, 14687, 14726, 14741, 14750, 14751, and 14752. Sites 14679, 14687, and 14726 were altered during historic times by ranching activities (sites 14679 and 14687) and military training activities (site 14726). Under criterion d, sites may be considered significant if they, "Have yielded, or be likely to yield, information important for research on prehistory or history." The seven Traditional Hawaiian sites are considered significant because of information they may yield, i.e., their research potential.

Site 14752 is also considered significant because it meets the requirement of criterion c, it embodies "...the distinctive characteristics of a type, period, or method of construction...." While other temporary shelters were recorded during the survey, site 14752 is distinctive because of its placement in a small lava tube chamber it is well protected from the weather, and there is a midden deposit. The site also meets the requirement of criterion e, it has "...an important historical cultural value to an ethnic group of the state." It is the location of human remains.

In addition to the historic ranching component of sites 14679 and 14687, 13 sites are attributed to the ranching period and one site is attributed to the ranching period but was apparently altered by the military during training exercises in the 1940s and 1950s. Included in this category are sites 14680, 14683, 14684, 14685, 14686, 14688, 14694, 14713, 14730, 14731 (contains a military component), 14732, 14749, and 9012. Most of these sites are former fence supports, but site 14687 is a habitation site; site 14688 is a corral, presumably associated with 14687; and site 9012 is a large lava stone wall that extends south from the present Kawaihae-Waimea Highway for a considerable distance. These sites are considered significant because they meet the requirement of criterion d, they have provided information important to the history of ranching in that area. Site 9012 also

Table 8
Site Function and Management Recommendations

Quadrangle	SIHP Number	Site Function	Cultural Period	Significance Criteria	Map	Excavation	Preservation	No Further Work
5	14679	Habitation/Fence Support	Inad. Hawaiian/Ranching	d	x	x		
5	14680	Fence Support	Ranching	d				x
5	14681	Fortification	Military	d				x
5	14682	Road Berm	Military	d				x
5	14683	Fence Support	Ranching	d				x
5	14684	Fence Support	Ranching	d				x
5	14685	Fence Support	Ranching	d				x
5	14686	Fence Support	Ranching	d				x
5	14687	Habitation	Inad. Hawaiian/Ranching	d	x	x		
5	14688	Corral	Ranching	d	x			
5	14689	Fortification	Military	d				x
5	14690	Marker	Historic	d				x
5	14691	Marker	Historic	d				x
5	14692	Fortification	Military	d				x
5	14693	Fortification	Military	d				x
5	14694	Fence Support	Ranching	d				x
5	14695	Marker	Historic	d				x
5	14696	Marker	Historic	d				x
5	14697	Fortification	Military	d				x
5	14698	Fortification	Military	d				x
5	14699	Target	Military	d				x
5	14700	Targets	Military	d				x
5	14701	Fortification	Military	d				x
5	14702	Fortification	Military	d				x
5	14703	Fortification	Military	d				x
5	14704	Fortification	Military	d				x
5	14705	Fortification	Military	d				x
5	14706	Fortification	Military	d				x
5	14707	Road Berm	Military	d				x
5	14708	Marker	Historic	d				x
5	14709	Fortification	Military	d				x
5	14710	Marker	Historic	d				x
5	14711	Marker	Historic	d				x
5	14712	Fortification	Military	d				x
5	14713	Fence Support	Ranching	d				x
5	14714	Fortification	Military	d				x
5	14715	Marker	Historic	d				x
5	14716	Fortification	Military	d				x
5	14717	Fortification	Military	d				x
5	14718	Fortification	Military	d				x

**Table 8
Site Function and Management Recommendations (continued)**

Quadrangle	SHP Number	Site Function	Cultural Period	Significance Criteria	Map	Excavation	Preservation	No Further Work
6	14719	Fortification	Military	d				x
6	14720	Target	Military	d				x
6	14721	Fortification	Military	d				x
6	14722	Fortification	Military	d				x
6	14723	Fortification	Military	d				x
6	14724	Fortification	Military	d				x
6	14725	Fortification	Military	d				x
6	14726	Habitation/fortification	Trad. Hawaiian/Military	d	x	x		x
6	14727	Fortification	Military	d				x
6	14728	Fortification	Military	d				x
6	14729	Road/Marker	Holohe	d				x
6	14730	Fence Support	Ranching	d				x
6	14731	Fence Support/fortification	Ranching/Military	d				x
6	14732	Fence Support	Ranching	d				x
6	14733	Road Berm	Military	d				x
6	14734	Fortification	Military	d				x
6	14735	Target	Military	d				x
6	14736	Fortification	Military	d				x
6	14737	Road Berm	Military	d				x
6	14738	Fortification	Military	d				x
6	14739	Fortification	Military	d				x
6	14740	Fortification	Military	d				x
6	14741	Habitation	Traditional Hawaiian	d	x	x		x
6	14742	Fortification	Military	d				x
6	14743	Fortification	Military	d				x
6	14744	Fortification	Military	d				x
6	14745	Targets	Military	d				x
6	14746	Fortification	Military	d				x
6	14747	Fortification	Military	d				x
6	14748	Fortification	Military	d				x
6	14749	Fence Support	Ranching	d				x
6	14750	Habitation	Traditional Hawaiian	d	x	x		
6	14751	Habitation	Traditional Hawaiian	d	x	x		
6	14752	Habitation/Burial	Traditional Hawaiian	c,d,e	x	x		
6	9012	Ranching/Boundary	Ranching	c,d	x	x		

meets the requirement of criterion c, it embodies "...the distinctive characteristics of a type, period, or method of construction..."

Forty-six sites are attributed to the military use of the area (excluding the Traditional Hawaiian site and the ranching site that were altered by military activity). Of these, 37 are small fortifications, five are target locations, and four are road berms. Eight sites are classified as historic markers: 14690, 14691, 14695, 14696, 14708, 14710, 14711, and 14715. These sites exhibit the characteristics of historic markers, e.g., exposed ground stain surfaces and recent breaks, but are not associated with military hardware and are not former fence post supports. The location and size of these markers, however, suggests that they are associated with the military use of the area. These sites are considered significant because they meet the requirement of criterion d, they have provided information important to the study of the military use of the area.

Site 14729 is the former route of the early Kawaihae-Waimea Highway. Included are a piled stone marker, the former roadbed, and basalt cobble revetment. The former highway route crosses the present highway into the study area at an elevation of 1350 ft, runs parallel to the present highway for a distance of approximately 2000 ft, and leaves the study area at an elevation of 1465 ft. This site is considered significant because it meets the requirement of criterion d, it has provided information regarding development of the area in during the early twentieth century.

IMPACTS AND MITIGATION MEASURES

Section 13-146-6 (a) (draft May 1989) provides four criteria to be used in assessing impacts to significant historic properties. These are:

1. "No effect". The project will have no effect on significant historic properties.
2. "Beneficial effect". A project will have a beneficial effect on significant historic properties if the project is to protect, exhibit, restore, or otherwise enhance these properties.

3. "Adverse effect". These effects include partial or total destruction, detrimental visual impingement, detrimental spatial impingement, and/or increasing access with chances of resulting damage.
4. "No adverse effect". This category applies only to cases where an historic property, significant solely for its information content, is planned to undergo data recovery to record and/or recover a reasonable and adequate amount of its significant information. Until data recovery is planned, one of the other three effects applies.

In the absence of a program to avoid or mitigate impacts, 75 historic properties (i.e., significant cultural resources) would be adversely effected by the proposed development within the Land of Ouli.

Mitigation of impacts to resources whose significance lies in their potential to yield information (criterion d) can be accomplished through a data recovery program. Of the 75 sites located within the project area, 73 are considered significant solely for their information content. Therefore, a data recovery program is an appropriate mitigation measure. The extent of the data recovery is directly related to the information available. Sixty-six of the sites considered significant for their information, i.e., research potential, are associated with the military or ranching use of the area. The types of sites recorded are limited in their research potential and are most useful in documenting the types of structures built and their distribution. This information has been collected and, therefore, no further archaeological work is recommended for these sites (see Table 8).

Six of the 73 sites considered significant for their information content have the potential to yield information concerning the Traditional Hawaiian use of the area. These sites include 14679, 14687, 14726, 14741, 14750, and 14751. Further research at sites 14687 will also provide additional information about the ranching period. Further research at a seventh site, site 14688, will compliment the information collected at 14687. It is recommended that a research design be developed and that a data recovery program be completed at these sites prior to development. The data recovery program should include a combination of detailed mapping and controlled excavation.

Mitigation of impacts to sites that are considered significant because of their distinctive characteristics (criterion c) or ethnic value (criterion e) cannot be achieved through a data recovery program. Site 14752 is considered significant for its distinctive characteristics and its ethnic value. Therefore, it is recommended that this site be avoided by the proposed development and be preserved. Site 9012 is also considered significant for its distinctive characteristics. It is recommended that this site also be avoided and preserved.

In summary, it is recommended that no further archaeological work be conducted at 66 sites, a data recovery program be completed at seven sites, and that two sites be preserved.

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**APPENDIX
SITE RECORDS**

SIHP SITE NUMBER: 05-14679

FORMAL TYPE: Midden, cairns.

FUNCTIONAL TYPE: Habitation/Fence support.

TEMPORAL ORIGIN: Pre-Contact/Post-Contact.

CULTURAL PERIOD: Traditional Hawaiian/Ranching.

DIMENSIONS: 50m x .50m (2500 sq m).

SETTING: Low relatively level ridge overlooking dry drainage to N-N/W. Elevation 1400 ft.

VEGETATION: Grasses (bunch); small unknown bush/shrub. Large agave to N/W ca. 100m.

FEATURES: The site consists of two rock structures located 1m apart. There is a light midden scatter on the surface covering an area of approximately 2500 sq m. Marine shells include *Cypraea*, *terebra*, and unidentified gastropod. There is also a light scatter of metal debris in the area. Included are rusted shrapnel fragments and M-1 carbine bullet casings. An isolated basalt flake tool was found on the surface 100m west of the site.

Feature A is a small rock cairn measuring 1m east-west by .75m NS and .50m high. The cairn was apparently much larger and was disturbed by removing the cobbles and boulders to construct Feature B. The feature was partially disassembled and no evidence of recent breakage or ground stain was seen. The cairn is generally rectangular, but its original size and shape cannot be determined.

Feature B is a larger cairn measuring 2.0m east-west by 1.75m NS and .50m high. The cobbles used to construct Feature B appear to have been taken from Feature A. Feature B was also partially disassembled and no recent breakage or ground stain were evident on the cobbles. This feature was more loosely constructed and a portion of a fence post was found in the feature.

The cobbles in Feature A are partially imbedded in the soil and the cobbles in Feature B are sitting on the surface.

SIHP SITE NUMBER: 05-14680

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 1m x 1m x .70m high.

SETTING: Located on a bluff overlooking Waikoloa River to North. Elevation 1185 ft.

VEGETATION: Grasses, unknown shrub, *koa* (small).

FEATURES: This site is located 50m east (mauka) of site 9012, the large stone wall forming the west (makai) boundary of the project area. The feature is oval shaped and the cobbles exhibit some recent breakage and ground stain. The feature is sitting on the soil surface, none are imbedded in the soil.

SIHP SITE NUMBER: 05-14681

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3.5m x 2m x .50m high.

SETTING: Located on the west facing slope of a ridge between Waikoloa River (south) and an unnamed drainage (north). Elevation 1195 ft.

VEGETATION: Grasses.

FEATURES: Site 14681 is a single C-shape structure situated on a rock outcrop 50m east (mauka) of site 9012. It measures 3.5m across the wings, 2m deep, and .50m high. It is open to the southwest. Some of the cobbles used to construct the feature display ground stain and recent breakage.

SIHP SITE NUMBER: 05-14682

FORMAL TYPE: Road berm.

FUNCTIONAL TYPE: Road berm.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military

DIMENSIONS: 38m long x 30cm high.

SETTING: Gentle southeast slope. Elevation 1190 ft.

VEGETATION: Grasses.

FEATURES: Site 14682 is a historic road berm. The road is overgrown with low grasses and is partially eroded. The berm is oriented east-west and extends for a distance of 38m.

SIHP SITE NUMBER: 05-14683

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 1.5m x 1.5m x 1.0m high.

SETTING: At end of NE/SW trending ridge, 200m east of Site 9012. Elevation 1200 ft.

VEGETATION: Grasses, *koa haole*, unidentified shrub.

FEATURES: This site consists of a single fence post support mound. It was constructed on top of a natural pahoehoe outcrop. Exposed ground stain and some recent breakage were noted on the cobbles.

SIHP SITE NUMBER: 05-14684

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 1m diameter x 70cm high.

SETTING: On top of a natural outcrop in the center of an intermittent drainage. Elevation 1230 ft.

VEGETATION: Low grass, shrubs.

FEATURES: Site 14684 is a single fence post support situated on a boulder outcrop. It measures 1m in diameter and .70m high. The stones used to construct the feature included some broken water-worn cobbles and some angular cobbles with ground stain.

SIHP SITE NUMBER: 05-14685

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 1m x 1m x 50cm.

SETTING: Located on a boulder outcrop on a low, west-facing ridge. Elevation 1215 ft.

VEGETATION: Lowland shrubs and grasses.

FEATURES: Site 14685 is a single cairn constructed of loosely piled pahoehoe cobbles. Ground stain was noted on the cobbles, but no recent breakage was evident.

SIHP SITE NUMBER: 05-14686

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact

CULTURAL PERIOD: Ranching.

DIMENSIONS: 1.5m diameter x 40cm high.

SETTING: Located on a southwest facing slope of a ridge between two drainages. Elevation 1220 ft.

VEGETATION: Grasses, low shrubs.

FEATURES: Site 14686 is a circular stone cairn constructed of pahoehoe cobbles. Ground stain was noted on the cobbles.

SIHP SITE NUMBER: 05-14687 (Figure A-1)

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Habitation.

TEMPORAL ORIGIN: Pre-Contact/Post-Contact.

CULTURAL PERIOD: Traditional Hawaiian/Ranching.

DIMENSIONS: 15m x 15m.

SETTING: On east-west trending ridge on north side of Waikoloa Gulch. Elevation 1245 ft.

VEGETATION: Grasses, small shrubs, *koa haole* trees to NW, agave to south.

FEATURES: The site consists of two adjacent walled enclosures. Midden remains (i.e., *Cypraea* shell fragments) and square nails were found within and surrounding the walls. Small paving gravel was found within the walls. Military debris, including shrapnel and mortar fragments, was also found at the site.

Feature A is the remnant of a rectangular structure measuring 12m x 14m. The walls range from .50m to .75m thick and they are 40m to .80m high. The east wall is 8.5m long, the north wall is 6.5m long, and the south wall is in two segments: 4m and 5m long.

Feature B is a rough circular structure west of the north wall. It measures 3.5m east-west by 4m north-south.

SIHP SITE NUMBER: 05-14688 (Figure A-2)

FORMAL TYPE: Enclosure.

FUNCTIONAL TYPE: Corral.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 50m x 50m.

SETTING: Just off ridge line in depression of major east-west drainage. Elevation 1210 ft.

VEGETATION: *Kiawe*, agave, banyan, grasses.

FEATURES: This site is a historic corral constructed using a natural U-shaped cliff opens to the west; a constructed wall extends northwest from the southern edge of the cliff face for 40m. A 20m long wall extends west from the northern portion of the cliff and then heads southwest to meet southern wall.

The walls range in thickness from .70m to 1.0m and range in height from .80m x 1.0m. The wall construction also includes natural boulder outcrops.

SIHP SITE NUMBER: 05-14689

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 5m x 50m.

SETTING: Located on a west-facing ridge finger south of Waikoloa River. Elevation 1255 ft.

VEGETATION: Grasses, *koa haole*, small shrubs.

FEATURES: Site 14689 consists of two features: a C-shape and a stone cairn. Rusted can fragments were found scattered in the site area.

Feature A is a circular mound of loosely piled pahoehoe cobbles. The mound is 2m in diameter and .75m high.

Feature B is a C-shape located 50m southwest of Feature A. The C-shape is open to the southwest and measures 2.75m wide, 1.0m deep, and .40m high.

SIHP SITE NUMBER: 05-14690

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Marker.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Historic.

DIMENSIONS: 1.5m x 1m x 60cm.

SETTING: On ridge south of Waikoloa Stream. Elevation 1270 ft.

VEGETATION: Lowland grasses and shrubs, *kiawe* trees between feature and stream.

FEATURES: Site 14690 is a single rock cairn constructed of pahoehoe cobbles stacked 3-high. Ground stain is evident on the cobbles, but no recent breaks are present, and no military debris is located nearby.

SIHP SITE NUMBER: 05-14691

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Marker.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Historic.

DIMENSIONS: .80m x .50m x .70m high.

SETTING: On low ridge above circular depression with six large *koa haole* trees to south. Road cut runs from east-west across north side of depression, 75m south of cairn. Elevation 1250 ft.

VEGETATION: Grasses, small unidentified shrub.

FEATURES: Site 14691 is a rock cairn constructed of pahoehoe cobbles. The long axis of the cairn is oriented east-west. Ground stain is evident on the cobbles, but there are no recent breaks on the cobbles or military hardware in the area.

SIHP SITE NUMBER: 05-14692

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 4m x 3m.

SETTING: Located on a west-facing ridge immediately south of a dry wash. Elevation 1250 ft.

VEGETATION: Grass, *kiawe*.

FEATURES: The site consists of a C-shape constructed of pahoehoe cobbles using a natural boulder outcrop to form part of the shelter. The wall of the C-shape is one to two cobbles wide and is loosely piled. The wall is .40m to 5.0m thick and ranges in height from .50m to 1.0m. It is open to the southwest. Military debris, including M-1 carbine cartridges, was noted on the surface. The C-shape is sitting on the surface of the soil, not imbedded; and ground stain was noted on the cobbles.

SIHP SITE NUMBER: 05-14693 (Figure A-3)

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 1m x 2m.

SETTING: Low east-west trending ridge south of a dry wash. Approximately 20m upslope from Site 14692. Elevation 1255 ft.

VEGETATION: Grasses, dead koa haole.

FEATURES: Site 14693 is a C-shape open to the west. It measures 2.1m across the wings, .80m deep, and .35m high. The wall of the structure is .30m thick. The cobbles used to build the structure exhibit some recent breakage and ground stain. Rusted metal fragments are lightly scattered in the area.

SIHP SITE NUMBER: 05-14694

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 2.0m x 1-3m.

SETTING: East-west trending ridge between two small drainages north and south. Elevation 1320 ft.

VEGETATION: Grasses, small unidentified shrub.

FEATURES: This site measures 2.0m north-south, 1.3m east-west, and .80 high. It is constructed of numerous small to medium size pahoehoe cobbles, many exhibiting exposed ground stains. Weathered, milled lumber was found within the feature and rusted tin cans were found nearby.

SIHP SITE NUMBER: 05-14695

FORMAL TYPE: Cairn

FUNCTIONAL TYPE: Marker.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Historic.

DIMENSIONS: 1.5m x 1.0m.

SETTING: Ridge top overlooking broad swale to south and west. Elevation 1280 ft.

VEGETATION: Grass.

FEATURES: This site is a rock cairn measuring 1.5m x 1.0m x .5m high. Ground stain is exposed on some of the cobbles, but there is no recent breakage. Also, there is no military debris in the vicinity of the cairn.

SIHP SITE NUMBER: 05-14696

FORMAL TYPE: Cairns.

FUNCTIONAL TYPE: Marker.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Historic.

DIMENSIONS: 2m x 10m.

SETTING: Top of knoll. Elevation 1270 ft.

VEGETATION: Bunch grass.

FEATURES: This site consists of two rock cairns situated 9m from one another. Feature A measures .5m in diameter and .4m high. Ground stain is evident on several boulders.

Feature B is also a cairn. It measures 1.0m north-south by 1.2m east-west. It is .5m high and is made of small to medium cobbles exhibiting some ground stain.

No historic debris, e.g., military hardware or rusted tin cans, were found in the area.

SIHP SITE NUMBER: 05-14697

FORMAL TYPE: Alignment.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 1.0m x 3.5m.

SETTING: Flat in broad swale. Elevation 1280 ft.

VEGETATION: Grasses, sparse *koa haole* nearby.

FEATURES: Site 14697 is an alignment 3.5m long by 1.0m wide and .87m high. It curves slightly with the inside of the curve open to the west. Ground stain and recent breakage are evident on the cobbles.

SIHP SITE NUMBER: 05-14698

FORMAL TYPE: Enclosures.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 5m x 12m

SETTING: On ridge top between up-slope from Site 14694. Elevation 1330 ft.

VEGETATION: Grasses, *koa haole*.

FEATURES: Site 14698 consists of two enclosures located 10m from one another. Feature A is a rectangular enclosure measuring 2.1m north-south by 1.4m east-west. The walls are composed of pahoe-hoe cobbles stacked a maximum of .55m high.

Feature B is a rectangular C-shape structure. It measures 1.7m north-south and 1.2m east-west. It is .3m high and recent breakage and ground stain are evident on some of the

cobbles. This feature is open to the west-southwest and is located 10m northwest of Feature A.

SIHP SITE NUMBER: 05-14699

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Target.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL ORIGIN: Military.

DIMENSIONS: 1m x 1.5m.

SETTING: On top of ridge between two small drainages. Elevation 1355 ft.

VEGETATION: Lowland grass and shrubs.

FEATURES: This site is a single rock cairn measuring 1m x 1.5m x .5m high. Recent breakage and ground stain are evident on the cobbles and military debris, e.g., rusted cans and shrapnel, is scattered in the area.

SIHP SITE NUMBER: 05-14700

FORMAL TYPE: Cairns.

FUNCTIONAL TYPE: Targets.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 1m x 3m x 70cm.

SETTING: On top of ridge.

VEGETATION: Lowland grasses and shrubs.

FEATURES: Site 14700 consists of two small cairns made of medium sized cobbles piled three stones high. Both cairns measure approximately 1m x 3m x .7m high. They are situated 10m from one another and the cobbles exhibit recent breakage and ground stain.

SIHP SITE NUMBER: 05-14701

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3m x 2m.

SETTING: On a west facing slope of a ridge 50m south of Waimea Kawa'ae Highway. Elevation 1365 ft.

VEGETATION: Lowland shrubs and grasses.

FEATURES: This site is a small well constructed C-shape open to the west (down slope). It measures 1.5m across the wings, 2m deep, and .75m high. It is constructed of small to medium sized cobbles. The cobble exhibit recent breakage and exposed ground stain. Broken glass and rusted metal debris are located down slope from the structure.

SIHP SITE NUMBER: 05-14702

FORMAL TYPE: Enclosure.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3.1m in diameter.

SETTING: On grassy ridge ca. 60m south of the Waimea-Kawaihae Highway.

VEGETATION: Grasses, small *koa haole* shrubs.

FEATURES: Site 14702 is a small circular enclosure constructed of a single line of medium size pahoehoe cobbles. The cobbles were not imbedded in the soil and ground stain was exposed. Metal fragments and an M-1 cartridge were found within the enclosure and an ammunition can lid was found 5m north of the enclosure.

SIHP SITE NUMBER: 05-14703 (Figure A-4)

FORMAL TYPE: Alignment.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3.2m long x .75m wide.

SETTING: Low ridge, grassy with lava rubble. Elevation 1400 ft.

VEGETATION: Grasses, small unidentified shrubs.

FEATURES: Site 14703 is a rock alignment 3.2m long by .75m wide. It is made of medium size cobbles piled two to three rocks high. Its maximum height is .45m. The alignment is oriented east-west and a small pile of rocks is located near the west end of the alignment. Military debris, e.g., rusted metal and rifle cartridges, are scattered throughout the area.

SIHP SITE NUMBER: 05-14704

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 2.5m x 1m.

SETTING: On top of a relatively prominent ridge. Elevation 1375 ft.

VEGETATION: Low grasses and shrubs.

FEATURES: This site is a single C-shape measuring 2.5m across the wings, 1m deep, and .4m high. The opening faces the northwest. It is made of small to medium size cobbles piled three to four high. The wall is .3m thick and the cobbles exhibit exposed ground stain.

SIHP SITE NUMBER: 05-14705

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 2.5m x 1.2m.

SETTING: On northeast facing slope. Elevation 1360 ft.

VEGETATION: Grasses.

FEATURES: This site is a C-shape situated on a relatively steep slope. The opening is facing east, i.e., up slope. The C-shape measures 2.5m across the wings, 1.2m deep, and .30 to .40m high. The wall thickness ranges from .30m to .40m and ground stain is exposed on several of the cobbles.

SIHP SITE NUMBER: 05-14706 (Figure A-5)

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 5m x 15m.

SETTING: Situated on the southwest facing slope of a broad ridge. Elevation 1350 ft.

VEGETATION: Grass, small unidentified shrubs.

FEATURES: The site consists of two features, a C-shape and a rock cairn. Feature A is a C-shape measuring 3.0m across the wings, 2.1m deep, and .8m high. The feature is open to the west and the southern portion of the feature makes use of a natural outcrop. It is constructed of medium to large cobbles.

Feature B is a small cairn located 10m east of Feature A. It is 1.0m in diameter and .55m high. Ground stain and recent breakage are evident on both features.

SIHP SITE NUMBER: 05-14707

FORMAL TYPE: Road berm.

FUNCTIONAL TYPE: Road berm.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 16m long x .35m wide.

SETTING: West facing slope along a low ridge. Elevation 1355 ft.

VEGETATION: Grasses.

FEATURES: Site 14707 is a single row of medium to large cobbles extending for a distance of 16m. The large cobbles are .35m across. The alignment is oriented east-west and the area appears to have been scraped.

SIHP SITE NUMBER: 05-14708

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Marker.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Historic.

DIMENSIONS: 1.6m x 1.0m.

SETTING: Near south boundary fence and dirt jeep road. Elevation 1350 ft.

VEGETATION: Grasses, *koa haole* shrubs.

FEATURES: This site is a small rock cairn measuring 1.6m north-south by 1.0m east-west. It is .4m high. Ground stain is exposed on the cobbles, but there is no evidence of breakage.

SIHP SITE NUMBER: 05-14709 (Figure A-6)

FORMAL TYPE: Alignment.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 5.5m x 1.3m.

SETTING: In low swale between two ridges and 10m from dirt road and fence line. Elevation 1380 ft.

VEGETATION: Grasses, low unidentified shrubs.

FEATURES: Site 14709 is a linear structure 5.5m long. It is .5m high and ranges in thickness from .7m to 1.3m. The structure is oriented northwest to southeast and some ground stain is exposed on the cobbles.

SIHP SITE NUMBER: 05-14710

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Marker.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Historic.

DIMENSIONS: 1.5m x 1.5m.

SETTING: On southwest facing slope of a broad ridge. Elevation 1375 ft.

VEGETATION: Low shrubs and grasses.

FEATURES: Site 14710 is a rock cairn 1.5m in diameter and .55m high. The cairn is constructed of loosely piled medium size pahoehoe cobbles on a natural boulder outcrop. Ground stain is exposed on the cobbles.

SIHP SITE NUMBER: 05-14711

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Marker.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Historic.

DIMENSIONS: 1m x 1m.

SETTING: On a relatively prominent ridge. Elevation 1415 ft.

VEGETATION: Low grasses and shrubs.

FEATURES: This site is a rock cairn measuring 1m in diameter and .5m high. It is constructed of medium size cobbles that exhibit exposed ground stain. The cobbles forming the base of the cairn are not imbedded in the soil.

SIHP SITE NUMBER: 05-14712

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 4m x 2m x 60cm.

SETTING: On a ridge between 2 small dissections.

VEGETATION: Lowland grasses and shrubs.

FEATURES: This site consists of a C-shape structure and a short wall segment. Also located at the site is an aerial photography target. Feature A is a C-shape measuring 4m across the wings and 2m deep. It is .6m high and makes use of a natural boulder outcrop. It is open to the southwest.

Feature B is a short wall segment located 8m east of Feature A. The wall segment is 1.5m long, 6m thick, and .6m high. The cobbles used to construct both of the features exhibit recent breakage and exposed ground stain. Considerable military debris, e.g., rusted metal, was found throughout the area.

The aerial photography target and a recent cobble cairn are situated between the two features. The cairn appears to have been constructed to hold a survey pole.

SIHP SITE NUMBER: 05-14713

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 2.0m x 2.0m.

SETTING: Swale between two east-west trending ridges. Elevation 1390 ft.

VEGETATION: Grasses, koa haole.

FEATURES: This site consists of a single rock cairn. It is roughly rectangular and measures 2.0m on a side and is .6m high. It was originally believed to be a possible burial cairn. It was subsequently disassembled and found to contain fragments of milled lumber and charred pieces of *kiawe*. The cobbles used to construct the cairn exhibited exposed ground stain.

SIHP SITE NUMBER: 05-14714 (Figure A-7)

FORMAL TYPE: Enclosure.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3.0m long x 1.80m wide.

SETTING: Low area of ridge trending east-west. Elevation 1410 ft.

VEGETATION: Grasses, *koa haole*.

FEATURES: Site 14714 is a small rectangular structure measuring 3.0m long and 1.8m wide at the south end and 1.6m wide at the north end. Its long axis is oriented north-south. It is constructed with a single row of cobbles, with one pahoehoe slab placed on edge. The slab stands .39m high.

Ground stain is exposed on the cobbles and there is considerable military debris in the area, including ammunition cans, cartridges, and rusted metal fragments.

SIHP SITE NUMBER: 05-14715

FORMAL TYPE: Cairns.

FUNCTIONAL TYPE: Marker.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Historic.

DIMENSIONS: 2m x 30m.

SETTING: Northwest facing slope between two broad ridges. Elevation 1405 ft.

VEGETATION: Low grasses and shrubs.

FEATURES: This site consists of three cobble cairns located within 10m of one another. They are aligned approximately north-south. All three are approximately 1.5m in diameter and .7m high. Ground stain is exposed on the cobbles but there is no evidence of breakage.

SIHP SITE NUMBER: 05-14716

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 1.5m x 2m.

SETTING: Northwest facing slope between two broad ridges. Elevation 1415 ft.

VEGETATION: Grass, *koa haole*.

FEATURES: This site is a single C-shape open to the southeast. It measures 2.0m across the wings, 1.4m deep, and .7m high. The wall of the structure is .5m thick of loosely piled, medium size cobbles. Ground stain and recent breaks are exposed on the cobbles.

SIHP SITE NUMBER: 05-14717 (Figure A-8)

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 5.35m x 2.3m.

SETTING: On east end of low ridge with structure open to west. Area within structure relatively level. Elevation 1445 ft.

VEGETATION: Grasses, unidentified small shrubs.

FEATURES: Site 14717 is a C-shape measuring 5.35m by 2.3m .. It is .5m high and is open to the west. It is rectangular-shaped rather than semi-circular. The cobbles at the base do not extend into the soil and ground stain is exposed on the cobbles.

SIHP SITE NUMBER: 05-14718

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 2m x 2m.

SETTING: West end of small ridge. Elevation 1440 ft.

VEGETATION: Grasses.

FEATURES: This site consists of two features: an irregular enclosure and a modified outcrop. Feature A is an enclosure that measures 1.8m north-south by 1.7m east-west. It is open to the west and has a maximum height of 1.5m.

Located at the west end of the southern wall is a natural boulder outcrop (Feature B). This outcrop has been modified by removing fractured pieces to construct the enclosure.

SIHP SITE NUMBER: 05-14719 (Figure A-9)

FORMAL TYPE: Enclosure.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 4.7m x 3.1m.

SETTING: On slope of southwest trending ridge. Elevation 1420 ft.

VEGETATION: Low shrubs and grasses.

FEATURES: This site is a rectangular enclosure measuring 4.7m by 3.1m. Its long axis is oriented north-south. It is constructed of small to medium size cobbles and the walls are .45m thick and .6m high. A wooden stick with a nail in it is imbedded in the east wall. There is a small 1m wide opening in the west wall near the corner at the south wall.

SIHP SITE NUMBER: 05-14720

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Target.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 1.70m x 1.30m.

SETTING: On a broad west trending finger of a southwest trending ridge. Elevation 1425 ft.

VEGETATION: Grasses.

FEATURES: Site 14720 is a single rock cairn measuring 1.7m east-west by 1.3m north-south. The down slope side of the cairn measures .9m high and the up slope side measures .3m high. Military hardware, e.g., rusted metal and cans, was noted in the area and the cobbles used to construct the feature exhibit recent breakage and ground stain.

SIHP SITE NUMBER: 05-14721 Figure A-10)

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 5m x 13m.

SETTING: Knoll top and outcrop 150m North of stream. Elevation 1435 ft.

VEGETATION: Grasses.

FEATURES: This site consists of three features: a modified outcrop, a circular enclosure, and a cairn. The features are aligned northeast to southwest. Feature A is a modified outcrop located at the northeast end of the complex. It is composed of a natural outcrop with cobbles piled against one side and two pahoehoe slabs leaning against the opposite side.

Feature B is a rock cairn composed of small to medium cobbles. It is approximately .5m in diameter and .5m high. Feature B is located 1m southwest of Feature A.

Feature C is a rectangular enclosure with rounded corners. It measures 4.2 m east-west and 3.8m north-south. The walls are .7m high and .5m to .7m thick. It is built adjacent to three outcrop boulders and is 2m southwest of Feature B.

Rusted metal fragments and cans were found near the features and the cobbles used to construct the features displayed recent breaks and ground stain.

SIHP SITE NUMBER: 05-14722

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: Ca. 2m across cusp.

SETTING: Located on southeast facing slope of southwest trending ridge. Elevation 1440 ft.

VEGETATION: Grasses.

FEATURES: Site 14722 is a C-shape measuring 2m across the wings and 1m deep. It is constructed of medium size cobbles stacked one to two high (ca.10-20cm). During a recent field check, two live hand grenades were found near the C-shape.

SIHP SITE NUMBER: 05-14723

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 8m x 32m.

SETTING: On slope of low east-west trending ridge. Elevation 1450 ft.

VEGETATION: Grasses, unidentified shrub.

FEATURES: This site consists of a complex of an alignment, a C-shape, and three cairns. Feature A is an alignment measuring 3m long by 1m thick, by .5m high. It is oriented north-south.

Feature B is a C-shape located 7m southwest of Feature A. The C-shape measures 2.2m across the wings, .9m deep, and .5m high.

Feature C is a cairn located 5m northwest of Feature A. It measures approximately 1m in diameter and .5m high.

Feature D is a cairn located 3m east of Feature A. It measures 1.5m by 1m by .5m high.

Feature E is a cairn located 25m northeast of Feature A. It measures 1m by .5m by .5m high.

The cobbles used to construct these features display exposed ground stain and recent breaks. Also, the cobbles forming the bases of the features are not imbedded in the soil. M-1 rifle cartridges and 50 cal. machine gun cartridges are scattered on the surface.

SIHP SITE NUMBER: 05-14724

FORMAL TYPE: Alignment.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 1m x 10m.

SETTING: Located on the south side of a broad, west-trending ridge. Elevation 1475.

VEGETATION: Low grasses and shrubs.

FEATURES: Site 14724 consists of a rock alignment extending in a north-south direction for a distance of 10m. It consists of a single row of boulders and large cobbles (ca. 30-40cm) running perpendicular to the ridge line. Cartridge cases and rusted metal debris were found scattered along the ridge.

SIHP SITE NUMBER: 05-14725

FORMAL TYPE: Wall.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 1.5m long x .50m wide.

SETTING: Located toward the west end of a broad, west-trending ridge. Elevation 1475 ft.

VEGETATION: Grasses.

FEATURES: This site is a single rock wall 1.5m long by .5m wide by .6m high. It was constructed of medium to large cobbles and is oriented approximately north-south (340 degrees). The cobbles exhibit exposed ground stain and some recent breakage.

SIHP SITE NUMBER: 05-14726

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Habitation/Fortification.

TEMPORAL ORIGIN: Pre-Contact/Post-Contact.

CULTURAL PERIOD: Traditional/Hawaiian/Military.

DIMENSIONS: 15m x 25m.

SETTING: Located along a narrow, west-facing ridge. Elevation 1480 ft.

VEGETATION: Grasses.

FEATURES: This site consists of two C-shapes and a rock cairn. The features are generally aligned on an axis of 240-60 degrees. Feature A is a cairn 1.5m in diameter and .35m high. It is constructed of medium to large cobbles.

Feature B is a C-shape located 10m west of Feature A. It measures 2.7m across the wings, 1.5m deep, and 1.1m high. It is rectangular-shaped and the cobbles were carefully stacked.

Feature C is a second C-shape located 8m west of Feature B. It is also rectangular-shaped and it measures 3.0m across the wings, 1.8m deep and .7m high.

Military debris was found scattered along the ridge. Included were M-1 carbine cartridge clips, mortar covers, and rusted metal fragments. Also found at the site, scattered over an area of 15m x 25m, were *Cypraea*, conus, and unidentified bivalve fragments.

SIHP SITE NUMBER: 05-14727 (Figure A-11)

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 4.5m x 2.2m.

SETTING: Located on narrow, northwest trending ridge. Elevation 1455 ft.

VEGETATION: Grasses, *koa haole*, *kiawe*.

FEATURES: Site 14727 is a single C-shape structure. It measures 4.5m wide across the wings, 2.2m deep, and .7m high. The wall has a maximum thickness of 1.2m. It is a semi-circular and ground stains and recent breakage are evident on some of the cobbles.

Military debris was found scattered along the ridge. Materials included an ammunition can lid, rusted metal fragments, and several unidentified pieces of equipment.

SIHP SITE NUMBER: 05-14728

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 5m x 15m.

SETTING: Located on broad west facing slope between two ridges. Elevation 1455 ft.

VEGETATION: Grasses, a few unidentified shrubs.

FEATURES: Site 14728 consists of two features: a rock cairn and a C-shape. The features are located within 10m of one another. Feature A is a cairn measuring 3m by 2m and .7m high. Its long axis is oriented northwest-southeast.

Feature B is a C-shape located 10m southeast of Feature A. The C-shape measures 2.7m across the wings, 1.5m deep, and .75m high. It is open to the southwest (ca. 230 degrees).

Both features exhibit recent breakage and exposed ground stain. Cartridge shells and rusted metal fragments were found scattered along the slope.

SIHP SITE NUMBER: 05-14729

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Road/Marker.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Historic.

DIMENSIONS: 1m diameter.

SETTING: Located in low area along northern boundary of the parcel. The old highway enters the parcel at an elevation of 1350 ft and extends inland to an elevation of 1475 ft.

VEGETATION: Grasses, small *koa haole*.

FEATURES: Site 14729 consists of a single rock cairn an remnant of the old Kawaihae-Waimea Highway. The road enters the study parcel at an elevation of 1350 ft and extends approximately 650m east, where it crosses the present highway at an elevation of 1475 ft. The width of the roadway averages 5.5m and it follows the southern, north-facing slope of a ridge system.

Located toward the east (mauka) end of the road extension, at an elevation of 1445 ft. is a rock cairn measuring 1m in diameter and .5m high. This cairn is located immediately north of the roadway near a basalt cobble revetment. The revetment faces north and provides support for the road as it crosses a swale. It measures 12.4m long, and 1.35m high. It is up to six courses high of angular and sub-angular basalt boulders.

SIHP SITE NUMBER: 05-14730

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 1m x 1m.

SETTING: Located near the inland end of the Kawaihae-Waimea Highway. Elevation 1470 ft.

VEGETATION: Grasses.

FEATURES: This site consists of a single cairn measuring 1.2m long, 1m wide, and .35m high. The cairn is constructed of four medium size cobbles and is aligned with sites 14731 and 14732, indicating that it served as a fence post support.

SIHP SITE NUMBER: 05-14731

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support/Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching/Military.

DIMENSIONS: 1.2m x 1m.

SETTING: Located in a narrow saddle of a southwest trending ridge. Elevation 1470 ft.

VEGETATION: Low grasses and shrubs.

FEATURES: Site 14731 is a rock cairn built adjacent to a boulder outcrop. It measures 1.2m by 1m and it is .5m high. Military debris, e.g., hand grenade pins and cartridge cases, were found scattered nearby.

The feature is aligned with sites 14730 and 14732, and the cobbles used to construct the feature exhibit exposed ground stain and recent breakage.

SIHP SITE NUMBER: 05-14732

FORMAL TYPE: Cairns.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 2m x 12m.

SETTING: Located at the southern side of a broad ridge. Elevation 1470 ft.

VEGETATION: Low shrubs and grasses.

FEATURES: Site 14732 consists of three cairn aligned with sites 14730 and 14731. These cairns measure approximately 1m in diameter and .4m high. The cairns are situated 6m from one another and the southern most cairn contains a weathered fragment of milled lumber.

SIHP SITE NUMBER: 05-14733

FORMAL TYPE: Road berm.

FUNCTIONAL TYPE: Road berm.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 4.5m long x 1.25m wide.

SETTING: Located on a broad, west-facing slope. Elevation 1480 ft.

VEGETATION: Grasses, *koa haole*.

FEATURES: This site is a linear rock feature 4.5m long by 1.25m wide by .5m high. It follows what appears to be an early scraped roadway leading to the east (mauka) property boundary. The scraped area is eroding and is somewhat overgrown with grasses.

SIHP SITE NUMBER: 05-14734

FORMAL TYPE: Alignment.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3m x .35m.

SETTING: Located on the west-facing slope of a broad ridge. Elevation 1495 ft.

VEGETATION: Low grasses and shrubs.

FEATURES: Site 14734 is an alignment 3m long by .35m wide and .7m high. It is oriented northwest-southeast and was constructed of medium to large cobbles. Ground stain and recent breakage are exposed on the cobbles.

SIHP SITE NUMBER: 05-14735

FORMAL TYPE: Modified outcrop.

FUNCTIONAL TYPE: Target.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3m x 2m.

SETTING: Located on a broad, west-facing ridge. Elevation 1505 ft.

VEGETATION: Grasses.

FEATURES: Site 14735 is a modified outcrop. It consists of medium sized cobbles stacked .7m high against a boulder outcrop. Recent breakage is exposed on the cobbles and M-1 carbine cartridges were found scattered around the feature.

SIHP SITE NUMBER: 05-14736

FORMAL TYPE: C-shapes.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 20m x 20m.

SETTING: Located on the south facing slope of a broad, west-trending ridge. Elevation 1505 ft.

VEGETATION: Grass, unknown shrub.

FEATURES: Site 14736 consists of four C-shape structures. Feature A measures 7m across the wings, 3m deep, and .55m high. It is seem-circular and it is open to the west.

Feature B measures 2.5m across the wings, 1.5m deep, and .6m high. Feature B is located 5m east of Feature A and it is open to the southwest.

Feature C is 2m northeast of Feature B. It measures 3m across the wings, 1.5m wide, and 1.3m high. It is open to the southwest.

Feature D is 2m northeast of Feature C. It measures 2.8m across the wings, 2.5m deep, and .55m high. It is open to the southwest.

All of the features are semi-circular in shape and Features B, C, and D are aligned along a northeast-southeast axis. Military debris, including bullets and bullet shell casings were found near Features B and D.

SIHP SITE NUMBER: 05-14737

FORMAL TYPE: Road berm.

FUNCTIONAL TYPE: Road berm.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3m x .5m.

SETTING: Located in low area between two west-trending ridges. Elevation 1490 ft.

VEGETATION: Grasses.

FEATURES: This site is a small alignment measuring 3m long, .5m wide, and .5m high. It is oriented along a northwest-southeast axis (330-150 degrees) and is located along the edge of a cleared area on a low ridge. The cleared area is overgrown with low grasses and there is considerable rusted metal debris in the area.

SIHP SITE NUMBER: 05-14738

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3m x 12m.

SETTING: On the west-facing slope of a broad ridge. Elevation 1510 ft.

VEGETATION: Grasses.

FEATURES: This site is a large C-shape structure measuring 5m across the wings, 2m deep, and .66m high. The wall is .3m thick. It is semi-circular and is open to the west. The cobbles that make up the base of the C-shape are imbedded in the soil, but there is no midden present.

A second feature, a modified outcrop, is located 6m west of the C-shape. This consists of two boulders with cobbles stacked on top. Located between the C-shape and the modified outcrop are M-1 carbine cartridges and rusted metal fragments. The cartridges are stamped with "LC42" and "LC43".

SIHP SITE NUMBER: 05-14739

FORMAL TYPE: Modified outcrops.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 2m x 7m.

SETTING: Located in the saddle of a small, west-facing ridge. Elevation 1485 Ft.

VEGETATION: Grasses.

FEATURES: Site 14739 consists of two modified outcrops with a surface scatter of M-1 cartridge casings. The outcrops are located adjacent to one another and each has small cobbles placed on top and between the boulders. The M-1 carbine casings are stamped with "FA37".

SIHP SITE NUMBER: 05-14740

FORMAL TYPE: Modified outcrop.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 4m x 3m.

SETTING: In broad, southwest-facing valley between two ridges. Elevation 1465 ft.

VEGETATION: Low shrubs, grasses, cactus.

FEATURES: This site consists of a boulder outcrop that has been modified by stacking medium sized cobbles against the east side of the boulders. The resulting structure measures 4m long by 3m to 4m across and exhibit exposed ground stain and recent breaks.

SIHP SITE NUMBER: 05-14741 (Figure A-12)

FORMAL TYPE: Overhang shelter.

FUNCTIONAL TYPE: Habitation.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Traditional Hawaiian.

DIMENSIONS: ca. 10m x 10m.

SETTING: Located on narrow, southwest-trending ridge. Elevation 1460 ft.

VEGETATION: Grasses, *koa haole*.

FEATURES: Site 14741 is a small overhang shelter located on a south-facing slope. Pahoehoe cobbles are located in front of the shelter and unidentified shell fragments were noted within the overhang. The overhang measures 3m long and extends into the cliff 1m to 2m.

SIHP SITE NUMBER: 05-14742

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 3m long x 2.1m wide x 1m high.

SETTING: On narrow, southwest-trending ridge. Elevation 1465 ft.

VEGETATION: Low shrubs, grass.

FEATURES: This site consists of a single C-shaped structure situated on a narrow ridge. It makes use of a natural boulder outcrop and forms a semi-circular structure open to the west. It measures 3m across the wings (including the boulder outcrop), 2.1m deep, and 1m high. Cartridge casings were found on the surface near the structure.

SIHP SITE NUMBER: 05-14743

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 15m x 25m.

SETTING: Located along a narrow, southwest trending ridge. Elevation 1470 ft.

VEGETATION: Grasses, *koa haole*, unknown shrubs.

FEATURES: Site 14743 consists of two rock alignments and four C-shape structures. The two alignments are slightly curved with the concave side facing southwest.

Feature A is an alignment measuring 3m long by 1m wide and .55m high. Feature B is located 20m south of Feature A and measures 3.2 long by 1m wide and .5m high.

Features C, D, E, and F are semi-circular C-shaped structures. Feature C measures 2.8m across the wings by 1.6m deep and .6m high. It is located 2m from Feature B at a compass heading of 275 degrees.

Feature D measures 5.5m across the wings by 2.5m deep and 1m high. It is located 6m from Feature B at a compass heading of 320 degrees.

Feature E measures 6m across the wings by 3m deep and 1m high. It is located between Features A and B, approximately 15m from Feature B.

Feature F measures 2.5m across the wings by 1.5m deep and .7m high. It is located 3m from Feature B at a compass heading of 325 degrees.

As with other military features in the area, the cobbles and boulders used in construction display exposed ground stain and recent breaks.

SIHP SITE NUMBER: 05-14744

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 15m x 15m.

SETTING: Located on a narrow, southwest-facing finger of a broad ridge. Elevation 1505 ft.

VEGETATION: Low grasses and shrubs.

FEATURES: Site 14744 consists of two features: a circular structure and a rock cairn. Feature A is an elongated circular structure measuring 5m east-west by 3.5m north-south. It consists of a single row of medium to large cobbles. Rusted metal fragments were found within the feature. What appears to be a small impact crater is located 2m south of the feature.

Feature B is a cairn measuring 1m in diameter by .65m high. It is located 10m northwest of Feature A.

SIHP SITE NUMBER: 05-14745

FORMAL TYPE: Cairns.

FUNCTIONAL TYPE: Targets.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 30m x 30m.

SETTING: Located on a relatively flat ridge, overlooking a dry wash. Elevation 1500 ft.

VEGETATION: Grasses.

FEATURES: Site 14745 consists of five low cairns. Four of the cairns form a quadrangle 25m on a side. The fifth cairn is located 10m northwest of the group. The position of four of the cairns suggests that they may have supported poles of a temporary structure. The cairns range in height from .5m to 1m and are 1m to 1.5m in diameter.

They were constructed of small to medium pahoehoe cobbles and sit on exposed bedrock or soil. Ground stain is exposed on many of the cobbles and recent breakage is evident. Spent bullets, cartridge casings, and rusted metal shrapnel is scattered throughout the area.

SIHP SITE NUMBER: 05-14746

FORMAL TYPE: C-shape.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 2.1m x 1.8m.

SETTING: Located on a broad, southwest-trending slope. Elevation 1500 ft.

VEGETATION: Grasses.

FEATURES: Site 14746 is a single C-shape measuring 2.1m across the wings, 1.8m deep, and .3m high. It is situated across a gully from Site 14745. Rusted metal was found on the surface around the feature and between the feature and the gully.

SIHP SITE NUMBER: 05-14747

FORMAL TYPE: Complex.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 4.0m x 1.9m deep x .50m high.

SETTING: Located on a broad, west-facing ridge. Elevation 1505 ft.

VEGETATION: Grass, unknown shrub.

FEATURES: Site 14747 is a large C-shape structure situated on a broad ridge. The structure measures 4m across the wings by 1.9m deep and .5m high. It is semi-circular in shape and the southern wing appears to have been disturbed, perhaps by a bulldozer. The structure is open to the west and military hardware and rusted cans were found in the vicinity. The cobbles used to construct the feature exhibit recent breaks and exposed ground stain.

SIHP SITE NUMBER: 05-14748

FORMAL TYPE: Walls.

FUNCTIONAL TYPE: Fortification.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Military.

DIMENSIONS: 2m x 20m.

SETTING: Located on the south-facing slope of a broad ridge, overlooking a narrow gully. Elevation 1525 ft.

VEGETATION: Grasses.

FEATURES: This site consists of two walls located 10m from one another. Both walls run parallel to the ridge and adjacent gully. They are constructed by filling the space between natural outcrop boulders with cobbles and small boulders. Each wall is approximately 3m long and 1m high and the cobbles and boulders used in construction exhibit recent breakage and exposed ground stain.

Located east of the walls is a rusted oil drum that was used as a target. It contains numerous bullet holes and was weighed down with small rock debris.

SIHP SITE NUMBER: 05-14749

FORMAL TYPE: Cairn.

FUNCTIONAL TYPE: Fence support.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

DIMENSIONS: 1.3m diameter.

SETTING: Located on top of a broad ridge where it splits into two narrow ridges. Elevation 1515 ft.

VEGETATION: Lowland grasses and shrubs.

FEATURES: This site consists of a single rock cairn. The cairn measures 1-3m in diameter by .45m high. It is constructed of medium sized cobbles on exposed bedrock. The cobbles exhibit exposed ground stain.

SIHP SITE NUMBER: 05-14750 (Figure A-13)

FORMAL TYPE: Overhang shelter.

FUNCTIONAL TYPE: Habitation.

TEMPORAL ORIGIN: Pre-Contact.

CULTURAL PERIOD: Traditional Hawaiian.

DIMENSIONS: Overhang 6m long, 1.5m deep, relatively flat area in front measures 7m x 7m.

SETTING: North edge of Keanuimano Stream in broad channel. Elevation 1530 ft.

VEGETATION: Grasses, shrubs (koa haole and unknown).

FEATURES: This site is an overhang shelter located at the edge of the stream bed. The opening faces the stream to the southwest. Cypraea and unidentified bivalves are on the surface within the shelter and on the slope outside of the shelter. The shelter sits approximately 2m above the stream bed and there is an accumulation of soil. Fragments of coral were also found in front of the shelter as well as up stream from the shelter.

SIHP SITE NUMBER: 05-14751 (Figure A-14)

FORMAL TYPE: Overhang shelter.

FUNCTIONAL TYPE: Habitation.

TEMPORAL ORIGIN: Pre-Contact.

CULTURAL PERIOD: Traditional Hawaiian.

DIMENSIONS: 12m x 12m.

SETTING: Drainage edge (south side) of fork leading into Keanuiomanu Stream. Elevation 1475 ft.

VEGETATION: *Koa haole*, grasses.

FEATURES: Site 14751 is an overhang shelter. The shelter measures 12m wide by 1m to 2m deep. It has a maximum height at the drip line of 1.5m. Located in front of the shelter is a flat area measuring 10m east-west by 7m north-south.

The shelter faces northwest and there is some accumulation of soil. Located within the shelter and on the flat area outside of the shelter are fragments of *kukui* shells, *Cypraea*, and coral.

SIHP SITE NUMBER: 05-14752 (Figure A-15)

FORMAL TYPE: Lava tube shelter.

FUNCTIONAL TYPE: Habitation/Burial.

TEMPORAL ORIGIN: Pre-Contact.

CULTURAL PERIOD: Traditional Hawaiian.

DIMENSIONS:

SETTING: A small knoll created by a lava bubble. Elevation 1175 ft.

VEGETATION: Grasses.

FEATURES: Site 14752 is a lava tube shelter consisting of two chambers. There is some soil accumulation within the shelter. The soil is very fine, light to medium brown silt. The entrance faces south and measures 1m in diameter and the entire shelter measures 11m east-west and 7m north-south. Except at the edges of the shelter, where the roof meets the floor, the ceiling ranges from .5m to 1.25m high. To the right (mauka) of the entrance is a waterworn cobble, and several angular pahoehoe cobbles, and fragments of gourd, coconut shell, and marine shells. A human long bone fragment (ulna) was found leaning against the east walls.

Located to the left of the entrance is the largest chamber. Within the center of the chamber is scatter of angular pahoehoe cobbles. On the soil surrounding the cobbles are *Cypraea*, *patella (opihi)*, unidentified marine shell, gourd fragments, and waterworn pebbles.

SIHP SITE NUMBER: 05-9012

FORMAL TYPE: Wall.

FUNCTIONAL TYPE: Ranching/Boundary.

TEMPORAL ORIGIN: Post-Contact.

CULTURAL PERIOD: Ranching.

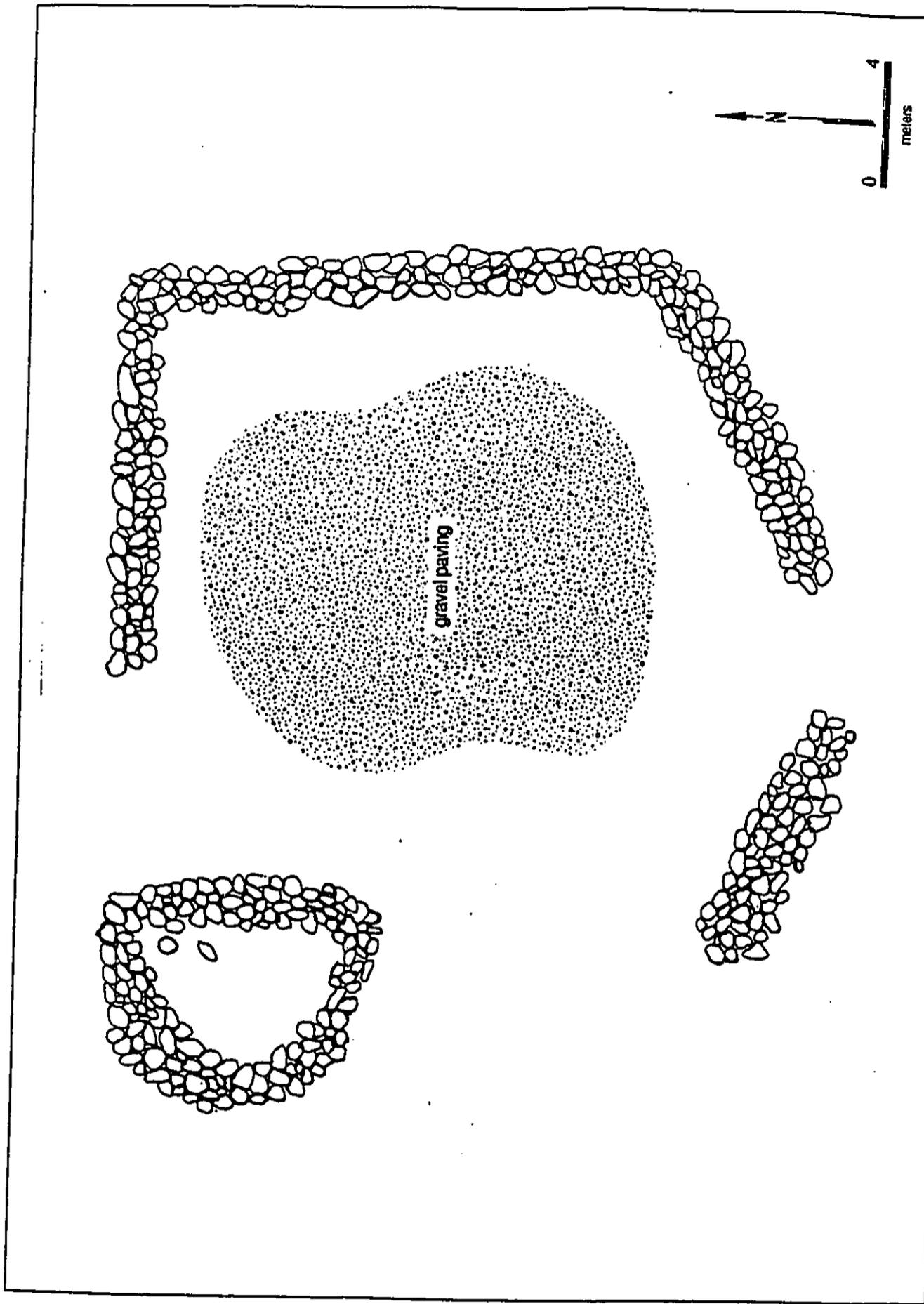
DIMENSIONS: Average height ca. 1m x 4000m long (continuous).

SETTING: Extends south from highway for a considerable distance. Elevation ranges from 1140 ft to 1190 ft.

VEGETATION: Grasses, *kiawe*, *koa haole*.

FEATURES: This site is a historic wall built in the late 1800s. It forms the west (makai) boundary of the property and runs from Kawaihae-Waimea Highway south for several kilometers. It is finely stacked and faced 2-3 boulders thick and up to 7 courses high. Within the current project it ranges from 1m to 1.5m and averages 1m thick.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



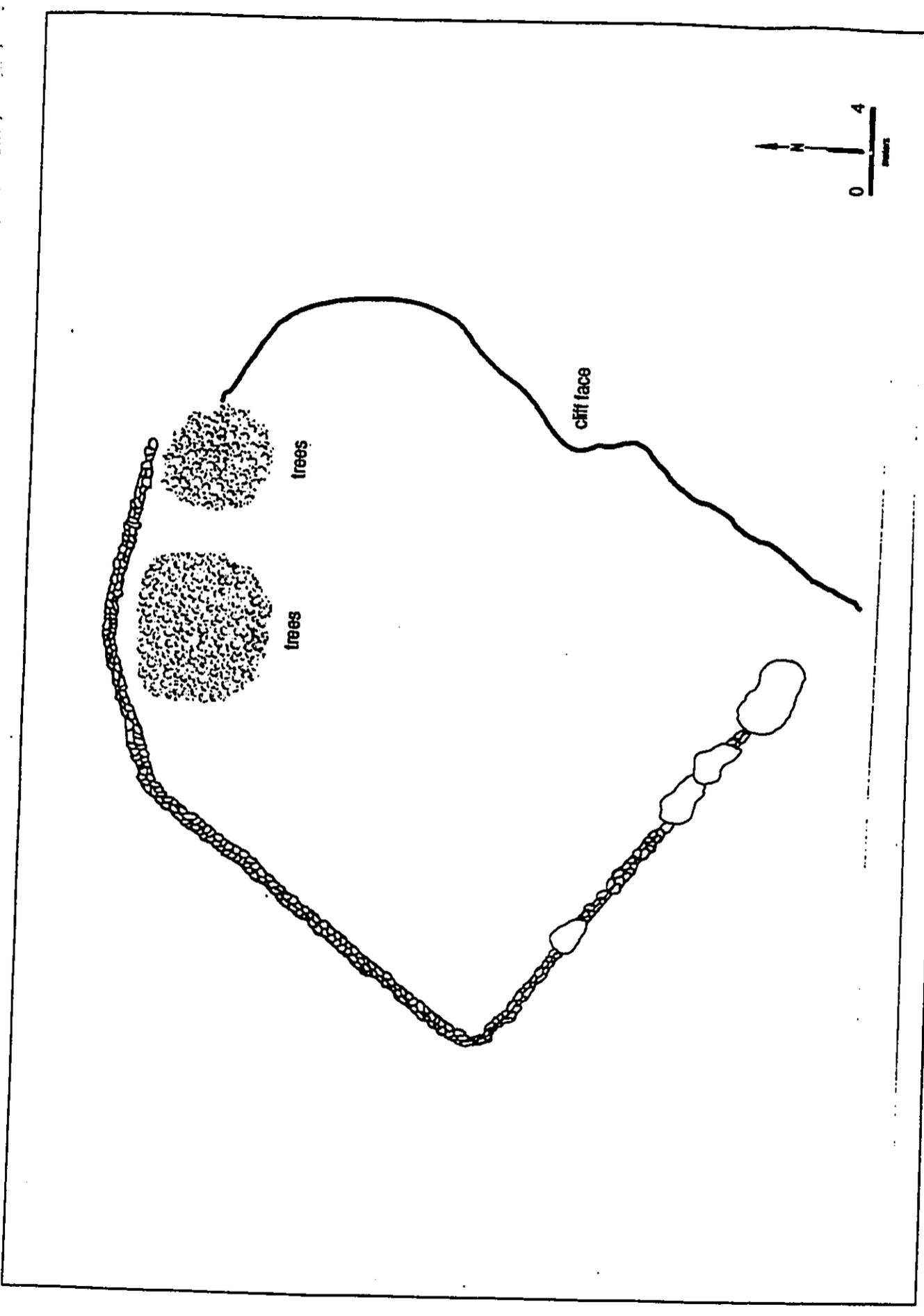
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Enclosures Site 5-14687

FIGURE

A-1

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

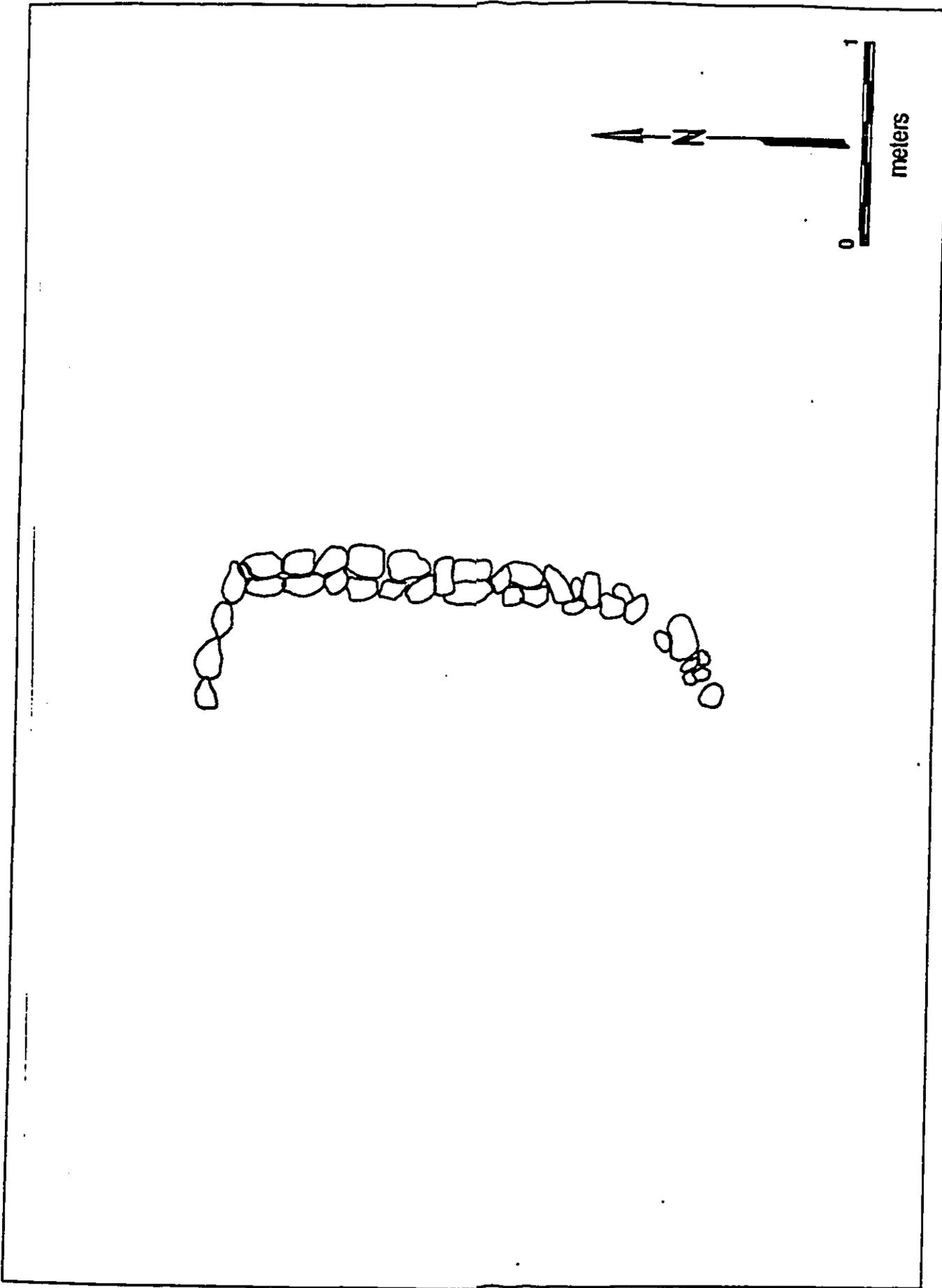


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Animal Enclosure Site 5-14688

FIGURE

A-2

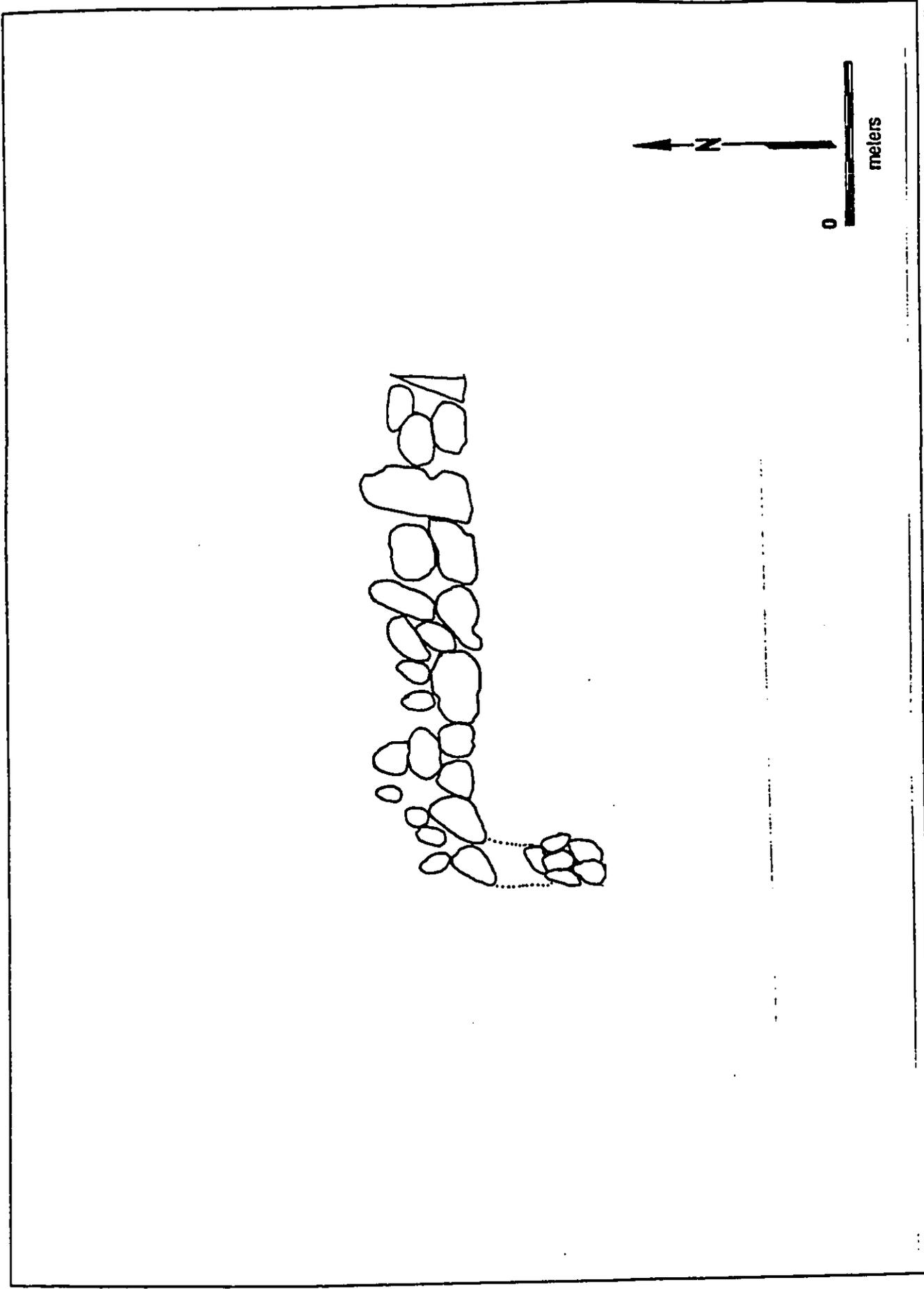


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Plan View Site 5-14693

FIGURE

A-3

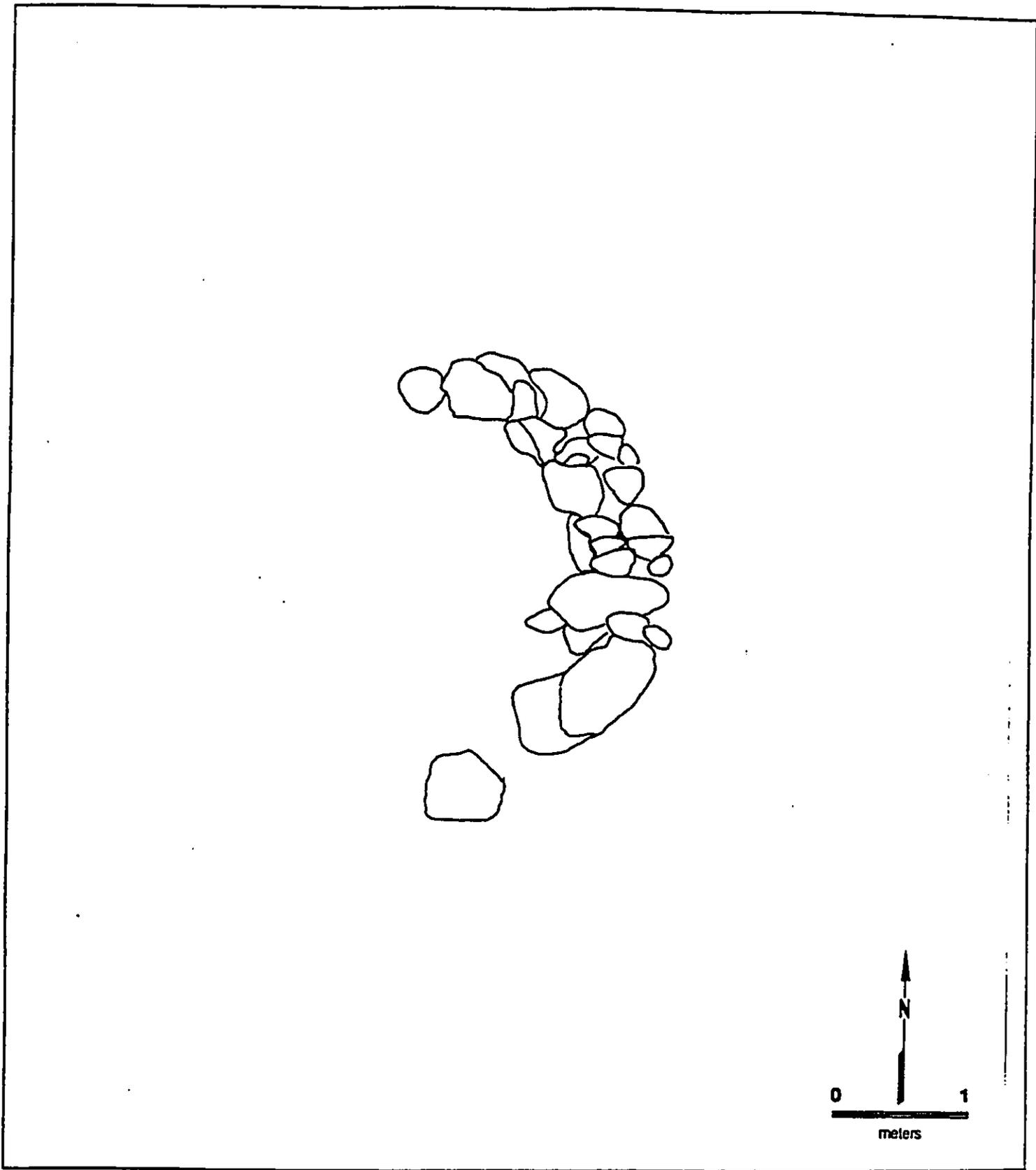


FIGURE

A-4

Plan View Site 5-14703

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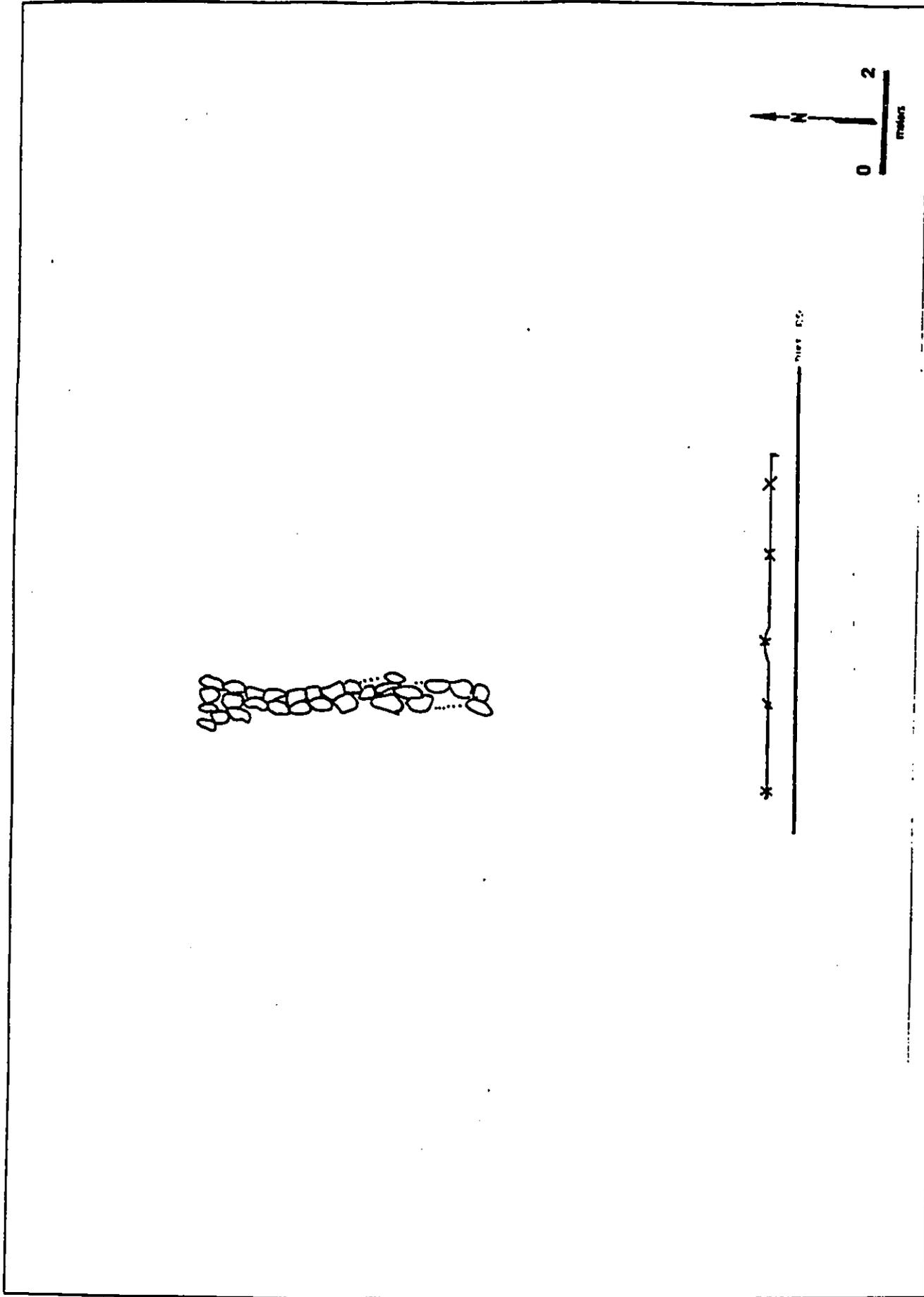
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Plan View Site 5-14706

FIGURE

A-5

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99



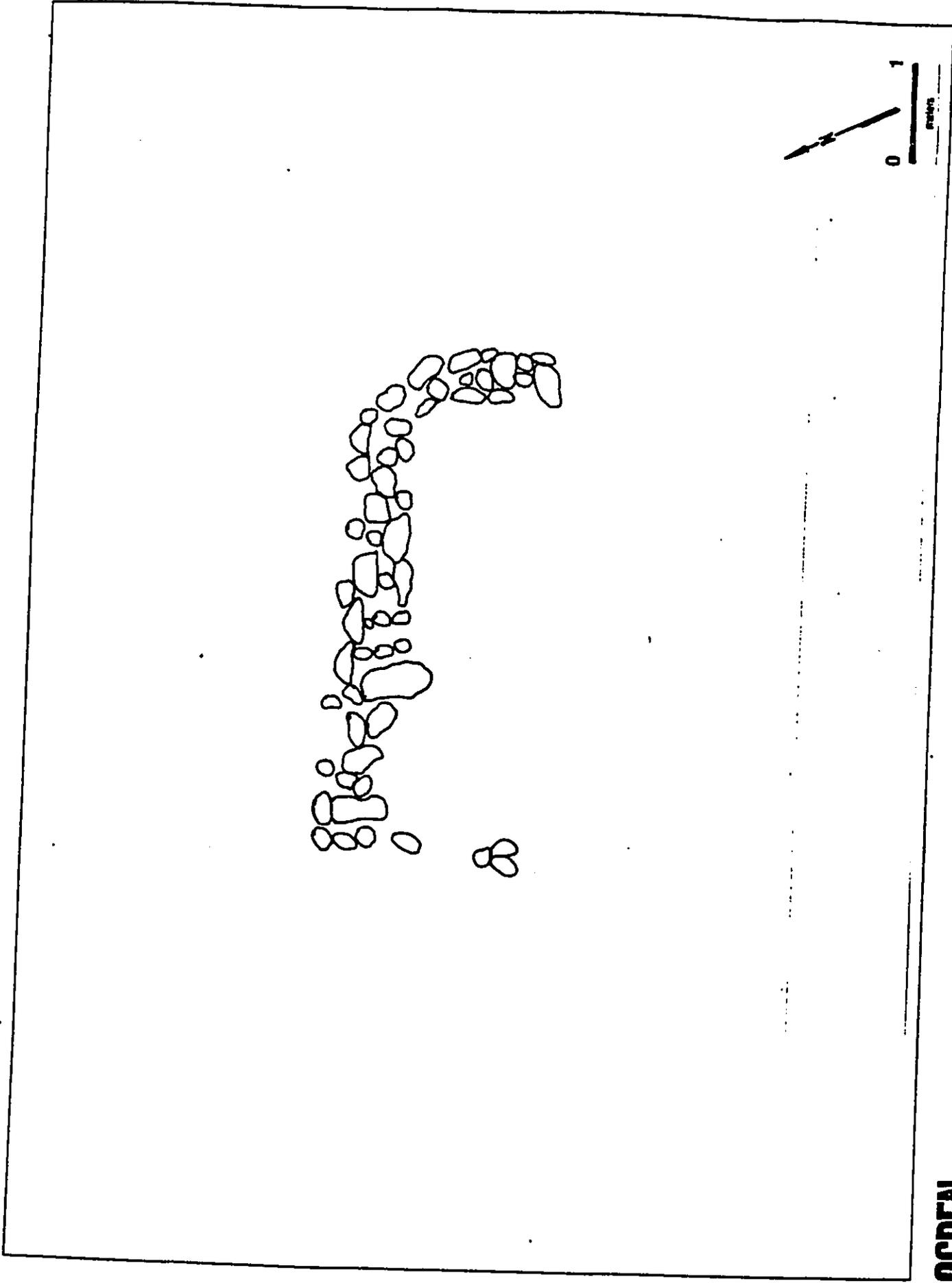
FIGURE

Plan View Site 5-14709

A-6

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



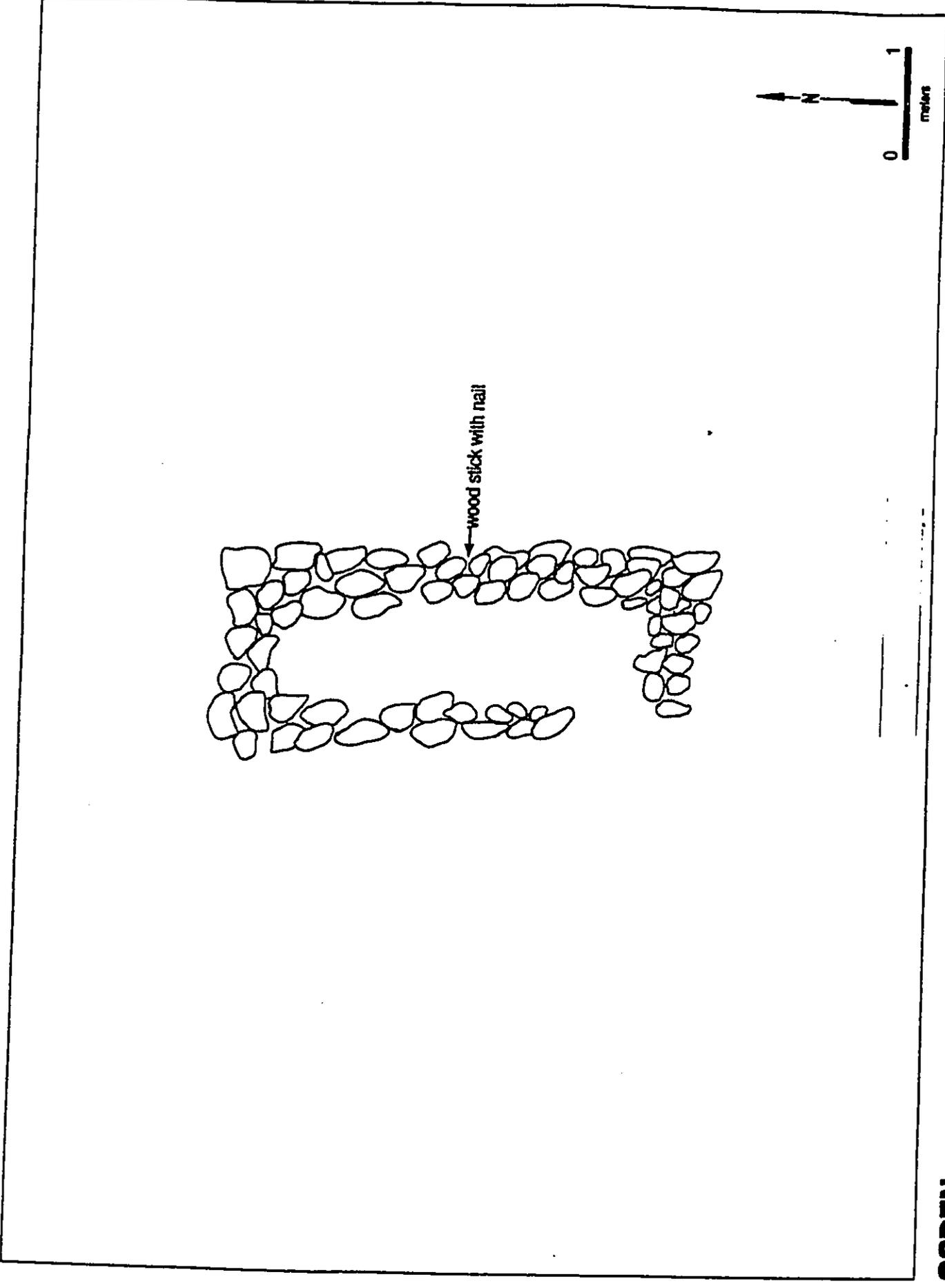
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Plan View Site 5-14717

FIGURE

A-8

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



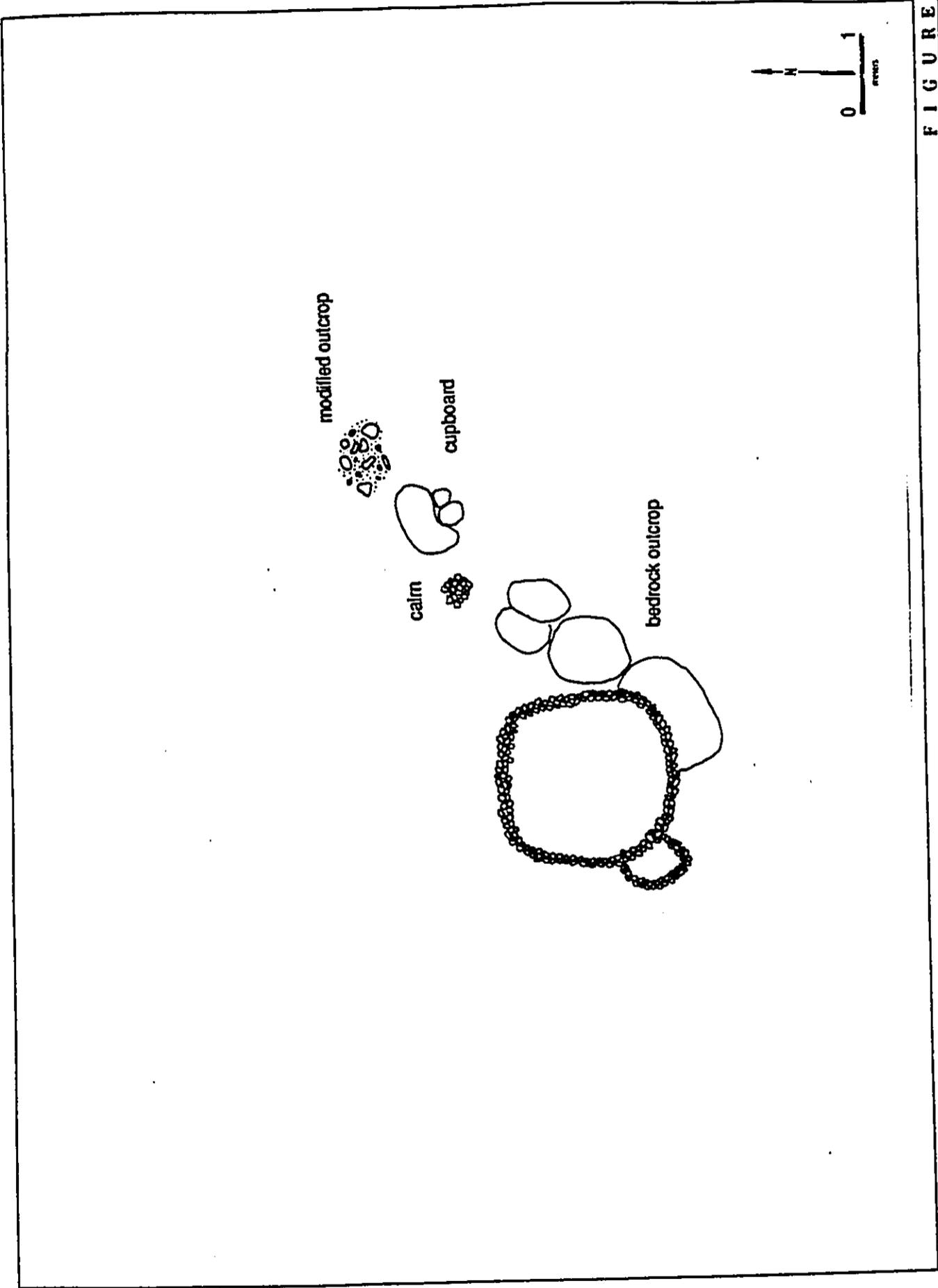
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Enclosure Site 5-14719

FIGURE

A-9

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000

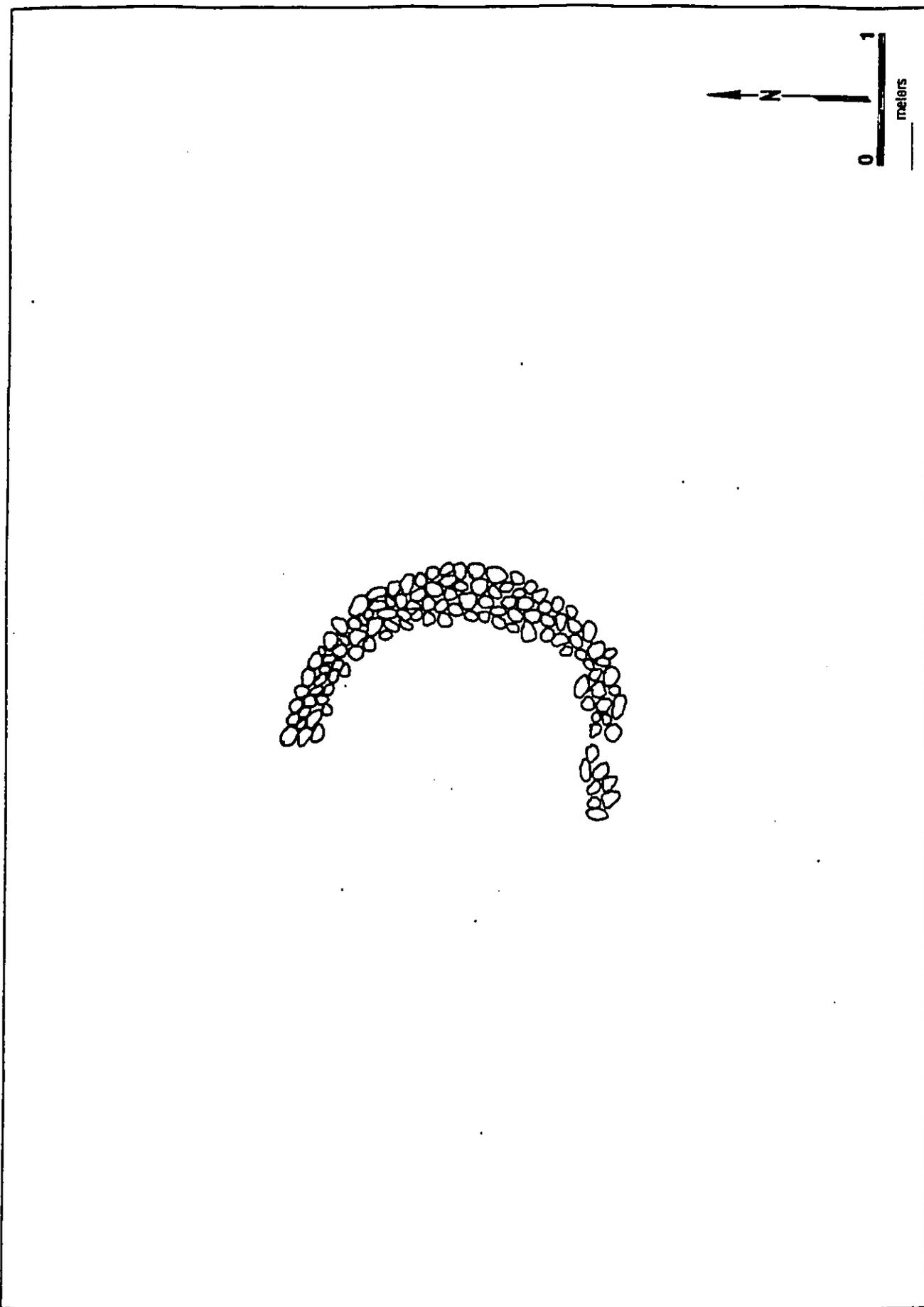


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Enclosure and Associated Features Site 5-14721

FIGURE
A-10

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

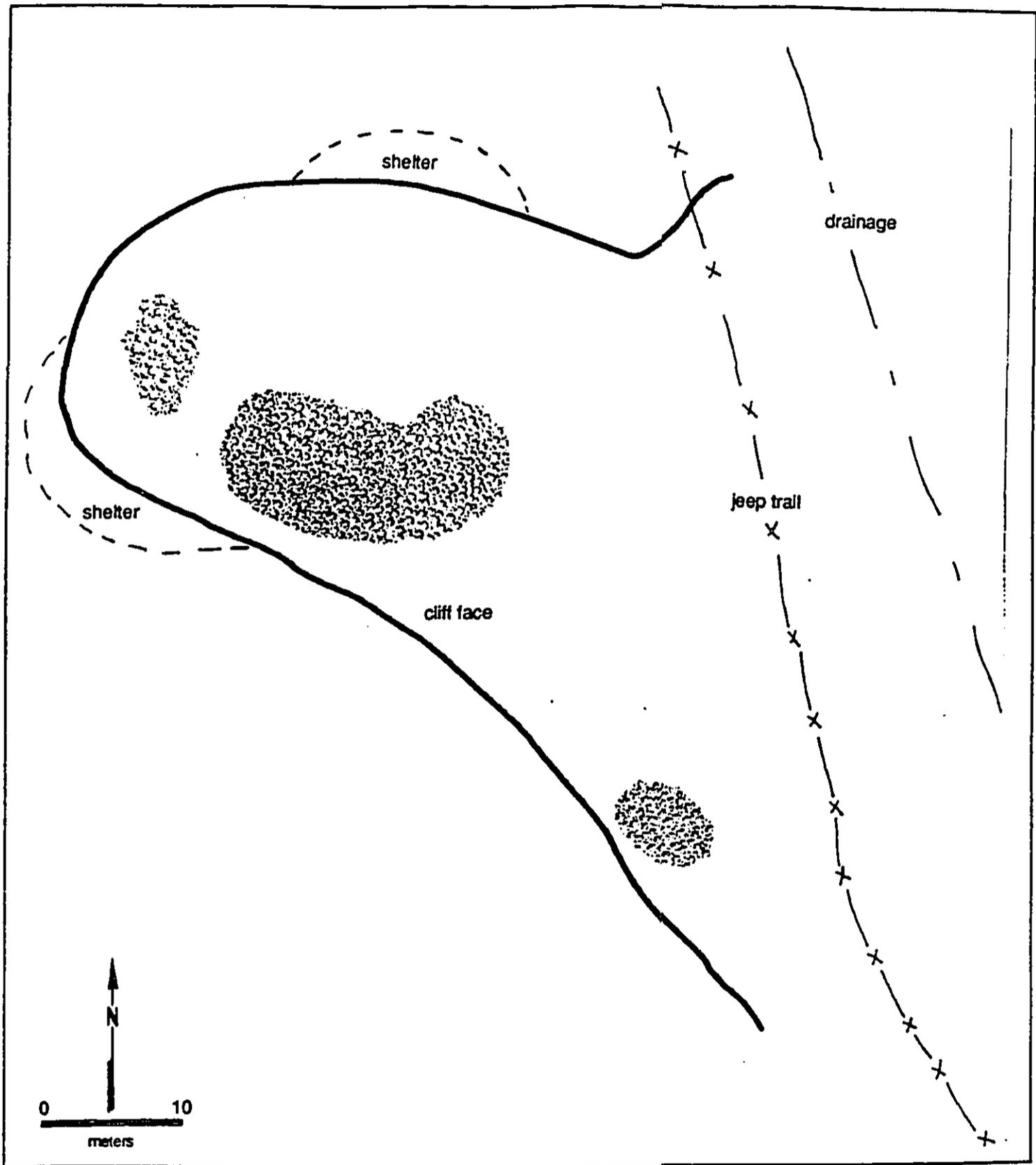


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C-Shape Site 5-14727

FIGURE

A-11

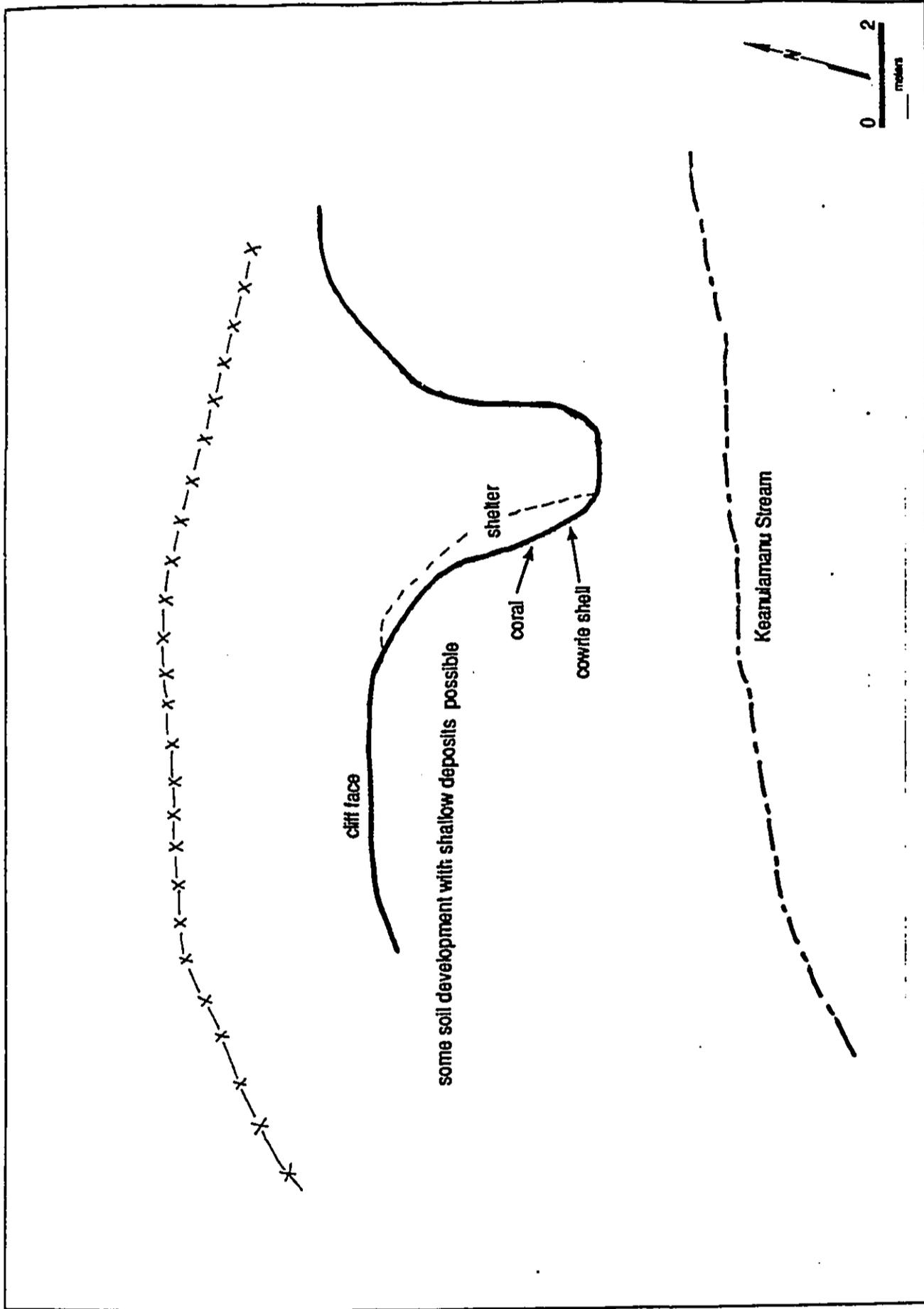


FIGURE

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Shelters Site 5-14741

A-12

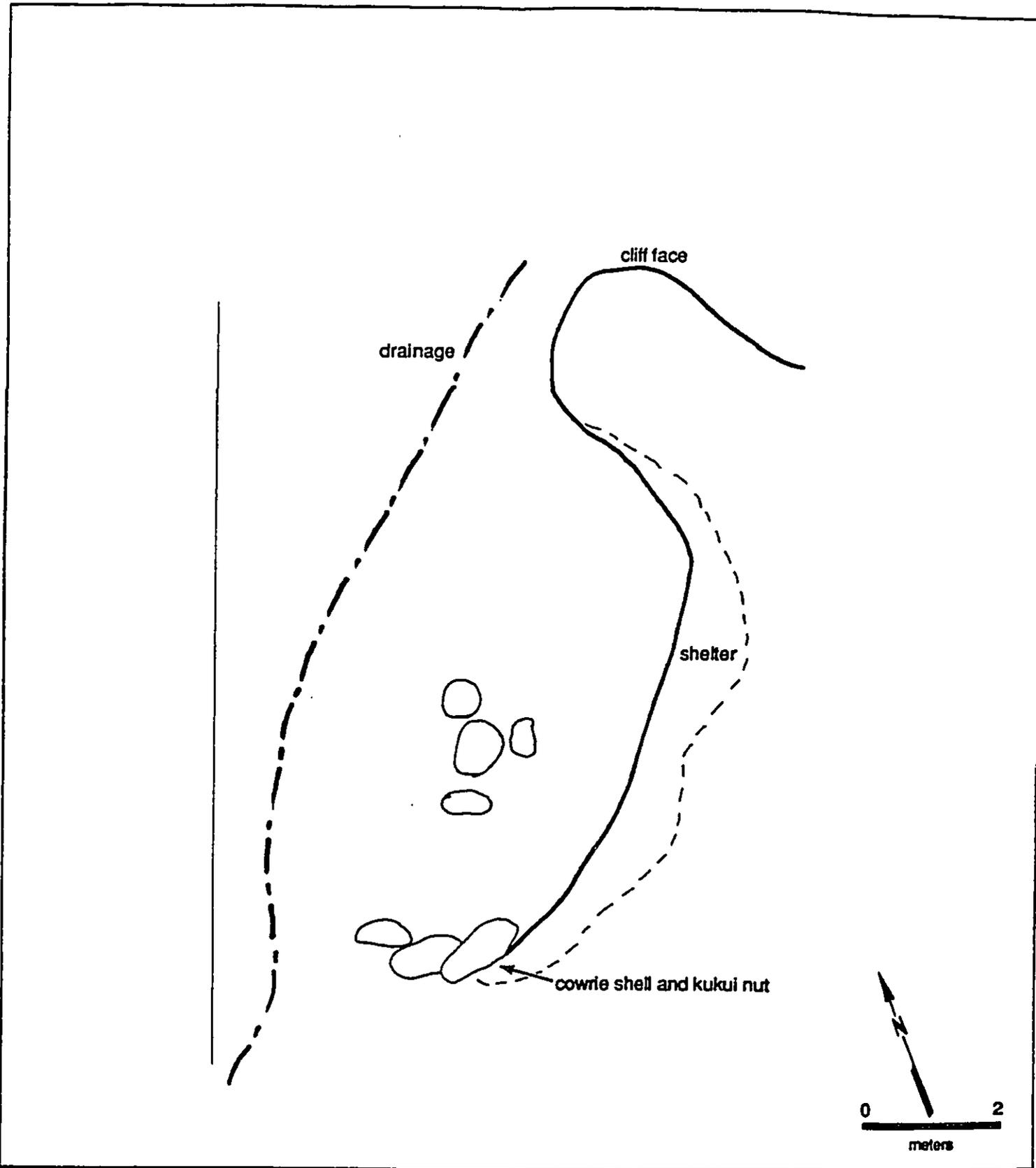


FIGURE

A-13

Shelter Site 5-14750

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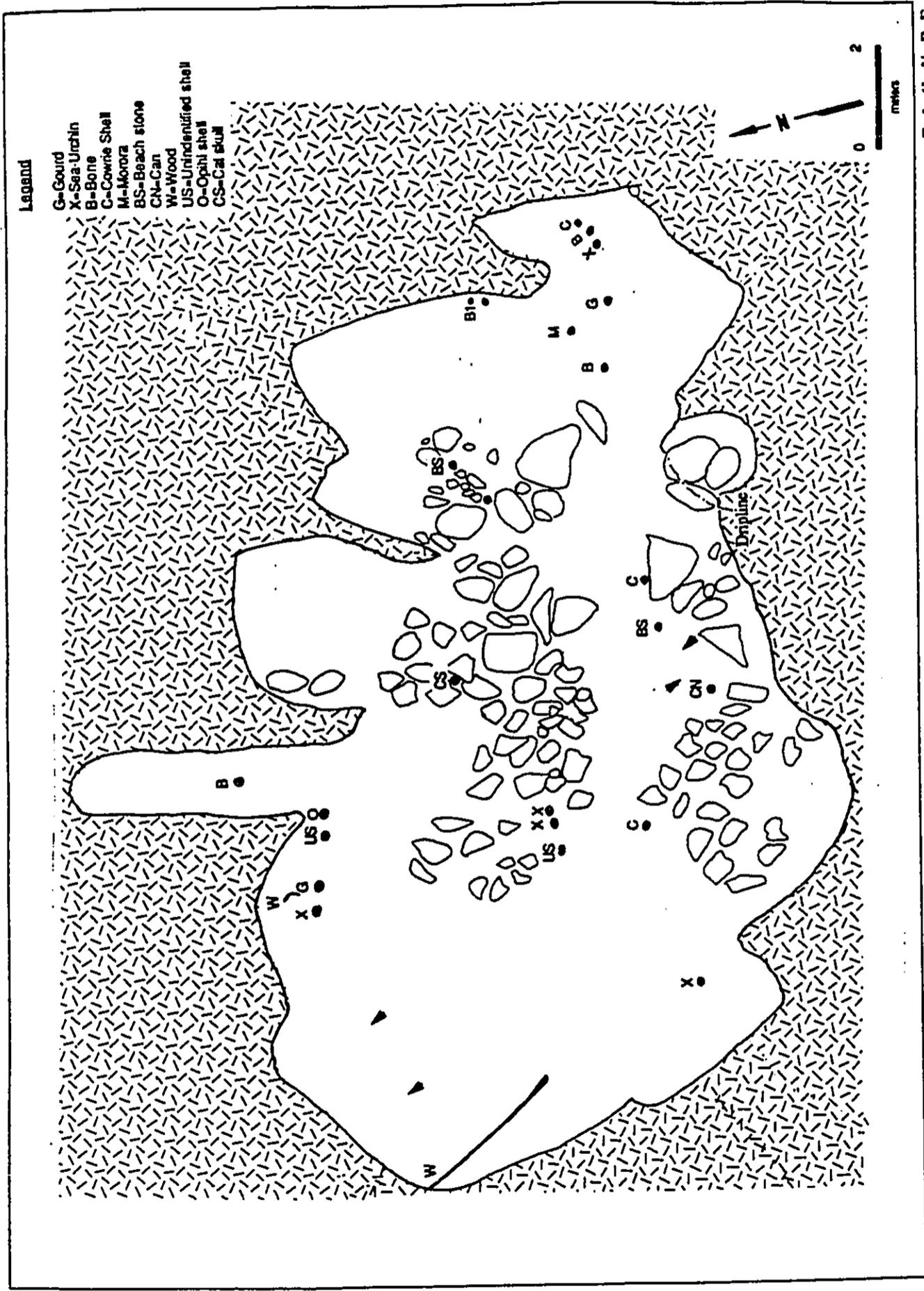


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Shelter Site 5-14751

FIGURE

A-14



FIGURE

A-15

Plan View Site 5-14752

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Appendix B
Traffic Impact Analysis Report
for
Ouli Golf Community

TRAFFIC IMPACT ANALYSIS REPORT

for

OULI GOLF COMMUNITY

FINAL

by:

**M&E PACIFIC, INC.
1001 Bishop Street
Suite 500, Pauahi Tower
Honolulu, Hawaii 96813-3497**

May, 1993

TABLE OF CONTENTS

	<u>PAGE</u>
Project Description	1
Existing Conditions	2
Traffic Forecasts	4
Traffic Impact Analysis	6
Conclusions	8

TABLES

Table 1	Trip Generation Distribution, Assignment
Table 2	Level of Service Analysis

FIGURES

Figure 1	Vicinity Map
Figure 2	Site Plan
Figure 3	Existing Traffic Volumes
Figure 4	ADT Traffic Volume Trend
Figure 5	1994 Ambient Traffic Forecast
Figure 6	1995 Ambient Traffic Forecast
Figure 7	2000 Ambient Traffic Forecast
Figure 8	Golf Course Generated Traffic
Figure 9	Affordable Housing Generated Traffic
Figure 10	Residential Generated Traffic
Figure 11	Anekona Estates Generated Traffic
Figure 12	1994 Total Traffic Forecast
Figure 13	1995 Total Traffic Forecast
Figure 14	2000 Total Traffic Forecast

APPENDICES

Appendix A	Traffic Turning Movement Count
Appendix B	Abstract of Methodology for the Capacity Analysis for Unsignalized Intersections

TRAFFIC IMPACT ANALYSIS REPORT OULI GOLF COMMUNITY

The Ouli Golf Community is being proposed in South Kohala, Hawaii. This report documents the results of a study conducted to evaluate the traffic impacts of the proposed development on Kawaihae-Waimea Road between the Queen Kaahumanu Highway and proposed project intersections. The study included a review of existing traffic conditions, forecast of future traffic conditions, and analysis of the forecast of future traffic conditions, and analysis of the forecast volumes to determine the need for any mitigating actions.

Project Description

Nansay Hawaii, Inc. is proposing to develop an 18-hole golf course and residential subdivision at Ouli, South Kohala, Hawaii. The proposed project site is on the south side of Kawaihae-Waimea Road about four miles mauka of the intersection with Queen Kaahumanu Highway as shown on Figure 1. The proposed project is expected to include:

- 18-hole golf course and clubhouse
- 60-75 affordable single-family residential units
- 50-75 affordable multi-family residential units
- 175-225 one acre lots.

The project site plan is shown on Figure 2. The affordable housing units are expected to be developed first and would be ready for occupancy in 1994. The golf course project is expected to be open for public play in 1995. The golf course layout will be designed to minimize the possibility of stray balls onto Kawaihae-Waimea Road. The developer intends to have the one acre lots ready for sale beginning in 1995 with the buyers constructing the residential units. The following land use assumptions were made for the purposes of this study:

- The one acre lots would be built out by the year 2000.
- The one acre lots would have a peak unit occupancy of 50 percent based on purchases by second home buyers and out-of-state visitors.
- The high values of the land uses ranges were used for the residential units and lots.

A two-lane roadway will provide access to the project site from Kawaihae-Waimea Road. Two alternative roadway plans have been proposed for the first phase to minimize infrastructure costs. Access to the affordable housing could be initially made by connecting with the roadway system of the adjacent Anekona Estates. This connection would be disconnected after the golf course is opened. Alternatively, a simple intersection without acceleration/deceleration and turning lanes could be constructed and later improved. The developer is required to construct a fully channelized intersection with separate lanes for each turning movement before opening the golf course. A stabilized shoulder will be provided on the roadway fronting the project site to accommodate pedestrians and bicyclists.

Existing Conditions

Existing roadway and traffic conditions were surveyed.

Kawaihae-Waimea Road (Route 19) is a rural two-lane highway under the jurisdiction of the State Department of Transportation. The highway has a 24-foot pavement width and is posted for a 45 mile per hour speed limit. As the name implies, the highway provides access between the makai community of Kawaihae and the mauka community of Waimea. The "Island of Hawaii Long-Range Highway Plan" (1991) gives fourth priority to a Kawaihae By-Pass Road. This would be a new two-lane road with climbing lanes between Kawaihae and Waimea, and would supplement the existing road. This project is not currently included in the State's six year capital improvement program.

The Kawaihae-Waimea Road is in rolling terrain and has many curves. The roadway has a six percent grade at the proposed location of the project site access road. Sight distance is approximately 1850 feet to the left (west) and 1700 feet to the right (east). These distances adequately meet minimum sight distance requirements of 635 and 570 feet respectively.

The Queen Kaahumanu Highway is the major north-south roadway in the region. It is a two-lane, Class I State Highway with limited access and 70 mile per hour design speed. The highway provides access from Kailua and terminates at the Kawaihae-Waimea Road intersection. The Highway Plan gives 12th priority to widening Queen Kaahumanu Highway to four lanes between Kawaihae-Waimea Road and Keahole Airport.

The Queen Kaahumanu Highway/Kawaihae-Waimea Road intersection is a major channelized, unsignalized intersection. Separate lanes are provided for each turning and through movements. The left turn movement from Kawaihae Highway is stop sign controlled. The left turn movement from Kawaihae-Waimea Road is not controlled. The access road from Kawaihae Village to Kawaihae-Waimea Road is 1500 feet mauka of the above intersection and does not impact its traffic operations.

Turning movement traffic volume counts were taken on March 31 and April 1, 1993, at the above two intersections. Counts were taken during both morning and afternoon peak periods. The resulting peak hour traffic volumes are shown on Figure 3. Because the traffic counts were taken on two separate days, the volumes between the two intersections do not match.

The State Department of Transportation has taken traffic counts at the Queen Kaahumanu Highway/Kawaihae-Waimea Road intersection every two years since 1976. The trends in daily two-way volumes on the Queen Kaahumanu Highway and Kawaihae-Waimea Road (east) approaches are shown on Figure 4. Traffic volumes increased steadily through 1988 and then jumped for 1990 and 1992. The average annual growth rate has been about 15 percent for Queen Kaahumanu Highway and 11 percent for Kawaihae-Waimea Road.

Traffic Forecasts

This study assumed that the proposed golf course would be ready for operations in 1995, and the residential units would be ready for occupancy from 1994 to 2000. Traffic volumes on Queen Kaahumanu Highway and Kawaihae-Waimea Road can be expected to increase in the interim due to regional growth. The traffic which would be generated by the proposed project was added to the ambient traffic forecasts on the two roadways to obtain the total forecast traffic volumes. For the purposes of this study, the Kawaihae By-Pass Road was assumed not to be built and traffic volumes from Kawaihae Village were assumed to remain at current levels.

Ambient traffic volumes were forecast for 1994, 1995 and 2000. The official long-range traffic forecasts from the forementioned Highway Plan were utilized as a basis for the forecasts. The annual growth rates on the various approaches of the Queen Kaahumanu Highway/Kawaihae-Waimea Road intersection were derived from the Highway Plan traffic forecasts as follows:

<u>Approach</u>	<u>Traffic Volumes</u>		<u>Growth Rate</u>
	<u>1986</u>	<u>2000</u>	
Kawaihae Road (west approach)	3594	5,000	2.8%
Waimea Road (east approach)	4574	12,100	11.6%
Queen Kaahumanu Highway	4715	12,500	11.9%

The above growth rates were applied to the 1993 existing volumes shown on Figure 3. The results are shown on Figures 5 to 7, for 1994, 1995 and 2000, respectively.

The traditional procedure of trip generation, distribution, and assignment was used to estimate the number of vehicle trips which would be generated by the proposed project in both peak hours, the distribution of these trips, and the specific turning movements affected. The following assumptions were made for the purposes of this study:

- The one acre house lots would be occupied by single-family households and would be 50 percent occupied. The trip generation rates for these units were reduced by 30 percent since the ITE rates are typical of urban and suburban neighborhoods with a higher propensity for trip making.
- The golf course would be about 200 acres.
- The affordable multi-family units would have the trip-making characteristics of planned unit development (PUD) units, which are generally town houses. The ITE trip generation rates were not adjusted.

Trip generation rates for the above three land uses were obtained from the ITE Trip Generation, (Fourth Edition, 1987). The rates and results of the trip generation analysis are shown on Table 1.

For trip distribution of golf course generated trips, it was assumed that 75 percent of the generated trips would be to/from the south (Kailua), 15 percent from Kawaihae and the remaining 10 percent to the east (Waimea). The results of assigning these volumes to the specific turning movements in the study area are shown on Figure 8.

The trip distribution for residential generated trips was assumed to be in the same proportions as traffic entering and leaving the Kawaihae Village access road, which showed 75 percent to Kailua and 25 percent to Waimea. Although there may be trips between the homes and golf course, the conservative assumption was made that all the project generated trips would leave the project (and use Kawaihae-Waimea Road) to show the maximum impact on the roadway. The results of assigning these volumes to the specific turning movements in the study area are shown on Figure 9 for the affordable residential units and Figure 10 for the one acre lots.

An alternative access proposal for the 1994 scenario is to connect with the roadway system in the adjoining Anekona Estates. The traffic forecasts for this project shown on Figure 11 are very small. There would be no effect on traffic operations (i.e., changes in level of service) if these volumes were added to the traffic volumes generated by the affordable housing (Figure 9). Therefore, only one total traffic forecast volumes for 1994 was developed to represent both access roadway alternatives.

The ambient traffic volumes for 1994 (Figure 5) were added to the affordable housing project generated volumes (Figure 9) to obtain the total forecast volumes on Figure 12. The ambient traffic volumes for 1995 (Figure 6) were added to the affordable housing project and golf course generated volumes (Figures 8 and 9) to obtain the total forecast volumes on Figure 13. The ambient traffic volumes for 2000 (Figure 7) were added to the affordable housing project, golf course and residential lots generated volumes (Figures 8 to 10) to obtain the total forecast volumes on Figure 14.

Traffic Impact Analysis

The existing, ambient and with project total forecast traffic volumes were analyzed using the TRB Highway Capacity Manual, Special Report 209 (1985) methodology for unsignalized intersections, described in the Appendix. The methodology yields levels of service (LOS) for critical turning movements at the intersection. The results are summarized on Table 2.

The evaluation of the results indicate that the general increase in ambient traffic will be the major cause of traffic degradation in future years. The left turn movement from Queen Kaahumanu Highway is forecast to decline from the current LOS C to F by 2000 for the ambient traffic forecasts. The large volumes of turning movements imply that highway improvements, most probably in the form of traffic signals, could be warranted at the Kawaihae-Waimea Road/Queen Kaahumanu Highway intersection even without the proposed project.

The previously discussed Kawaihae By-Pass Road recommended in the long-range highway plan would also serve as a mitigating measure. This proposed improvement, whose alignment has not been determined, would reduce through traffic volumes on Kawaihae-Waimea Road and improve traffic operations on the roadway and the forementioned intersection. The levels of service shown on Table 2 would improve as a result. Highway improvements at the Queen Kaahumanu Highway/Kawaihae-Waimea Road intersection would not be required if the by-pass road were built.

The proposed project is expected to have some traffic impact since there are changes in levels of service from ambient to forecast conditions. However, traffic operations would still be acceptable despite these changes and traffic improvements would not be required.

The proposed project is projected to cause minor but acceptable changes in levels of service at the Kawaihae-Waimea Road/Queen Kaahumanu Highway intersection in the interim years. The left turn movement from Queen Kaahumanu Highway is forecast to change from LOS C with ambient conditions to LOS D with the project in the 1994 AM peak and from LOS D to E in the 1995 PM peak. These changes do not require additional intersection improvements.

The proposed project would also have a minor but acceptable impact on traffic operations at the Kawaihae Village access road. For 1994, the outbound left turn movement is forecast to change from LOS A to B in the AM peak and from LOS B to C in the PM peak with the proposed project. These changes imply slightly longer waiting times and queues for outbound vehicles but does not require additional intersection improvements. Left turn traffic operations at the intersection would remain acceptable in 2000, as indicated by the LOS D or better.

The turning movements at the Ouli access road intersection show very acceptable levels of service (C or better) for 1994. This implies that channelization improvements are not initially required. The levels of service are forecast to remain adequate (D or better) in 1995, implying that the proposed intersection channelization improvements would be adequate. The intersection may warrant traffic signalization by 2000, as indicated by LOS F in the PM peak.

The increase in ambient traffic volumes is the primary cause for this need, and traffic signals would not be required if the Kawaihae By-Pass Road were built.

Conclusions

The proposed project is expected to have a minor traffic impact on the local roadway system. The growth in regional traffic would have a greater impact to create the need for highway improvements at the Queen Kaahumanu Highway/Kawaihae-Waimea Road intersection with or without the project. The construction of the recommended Kawaihae By-Pass Road would reduce through volumes on Kawaihae-Waimea Road and minimize the need for any of the traffic improvements recommended in this study. Additional improvements will not be required at the existing Kawaihae Village access road. The proposed project access road intersection can be initially built without channelization at either Ouli or the Anekona Estates. Channelization is expected to provide adequate traffic operations from 1995 until 2000, when traffic signals may be warranted mostly due to the increase in ambient traffic. Traffic signals would not be required if the Kawaihae By-Pass Road were built.

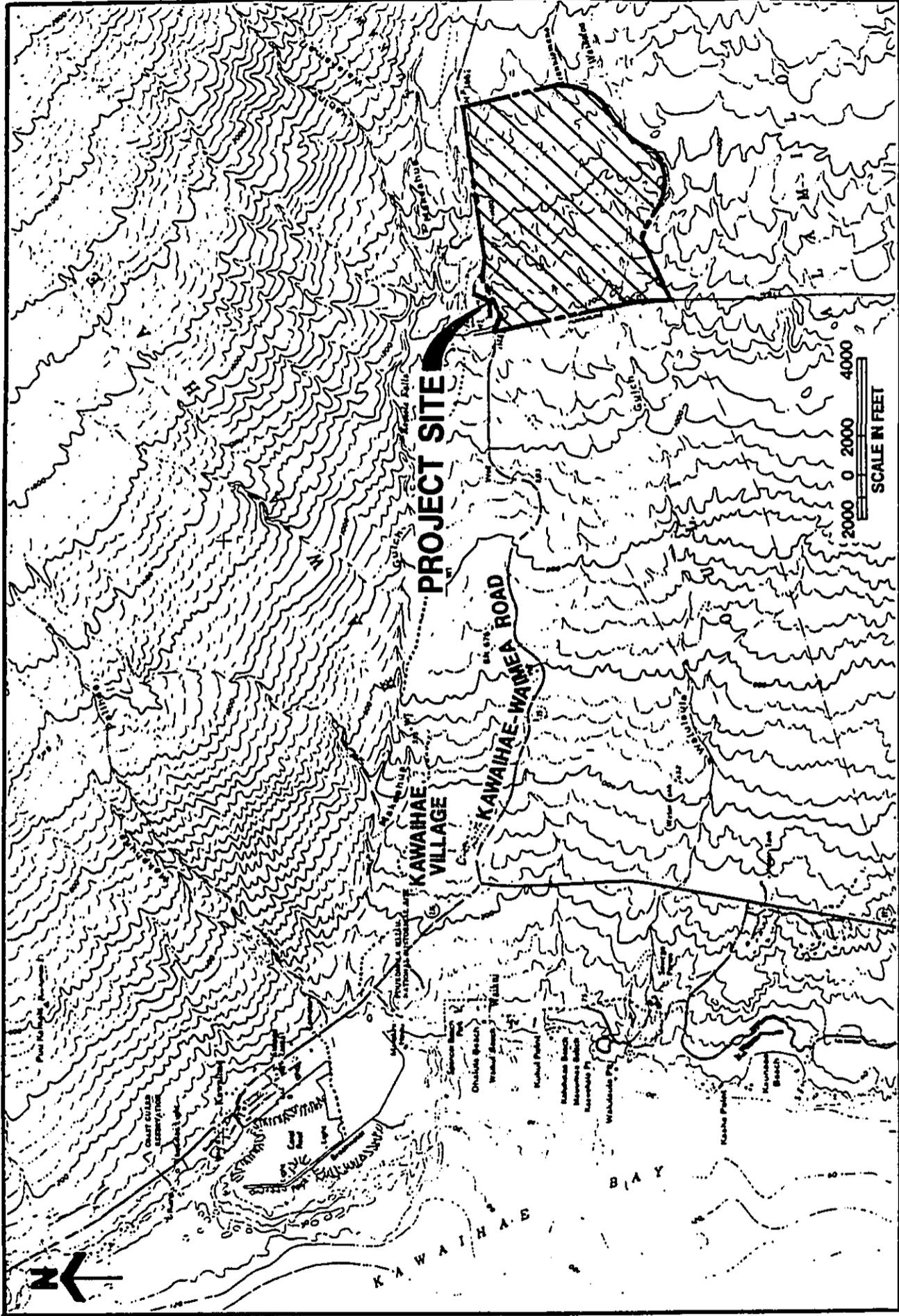
TABLE 1
TRIP GENERATION

Trip Generation	AM Peak Hour		PM Peak Hour	
	Inbound Rate	No.	Inbound Rate	No.
Affordable Housing:				
75 multi-family units	0.11	10	0.41	30
75 single-family units	0.22	15	0.63	45
Total		25		75
Golf Course:				
20 acres	0.21	45	0.03	5
1 Acre Lots:				
115 units	0.15	15	0.45	50
			0.25	30

TABLE 2
LEVEL OF SERVICE ANALYSIS

INTERSECTION & TURNING MOVEMENTS	1993		1994		1995		2000	
	EXISTING	FORECAST	AMBIENT	FORECAST	AMBIENT	FORECAST	AMBIENT	FORECAST
AM PEAK HOUR								
<u>Kawalhae-Waimea Road (KWR) at Queen Kaahumanu Highway (QKH)</u>								
QKH Left Turn	C	D	C	D	D	D	F	F
QKH Right Turn	A	A	A	A	A	A	A	A
KWR Left Turn	A	A	A	A	A	A	B	C
<u>Kawalhae-Waimea Road (KWR) at Kawalhae Village (KV) Access Road</u>								
KV Left Turn	A	B	A	B	B	B	C	C
KV Right Turn	A	A	A	A	A	A	A	A
KWR Left Turn	A	A	A	A	A	A	A	A
<u>Kawalhae-Waimea Road (KWR) at Ouli Access Road</u>								
Ouli Left Turn	N.A.	B	N.A.	B	N.A.	C	N.A.	D
Ouli Right Turn	N.A.	A	N.A.	A	N.A.	A	N.A.	A
KWR Left Turn	N.A.	A	N.A.	A	N.A.	A	N.A.	A
PM PEAK HOUR								
<u>Kawalhae-Waimea Road (KWR) at Queen Kaahumanu Highway (QKH)</u>								
QKH Left Turn	C	D	D	D	D	E	F	F
QKH Right Turn	A	A	A	A	A	A	B	C
KWR Left Turn	A	A	A	A	A	A	A	B
<u>Kawalhae-Waimea Road (KWR) at Kawalhae Village (KV) Access Road</u>								
KV Left Turn	B	C	B	C	C	C	D	D
KV Right Turn	A	A	A	A	A	A	A	A
KWR Left Turn	A	A	A	A	A	A	A	A
<u>Kawalhae-Waimea Road (KWR) at Ouli Access Road</u>								
Ouli Left Turn	N.A.	C	N.A.	C	N.A.	D	N.A.	F
Ouli Right Turn	N.A.	A	N.A.	A	N.A.	A	N.A.	A
KWR Left Turn	N.A.	A	N.A.	A	N.A.	A	N.A.	A

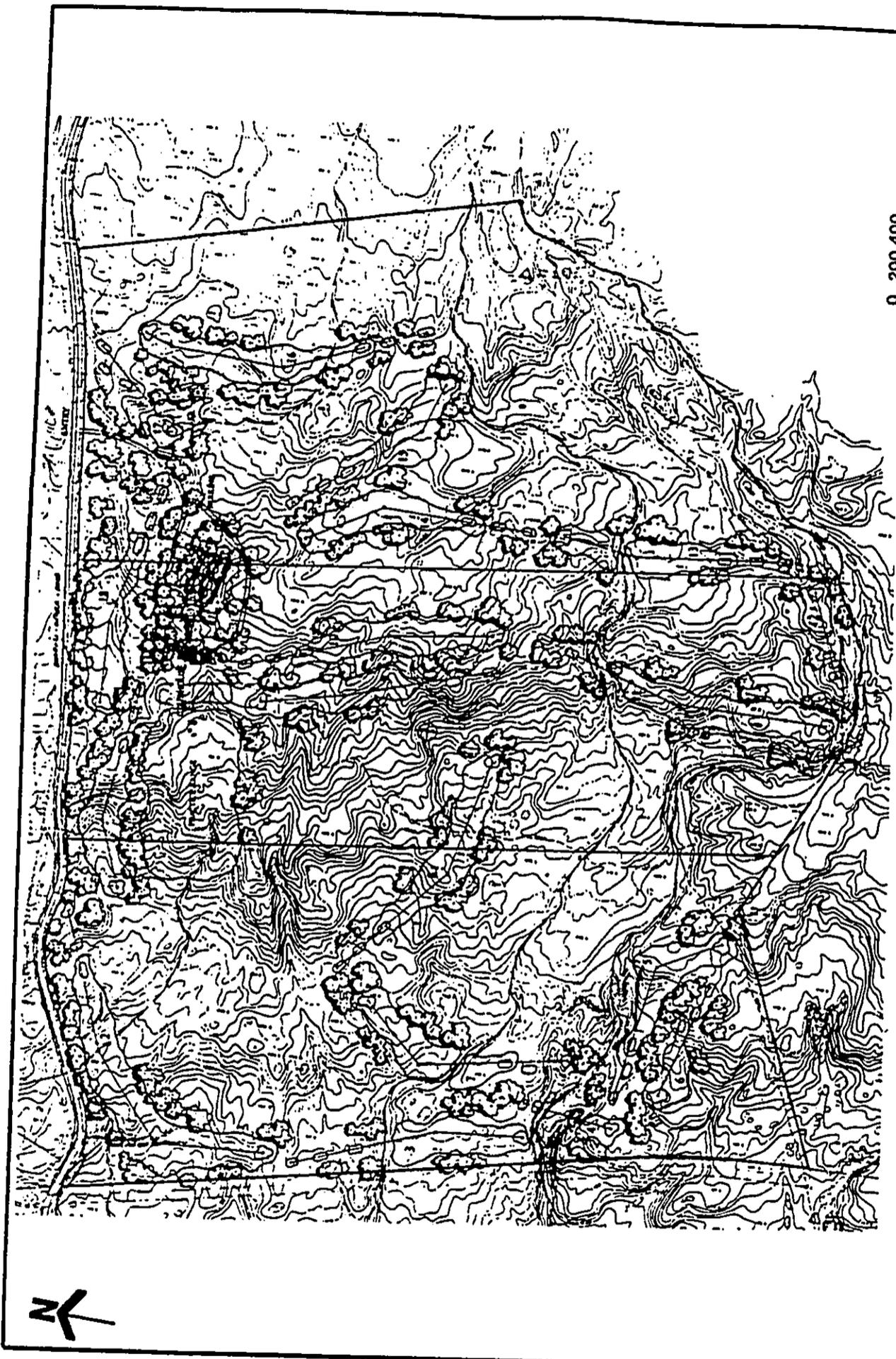
FIGURES



Ouli Golf Community

VICINITY MAP

Figure 1



0 200 400
SCALE IN FEET

Ouli Golf Community

SITE PLAN

Figure

2

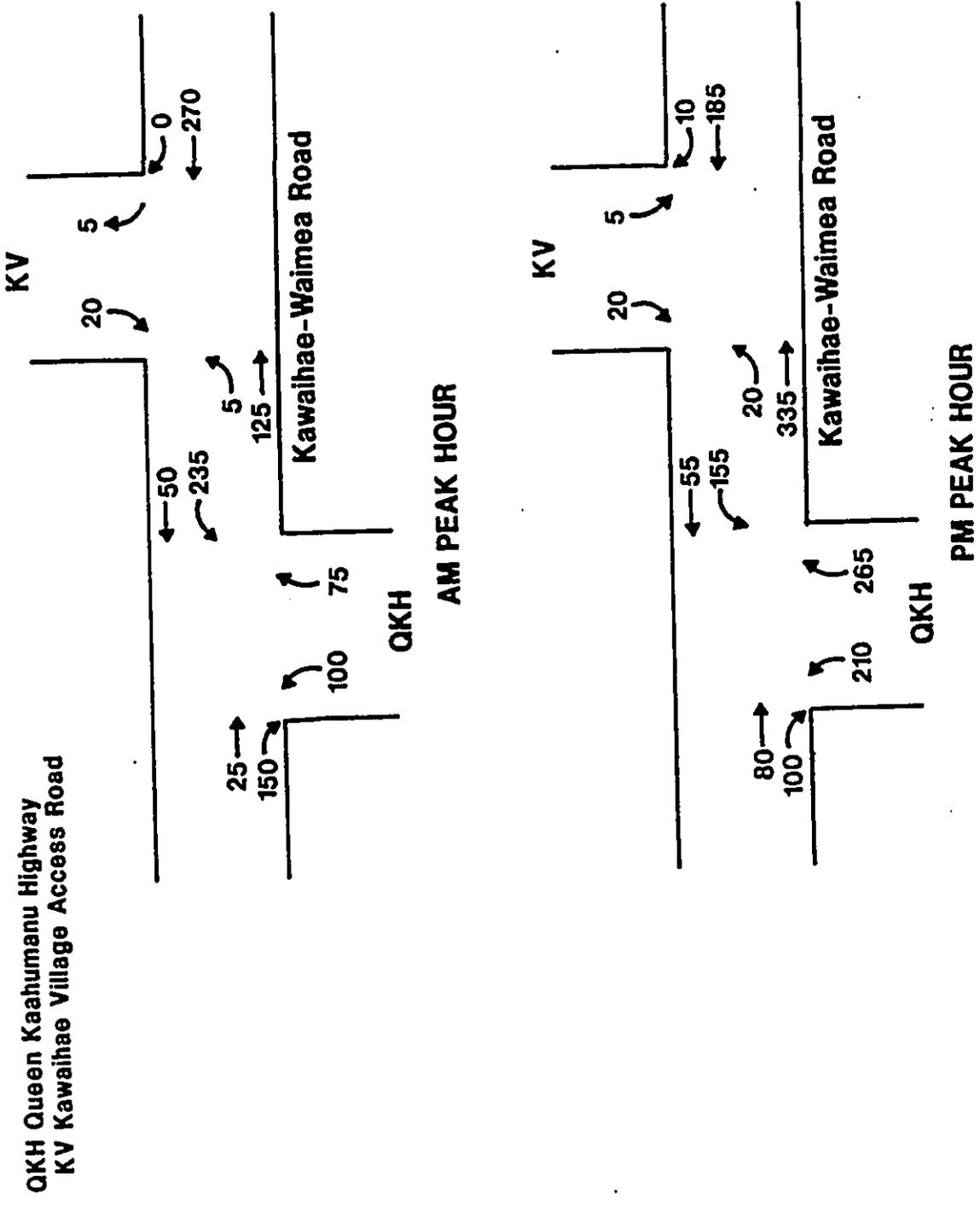


Figure 3

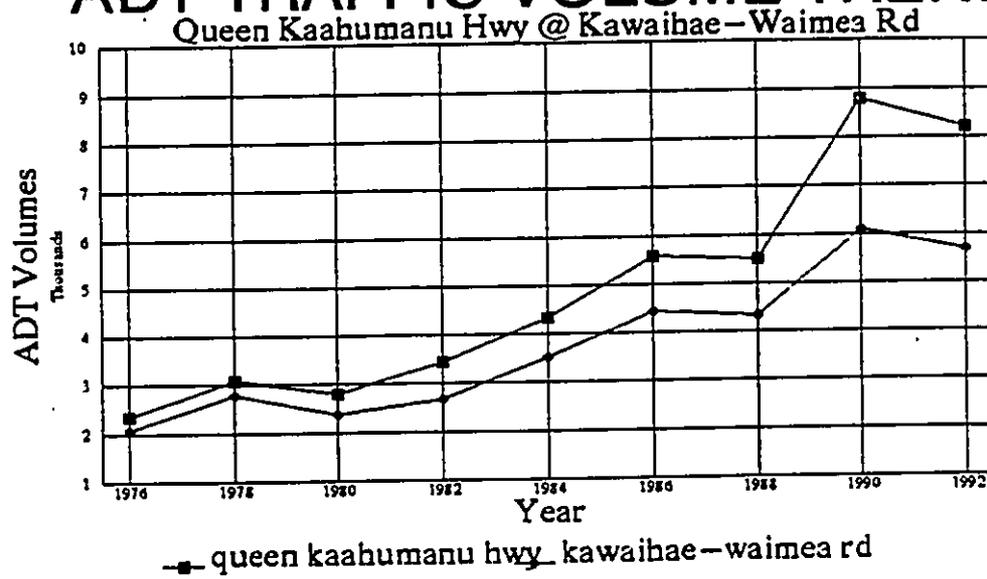
EXISTING TRAFFIC VOLUMES

Ouli Golf Community

OULI COUNTRY CLUB
 SDOT traffic counts at Queen Kaahumanu Hwy @ Kawaihae-Waimea Rd.

traffic volumes				
year	queen kaahuma hwy		kawaihae waimea road	
	2 year growth	2 year growth	2 year growth	2 year growth
1976	2358		2077	
1978	3085	1.3083	2790	1.3433
1980	2818	0.9135	2372	0.8502
1982	3445	1.2225	2687	1.1328
1984	4337	1.2589	3513	1.3074
1986	5592	1.2894	4446	1.2656
1988	5500	0.9835	4335	0.975
1990	8777	1.5958	6097	1.4065
1992	8192	0.9333	5693	0.9337

ADT TRAFFIC VOLUME TREND



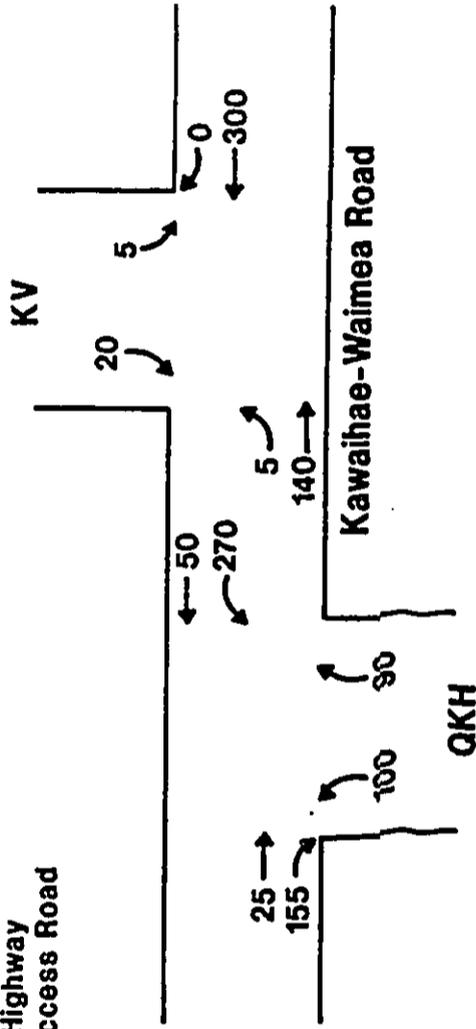
Ouli Golf Community

ADT TRAFFIC VOLUME TREND

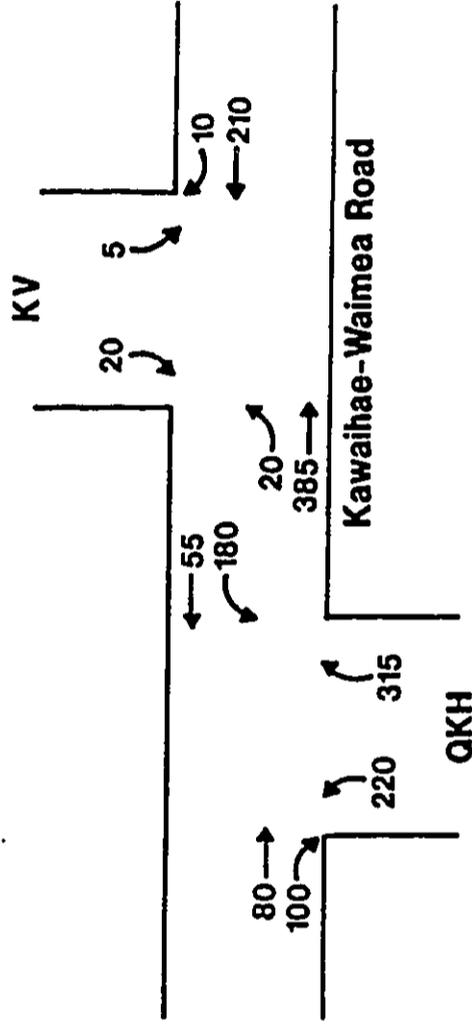
Figure

4

QKH Queen Kaahumanu Highway
 KV Kawaihae Village Access Road



AM PEAK HOUR



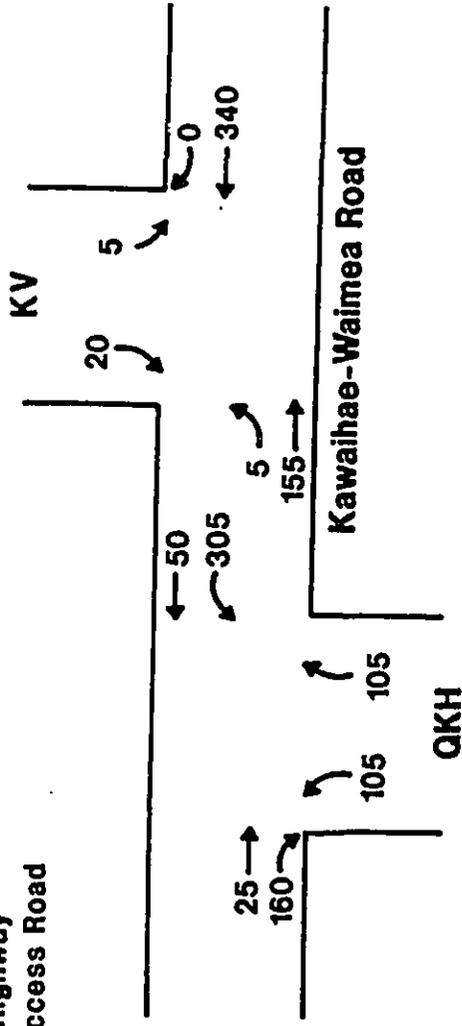
PM PEAK HOUR

Ouli Golf Community

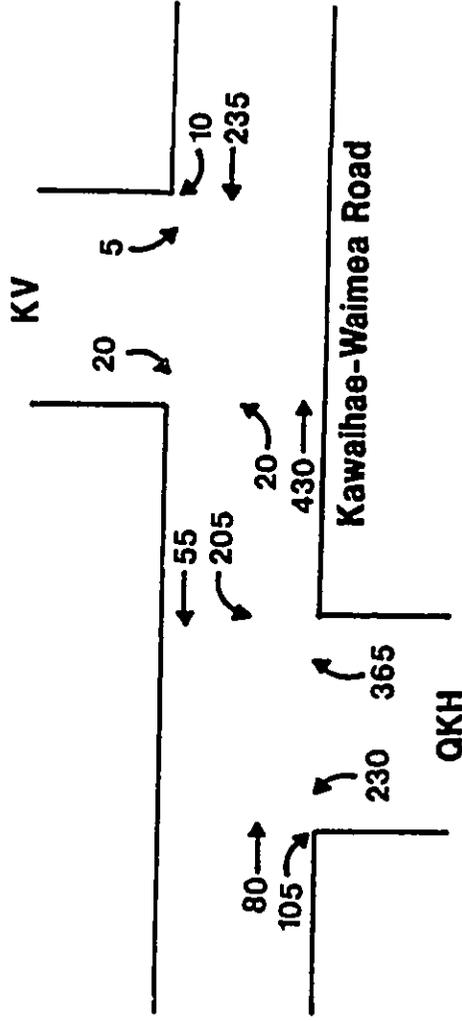
1994 AMBIENT TRAFFIC FORECAST

Figure
5

QKH Queen Kaahumanu Highway
 KV Kawaihae Village Access Road



AM PEAK HOUR



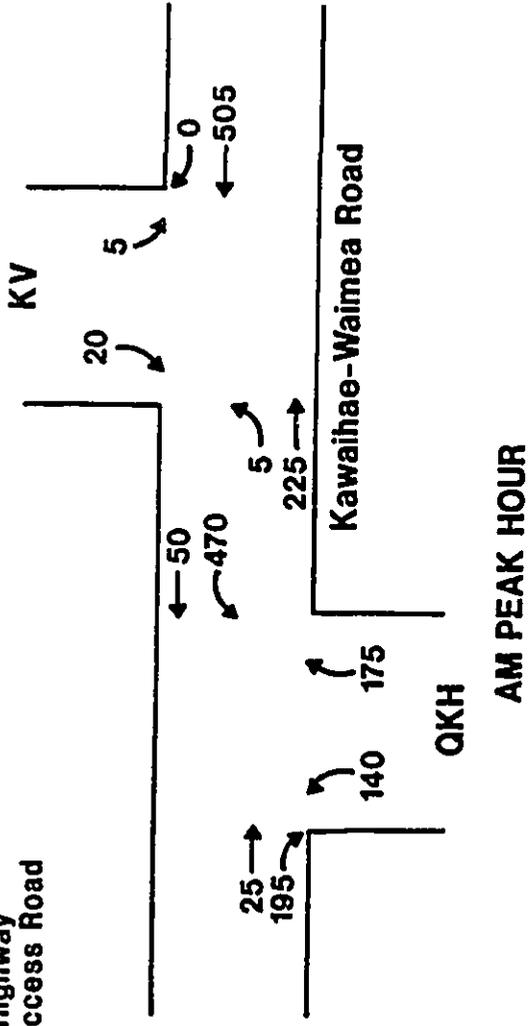
PM PEAK HOUR

Ouli Golf Community

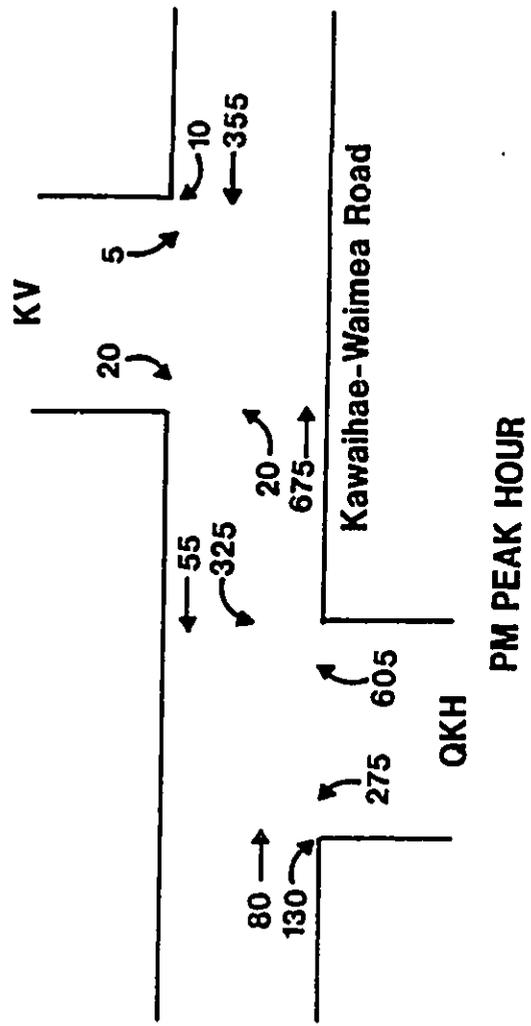
1995 AMBIENT TRAFFIC FORECAST

Figure
6

QKH Queen Kaahumanu Highway
 KV Kawaihae Village Access Road



AM PEAK HOUR



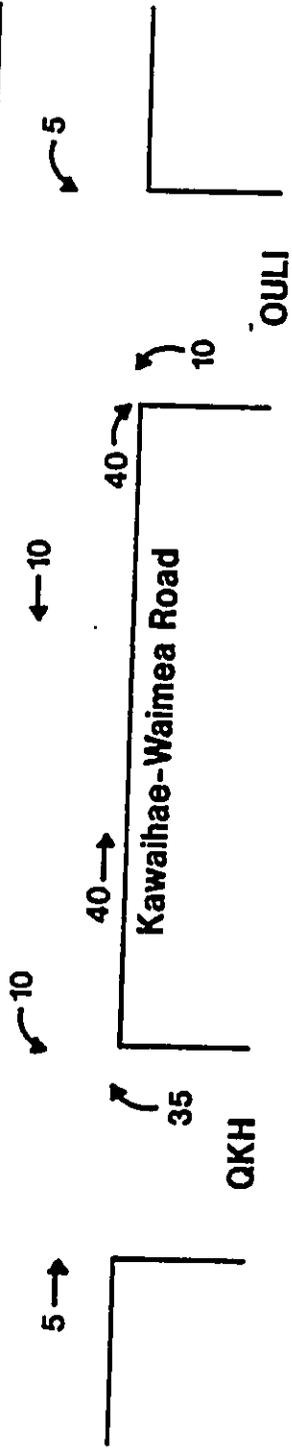
PM PEAK HOUR

Ouli Golf Community

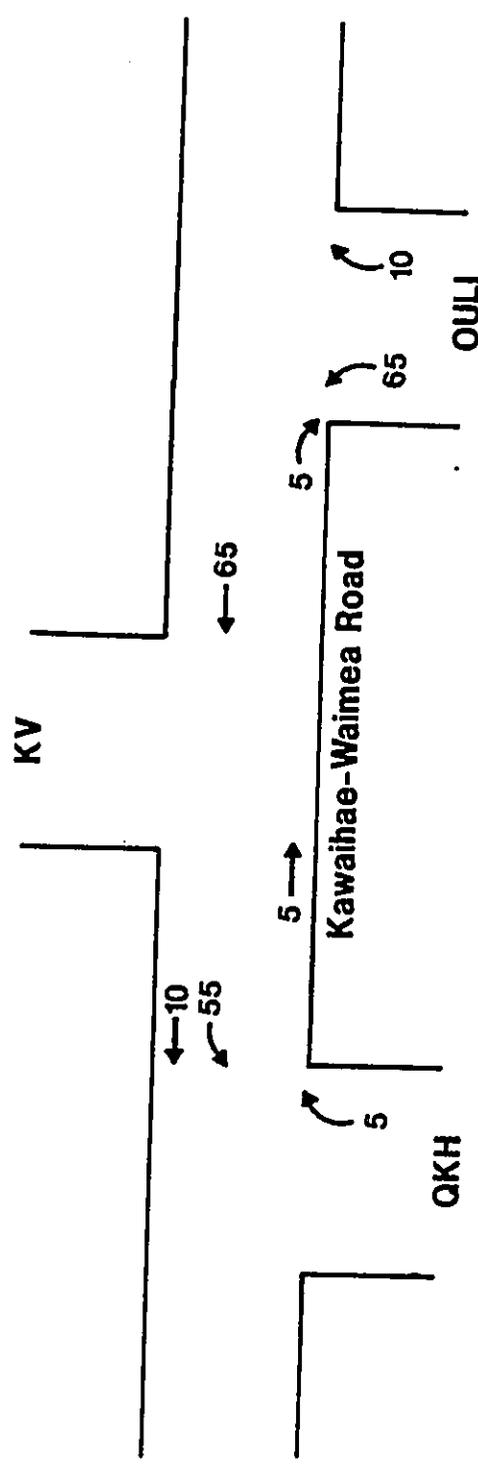
2000 AMBIENT TRAFFIC FORECAST

Figure
 7

OKH Queen Kaahumanu Highway
 KV Kawaihae Village Access Road



AM PEAK HOUR



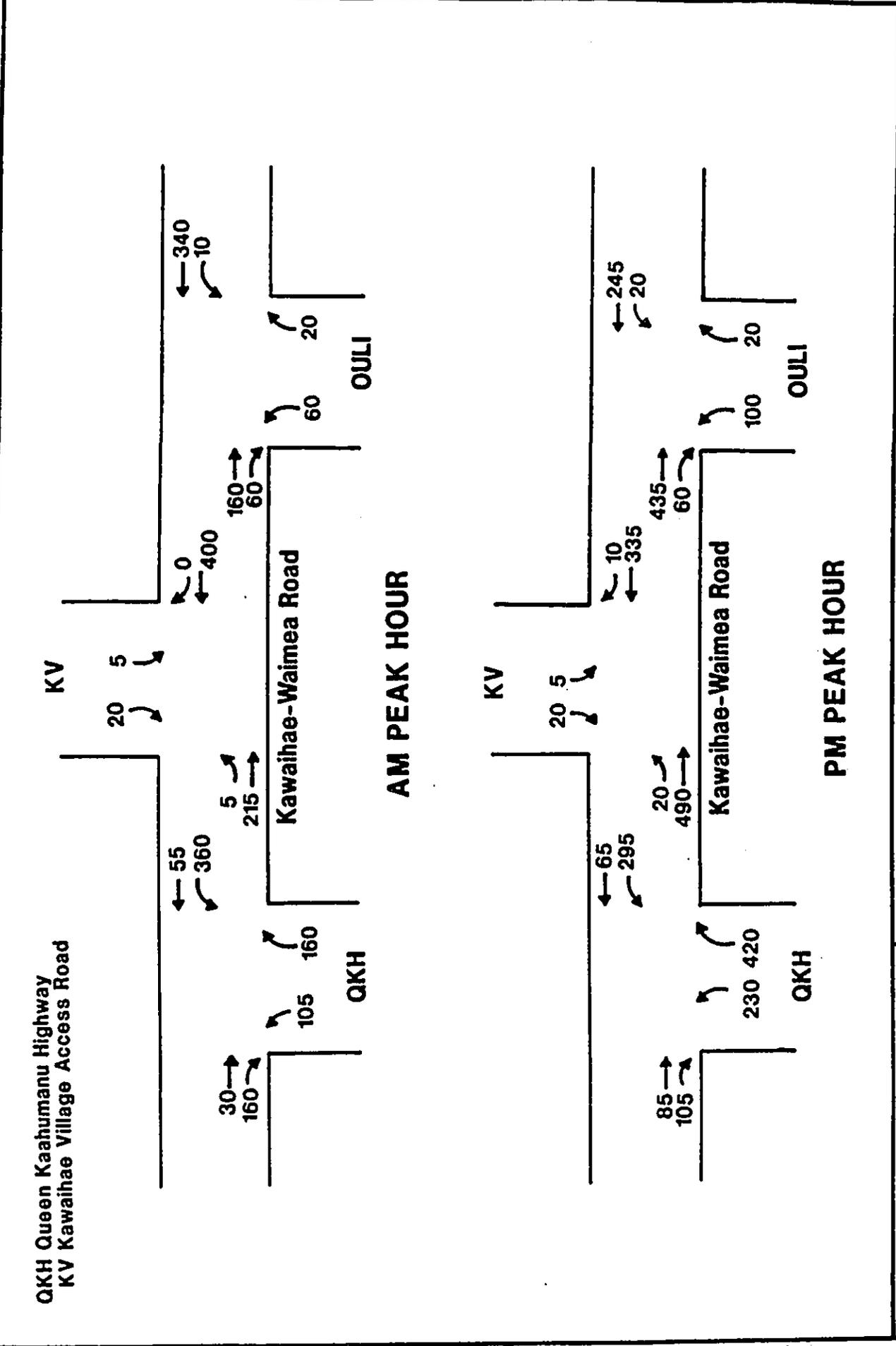
PM PEAK HOUR

Oui Golf Community

GOLF COURSE GENERATED TRAFFIC

Figure
 8

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

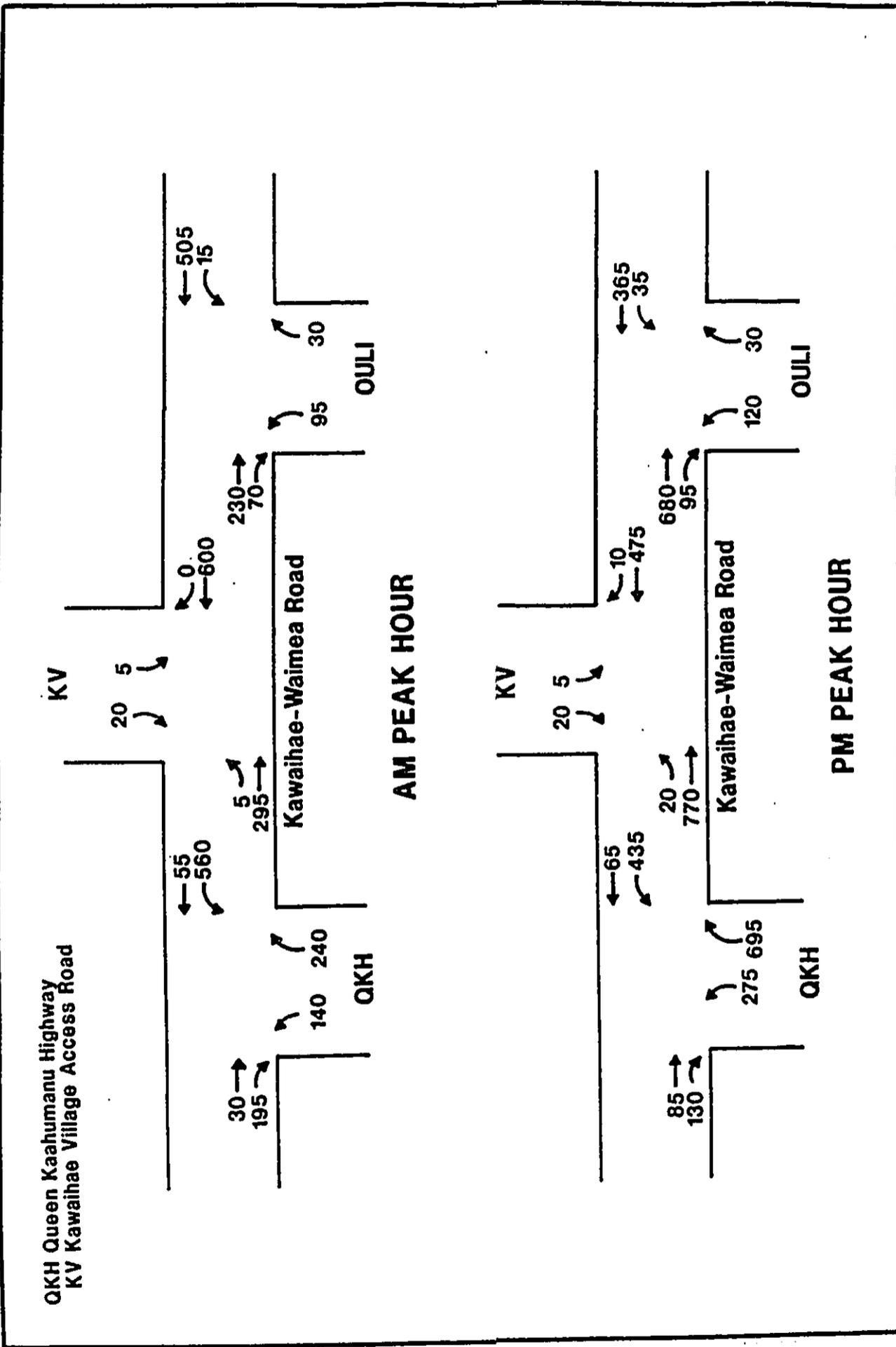


Ouli Golf Community

1995 TOTAL TRAFFIC FORECAST

Figure 13

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



Ouli Golf Community

2000 TOTAL TRAFFIC FORECAST

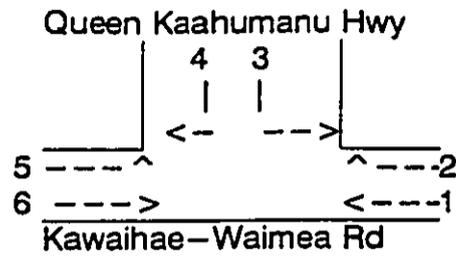
Figure 14

APPENDICES

APPENDIX A

TRAFFIC TURNING MOVEMENT COUNT
OULI COUNTRY CLUB TRAFFIC STUDY

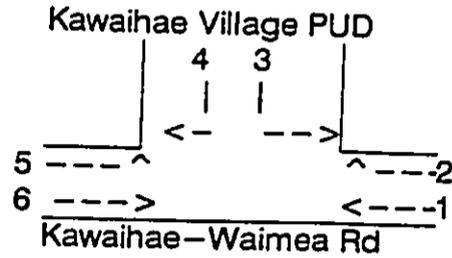
LOCATION: Queen Kaahumanu Hwy @
Kawaihae-Waimea rd
DATE: March 31, 1993
TIME: 6:30-8:30am, 3:30-5:30p
WEATHER: clear & sunny
RECORDER: John D. Green



TIME PERIOD	MOVEMENT NUMBER						TOTAL
	1	2	3	4	5	6	
6:30-6:45	2	46	17	13	65	8	151
6:45-7:00	4	51	24	17	67	12	175
7:00-7:15	3	33	25	7	51	10	129
7:15-7:30	9	31	34	28	43	8	153
7:30-7:45	7	36	15	22	76	20	176
7:45-8:00	10	38	15	27	33	9	132
8:00-8:15	6	19	14	21	41	17	118
8:15-8:30	11	29	18	26	30	15	129
6:30- 8:30	52	283	162	161	406	99	1163
6:45- 7:45	23	151	98	74	237	50	633
3:30- 3:45	16	28	66	84	51	16	261
3:45- 4:00	24	28	43	56	33	14	198
4:00- 4:15	29	26	45	60	36	12	208
4:15- 4:30	10	16	58	67	33	15	199
4:30- 4:45	17	29	35	58	34	17	190
4:45- 5:00	11	26	40	47	19	10	153
5:00- 5:15	12	21	33	39	28	15	148
5:15- 5:30	12	23	39	42	35	20	171
3:30- 5:30	131	197	359	453	269	119	1528
3:30- 4:30	79	98	212	267	153	57	866

**TRAFFIC TURNING MOVEMENT COUNT
OULI COUNTRY CLUB TRAFFIC STUDY**

LOCATION: Kawahae-Waimea Rd @
Kawaihae Village PUD
DATE: April 1, 1993
TIME: 6:30-8:30am, 3:30-5:30p
WEATHER: clear & sunny
RECORDER: John D. Green



TIME PERIOD	MOVEMENT NUMBER						TOTAL
	1	2	3	4	5	6	
6:30-6:45	93	0	0	5	1	14	113
6:45-7:00	69	0	1	4	1	16	91
7:00-7:15	61	0	2	0	0	21	84
7:15-7:30	72	0	0	5	0	18	95
7:30-7:45	51	0	2	7	2	40	102
7:45-8:00	86	0	3	6	2	44	141
8:00-8:15	35	0	1	2	1	22	61
8:15-8:30	39	0	1	4	3	27	74
6:30- 8:30	506	0	10	33	10	202	761
7:00- 8:00	270	0	7	18	4	123	422
3:30- 3:45	57	1	1	8	4	100	171
3:45- 4:00	46	3	1	8	3	85	146
4:00- 4:15	49	2	4	2	10	76	143
4:15- 4:30	33	2	0	3	3	76	117
4:30- 4:45	56	0	0	0	5	50	111
4:45- 5:00	57	0	1	5	3	52	118
5:00- 5:15	33	1	1	1	3	41	80
5:15- 5:30	52	1	2	7	3	41	106
3:30- 5:30	383	10	10	34	34	521	992
3:30- 4:30	185	8	6	21	20	337	577

A P P E N D I X B

ABSTRACT OF METHODOLOGY

for the

CAPACITY ANALYSIS FOR UNSIGNALIZED INTERSECTIONS

ABSTRACT FOR METHODOLOGY
for the
CAPACITY ANALYSIS OF UNSIGNALIZED INTERSECTIONS

This abstract summarizes the procedures for analyzing the capacities of unsignalized intersections. These procedures are described in the Highway Capacity Manual, Special Report 209 (1985) by the Transportation Research Board. This manual "is a collection of techniques for estimating highway capacity that have been judged, through consensus, as the best available at the time of publication." This manual does not set legal standards for highway design but the procedures have become widely accepted and used in the traffic engineering profession.

The capacity analysis procedure is based on a German method originally published in 1972 and translated in 1974, and modified for U. S. conditions by the TRB. It is intended for two-way STOP- and YIELD-controlled intersections and calculates the capacities of movements which cross or turn through the major traffic stream. The capacity of each movement is based on two factors: the gap distribution in conflicting traffic streams and the gap acceptance behavior of drivers at such intersections.

The basic steps in methodology are as follows:

- 1) Define intersection geometry and traffic volumes.
- 2) Determine the "conflicting conflicts" through which every minor street movement and major street left turn must cross.

- 3) Determine the size of the gap in the conflicting stream needed by vehicles in each movement crossing a conflicting traffic stream.
- 4) Determine the capacity of the gaps in the major traffic stream to accommodate each of the subject movements that will utilize these gaps.
- 5) Adjust the capacities to account for impedance and the use of shared lanes.

Tables and charts, as well as computer programs, have been developed to facilitate using this methodology.

INTERSECTION DATA

Key geometric factors include: number and use of lanes, channelization, percent grade, curb radii and approach angle, and sight distances. One hour volumes are specified by movement and converted to passenger cars per hour using the passenger car equivalents in TABLE 10-1.

CONFLICTING TRAFFIC

The conflicting movements each turning movement faces is summarized on Figure 10-2. The right turn movement from the minor street faces the least number of conflicting movements, the left turn movement from the minor street the most. Adjustments to the conflicting traffic volumes are shown on Figure 10-2.

CRITICAL GAP SIZE

"The 'critical gap' is defined as the median time headway between two successive vehicles in the major traffic stream that is accepted by drivers in a subject movement that must cross and/or emerge with the major street traffic." It is dependent upon a number of factors, including:

TABLE 10-1. PASSENGER-CAR EQUIVALENTS FOR UNSIGNALIZED INTERSECTIONS

TYPE OF VEHICLE	GRADE (%)				
	-4%	-2%	0%	+2%	+4%
Motorcycles	0.3	0.4	0.5	0.6	0.7
Passenger Cars	1.0	1.2	1.5	2.0	3.0
SU/RV's*	1.2	1.5	2.0	3.0	4.0
All Vehicles*	0.9	1.0	1.1	1.4	1.7

*Special trucks and recreational vehicles.
 **If vehicle composition is unknown, these values may be used as an approximation.

Subject Movement	Conflicting Traffic, V_{ci}	Illustration
1. RIGHT TURN from minor street.	$1/2(V_{r2})^{***} + V_{t1}$	
2. LEFT TURN from major street.	$V_r^{***} + V_{t1}$	
3. THROUGH MVT from minor street.	$1/2(V_{r2})^{***} + V_{t2} + V_{l2}$ $+ V_{r2} + V_{t2} + V_{l2}$	
4. LEFT TURN from minor street.	$1/2(V_{r2})^{***} + V_{t2} + V_{l2}$ $+ V_{r2} + V_{t2} + V_{l2}$ $+ V_o + V_{or}$	

- V_r includes only the volume in the right hand lane.
- Where a right-turn lane is provided on major street, eliminate V_r or V_{r2} .
- Where the right-turn radius into minor street is large and/or where these movements are STOP/YIELD controlled, eliminate V_r (Case 2), and V_{r2} and/or V_{r2} (Case 4). V_{r2} may also be eliminated on multilane major streets.

Figure 10-2. Definition and computation of conflicting traffic volumes.

- 1) The type of maneuver being executed.
- 2) STOP or YIELD sign control.
- 3) The average running speed on the major street.
- 4) The number of lanes on the major street.
- 5) The geometrics and environmental conditions at the intersection.

The value of the critical gap is selected from Table 10-2. The basic critical gap is selected and adjustments and modifications made.

POTENTIAL CAPACITY FOR MOVEMENT

"The potential capacity is defined as the 'ideal' capacity for a specific movement," and is selected from Figure 10-3. It is based on the conflicting traffic volume and the critical gap. The result is read in passenger cars per hour.

IMPEDANCE EFFECTS

The methodology assumes that vehicles use gaps at an unsignalized intersection in a prioritized manner. Thus, when traffic becomes congested in a high-priority movement, it can reduce the potential capacity of lower priority traffic movements. Given the priority of gap usage:

- 1) Left turn from the major street impede both through movements and left turns from the minor street.
- 2) Through movements from the minor streets impede left turns from the minor street.

The impact of impedance is addressed by multiplying the potential capacity of a movement by a series of impedance

TABLE 10-2 CRITICAL GAP CRITERIA FOR UNSIGNALIZED INTERSECTIONS

BASIC CRITICAL GAP FOR PASSENGER CARS, SEC				
VEHICLE MANEUVER AND TYPE OF CONTROL	AVERAGE RUNNING SPEED, MAJOR ROAD			
	30 MPH		55 MPH	
	NUMBER OF LANES ON MAJOR ROAD			
	2	4	2	4
RT from Minor Road	5.5	5.5	6.5	6.5
STOP	5.0	5.0	5.5	5.5
YIELD	5.0	5.5	5.5	6.0
LT from Major Road	5.0	5.5	5.5	6.0
Cross Major Road				
STOP	6.0	6.5	7.5	8.0
YIELD	5.5	6.0	6.5	7.0
LT from Minor Road	6.5	7.0	8.0	8.5
STOP	6.0	6.5	7.0	7.5
YIELD	6.0	6.5	7.0	7.5

ADJUSTMENTS AND MODIFICATIONS TO CRITICAL GAP, SEC	
CONDITION	ADJUSTMENT
RT from Minor Street: Curve radius > 50 ft or turn angle < 50°	-0.5
RT from Minor Street: Acceleration lane provided	-1.0
All movements: Population ≥ 250,000	-0.5
Restricted sight distance*	+0 to -1.0

NOTES: Maximum total decrease in critical gap = 1.0 sec.
 Maximum Critical gap = 1.5 sec.
 For values of average running speed between 30 and 55 mph, interpolate.
 *This adjustment is made for the specific movements impacted by restricted sight distance.

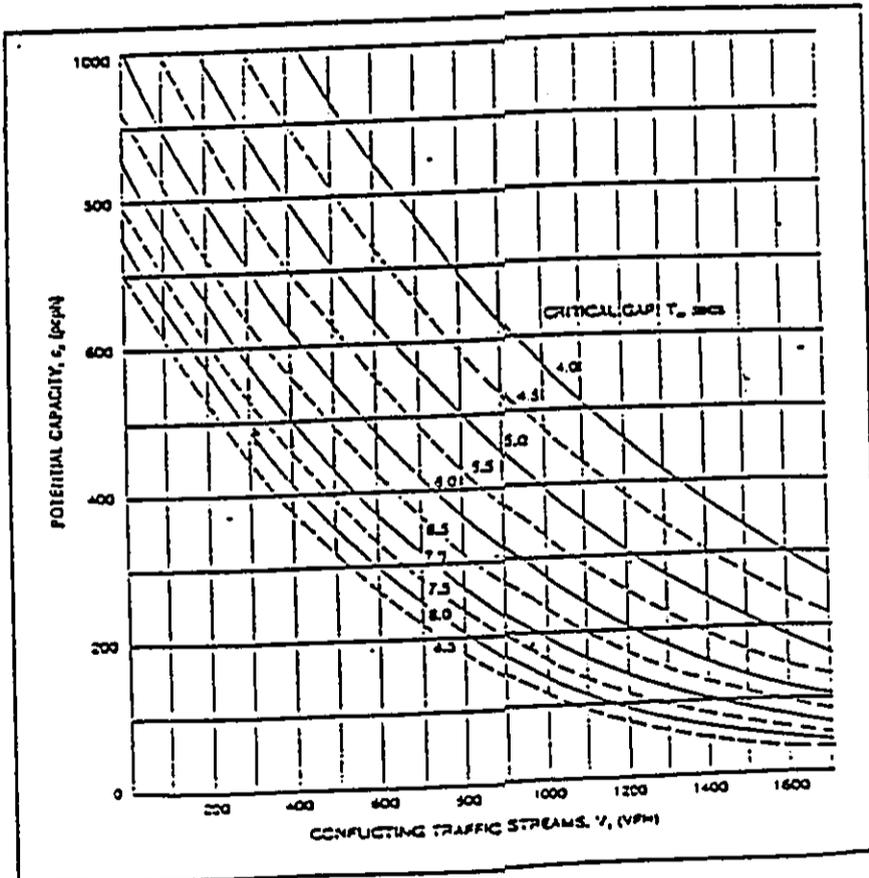


Figure 10-3. Potential capacity based on conflicting traffic volume and critical gap size.

factors for each higher priority impeding movement.

Impedance factors are derived using Figure 10-5.

SHARED LANE CAPACITY

The methodology has assumed to this point that each minor street movement has an exclusive lane. In reality, most minor street approaches have two or three movements sharing one lane. An equation is used to compute the capacity of the shared lane.

LEVEL OF SERVICE CRITERIA

The above computations yield a capacity solution for each lane on the minor street approaches and for left turn movements from the major streets. This figure is used to derive the reserve capacity, the difference between the capacity solution and the volume of traffic using the lane. Level of service criteria are stated in general terms for general ranges of reserve capacity and delay, as follows:

<u>Reserve Capacity</u>	<u>Level of Service</u>	<u>Expected Delay</u>
> 400	A	Little or no delay
300-399	B	Short traffic delays
200-299	C	Average traffic delays
100-199	D	Long traffic delays
0- 99	E	Very long traffic delays
a/	F	a/

a/ When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement to the intersection.

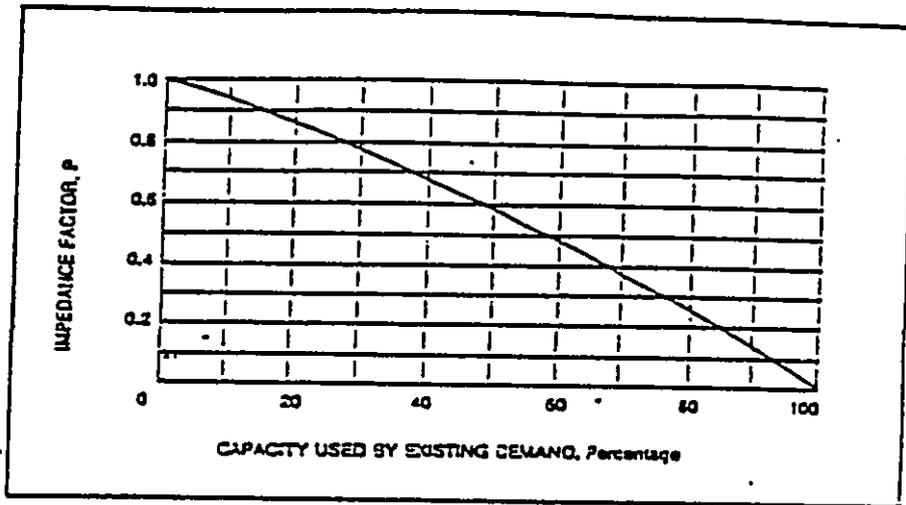


Figure 10-3. Impedance factors as a result of congested movements.

Appendix C
Survey of the Avifauna and Feral Mammals

SURVEY OF THE AVIFAUNA AND FERAL MAMMALS ON A
458 ACRE PARCEL LOCATED ALONG THE KAWAIHAE-
WAIMEA ROAD, SOUTH KOHALA, HAWAII

Prepared for
NANSAY HAWAII, INC.

BY

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14 November 1990

INTRODUCTION

The purpose of this report is to summarize the findings of a two day (10-11 November 1990) bird and mammal field survey of property located along the Kawaihae-Waimea road in South Kohala, Hawaii (Fig.1). Also included are references to pertinent literature as well as unpublished reports on the fauna of West Hawaii.

The objectives of the field survey were to:

- 1- Document what bird and mammal species occur on the property or may likely occur given the type of habitats available.
- 2- Provide some baseline data on the relative (estimated) abundance of each species.
- 3- Determine the presence or likely occurrence of any native fauna particularly any that are considered "Endangered" or "Threatened". If such occur or may likely be found on or near the property identify what features of the habitat may be essential for these species.
- 4- Identify any special or unique habitats for wildlife that may occur on or near the property and note what importance these sites may have for the fauna in this region.

GENERAL SITE DESCRIPTION

This 458 acre site lies between the Kawaihae-Waimea road and Waiulaula Gulch at approximately 1500 feet elevation (Fig.1). The majority of the property is covered in dry grass. Scattered Kiawe trees (Prosopis pallida) can be found in low lying areas. Waiulaula Gulch along the south boundary contains a variety of exotic trees such as Christmas Berry (Schinus terebinthifolius), Koa Haoli (Leucaena leucocephala) and Banyan (Ficus spp.).

Weather during the survey was partly cloudy with easterly winds.

STUDY METHODS

Field observations were made with the aid of binoculars and by listening for vocalizations. These observations were concentrated during the peak bird activity periods of early morning and late afternoon. Attention was also paid to the presence of tracks and scats as indicators of bird and mammal activity. At various locations (see Fig.1) eight minute counts were made of all birds seen or heard. Between these count (census) stations observations of birds seen or heard were also noted. These data provide the basis for the relative (estimated) abundance figures given in this report (Table 1). Published and unpublished reports of birds known from similar habitat elsewhere in West Hawaii were also consulted in order to

acquire a more complete picture of the possible species that might occur in the area (Bruner 1979, 1980, 1984a, 1984b, 1984c, 1985a, 1985b, 1985c, 1986, 1988a, 1988b, 1989a, 1989b, 1989c, 1990a, 1990b, 1990c; Hawaii Audubon Society 1989; Pratt et al. 1987; David 1989, 1990). Observations of feral mammals were limited to visual sightings and evidence in the form of scats and tracks. No attempts were made to trap mammals in order to obtain data on their relative (estimated) abundance and distribution. One evening was devoted to searching for the presence of owls and the Hawaiian Hoary Bat (Lasiurus cinereus semotus).

Scientific names used herein follow those given in the most recent American Ornithologist's Union Checklist (A.O.U. 1983), Hawaii's Birds (Hawaii Audubon Society 1989); A Field Guide to the Birds of Hawaii and the Tropical Pacific (Pratt et al. 1987); Mammal Species of the World (Honacki et al. 1982 and Hawaiian Coastal Plants and Hawaiian Forest Plants (Merlin 1980a, 1980b).

RESULTS AND DISCUSSION

Resident Endemic (Native) Land and Water Birds:

No Short-eared Owl or Pueo (Asio flammeus sandwichensis) were observed but this bird could potentially occur on the island of Hawaii particularly at higher elevations (Berger 1971, Hawaii Audubon Society 1989; Pratt et al. 1987). Another potential endemic that may forage in the area is the Hawaiian Hawk or

'Io (Buteo solitarius). This species is more common along the Hamakua coast and near Hilo. No other resident endemics would be expected at this locality (Hawaii Audubon Society 1989).

Migratory Indigenous (Native) Birds:

Migratory shorebirds winter in Hawaii between the months of August through May. Some juveniles will stay through the summer months as well (Johnson and Johnson 1983). Of all the shorebirds species which winter in Hawaii the Pacific Golden Plover (Pluvialis fulva) is the most abundant. Plover prefer open areas such as exposed intertidal reef, rocky shorelines, mud flats, lawns, pastures, plowed fields and sparse grasslands. They arrive in Hawaii in early August and depart to their arctic breeding grounds during the last week of April (Johnson et al. 1981). Bruner (1983) and Johnson et al. (1989) have also shown plover are extremely site-faithful on their wintering grounds and many establish foraging territories which they defend vigorously. Such behavior makes it possible to acquire a fairly good estimate of the abundance of plover in any one area. These populations likewise remain relatively stable over many years (Johnson et al. 1989). A total of five Pacific Golden Plover were recorded during the survey. These birds were observed along Waiulaula Gulch. Most of the property is covered in tall grass and is therefore unsuitable for plover. One Wandering Tattler (Heteroscelus incanus) was also recorded at Waiulaula Gulch.

This species is usually solitary and will utilize stream drainages as well as rocky intertidal habitat. No other migratory shorebirds are likely to occur with any frequency at this site.

Resident Indigenous (Native) Birds:

No indigenous species were recorded. Black-crowned Night Heron (Nycticorax nycticorax) occur along coastal wetlands and stream courses. The ephemeral nature of the stream in Waiulaula Gulch limits the value of this area for heron.

Resident Indigenous (Native) Seabirds:

No seabirds were observed on the property. Some seabirds do nest and roost on the main islands but not at this location (Pratt et al. 1987).

Exotic (Introduced) Birds:

A total of 16 species of exotic birds were recorded during the field survey. The most abundant species were Zebra Dove (Geopelia striata), Northern Mockingbird (Mimus polyglottus) and Japanese White-eye (Zosterops japonicus). The sighting of a flock of free flying parrots (species unconfirmed) was somewhat unexpected. They undoubtedly are escaped cage birds.

Given the habitats found on the property as well as data from surveys elsewhere in West Hawaii (Bruner 1979, 1980, 1984a,

1984b, 1984c, 1985a, 1985b, 1985c, 1986, 1988a, 1988b, 1989a, 1989b, 1989c, 1990a, 1990b, 1990c) and information provided in Berger (1972); Pratt et al. (1987); David (1989, 1990) and Hawaii Audubon Society (1989) the following exotic bird species might also be expected to occur on or near the property: Ring-necked Pheasant (Phasianus colchicus), Erckel's Francolin (Francolinus erkelii), California Quail (Callipepla californica), Japanese Quail (Coturnix japonica), Chestnut-bellied Sandgrouse (Pterocles exustus), House Finch (Carpodacus mexicanus), Lavender Waxbill (Estrilda caerulescens) and Black-rumped Waxbill (Estrilda troglodytes).

Feral Mammals:

Evidence of Small Indian Mongoose (Herpestes auropunctatus) and feral cat was found on the survey. Mice and rats are also likely to occur at this site. No trapping was conducted in order to assess the relative abundance of mammals.

Information on the endemic and endangered Hawaiian Hoary Bat is sketchy but this species has been frequently reported from Hawaii (Tomich 1986; Kepler and Scott 1990). None were observed on this field survey despite evening searches of the area. This species is believed to roost solitarily in trees. Much remains to be known about its natural history and ecological requirements.

CONCLUSION

A brief field survey such as this one can at best provide only a limited perspective of the wildlife. Not all species will necessarily be observed and information on their use of the site must be sketched together from brief observations and the available literature. The number of species and the relative abundance of each species may vary throughout the year due to available resources and reproductive success. Species which are migratory will quite obviously be a part of the faunal picture only at certain times during the year. Some exotic species prosper for a time only to later disappear or become a less significant part of the ecosystem (Williams 1987; Moulton et al. 1990). Thus only long term studies can provide a comprehensive view of the bird and mammal populations in a particular area. However, when brief field studies are coupled with data gathered from other similar habitats the value of the conclusions drawn are significantly increased.

The following are some general conclusions related to bird and mammal activity on this property:

- 1- All representative types of habitat found on the property were censused. The more densely forested Waiulaula Gulch supports the greatest number of birds. The more open grassland habitat is much less utilized by wildlife.
- 2- The property was found to support the normal array of exotic species of birds one would expect in this type of environment

in Hawaii. However, some species typically found in this habitat were not recorded. This could have been due to the fact that the survey was too brief or that their numbers are so low that they went undetected or a combination of these and other factors.

- 3- The only native species recorded were the Pacific Golden Plover and Wandering Tattler. These two species were uncommon due to limited suitable habitat.
- 4- In order to obtain more definitive data on mammals a trapping program would be required. However, the brief observations obtained on this survey did not find that the numbers of feral mammals differed dramatically from data gathered on other faunal surveys in similar habitat in West Hawaii.
- 5- Waiulaula Gulch is an important natural feature in this area. The small pools of water and the refuge provided by the trees are essential to the fauna at this locality. Dry grassland habitat similar to that found on this property is abundant in West Hawaii.
- 6- The proposed golf course development will offer an alternative set of habitats to what presently exists on the site. The shorter grass and an increase in the number of trees resulting from development will make this site more attractive to some species such as Pacific Golden Plover and Common Myna (Acridotheres tristis) but will be less usable for dry grassland species like Warbling Silverbill (Lonchura malabarica).

TABLE 1

Exotic (introduced) birds recorded at Waimea, South Kohala, Hawaii

COMMON NAME	SCIENTIFIC NAME	RELATIVE ABUNDANCE*
Parrot spp(?)	?	R = 17
Barn Owl	<u>Tyto alba</u>	R = 1
Gray Francolin	<u>Francolinus pondicerianus</u>	R = 3
Black Francolin	<u>Francolinus francolinus</u>	C = 7
Spotted Dove	<u>Streptopelia chinensis</u>	U = 4
Zebra Dove	<u>Geopelia striata</u>	A = 10
Mourning Dove	<u>Zenaida macroura</u>	R = 8
Common Myna	<u>Acridotheres tristis</u>	U = 5
Northern Mockingbird	<u>Mimus polyglottus</u>	C = 9
Northern Cardinal	<u>Cardinalis cardinalis</u>	U = 2
Japanese White-eye	<u>Zosterops japonicus</u>	A = 12
Nutmeg Mannikin	<u>Lonchura punctulata</u>	C = 6
Warbling Silverbill	<u>Lonchura malabarica</u>	C = 6
Eurasian Skylark	<u>Alauda arvensis</u>	C = 7
House Sparrow	<u>Passer domesticus</u>	R = 1
Saffron Finch	<u>Sicallis flaveola</u>	R = 2

*(see page 11 for key to symbols)

KEY TO TABLE 1

Relative (estimate) abundance = number observed during survey
or average number on eight
minute counts.

A = abundant (ave. 10+) number which follows is average of data
from all survey days

C = common (ave. 5-10) number which follows is average of data
from all survey days

U = uncommon (ave. less than 5) number which follows is average
of data from all survey days

R = recorded (seen or heard at times other than on 8 min. counts
or on one count only) number which follows is the
total number seen or heard over the duration of the
survey.

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Appendix D
Botanical Survey Report

BOTANICAL SURVEY REPORT OF THE OULI RESIDENTIAL DEVELOPMENT SITE

for

Nansay Hawaii, Inc.
Kamuela Business Center
Kamuela, Hawaii 96743-0020

by

Evangeline J. Funk Ph.D.
Botanical Consultants
P.O.Box 90765
Honolulu, Hawaii 96835

December, 1990

TABLE OF CONTENTS

	Page
INTRODUCTION.....	1
METHODS.....	1
BOTANICAL HISTORY.....	1
ENDANGERED SPECIES.....	3
RESULTS.....	3
Open Grass Scrub.....	3
CONCLUSIONS.....	6
LIMITATIONS OF THE SURVEY.....	6
LITERATURE CITED.....	8
SPECIES LIST.....	9

LIST OF FIGURES

FIGURE 1. VEGETATION MAP.....	4
FIGURE 2. GRASS COVERED GENTLY ROLLING HILLS.....	5
FIGURE 3. SMALL SANDALWOOD TREES ARE COMMON ON THIS SITE.....	5
FIGURE 4. KEANOLOMENO STREAM IS THE SOUTHERN BOUNDRY.....	7
FIGURE 5. THE WATER FALL OF KAENOLOMANO STREAM.....	7

INTRODUCTION

A botanical survey of the proposed Ouli Residential Development Site was undertaken in October, 1990. The purpose of the survey of this 450 acre site was to collect data for the preparation of a species list; to describe the vegetation of the site; and to ascertain if any proposed or listed, threatened or endangered plants are growing in the area (USFWS 1989).

METHODS

The walk-through method was used during the data collection phase of the survey. Transects were run from Kawaihae-Waimea Highway to Keanulomano Stream. All parts of the site were examined.

BOTANICAL HISTORY

The Ouli Residential Development Site is located in what Hillebrand described as "open country, grass covered, with isolated trees or clumps of trees (Hillebrand 1888) and what Rock labelled (Rock 1913) the lowland zone. Today, nearly eighty years later Rock's description of the lowland zone is still applicable. He observed that the area was open grassland with kiawe (*Prosopis pallida* (Humb. & Bonpl. ex Willd.) Kunth), pili grass (*Heteropogon contortus* (L.) P. Beauv.), panini (*Opuntia ficus-indica* (L.) Mill.) and alien species from many countries, the most obnoxious among them being lantana (*Lantana camara* L.).

The designation used by Hillebrand and Rock was incorporated into Ripperton and Hosaka's 1942 effort to categorize the vegetation of the Hawaiian Islands (Ripperton & Hosaka 1942). In the Ripperton and Hosaka scheme, the study site lies at the upper limits of Zone A - the coastal lowlands, which are characterized by low rainfall, high daytime temperatures and xerophytic (dryland) vegetation.

Harsh environmental conditions, extensive and varied disturbance, and the high percentage of alien species now occupying the area have rendered it fairly uninteresting for botanical studies. As a result little was written about the vegetation of the upper coastal lowlands until the enactment of the endangered species act of 1973 and the advent of the environmental impact process in 1970.

During the 1980s, three environmental impact statements for projects in and around the Kawaihae area were filed. In 1985, the Waikola Beach Resort EIS (USACOE 1985) reported that no plant species on the federal list of proposed or threatened and endangered species were found just southwest of the Ouli Residential Development Site. Two years later an EIS prepared by Belt Collins and Associates (Belt Collins and Associates 1987) for the Mauna Lani Resort was filed and in 1989 the same firm filed an EIS for the Mauna Lani Cove Hotel, both in the south Kohala area. Both of these documents contained extensive botanical study reports and neither reported finding proposed or listed threatened and endangered plant species in the area. All of the above reports have been for coastal projects located not far from the Ouli Development Site.

In 1985, Parker Ranch petitioned the Land Use Commission for a land use change. That petition contained the results of extensive flora and fauna surveys carried out in the Waimea, Hawaii area just northeast of this study site. Here again no critical plant species were reported. The only reference to endangered plant species in all of these documents is found in the Mauna Lani Cove EIS (Belt Collins and Associates 1989). In this paper the author notes having found seven colonies of the ephemeral fern, pololei, (*Ophioglossum concinnum* Brack.) on the Mauna Lani Cove site and notes

that the fern has been reported from Oahu, Molokai, Maui, and Lanai but apparently was unaware that large colonies of pololei have also been reported from the island of Kauai (Funk 1984). *Ophioglossum concinnum* is a Category 1 endangered species and will be listed in 1993 (Pers. comm. Derral Herbst Ph.D. - Botanist USFWS).

ENDANGERED SPECIES

No currently listed or proposed candidate endangered or threatened plant species were found within the study area (USFWS 1989).

RESULTS

Open grass scrub is the single vegetation type found on the Ouli Residential Development Site. The area can be characterized as gently rolling grasslands with scattered forbs, shrubs, and trees with frequent, low, rock outcrops (Figure 1). The emergent vegetation is very widely distributed kiawe trees (*Prosopis pallida* (Humb. & Bonpl. ex Willd.) Kunth). Individual trees attain a height of from 6 to 8 m and are usually found in low places such as dry stream beds or swales.

The shrub layer is made up of several other taxa which can be found either singly or in small patches. These include sandalwood (*Santalum ellipticum* Gaud.), a'ali'i (*Dodonea viscosa* Jacq.), akia (*Wikstroemia phillyreifolia* A. Gray), Mauritius hemp (*Furcraea foetida* (L.) Haw.), and christmasberry (*Schinus teribinthifolius* Raddi). Botanically, the most interesting of these is, by far, the sandalwood (Figure 2). Sandalwood played a very significant role in the early history of the Hawaiian islands and it is still of great interest to botanists and historians.

Because the area was once pasture land, the forb or herb layer is made up principally of grasses. The most common of these are buffelgrass

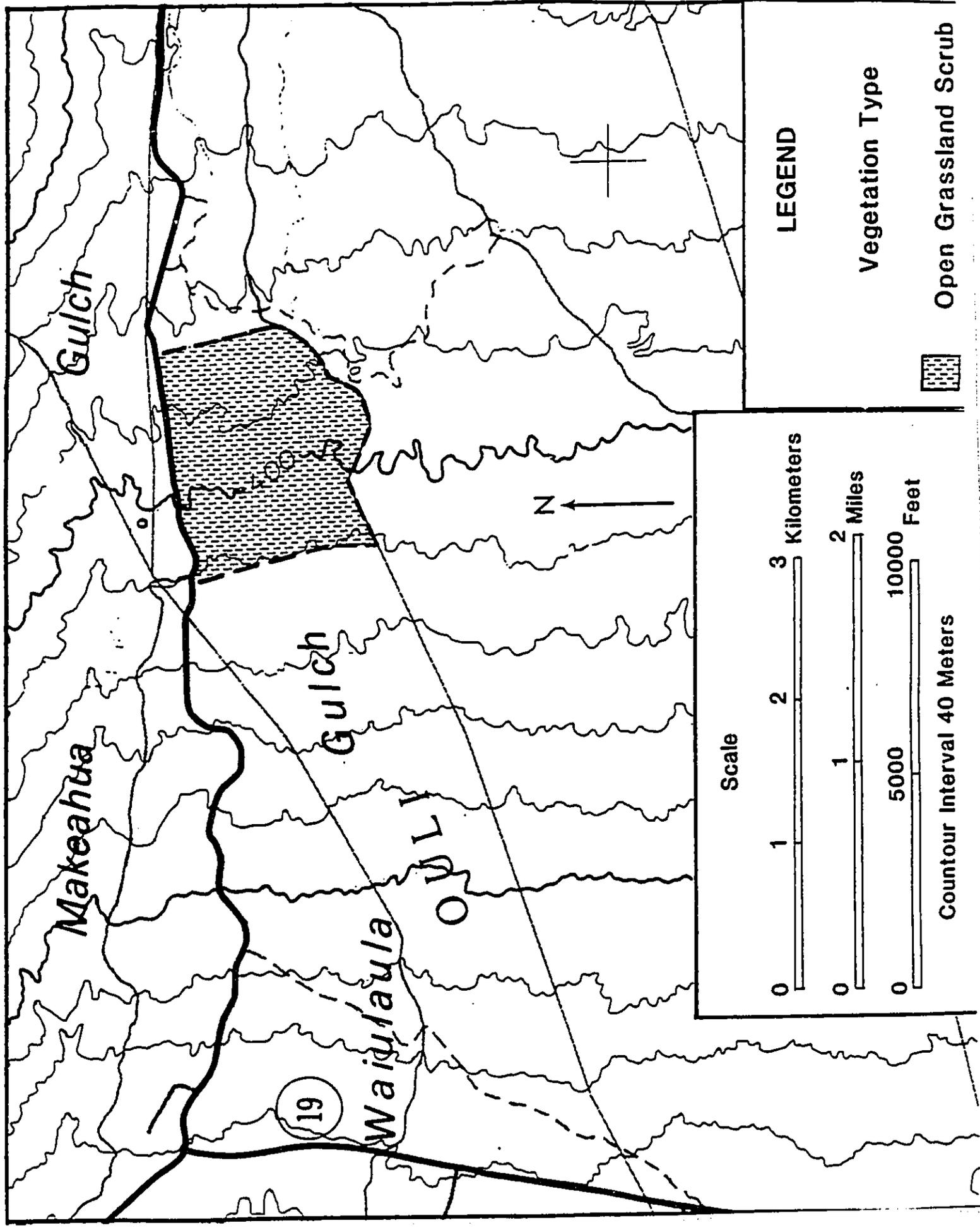




Figure 2. GRASS COVERED ROLLING HILLS.



Figure 3. SMALL SANDALWOOD TREES ARE COMMON ON THIS SITE.

(*Cenchrus ciliaris* L.), fountain grass (*Pennisetum setaceum* (Frossk.) Chiov.), and bristly foxtailgrass (*Setaria verticillata* (L.) Kunth). In addition a rich mixture of introduced weeds or alien species and several native taxa are also to be found growing within the grass cover.

The southern boundary of the site is Keanolomano Stream (Figure 3 and Figure 4). Along the stream, the vegetation is very green and robust, but the species composition is not very different from that of the rest of the site. For example, christmasberry which is usually about a meter in height on most of the site, is 3 to 4 meters high along the stream and the variety of grasses is much greater.

CONCLUSIONS

Open grass scrub is found in many parts of the broad coastal plain from South Kohala to Kailua Kona. The native vegetation on this site is common in many other places. It would be laudable if some of the sandalwood trees and other native species can be incorporated into the landscaping of the site.

LIMITATIONS OF THE SURVEY

This survey was undertaken in late October when the area was very dry and many summer deciduous taxa were dormant. A similar survey during the wet season would probably have resulted in a more extensive list of introduced species.



FIGURE 4. KEANOLOMANO STREAM IS THE SOUTHERN BOUNDRY OF THE SITE.



FIGURE 5. THE WATER FALL OF KEANOLOMANO STREAM.

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CHECKLIST OF PLANT SPECIES FOUND ON THE OULI RESIDENTIAL DEVELOPMENT SITE

The plant families in the following species list have been alphabetically arranged within two groups, Monocotyledons, and Dicotyledons. The genera and species are arranged alphabetically within families. The taxonomy and nomenclature follow that of St. John (1973) and Wagner, Herbst and Sohmer (1990). For each taxon the following information is provided:

1. An asterisk before the plant name indicates a plant introduced to The Hawaiian Islands since Cook or by the aborigines.
2. The scientific name.
3. The Hawaiian name and or the most widely used common name.
4. Abundance ratings are for this site only and they have the following

meanings:

Uncommon - a plant that was found less than five times.

Occasional - a plant that was found between five to ten times.

Common - a plant considered an important part of the vegetation

Locally abundant - plants found in large numbers over a limited area. For example the plants found in grassy patches.

This species list is the result of an extensive survey of this site at the end of the dry season (October 1990) and it reflects the vegetative composition of the flora during a single season. Minor changes in the vegetation will occur due to introductions and losses and a slightly different species list would result from a survey conducted during a different growing season.

CHECKLIST OF PLANT SPECIES FOUND ON THE OULI RESIDENTIAL DEVELOPMENT SITE

Scientific Name	Common Name	Abundance
MONOCOTYLEDONES		
COMMELINACEAE - Spiderwort Family		
* <i>Commelina difusa</i> N.L. Burm.	Honohono grass	Locally abundant
CYPERACEAE - Sedge Family		
* <i>Cyperus halpan</i> L.		Uncommon
* <i>Pycreus polystachyos</i> (Rottb.) P. Beauv.		Uncommon
GRAMINEAE - Grass Family		
* <i>Bothriochloa bladhii</i> (Retz.) Clayton	Beardgrass	Locally abundant
* <i>Brachiaria mutica</i> (Forsk.) Staph	Paragrass	Locally abundant
* <i>Cenchrus ciliaris</i> L.	Buffel grass	Locally abundant
* <i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	Common
* <i>Digitaria setigera</i> Roth	Itchy crab grass	Uncommon
* <i>Heteropogon contortus</i> (L.) P. Beauv.	Pili grass	Common
* <i>Melinis minutiflora</i> P. Beauv.	Molassesgrass	Locally abundant
* <i>Paspalum fimbriatum</i> Kunth	Panama grass	Uncommon
* <i>Pennisetum setaceum</i> (Frossk.) Chiov	Fountain grass	Common
* <i>Pennisetum clandestinum</i> Chiov	Kikuyugrass	Uncommon
* <i>Rhynchelytrum repens</i> C.E. Hubb	Natal redtop	Common
* <i>Sacciolepis indica</i> (L.) Chase	Glenwoodgrass	Uncommon
* <i>Setaria verticillata</i> (L.) P. Beauv	Bristly Foxtail	Locally abundant
* <i>Sporobolus virginicus</i> (L.) Kunth	Beach dropseed	Locally abundant
* <i>Sporobolus diander</i> (Retz.) P. Beauv	Indian dropseed	Occasional
AGAVACEAE - Agave Family		
* <i>Furcraea foetida</i> (L.) Haw.	Mauritius hemp	Common
DICOTYLEDONES		
APOCYNACEAE - Periwinkle Family		
* <i>Catharanthus roseus</i> (L.) G. Don	Periwinkle	Uncommon
AMARANTHACEAE - Amaranth Family		
* <i>Amaranthus spinosus</i> L.	Spiny amaranth	Common
ANACARDIACEAE - Mango Family		
* <i>Schinus terebinthifolius</i> Raddi	Christmas berry	Occasional

Scientific Name	Common Name	Abundance
ASTERACEAE - Sunflower Family		
* <i>Ambrosia artemisifolia</i> L.	Common ragweed	Common
* <i>Bidens pilosa</i> L.	Spanish needle	Common
* <i>Centaurea melitensis</i> L.	Napa Thistle	Locally abundant
* <i>Conyza bonariensis</i> (L.) Cronq.	Hairy horseweed	Common
* <i>Conyza canadensis</i> Cronq.	Horseweed	Occasional
* <i>Emilia coccinea</i> (Sims) G. Don	Flora's paintbrush	Occasional
<i>Lipochaeta lavarum</i> (Gaud.) DC		Uncommon
* <i>Pluchea symphytifolia</i> (Mill) Gillis	Sourbush	Occasional
* <i>Tridax procumbens</i> L.	Coat buttons	Locally abundant
* <i>Verbesina encelioides</i> Cav.	Golden crown-beard	Occasional
* <i>Xanthium saccharatum</i> Wallr.	Cocklebur	Uncommon
* <i>Zinnia peruviana</i> (L.) L.		Occasional
CACTACEAE - Cactus Family		
* <i>Opuntia ficus-indica</i> (L.) Mill.	Panini	Uncommon
CHENOPODIACEAE - Goosefoot Family		
<i>Chenopodium oahuense</i> (Meyen) Aellen	'Aheahea	Common
CONVOLVULACEAE - Moringlory Family		
* <i>Ipomoea cairica</i> L. Sweet	Ivy leafed morninglory	Occasional
* <i>Jacquemontia ovalifolia</i> (Choisy) H. Hallier	Pa'uohi'iaka	Common
CUCURBITACEAE - Cucumber Family		
* <i>Cucumis dipsaceus</i> Ehrh. ex Spach	Hedgehog Gourd	Occasional
EUPHORBIACEAE - Spurge Family		
* <i>Chamaesyce hirta</i> L.	Hairy spurge	Common
* <i>Chamaesyce hypericifolia</i> Mellsp.	Graceful spurge	Occasional
* <i>Ricinus communis</i> L.	Castor bean	Common
FABACEAE - Bean Family		
* <i>Acacia confusa</i> Merr.	Formosa koa	Uncommon
* <i>Acacia mearnsii</i> De Wild.	Black wattle	Uncommon
* <i>Chamaecrista nictitans</i> subsp. <i>patellaria</i>	Partridge pea	Common
* <i>Crotalaria incana</i> L.	Fuzzy rattle-pod	Occasional
* <i>Crotalaria pallida</i> Aiton		Occasional
* <i>Desmodium incanum</i> DC		Occasional
* <i>Desmodium tortuosum</i> (Sw.) DC	Beggarweed	Occasional
* <i>Indigofera suffruticosa</i> Mill.	Iniko	Common
* <i>Leucaena leucocephala</i> deWit	Koa-haole	Common

Scientific Name	Common Name	Abundance
FABACEAE - Bean Family con't		
* <i>Macroptilium lathyroides</i> (L.) Urb.	Wild bean	Locally abundant
* <i>Medicago minima</i> (L.) Bartal.	Small bur clover	Locally abundant
* <i>Pithecellobium dulce</i> Benth.	Madras thorn	Occasional
* <i>Prosopis pallida</i> HBK	Kiawe, algaroba	Occasional
LABIATAE - Mint Family		
* <i>Hyptis pectinata</i> (L.) Poit.	Comb. hyptis	Occasional
LYTHRACEAE - Loosestrife Family		
* <i>Cuphea carthagensis</i> (Jacq.) Macbr.	Tarweed	Locally abundant
MALVACEAE - Mallow Family		
* <i>Abutilon grandifolium</i> (Willd.) Sweet	Hairy abutilon	Locally abundant
* <i>Malvastrum coromandelianum</i> Garcke	False marrow	Common
* <i>Sida fallax</i> Walp.	'Ilima	Common
MORACEAE - Fig Family		
* <i>Ficus retusa</i> L.	Banyan	Uncommon
MYRTACEAE - Myrtle Family		
* <i>Psidium guajava</i> L.	Common guava	Uncommon
NYCTAGINACEAE - Four o'clock Family		
<i>Boerhavia repens</i> L.	Alena	Common
ONAGRACEAE - Evening primrose Family		
* <i>Ludwigia octovalvis</i> (Jacq.) Raven	Primrose willow	Uncommon
PLANTAGINACEAE - Plantain Family		
* <i>Plantago lanceolata</i> L.	Narrow leaved plantain	Uncommon
POLYGONACEAE - Buckwheat Family		
* <i>Polygonum punctatum</i> Elliot	Water smartweed	Uncommon
PORTULACACEAE - Portulaca Family		
* <i>Portulaca pilosa</i> L.	Akulikuli	Common

Family	Scientific Name	Common Name	Abundance
RUBIACEAE - Coffee Family			
	* <i>Pentas lanceolata</i> (Forsk.) K. Schum		Uncommon
SANTALACEAE - Sandalwood Family			
	<i>Santalum ellipticum</i> Gaud.	Coast sandalwood	Abundant
SAPINDACEAE - Soapberry Family			
	<i>Dodonaea viscosa</i> Jacq.	A'ali'i	Common
SOLANACEAE - Tomato Family			
	* <i>Solanum capsicoides</i> All.	Cockroach berry	Occasional
STERCULIACEAE - Stink tree Family			
	(*) <i>Waltheria indica</i> L.	Hi'aloa, uha-loa	Common
THYMELAEACEAE - Akia Family			
	<i>Wikstroemia phillyreifolia</i> A. Gray	Akia	Common
VERBENACEAE - Verbena Family			
	* <i>Lantana camara</i> L.	Lantana	Occasional
	* <i>Stachytarpheta jamaicensis</i> Vahl.	Vervain	Common

Appendix E
County Pre-emption
Resolution

EXHIBIT 18
COUNTY OF HAWAII STATE OF HAWAII

RESOLUTION No. 84 93
(DRAFT 2)

RESOLUTION OF THE COUNTY COUNCIL OF THE COUNTY OF HAWAII
AUTHORIZING THE EXEMPTION OF ZONING CODE REQUIREMENTS FOR AN
AFFORDABLE HOUSING PROJECT WITHIN THE PROPOSED OULI GOLF
COMMUNITY PURSUANT TO CHAPTERS 201E-201 AND 201E-210 OF THE
HAWAII REVISED STATUTES.

WHEREAS, Nansay Hawaii, Inc., is proposing the development
of the Ouli Golf Community in Ouli, South Kohala, Hawaii; and

WHEREAS, Nansay Hawaii, Inc., desires to provide affordable
housing for residents of the County of Hawaii; and

WHEREAS, Nansay Hawaii, Inc., has identified a 15-acre site
within the proposed Ouli Golf Community for 60-75 single family
and 50-75 multi-family affordable housing units; and

WHEREAS, Nansay Hawaii, Inc., and the County will be
entering into an agreement to ensure that the 15-acre site is
developed as an affordable housing project; and

WHEREAS, the development of 60-75 single family and 50-75
multi-family affordable housing units within the Ouli Golf
Community will be consistent with the objectives of Section 46-
15.1 and Section 201E of the Hawaii Revised Statutes.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE COUNTY
OF HAWAII that the affordable housing site, identified on the map
attached hereto as Exhibit A, is hereby preempted from the County
General Plan to allow a change of designation from Extensive
Agriculture to Medium Density Urban Development.

BE IT FURTHER RESOLVED, that the said affordable housing
site is hereby exempted from zoning requirements.

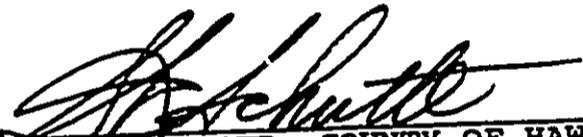
BE IT FURTHER RESOLVED, that Nansay Hawaii, Inc., shall
submit the detailed plans and specifications of the affordable
housing project to the County Council of Hawaii for specific
preemption approval prior to the development of the project.

BE IT FURTHER RESOLVED, that pursuant to Section 201E-210(a)(3)(C) of the Hawaii Revised Statutes, the Mayor or his designee shall be the responsible County official to certify compliance with applicable laws and ordinances relating to the development of the affordable housing project.

BE IT FURTHER RESOLVED, that copies of this resolution be sent to Nansay Hawaii, Inc., the Mayor, the Administrator of the Office of Housing and Community Development, and the Planning Director for the County of Hawaii.

Dated at Hilo, Hawaii, this 28th day of July, 1993.

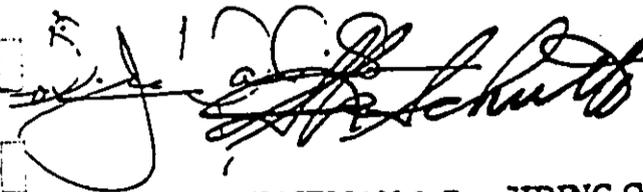
INTRODUCED BY:



 COUNCIL MEMBER, COUNTY OF HAWAII

COUNTY COUNCIL
 County of Hawaii
 Hilo, Hawaii

I hereby certify that the foregoing RESOLUTION was by the vote indicated to the right hereof adopted by the COUNCIL of the County of Hawaii on July 28, 1993.


 COUNTY CLERK CHAIRMAN & PRESIDING OFFICER

ROLL CALL VOTE

	AYES	NOES	ABS	EX
ARAKAKI	X			
BONK-ABRAMSON		X		
CHILDS	X			
DE LIMA	X			
DOMINGO	X			
HALE		X		
RATH	X			
ROSEHILL	X			
SCHUTTE	X			
	7	2	0	0

Reference C-485

RESOLUTION NO. **84 93** (DRAFT 2)

Oull Golf Community

SITE PLAN



Affordable Housing sites

Scale 1:27

EXHIBIT A

Figure

3

Appendix F
Rental Market Information

Mr. Tom Yamamoto
Nansay Hawaii, Inc.
P.O. Box 111222, Suite 727
Kamuela Business Center
Kamuela, HI 96743

Re: The Demand for Affordable Housing in West Hawaii

Dear Tom:

We have reviewed the waiting lists in each of our projects and have found that there are approximately 220 active applicants waiting to be placed in affordable housing. This figure does not include the 84 applications we have just received for placement in the newest project, Ke Kumu.

PROJECT	NUMBER OF UNITS	TYPE OF HOUSING	RENTAL PROGRAMS
HALE HOOKIPA	32	STATE/HUD/ELDERLY	FEDERAL LOW RENT
NANI OLU	32	STATE/HUD/ELDERLY	FEDERAL LOW RENT
KA HALE KAHALUU	30	STATE/HUD/FAMILY	FEDERAL LOW RENT
KEALAKOHE	48	STATE/HUD/FAMILY	FEDERAL LOW RENT
NOELANI	19	STATE/HUD/FAMILY	FEDERAL LOW RENT
NOELANI II	24	STATE/HUD/FAMILY	FEDERAL LOW RENT
LATI ANI	200	STATE/FAMILY/SINGLE	RENTAL ASSISTANCE
HALE ANUHEA	21	COUNTY/HUD/ELDERLY	SECTION EIGHT
KAIMALINO	40	STATE/HUD/FAMILY	FEDERAL LOW RENT
KKUMU	48	STATE/FAMILY	RENTAL ASSISTANCE

We have been in the affordable rental sector for the past twelve years and have first hand experience in all aspects of the rental assistance, section 8, and rent supplement programs. We work with people who need housing everyday and understand and appreciate the role for affordable housing in this community. We can unequivocally say that there is now a strong demand for affordable rental housing in West Hawaii and we anticipate the demand to become greater as the economy improves and more people move into the area.

The unique characteristics of the local economy will always create a need for affordable housing. West Hawaii is a community where over fifty percent of the household incomes fall below \$25,000 per year. Yet, this area is one of the most expensive places to live in the nation. Unfortunately, this situation will not change in the near future.

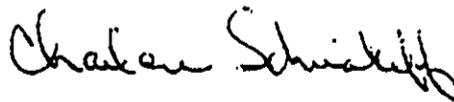
The cost of housing is extremely high in West Hawaii. West Hawaii has become an international market for real estate and development. Although the industry has provided jobs in construction and real estate, it has had a major impact in driving up the cost of housing. Even in a recession, the average sales price for a house in Kona is currently \$250,000, unfortunately out of the reach of most working families. The high real estate prices have affected the rental market. Most homes now rent for over \$1,000 per month forcing families to allocate over 50% of their net income towards housing.

The demand for affordable housing will increase as more people move into this area. It is projected that the population of the Big Island will increase 14% by 1995, and by 2005 there will be 207,000 people living on the island. North Kona and South Kohala will see a dramatic increase in population with nearly 52,000 people projected to live in this area in just two years.

As the economy improves, more people will move into the area increasing the need for affordable rental housing. There are over 35,000 condos, house lots and homes planned for development in North Kona and South Kohala. This does not include the hotels that are currently under construction or planned for the future. The airport expansion program is now under way and the tourist industry should see a dramatic increase as direct flights from around the world arrive in West Hawaii.

West Hawaii is a great place to live but a difficult place to make a living. This area is a terrific spot for retirees from the mainland or people with high paying jobs. However, for the average local family that lives and works in this community, the price of paradise is too high unless more affordable housing becomes a reality.

Best regards,



Charlene Sohriakoff

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