



EXECUTIVE CHAMBERS

HONOLULU

GEORGE R. ARIYOSHI
GOVERNOR

November 18, 1985

Ms. Letitia N. Uyehara
Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Based on the recommendation of your office, I am pleased to accept the environmental impact statement for the construction camp housing at Hale Pohaku, Hamakua, Hawaii, as a satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes.

This environmental impact statement will be a useful tool in deciding whether this project should be allowed to proceed. My acceptance of the statement is an affirmation of its adequacy under applicable laws and does not constitute an endorsement of the proposal.

When the decision is made regarding this action, I expect the proposing agency to carefully weigh the societal benefits against the environmental impact which will likely occur. This impact is adequately described in the statement, and, together with the comments made by reviewers, provides a useful analysis of alternatives to the proposed action.

With warm personal regards, I remain,

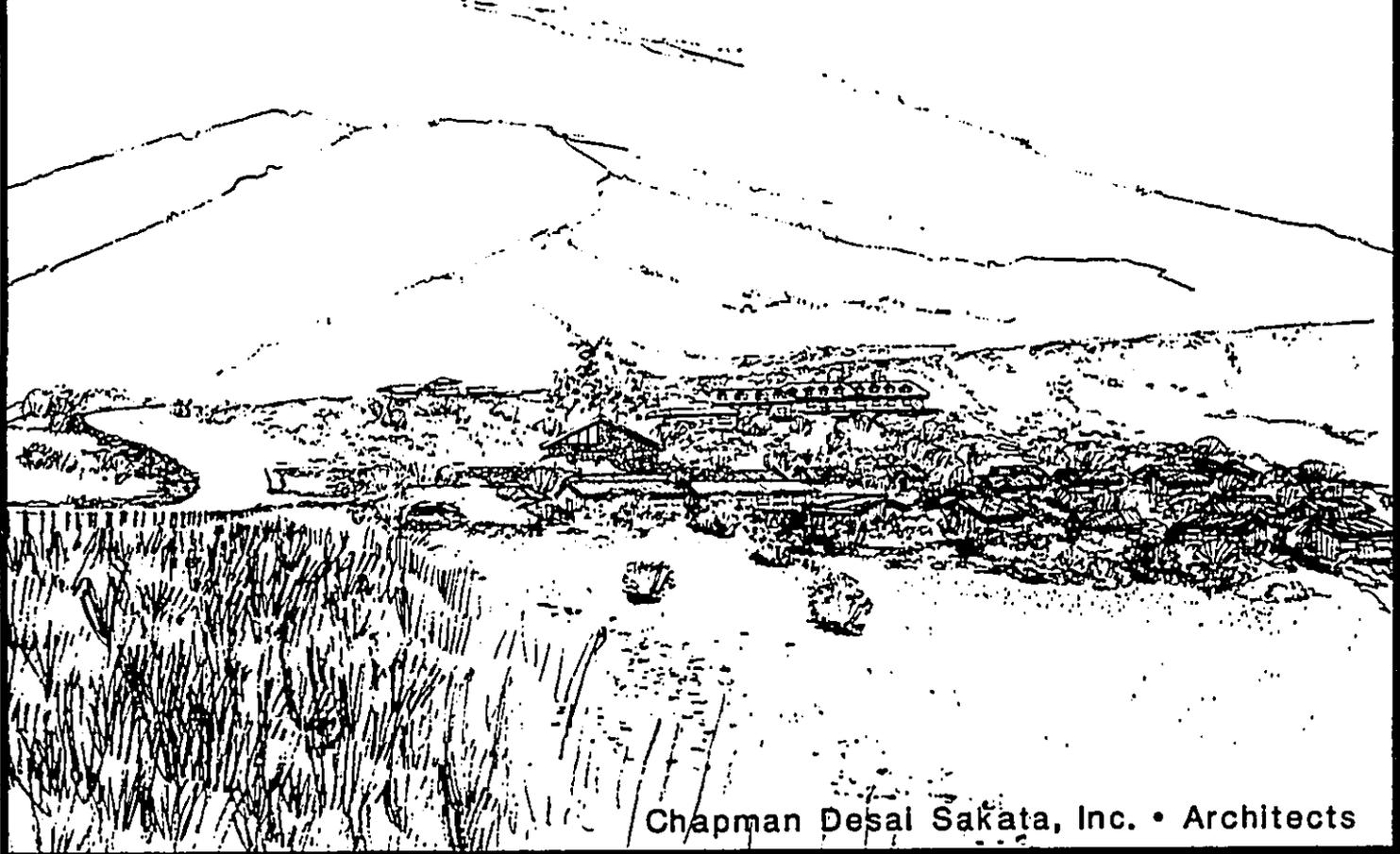
Yours very truly,


George R. Ariyoshi

cc: Honorable Albert Simone

1985 FEIS HAWAII

AMENDMENT TO THE MAUNA KEA SCIENCE RESERVE: COMPLEX
DEVELOPMENT PLAN



Chapman Desai Sakata, Inc. • Architects

**AMENDMENT TO THE MAUNA KEA SCIENCE
RESERVE COMPLEX DEVELOPMENT PLAN**

**FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT
FOR CONSTRUCTION CAMP HOUSING**

HALE PŌHAKU, HĀMĀKUA, HAWAII

University of Hawaii

October 1985

MCM

PLANNING 320 Ward Avenue • Suite 106 • Honolulu, Hawaii 96814 • Phone (808)545-3633

**AMENDMENT TO THE MAUNA KEA SCIENCE
RESERVE COMPLEX DEVELOPMENT PLAN**

**FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT
FOR CONSTRUCTION CAMP HOUSING**

HALE PŌHAKU, HĀMĀKUA, HAWAII

University of Hawaii

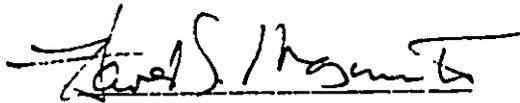
October 1985

MCM

PLANNING 320 Ward Avenue • Suite 106 • Honolulu, Hawaii 96814 • Phone (808)545-3633

FINAL
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
AMENDMENT TO THE MAUNA KEA SCIENCE RESERVE COMPLEX
DEVELOPMENT PLAN
FOR
CONSTRUCTION CAMP HOUSING AT HALE POHAKU
Hamakua, Mauna Kea, Hawaii

Prepared for
THE UNIVERSITY OF HAWAII



Harold S. Masumoto
Vice-President For Administration

Prepared By
MCM PLANNING
Honolulu, Hawaii

October 1985

PROJECT: AMENDMENT TO THE MAUNA KEA SCIENCE
RESERVE COMPLEX DEVELOPMENT PLAN FOR
CONSTRUCTION CAMP HOUSING AT HALE
POHAKU

LOCATION: HALE POHAKU, HAMAKUA
ISLAND OF HAWAII
STATE OF HAWAII

PROPOSING AGENCY: UNIVERSITY OF HAWAII
VICE-PRESIDENT FOR ADMINISTRATION
2444 DOLE STREET
HONOLULU, HAWAII 96822
CONTACT: MR. HAROLD S. MASUMOTO
TELEPHONE: (808) 948-7069

ACCEPTING AUTHORITY: THE HONORABLE GEORGE R. ARIYOSHI
GOVERNOR, STATE OF HAWAII

CONSULTANT: MCM PLANNING
P.O. BOX 27506
HONOLULU, HAWAII 96827
CONTACT: MARILYNN C. METZ, AICP
TELEPHONE: (808) 732-7143 or (808) 545-3633

PREFACE

Subsequent to the publication of the draft EIS, the Conservation District Use Application (CDUA) for use of lands at Hale Pohaku for the construction camp was amended to include a proposed subdivision action within the Conservation District for an approximately ± 21-acre site at Hale Pohaku for the following uses:

1. Existing permanent Mid-Level Facilities, consisting of approximately 7 acres, pending the formal execution of a lease earlier authorized, with conditions, by the Board of Land and Natural Resources;
2. An area consisting of approximately 6 acres to include the land necessary for planned expansion of the permanent Mid-Level Facilities; an area reserved for future expansion of the facilities pending a decision, to be made before the year 2000 in accordance with a revised plan, as whether or not to continue to allow new astronomical facilities on Mauna Kea beyond the 13 projected in the Mauna Kea Science Reserve Complex Development Plan; and a buffer area to separate day sleepers from daytime activities. All of the reserved area will remain in open space until such a time as a revised plan is prepared and an expansion decision is made;
3. An area of approximately 3 acres for an Information Station, the operation and maintenance of which are to become the responsibility of the University of Hawaii as proposed in the Management Plan which was approved by the Board of Land and Natural Resources (BLNR) on February 22, 1985;
4. An area of approximately 4 acres for a long-term construction workers' camp to meet the needs and timetables for the construction of anticipated new telescopes identified and/or planned for in the SRCDP; and,
5. An area of approximately 1 acre for a construction staging area.

The University is also requesting the disposition of a single lease document from DLNR covering all of the above-mentioned areas. This will require the BLNR to remove the 21 acres from the Mauna Kea Forest Reserve.

The above uses and/or land areas have been addressed in this and the following environmental impact statements which are incorporated into this EIS by reference:

Revised Environmental Impact Statement - Hale Pohaku Mid-Elevation Facilities Master Plan: DLNR, 1980.

Final Environmental Impact Statement - Mauna Kea Science Reserve Complex Development Plan: RCUH, 1983.

Upon approval of the amended CDUA, UH is requesting that the BLNR authorize withdrawal of the subject lands from the Forest Reserve. A map showing the proposed leased area is presented on the following page.

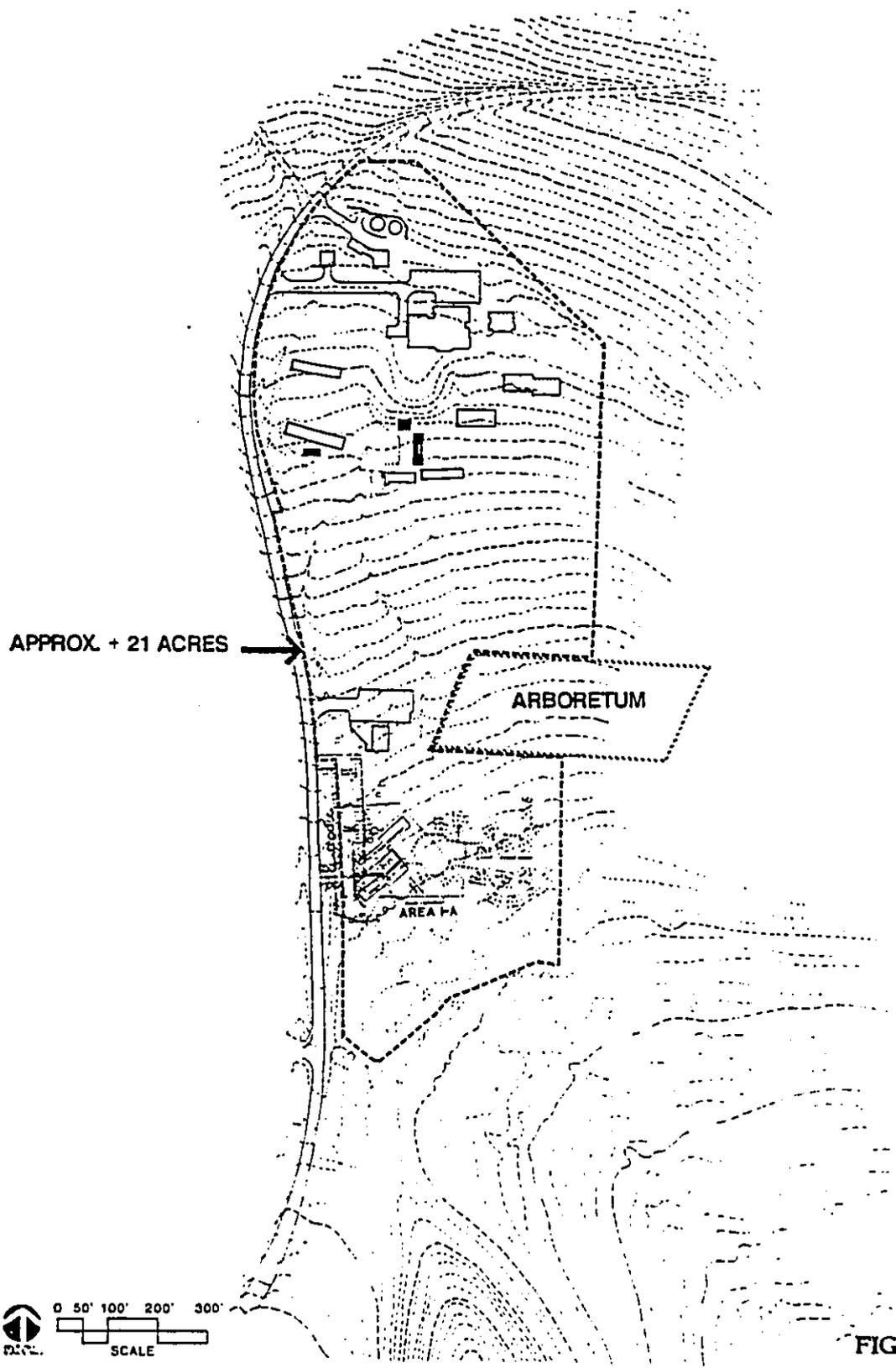


FIGURE A

PROPOSED UH SUBDIVISION AND LEASE AREA
 AMENDMENT TO CDUA HA-1819
 TAX MAP KEY: 4-4-15:1(POR)

TEMPORARY CONSTRUCTION CAMP HOUSING AT
 HALE POHAKU

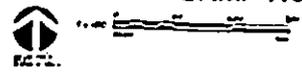


TABLE OF CONTENTS

	Page
Preface	
List of Figures	ii
Summary	iii
Purpose of this Supplemental Environmental Impact Statement	vii
PART I: INTRODUCTION	1
PART II: PROJECT DESCRIPTION	10
PART III: IMPACTS AND MITIGATING MEASURES	19
PART IV: EVALUATION OF ALTERNATIVES	32
Table 1 - Evaluation of Alternative Sites	42
PART V: RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE POLICIES, PLANS AND CONTROLS FOR THE HALE POHAKU AREA	43
PART VI: LIST OF NECESSARY APPROVALS	49
PART VII: UNRESOLVED ISSUES	50
PART VIII: AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED IN THE PREPARATION OF THE EIS	51
REFERENCES	
APPENDIX A: Botanical Survey for the Proposed Construction Camp	
APPENDIX B: Avian Survey of Hale Pohaku Area	
APPENDIX C: Preliminary Archaeological Survey	
APPENDIX D: Correspondence with U.S. Fish & Wildlife Service	
APPENDIX E: Comments and Responses on the Draft Supplemental EIS	

LIST OF FIGURES

<u>Figure No.</u>		<u>Page</u>
A	Proposed UH Subdivision and Lease Area	
1	The Region	2
2	Location Map	3
3	Existing Facilities at Hale Pohaku	5
4	SRCDP: Proposed Physical Plan for the Summit to Year 2000	7
5	SRCDP: Proposed Hale Pohaku Expansion	8
6	Construction Camp Master Plan	12
7	Conceptual View of Proposed Construction Camp	13
8	Conceptual Cabin Layout	15
9	Conceptual Cabin Cluster	16
10	Proposed Infrastructure & Drainage Plan	18
11	Existing Conditions & Alternate Areas for Construction Camp Housing at Hale Pohaku	33
12	Alternative Area I-B	36
13	Alternative Area II	38
14	1977 DLNR Mauna Kea Plan	44
15	SRCDP: Amendments to the 1977 DLNR Mauna Kea Plan	45

SUMMARY

In 1968, the Board of Land and Natural Resources (BLNR) approved a 65-year lease with the University of Hawaii (UH) for all lands above the approximately 12,000-foot elevation on Mauna Kea. The lease (General Lease #S-4191) refers to these lands as the Mauna Kea Science Reserve. Since then, UH has been actively advancing mankind's understanding of the physical universe through operation of an astronomical training and research facility in the summit area of the Science Reserve. To date, there are four major and two smaller telescopes in operation there and two additional major facilities are currently under construction. In August 1984, the BLNR approved a CDUA for the construction and operation of a ninth telescope there--the ten-meter W. M. Keck Observatory. The Mauna Kea Science Reserve Complex Development Plan (SRCDP), which was approved by the UH Board of Regents in 1983, projects that a total of 13 telescopes will be in operation on Mauna Kea by the year 2000; this includes the existing and under-construction facilities, the W. M. Keck Observatory, and four, as yet uncommitted, additional major telescopes.

Because the summit of Mauna Kea is 13,796 feet high, it is inefficient and physically hazardous for scientists, support staff, and construction workers to go directly from sea-level to work at the summit without acclimatizing themselves for a period of time at an intermediate elevation. For this reason, from the time UH began construction of the 89-inch telescope in 1968, Hale Pohaku has been used as a construction camp/astronomical research support facility to house people working on the summit because its altitude of approximately 9,000 feet has been shown to be ideal for acclimatization purposes.

Hale Pohaku is located within the boundaries of the critical habitat of the rare and endangered Palila (Loxioides bailleui), a bird which is found nowhere else in the world. Development within a federally recognized critical habitat of an endangered species is subject to the rules and regulations of Section 7 of the Endangered Species Act of 1973 (U.S.C. 1536) and 1978 amendments to the Act, if a federal presence is involved in the project. A letter from the U.S. Department of the Interior, Fish and Wildlife Service, stating that the project would not be expected to have any significant impacts on the bird or its habitat is appended to this EIS.

At the time the SRCDP was prepared, it was recognized that construction workers would also require housing at Hale Pohaku during the time that they were working at the summit. It was not anticipated, however, that this type of housing would be required for more than one telescope construction crew at a time. Based on interest shown by potential telescope projects in the past two years, there is strong probability that, in the near future, there may be parallel or overlapping construction of a number of major telescopes on Mauna Kea. A construction camp, that can be expanded to accommodate a relatively large number of construction workers over the long term, is required. This facility is needed now for workers who will be constructing the W. M. Keck Observatory.

Three areas were selected as potential locations for the proposed construction camp. Each site was evaluated for suitability based on the following criteria:

- o Degree of disturbance to the mamane/naio forest ecosystem and critical habitat of the Palila.
- o Visibility of the camp from the main road, the Information Station, and the Mid-Level Facilities.
- o Degree of disturbance, if any, to archaeological sites.
- o Degree of separation of user groups.
- o Access and parking requirements.
- o Requirements for grading and clearing, drainage improvements, terracing and retaining walls.
- o Required length of water and electrical line extensions.

A proposed subdivision action within the Conservation District for an approximately \pm 21-acre site at Hale Pohaku, which would include the construction camp and staging areas, is currently before the Board of Land and Natural Resources. UH is requesting the disposition of a single lease document from DLNR covering the entire \pm 21 acres.

The construction camp will be developed in increments, with buildings being constructed only when actually needed. It is anticipated that during the next 15 years from 60 to 140 construction workers will require bedspaces at Hale Pohaku at one time. Two to four additional buildings will be required to provide common spaces for cooking, dining and lounge facilities. The camp will generally be occupied on weekdays with workers returning to their homes on weekends.

The camp will consist of two remodeled temporary buildings and from 6 to a maximum of 17 new 8-person cabin-like structures. Care will be taken to minimize the removal of mamane trees and disturbance to the area.

The buildings will be one story in height, raised off the ground on wood posts, and skirted. They will be nestled in the trees. Both the remodeled and new buildings will have exteriors that will blend into the surrounding environment. Access to the construction camp facilities will be on foot from the parking area. All buildings will be connected by walkways of crushed cinder or gravel confined within suitable curbing material.

The first increment of development will provide sleeping, dining and lounge areas for 24 to 29 workers. If additional housing is required during the W. M. Keck Observatory construction period, one or two 8-person cabins will be constructed. First phase infrastructure improvements will include drainage improvements, construction and surfacing (with pavement or gravel) of a parking area for 20 vehicles, extension of cold water pipes and electrical conduits and the construction of cesspools. Hot water will be provided by electric water heaters in each building.

Potential adverse environmental effects during the construction phase of the project include: increased traffic and temporary generation of emissions from internal combustion engines; dust; disturbance to resident avi-fauna; noise which may disturb resident astronomy personnel; and visual impacts caused by the presence of construction materials stored on-site. Most of these impacts will be short-term and localized; they will only affect the immediate construction area. Mitigating measures will be instituted to minimize the effects.

Some potential long-term adverse impacts, resulting from the use of the site for construction camp purposes until the year 2000, include:

- o Removal of some vegetation in order to develop the camp. This can be mitigated by replanting with vegetation native to Mauna Kea. In addition, increased foot traffic in vegetated areas could result in some plants being trampled with resulting potential damage to their root structures.
- o An increased number of people present in the area which could adversely affect the Palila and resident avian species. These impacts can be partially mitigated by insuring that predators are not attracted to the site and continuing the on-going program of trapping rats, feral cats and other predators and pests.
- o Some indirect impacts to archaeological sites in areas adjacent to the project site that may occur as a result of increased usage of the area. Some sites can be fenced to mitigate these effects. An archaeological mitigation/preservation plan will be developed in cooperation and coordination with officials of the State Historic Preservation Office and approved by them.
- o The construction camp will be visible from the paved Mauna Kea Observatory Access Road and other locations in the area. Conformity with the specified siting and design guidelines will serve to mitigate this impact.

The Hale Pohaku Complex Development Plan and the Revised Environmental Impact Statement for the Plan set forth various criteria for the development of the Mid-Level Facilities. These criteria, and measures to mitigate adverse environmental effects, are incorporated into this EIS by reference. Most of these measures were also incorporated into CDUAs for the astronomy Mid-Level Facilities and the W. M. Keck Observatory dormitory. A CDUA for the construction camp was filed with the BLNR on June 28, 1985. It is anticipated that the Board will impose conditions on the construction camp permit to insure mitigation of adverse effects.

The construction and operation of the proposed project will involve the irretrievable commitment of certain natural and fiscal resources. Major resource commitments include land, money, construction materials, manpower and energy. The impacts of using these resources should be weighed against improving the safety and well-being of the workers necessary to construct the telescopes on the mountain.

At the present time, it is not legally permissible to insist that all construction workers and support staff live at Hale Pohaku. Because of the risks, however, it is the policy of UH to encourage acclimatization of all personnel working in the

summit area. UH believes that providing adequate housing for construction workers will encourage them to live at Hale Pohaku during the time that they are working at the summit.

PURPOSE OF THIS SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT

This draft supplemental environmental impact statement has been prepared for the following purposes:

1. to comply with Chapter 343, Hawaii Revised Statutes;
2. to comply with EIS Regulations Section 1:31 c.1;
3. to inform the public of the proposed construction camp at Hale Pohaku and to obtain comments on the proposed action;
4. to assess the environmental setting of the proposed construction camp housing and surrounding areas;
5. to evaluate the possible environmental impacts of the proposed actions;
6. to outline mitigating actions for potential impacts;
7. to consider alternatives to the proposed action and the impacts of those alternatives; and,
8. to fulfill the environmental requirements for a Conservation District Use permit.

Comments received during the public review period were addressed and are incorporated into or appended to this final environmental impact statement.

PART I: INTRODUCTION

A. THE REGION

The island of Hawaii, the youngest and the largest of the Hawaiian islands, is composed of five volcanoes; its area is still being expanded by volcanic eruptions. The island, commonly referred to as the Big Island, has a diverse climate and topography, with environments ranging from dense tropical forests to the snow-covered peaks of Mauna Kea and Mauna Loa. It is the southernmost island of the State of Hawaii, located approximately 200 miles southeast of Oahu (Figure 1). The 1980 census estimates the Big Island's population at 92,053, which represents a 45 percent increase since 1970. Forty percent of the island's population resides in the county's largest city, Hilo, which is located on the eastern coast of the island, approximately a 2-hour drive from the summit of Mauna Kea.

The summit of Mauna Kea, the highest point in the Pacific basin, rises 30,000 feet from the ocean floor. The highest of its cinder cones, Puu Wekiu, towers 13,796 feet above sea level. The seasonally snow-covered slopes, above the 10,000-foot elevation, are used for skiing and snow play. Hunting of large game mammals and game birds is a popular use within and on the perimeter of the mamane/naio forest. Hiking, sightseeing and photography are also popular uses of the mountain.

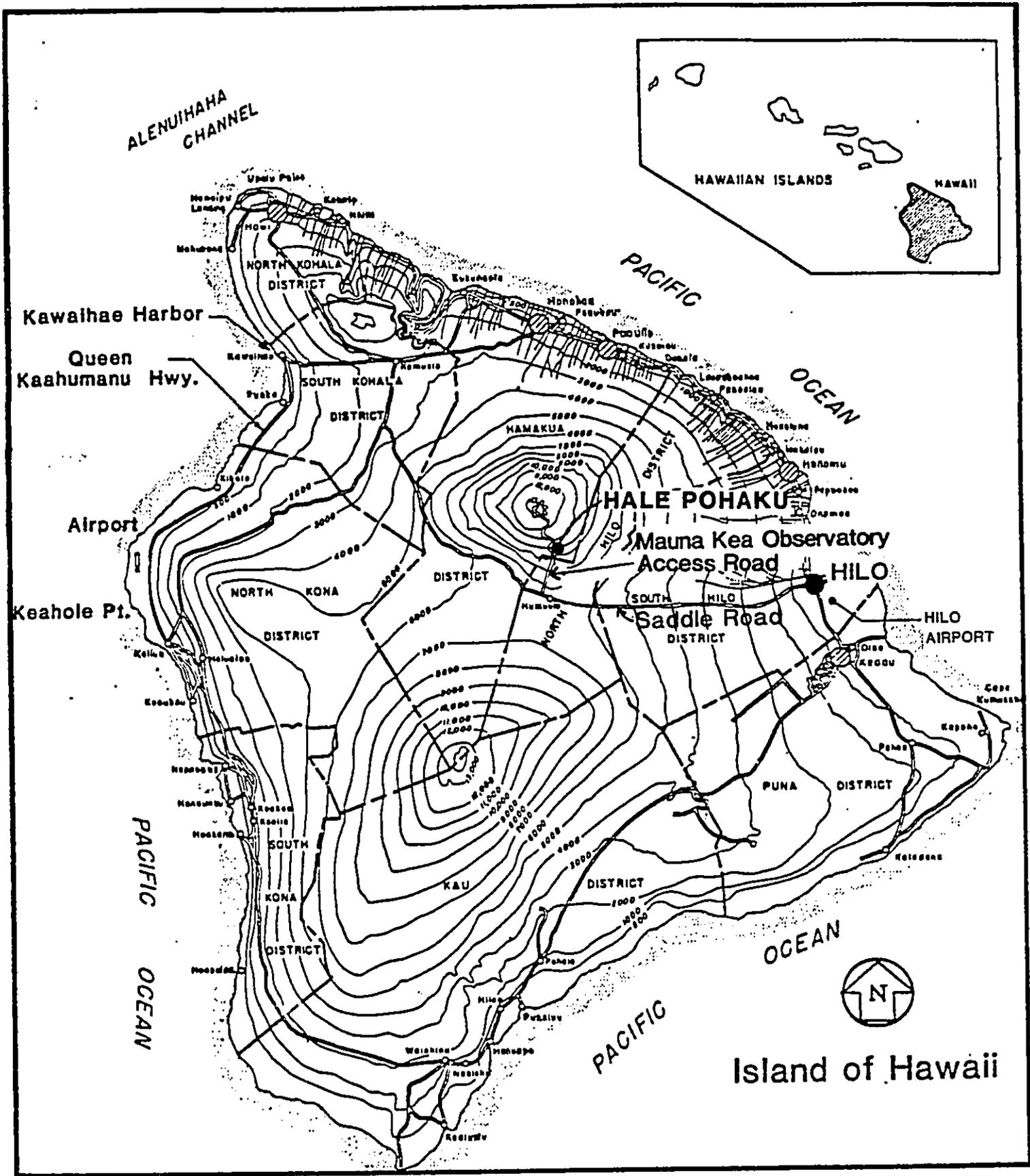
The mountain's unique natural and historical features makes it an ideal site for scientific field research. Native Hawaiian flora and fauna, including rare plants and birds, exist on the slopes of the mountain. Several of these species are found nowhere else in the world. Over 30,000 acres of the mamane/naio forest area of the mountain has been designated as the critical habitat of the rare and endangered Palila (Loxioides bailleui).

B. MAUNA KEA SCIENCE RESERVE

Since 1968, the University of Hawaii (UH) has been actively advancing mankind's understanding of the physical universe through operation of an astronomical training and research facility on Mauna Kea. In recognition of the unique qualities of the Mauna Kea summit area for astronomical research, the Board of Land and Natural Resources (BLNR) approved a 65-year lease (beginning January 1, 1968) with UH for all lands above the approximately 12,000-foot elevation on Mauna Kea. The lease (General Lease No. S-4191) refers to these lands as the Mauna Kea Science Reserve (Figure 2). To date, the national and international scientific community has established four major and two smaller telescopes within the summit area of the Science Reserve; two additional major facilities are currently under construction. UH, as applicant for a 10-meter telescope, now called the W. M. Keck Observatory, has recently received a Conservation District Use Permit (CDUP) to construct a ninth telescope--which will be the world's largest--there.

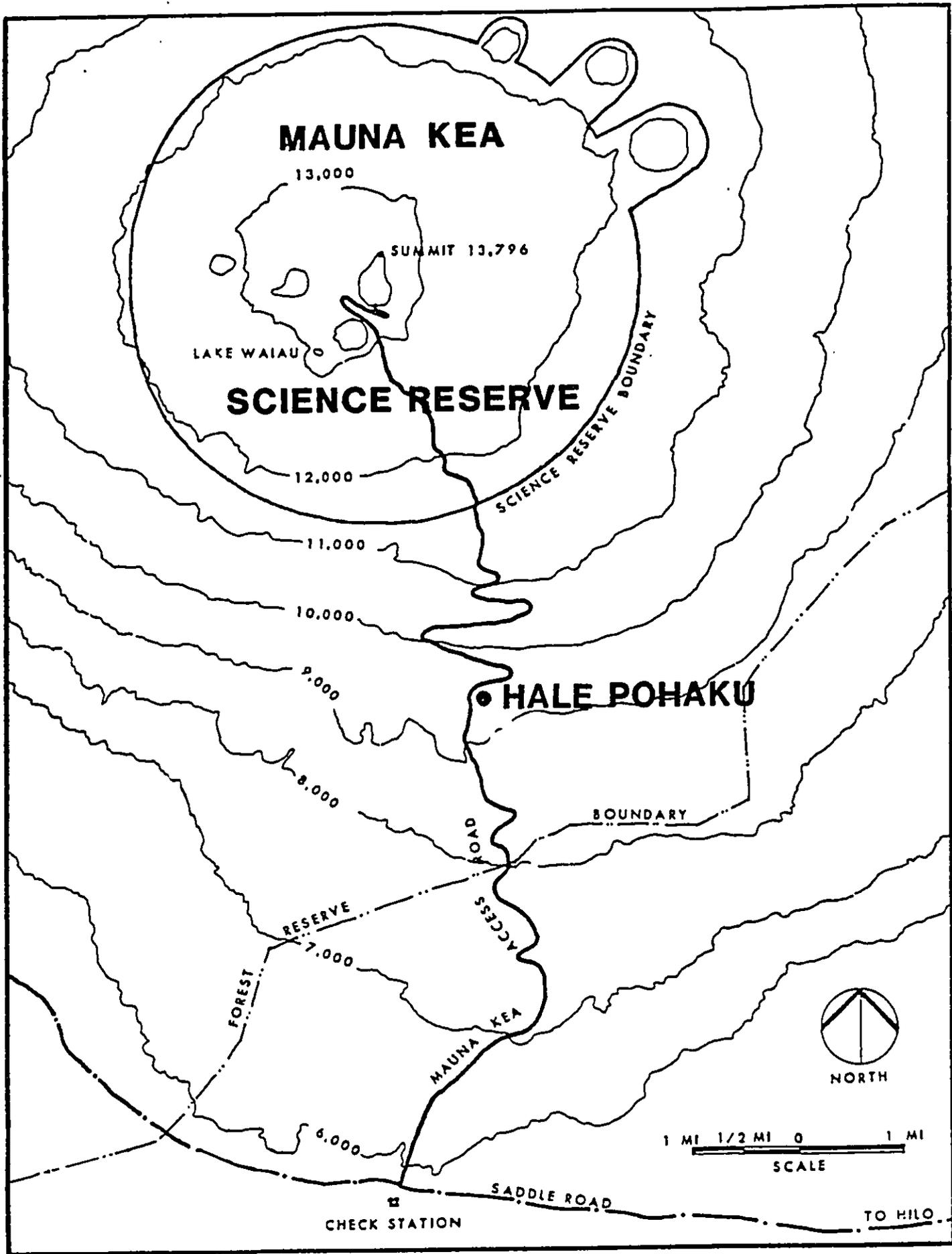
C. HALE POHAKU

Hale Pohaku is situated in TMK 4-4-15:01 (portion) within the Resource Subzone of the State Conservation District. All but approximately 7 acres are within the Mauna Kea Forest Reserve. The Hale Pohaku area is also situated within the



The Region

Figure 1



Location Map

Figure 2

critical habitat of the Palila (Federal Register, August 1977). If a federal presence is involved in a project, development within a federally recognized critical habitat of an endangered species is subject to the rules and regulations of Section 7 of the Endangered Species Act of 1973 (U.S.C. 1536) and 1978 amendments to the Act. If federal funds are used in the construction of any of the proposed construction camp facilities, formal consultation between the affected federal agency and the U.S. Fish and Wildlife Service is required.

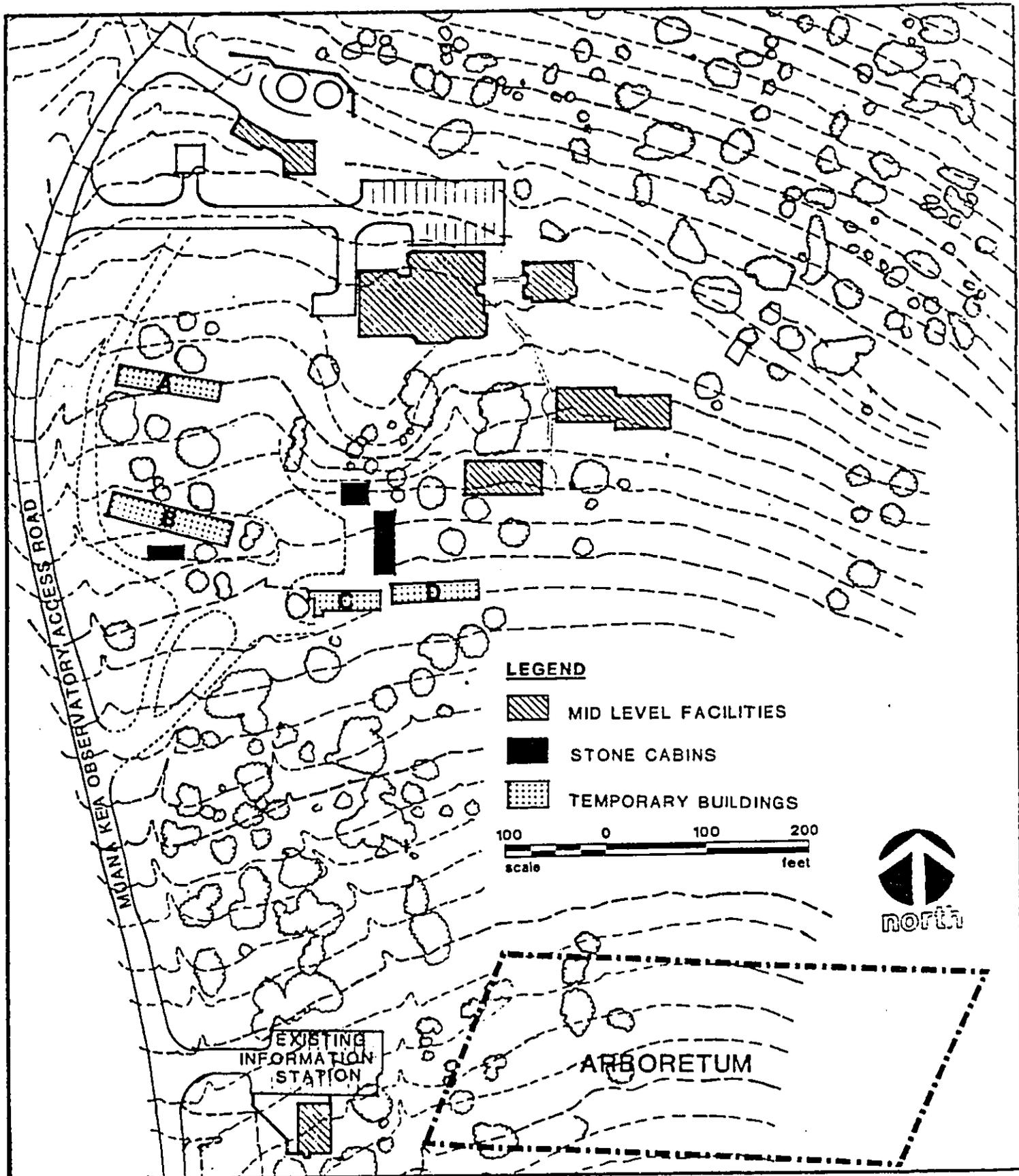
Hale Pohaku, "House of Stone," was named after the stone cabins located at the 9,200-foot elevation of Mauna Kea. These cabins were built in the 1930s after the road to Hale Pohaku was completed. There were several reasons for building the cabins at Hale Pohaku. One reason was to have this type of facility for the convenience of those going to the top of the mountain; another equally important reason was that the altitude at Hale Pohaku was ideal for acclimatizing hunters, hikers and snow visitors before they proceeded to the rarefied atmosphere of the upper elevations (DLNR, 1980a). For these same reasons, from the time UH began construction of its first telescope in 1968, Hale Pohaku has been used as a construction camp/astronomical research support facility to house people working at the summit.

Because the summit of Mauna Kea is 13,796 feet high, it is inefficient and physically hazardous for scientists, support staff and construction workers to go directly from sea level to work at the summit without acclimatizing themselves for a period of time at an intermediate elevation. There are important medical reasons for requiring acclimatization of personnel who work at the summit. Individuals going directly from sea level to nearly 14,000 feet can suffer from mountain sickness (Serouche). One of the most serious effects of altitude sickness is pulmonary edema; other effects, less severe but still significant, are headache, nausea, somnolence, vomiting, diarrhea, loss of mental acuity, and difficulty in concentration. These effects often result in reduction of capability to function effectively at high elevations. In the case of construction workers using various types of construction machinery, the potential for serious accidents increases dramatically.

A new Mid-Level Facility for acclimatization of personnel, which provides sleeping accommodations, offices, eating, and lounge areas for astronomers, technicians and support staff, was dedicated in 1983. This facility, which was built in accordance to the Hale Pohaku Mid-Level Facilities Complex Development Plan (DLNR, 1980b), replaced the temporary structures which had been used since 1968. It was constructed to support the six telescopes which were in operation on the mountain in 1980. Figure 3 illustrates the location of existing facilities at Hale Pohaku.

D. FUTURE TELESCOPES AND EXPANSION OF HALE POHAKU

The Mauna Kea Science Reserve Complex Development Plan (SRCDP), which was approved by the UH Board of Regents in 1983, was prepared to provide the physical planning framework necessary to insure consistent, environmentally acceptable development on the mountain (RCUH, 1983a). The SRCDP consists of two documents: the Complex Development Plan (CDP) and the Environmental Impact Statement (EIS). The CDP describes the general physical characteristics and siting criteria for future facilities at the summit and Hale Pohaku, future infrastructure requirements and the design and environmental criteria which should be followed



Existing Facilities at Hale Pohaku Figure 3

when implementing the development program. It also presents a management plan for UH areas on the mountain. The EIS describes the elements of the CDP; evaluates alternatives to each action; assesses the possible environmental impacts of implementing the actions proposed in the SRCDP; and describes measures to mitigate adverse effects. The EIS was accepted by the Governor in January 1983.

The SRCDP projects that a total of 13 telescopes will be in operation on Mauna Kea by the year 2000 (Figure 4). The plan also addresses expansion of the Hale Pohaku Mid-Level Facilities to accommodate scientists using the planned and projected future telescopes (Figure 5).

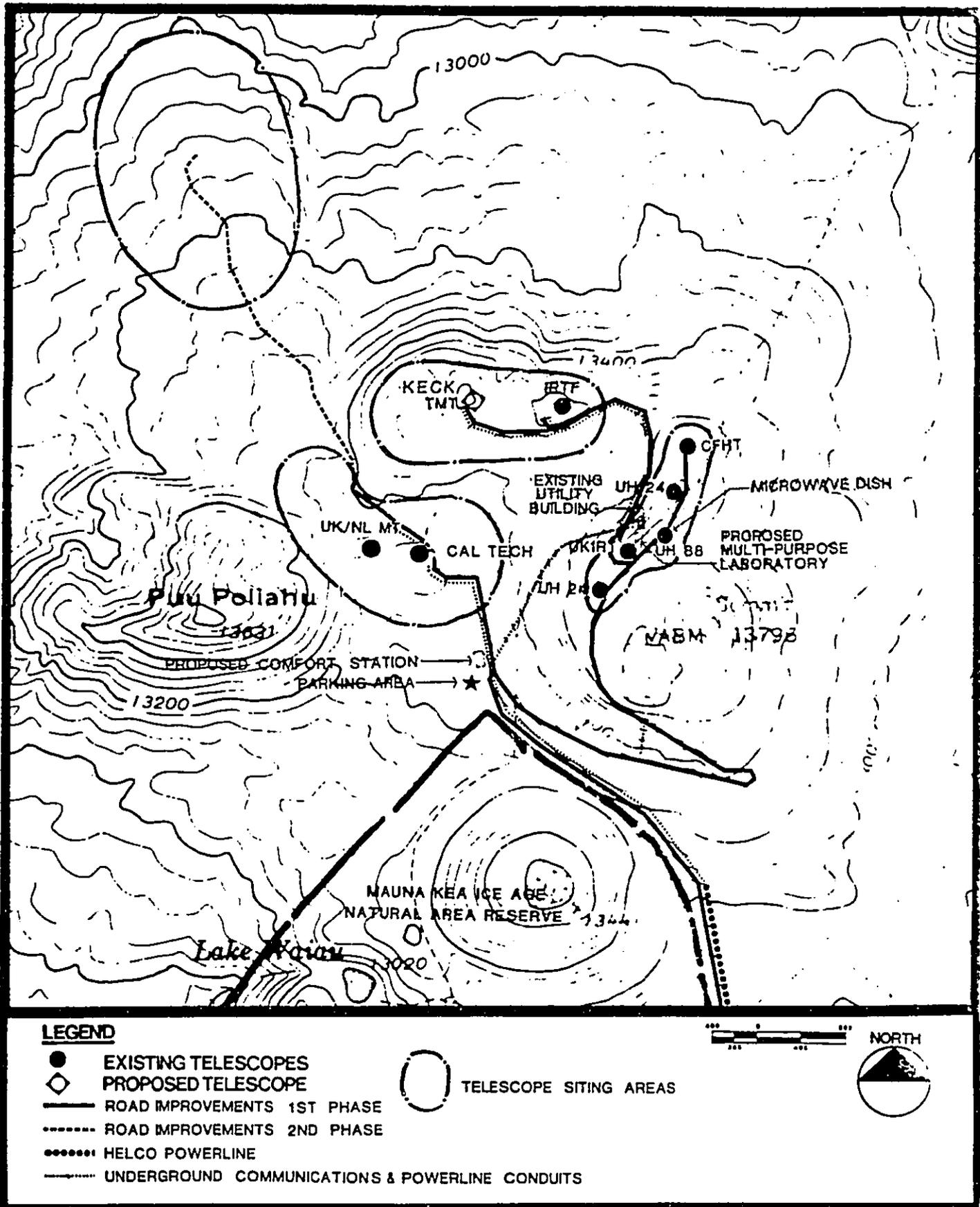
E. PROPOSED CONSTRUCTION CAMP

At the time the SRCDP was prepared, it was recognized that construction workers building future telescopes would also require housing at Hale Pohaku during the time that they were working at the summit. It was not anticipated, however, that this type of housing would be required for more than one telescope construction crew at a time. The Final Environmental Impact Statement for the SRCDP addresses construction camp housing in the following manner:

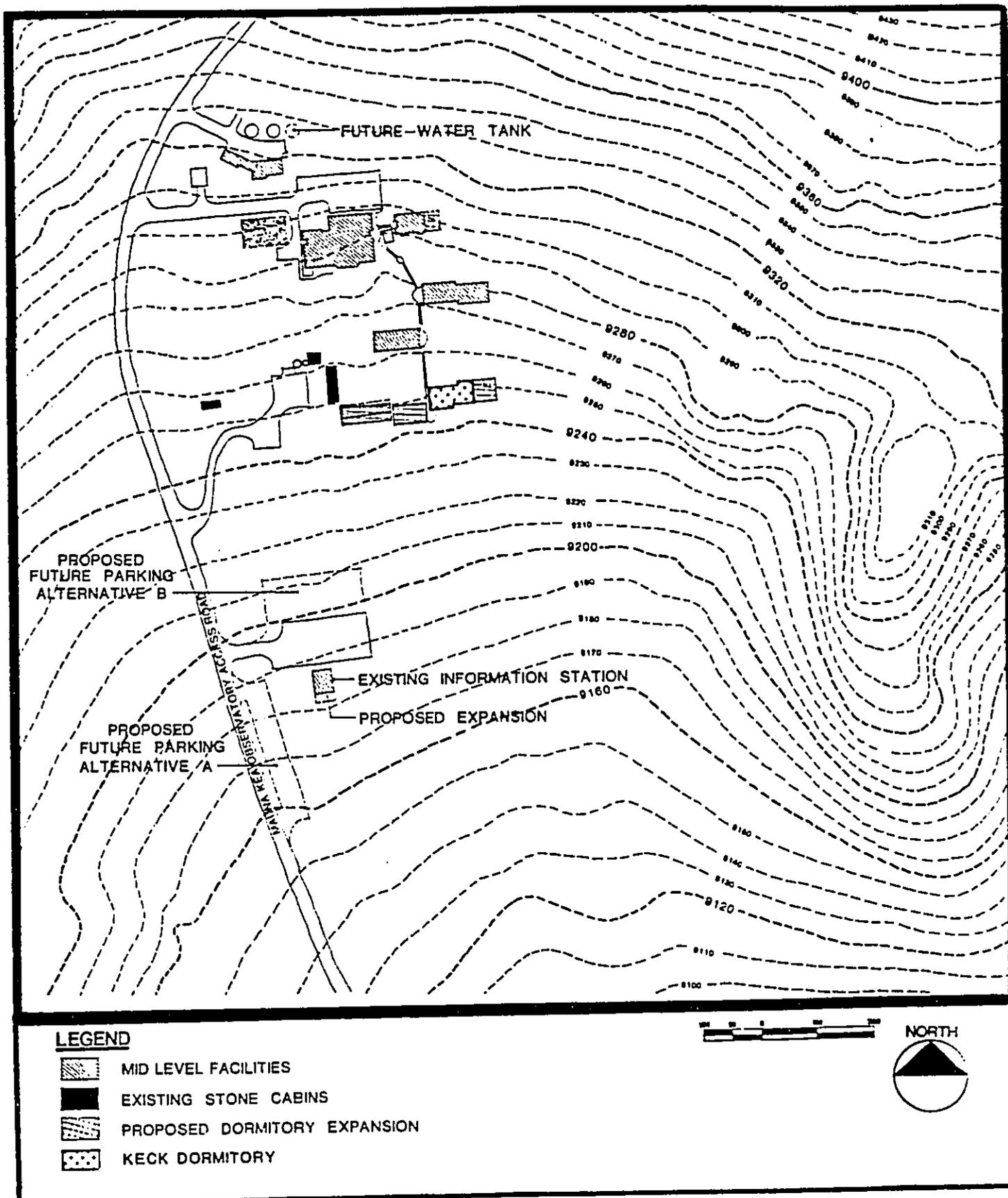
One of the temporary UH buildings adjacent to the large stone cabin can be used for sleeping accommodations for construction workers. The building has ten bedrooms and two storage areas... Dining and recreation facilities for construction workers can be accommodated in the other temporary UH building. This building...is currently being used as a research preparation area.

When the area on which the temporary UH buildings are located is needed for construction of permanent dormitory space, it will no longer be available to accommodate construction workers. When, and if, this occurs, other arrangements for construction camp housing must be made. (RCUH, 1983b)

Based on the SRCDP and on interest shown by potential telescope projects in the past two years, there is a strong probability that, in the near future, there may be parallel or overlapping construction of a number of major telescopes on Mauna Kea. UH has determined, therefore, that a construction camp is needed that can be expanded to accommodate a relatively large number of construction workers through the construction period projected in the SRCDP (year 2000). Foundation work on the W. M. Keck Observatory is planned to commence in early 1986 and, at the present time, there is no long-term housing available for the workers. A Conservation District Use Application (CDUA) has been filed with the BLNR in order to obtain approval of a construction camp master plan, use of a 4-acre site at Hale Pohaku for the proposed development, and permission to construct and occupy first phase improvements on the site. In addition, the CDUA requests use of an area of approximately 1 acre for a staging area for telescope construction activities on the mountain. Approval of the CDUA should be considered an amendment to the SRCDP.



SRCDP: Proposed Physical Plan for the Summit to Year 2000 **Figure 4**



**SRCDP: Proposed Hale Pohaku Expansion
Figure 5**

F. ENVIRONMENTAL REQUIREMENTS

The Office of Environmental Quality Control (OEQC) determined that the proposed construction camp constituted a major change in the original SRCDP and that a supplemental environmental impact statement was required. Because this EIS is supplementary to the SRCDP EIS, it incorporates, by reference, the planning guidelines, development criteria, projections and recommendations set forth in the SRCDP and the SRCDP EIS. Also incorporated by reference are the criteria and recommendations of the Hale Pohaku Complex Development and EIS (DLNR, 1980 a & b).

PART II: PROJECT DESCRIPTION

A. OVERVIEW

The purpose of the construction camp is to support telescope construction activities on Mauna Kea to the year 2000. The SRCDP projects that a total of 13 telescopes will be constructed on Mauna Kea by that time; this includes the facilities that are now operating and those under construction, the W. M. Keck Observatory, and four as yet uncommitted additional major telescopes. Based on the interest shown by potential telescope projects in the past 2 years, the need to demolish the temporary UH buildings (C and D, Figure 3), which have served as construction worker housing in the past, in order to make room for additional permanent dormitories is imminent. In addition, space is extremely limited in these buildings and there is no room for expansion. Because it was determined that all construction camp housing should be located in one general area, it was necessary to identify a suitable area for a construction camp that could eventually accommodate the housing needs of all construction workers, even if several telescopes were under construction at one time.

A mid-level facility at an elevation above 9,000 feet was recommended by various physicians as necessary for the effective operation of the summit telescopes and, by inference, the effective operation of construction machinery. Officials at UH have learned, from their on-going experience on Mauna Kea, that acclimatization has been best obtained by having individuals spend time continuously at 9,000 feet or slightly higher when working at the summit. For the health and safety of the construction workers, it is important that accommodations be provided that will allow them to remain acclimatized during the time that they are working at the summit.

A proposed subdivision action within the Conservation District for an approximately ± 21-acre site at Hale Pohaku, which would include the construction camp and staging areas, is currently before the Board of Land and Natural Resources. UH is requesting the disposition of a single lease document from DLNR covering the entire ± 21 acres.

The construction camp is planned to be developed in increments, with buildings being constructed only when actually needed. It is anticipated that during the next 15 years from 60 to 140 construction workers will require bedspaces at Hale Pohaku at one time. Two to four additional buildings will be required to provide common spaces for cooking, dining and lounge facilities. The camp will generally be occupied on weekdays, with workers returning to their homes on weekends.

B. MASTER PLAN

1.0 Planning Considerations

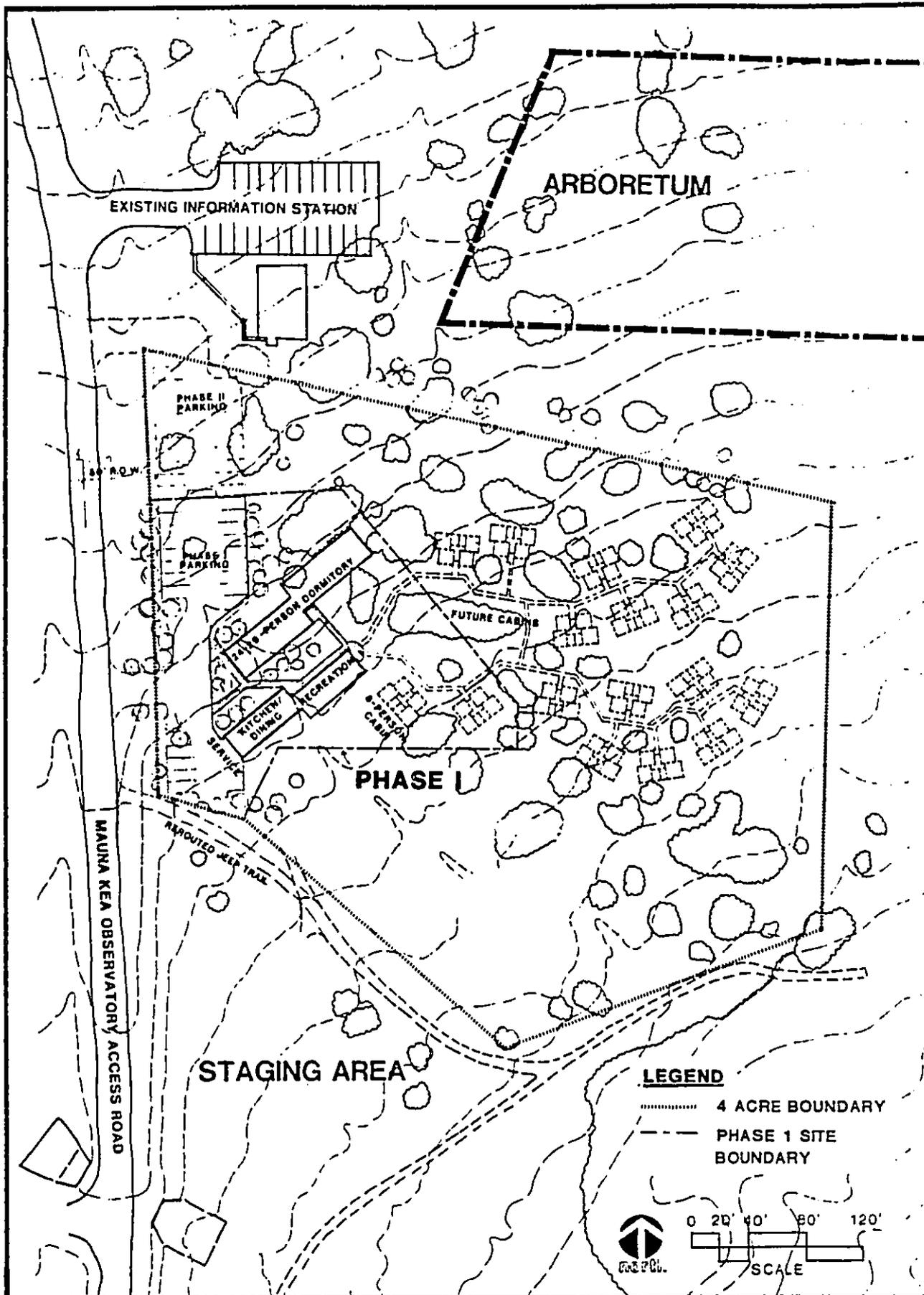
The following guidelines were followed in the development of a conceptual site plan and design criteria for the project:

- o **The Mamane/Naio Forest Ecosystem:** Locate structures and activities so that there will be minimal disturbance to the mamane/naio forest ecosystem, and the critical habitat of the Palila. Few if any mamane trees should be removed. Any rare or unique flora found on the site should be preserved.
- o **Visual Impact of the Project:** Buildings should not detract from the natural environment or existing development in the area. There should be special emphasis on the visibility of the camp from the main road, the Information Station, and the main Mid-Level Facilities.
- o **Public Access:** Planning of the proposed camp should respect existing jeep trails and insure that public access to other areas of the mountain via these trails is not impeded.
- o **Archaeological Sites:** Planning for the project should respect archaeological findings.
- o **Siting:** Buildings should work with the slope of the site to reduce disturbance of the land and to visually blend buildings into the site. Disturbance of existing drainage patterns should also be minimized. Facilities should be both water and energy efficient.

2.0 Description of the Plan

The construction camp will consist of two existing temporary buildings, which will be relocated from their present location fronting the Mauna Kea Observatory Access Road, and from 6 to a maximum of 17 new 8-person cabin-like structures which will be built as needed (Figure 6). All structures will be sited as nearly as possible in the areas designated on the master plan. Care will be taken to minimize the removal of mamane trees and disturbance to the area. If a tree must be removed it should be transplanted to another nearby area. Additional mamane and native plants endemic to Mauna Kea will be planted to visually buffer parking areas and buildings from the road.

All buildings in the construction camp will be one story in height, raised off the ground on wood posts, skirted and sited so that they are nestled among the trees (Figure 7). They will be constructed on pier-type foundations to minimize marring of the existing landscape. Except for windows, there will be no reflective surfaces on any of the buildings. Both the relocated and new buildings will have exteriors that will blend into the surrounding environment and not detract from the existing buildings at Hale Pohaku. Paint and/or stains will be earth tones; the color of the roofs must be consistent with the existing astronomy permanent Mid-Level Facilities.



The new buildings that will be constructed on the site will be one story, wooden structures with cabin-like exteriors. They will be no larger than 800 square feet, and each will accommodate up to 8 construction workers. The cabins should each contain two bathrooms, one with shower facilities. All of the new buildings must be similar in appearance. Figures 8 and 9 illustrate the design concept for the sleeping cabins.

Adequate dining and lounge facilities for the workers will be provided. The exteriors of these buildings will resemble those of the sleeping cabins in color, material, size and height. Although no specific areas will be designated for outdoor recreation, volleyball can be played in the Information Station parking lot and jogging can take place along the paved highway. Workers will be instructed to confine their outdoor activities to paved surfaces and existing trails.

Infrastructure improvements will include construction and surfacing (with pavement or gravel) of a parking area located adjacent to the Mauna Kea Observatory Access Road to a maximum of 44 spaces. The parking area, which was identified in the SRCDP as an alternative location for expanding the parking for the Information Station, will be used by local workers who drive to Hale Pohaku from their homes in other areas of the island, and for four-wheel drive vehicles which will be used to transport the workers to construction sites at the summit. On weekends the parking area may be available for use by the general public.

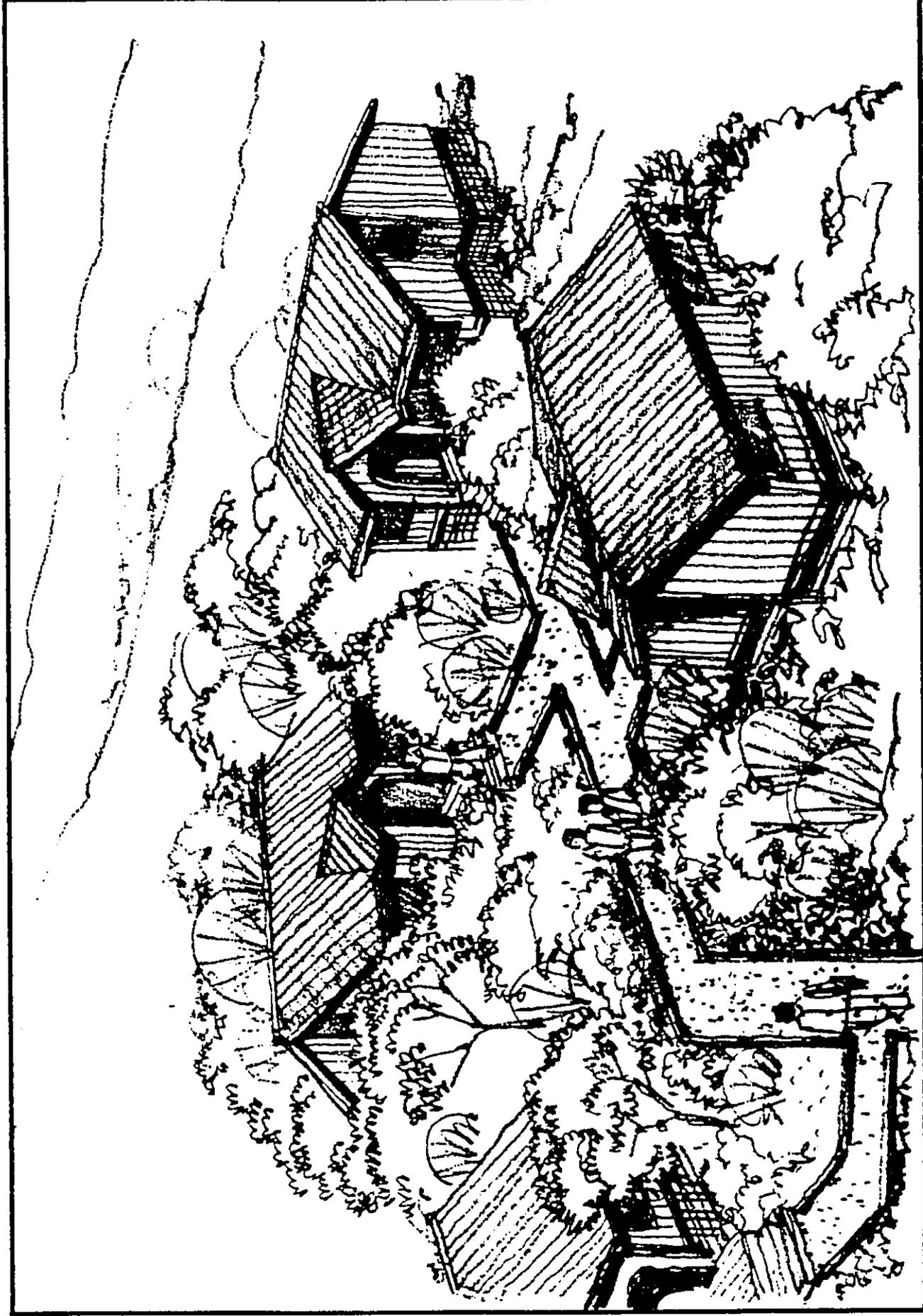
Access to the construction camp facilities will be on foot from the parking area; no additional access roads are required. All buildings will be connected by walkways of crushed cinder or gravel confined within suitable curbing material.

Water will be supplied to the facility from the Hale Pohaku system via a piping connection and water meter located near the Information Station Parking lot. Until commercial power is available, electrical power will be provided by the 250-KW generator, located in the maintenance area of the Mid-Level Facilities. Cold water pipes and electrical conduits will be buried in trenches extending from their connections at the Information Station. Hot water is initially planned to be provided by electric water heaters in each building. At some time in the future it might be advisable to investigate the installation of a field of solar panels to provide hot water for the camp.

Drainage improvements consisting of earth swales, culverts, and CRM headwalls will be constructed to divert flows around the site. Sewage will be disposed of by means of cesspools in accordance with State Department of Health regulations. Figure 10 illustrates the proposed infrastructure and drainage improvements.

It is anticipated that UH through Mauna Kea Support Services (MKSS) will enforce rules governing operation of the facility, and conduct of the occupants. This will ensure that the area is kept neat and free of litter and that there will be adequate control of activities that might damage the surrounding environment.

The eventual disposition of the construction camp buildings has not been determined as yet. Because a 5-year lead time is required in telescope development, a decision will be needed in the mid-1990s as to whether to terminate the growth of new astronomical facilities on Mauna Kea by limiting the number of telescopes to the 13 projected in the SRCDP, or to continue to allow additional facilities in accordance with some revised



Conceptual View of Cabin Cluster
Figure 9



Chapman
Desai
Sakata,
Inc.

1000 University Avenue, Suite 1000, Berkeley, CA 94702
Tel: 415.863.1000 Fax: 415.863.1001

plan. If it is determined--under a mutually revised SRCDP--that additional telescopes (beyond the projected 13) will be allowed to locate on Mauna Kea after the year 2000, then use of the construction camp would also have to be extended through the duration of the new telescope construction period. If it is determined that no further telescope construction will occur, a plan for disposing of the construction camp buildings will be developed.

C. PHASE I DEVELOPMENT

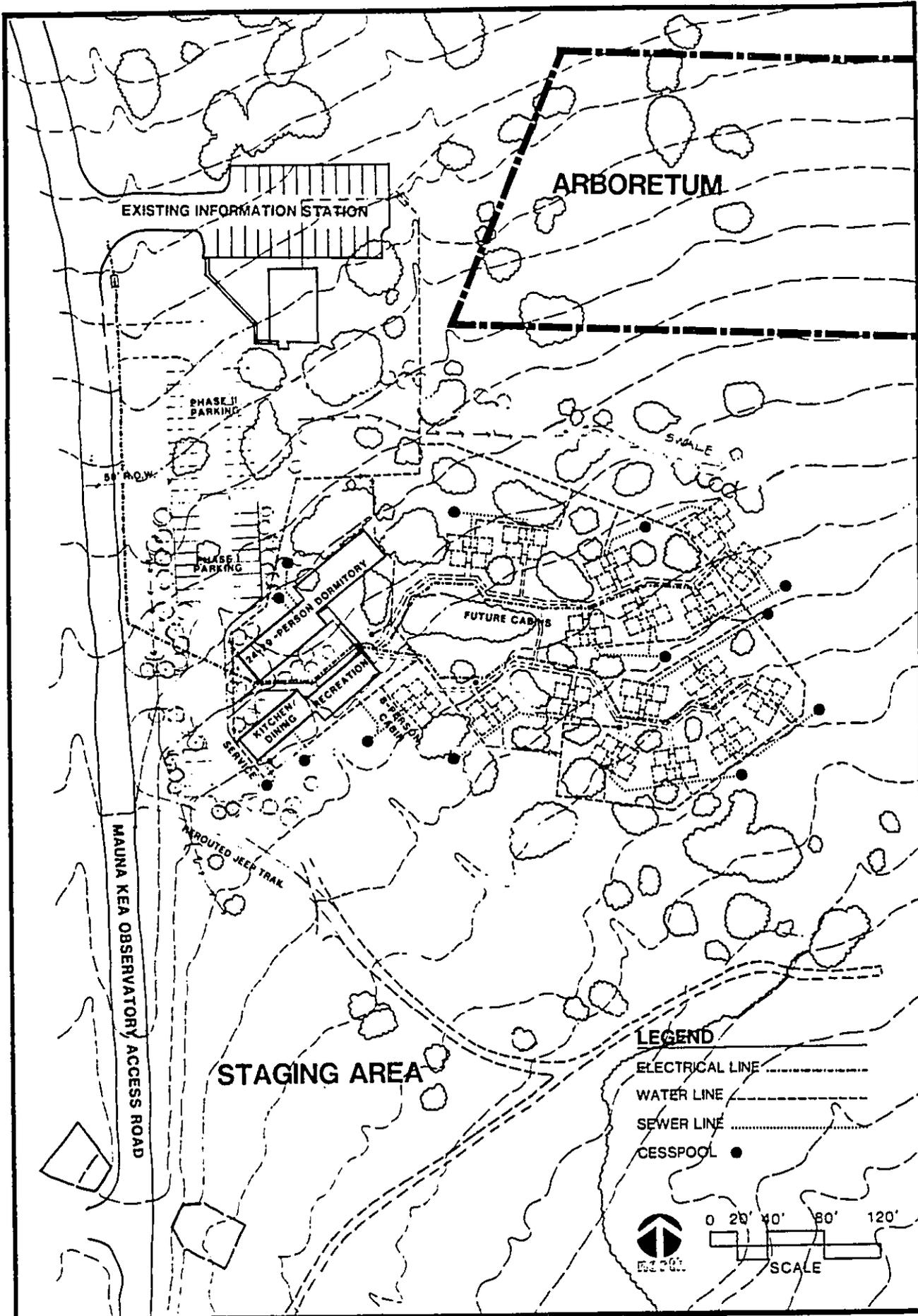
The first increment of development will involve the relocation of two existing buildings (Figure 3, A and B) to the construction camp site. The relocated buildings will be remodeled to provide sleeping areas for 24 to 29 workers in one building and kitchen/dining/lounge areas in the other. Each of the two buildings will be cut in half for moving. When they are relocated on the construction camp site, in the area shown in Figure 6, they will be left in half and jogged at midpoint to reduce scale, break the long corridor, and bring in light.

The relocated buildings will be constructed on pier-type foundations to minimize marring of the existing landscape. They will be raised off the ground on wood posts and skirted. Except for windows, there will be no reflective surfaces on the buildings. Exteriors of the remodeled buildings will be refinished so that they blend into the surrounding environment and do not detract from the existing buildings at Hale Pohaku. They will be painted and/or stained in earth tones; the roofs will be refinished in a color that will resist fading and will be consistent with the roofs of the permanent Mid-Level Facilities. All gutters will be painted to match the roofs. The buildings will be connected by walkways of crushed cinder or gravel.

If additional housing is required during the W. M. Keck Observatory construction period, one or two 8-person cabins will be constructed in the area designated for Phase I Development (Figure 6). These additional buildings will be designed and constructed in conformance with the previously described criteria.

First phase infrastructure improvements will include drainage improvements, construction and surfacing (with pavement or gravel) of a parking area for 20 vehicles, extension of cold water pipes and electrical conduits and the construction of cesspools to service the facilities (Figure 10). Hot water will be provided by electric water heaters in each building.

Construction of Phase I improvements is expected to begin in early 1986, as soon as all permits are obtained. Occupancy will be immediately after the improvements are completed. Funding for the first phase of the construction camp will be from the W. M. Keck Foundation.



Proposed Infrastructure & Drainage Plan
Chapman Desai Sakata, Inc./
Fukunaga & Associates, Inc. **Figure 10**

PART III: ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

A. INTRODUCTION

Both primary (direct) and secondary (indirect) environmental impacts might be generated by the proposed development. These impacts can be either positive or negative, short-term or long-term. Direct impacts are those which are related to the construction and operation of the facilities, while indirect impacts are those which may occur in other areas of the region as a result of on-going activities on the site.

The discussion of anticipated environmental impacts which follows will assess the effects of development and use of the construction camp on the following areas of concern:

- o Drainage and Erosion
- o Flora and Fauna (including the critical habitat of the Palila)
- o Historical/Archaeological Attributes of the Area
- o Visual Appearance of the Area
- o Infrastructure, Utilities and Services
- o Construction Workers and Astronomy Personnel
- o Visitors and Recreational Users of the Hale Pohaku Area

B. THE ENVIRONMENTAL SETTING OF THE PROJECT AREA

Hale Pohaku is located approximately 34 miles--an approximately 1 hour drive--from Hilo, the island of Hawaii's largest city. Access to Hale Pohaku from either Hilo, Kona or Kamuela is via the Saddle Road (Route 20), to Pu'u Huluhulu and from there via the 6-mile-long, 20-foot-wide paved Mauna Kea Observatory Access Road. This paved road was constructed about 12 years ago and is in excellent condition. An 8.3-mile, unpaved, 15-foot-wide road extends from Hale Pohaku to the summit of Mauna Kea (Figure 1). When weather conditions are favorable, the driving time from Hale Pohaku to the summit is approximately 20 minutes.

Records of rainfall show that Hale Pohaku averages approximately 25 inches annually, with the wettest months being November through March. The summit area experiences snowfalls from time to time, especially during the cooler half of the year (October to April). Although snowfalls generally occur above the 10,000-foot elevation, there are recorded incidents of snow falling as low as 6,500 feet (Price, 1962).

Temperatures in the area range from the 30s (Fahrenheit) to the mid-70s (Fahrenheit). Prevailing winds at Hale Pohaku are from the northeast and are characterized by occasional strong to heavy gusts. The area is located well above the 7,000-foot tradewind inversion and therefore the air is very clean. Pollutants

such as smog, smoke, dust and salt spray do not cause any particular problem at Hale Pohaku provided that they are generated below this inversion level.

Slopes at Hale Pohaku vary from 10 to 15 percent west of the water tanks, while slopes to the east are as steep as 50 percent. The average slope of the existing developed area is 12 percent.

The project area is characterized by Huikau extremely stony, loamy sand soil which is 30 to 40 inches thick resting on aa lava. The surface layer is a very dark, loamy sand about 5 inches thick while the substratum consists of alternating layers of ash, cinders and pumice. Stone size aa lava fragments may occupy 30 to 60 percent (by volume) of the lower substratum (Soil Conservation Service, 1973).

Because of the very limited precipitation and high permeability of the soils, ground water resources in the Hale Pohaku area are presumed to be non-existent. No water table is known to exist anywhere in the vicinity of Hale Pohaku, nor are any groundwater sources developed in the area (Dames & Moore, 1982). Although there probably is dike-impounded water near the project area, it is assumed to be too deep beneath the surface for development (U.S. Geological Survey, 1973). Lake Waiau, at an elevation of approximately 13,000 feet, is the only surface water in the upper regions of Mauna Kea.

The vegetation of Hale Pohaku is composed of an open mamane (Sophora chrysophylla) forest with scattered native shrubs and sparse ground cover dominated by endemic and introduced grasses. Two subspecies of mamane were observed in the area: S. chrysophylla subsp. glabrata var. ovata f. maunakeaensis and S. chrysophylla subsp. and var. circularis, a candidate for endangered status. Hinahina (Geranium cuneatum var. hololeucum) and 'aheahea (Chenopodium oahuense), two endemic shrubs of occasional occurrence, generally grow in the proximity of mamane trees. The hinahina, a low rounded shrub with silvery leaves, is listed as a candidate endangered taxon. Botanists with the State Endangered Species program found four different taxa of native mint vines growing under mamane trees and often climbing into their canopies; these are Stenogyne microphylla, S. diffusa var. glabra, S. rugosa subsp. subulata var. nov., and S. rugosa. The first three of these mints are candidates for listing as endangered species. Grasses are an important component of the ground cover of this forest with the endemic bunchgrasses Deschampsia australis and Trisetum glomeratum and the exotic Stipa cernua most numerous. Other grasses and forbs of frequent occurrence are Kentucky bluegrass (Poa pratensis), hairy oatgrass (Danthonia pilosa), ripgutgrass (Bromus rigidus), and sheep sorrel (Rumex acetosella); these exotics are commonly found beneath mamane trees. Another prominent component of the ground cover is the common mullein (Verbascum thapsus), an introduced rosette-shaped plant which grows in bare soil throughout the site (RCUH, 1983b).

Mamane is the major food source of a number of bird species, including the endangered Palila. The clumps of mamane are also important because they act as fog interceptors to provide themselves, and other species associated with them, with the small amounts of moisture they need for survival. In addition, the Sophora clumps help prevent the ash soil under them from being carried away by winter storms.

Two endangered bird species are known to occur on the upper slopes of Mauna Kea (the Dark-rumped Petrel, Pterodroma phaeopygia, and the Palila, Loxioides

bailleui). Although neither was detected during the present survey, the latter has been seen at or near Hale Pohaku with some consistency in recent years (Scott et al., 1984).

The Palila (Loxioides bailleui) is a small bird of the Hawaiian honey-creeper sub-family (Drepanididae), and has been listed as an endangered species since 1966. Mamane trees provide most of the food, shelter and nest sites for the Palila. Because this endangered species is dependent on the green pods and flowers of the mamane, and because the mamane flowers sporadically on the mountain slopes, it was necessary to include, within this habitat, forest land that encompasses most of the Palila's known historic range on Mauna Kea. Over 30,000 acres of the mamane/naio forest area of the mountain have been designated as the critical habitat of the endangered Palila encompassing Hale Pohaku and extending above it to the 10,000-foot level.

The Dark-rumped Petrel is an endangered pelagic seabird that breeds on many of the Hawaiian Islands between the months of May and October. Although presently known only from high altitude and/or fairly accessible areas, this species may once have been fairly common throughout the archipelago (Olson and James, 1982). On the island of Hawai'i, Dark-rumped Petrel are known from Mauna Loa and Hualalai in addition to Mauna Kea (Conant, 1980).

An avian survey of the Hale Pohaku area was conducted by Maile Stemmerman Kjargaard in May 1985 (Appendix B). Bird species seen during the 2-day and 1 night survey included:

<u>Callipepla californica</u>	California Quail
<u>Alaudia arvensis Linnaeus</u>	Eurasian Skylark
<u>Zosterops japonicus</u>	Japanese White-eye
<u>Hemignathus virens</u>	'Amakihi
<u>Himatione songuinca</u>	'Apapane
<u>Carpodacus mexicanus</u>	House Finch
<u>Passer domesticus</u>	House Sparrow

Neither the Palila or the Dark-rumped Petrel were observed or heard during the survey.

Mammals inhabiting the area include: feral pigs (Sus scrofa), mouflon sheep (Ovis Musimon), and possibly small numbers of feral sheep (Ovis aires) and feral goats (Capra hircus).

The Mauna Kea Ice Age Natural Area Reserve is located between the elevations of 10,400 and 13,200 feet. The main ice age features located in the reserve are Pohakuloa Gulch (formed by glacial meltwater), glacial moraine and meltwater deposits of fine sediments (present down to the 10,500-foot elevation), and the glacially sculptured features of cinder cones and lava flows. Lake Waiau, one of the highest lakes in the United States, and the Keanakakoi Adze Quarry, an ancient Hawaiian Historic Place, are other features of the Reserve.

The Keanakakoi Adze Quarry is located within the Natural Area Reserve at the 12,400-foot elevation. The quarry site is listed on the National Register of Historic Places. The site was a very important and extensive center of Hawaiian adze manufacturing.

A variety of archaeological remains, including five lithic scatters and two shrines, were recorded in recent archaeological reconnaissance surveys of the Hale Pohaku area by Dr. Patrick McCoy (Appendix C). Dr. McCoy reports:

On present evidence the primary activity was centered on the exploitation of the core bombs in the manufacture of a variety of stone implements. The presence of unmodified pieces of the raw material on the shrines is analogous to the manufacturing by-products on a number of shrines in the Mauna Kea Adze Quarry with which this site evinces a possible relationship in terms of other residues... A variety of circumstantial evidence exists to suggest a possible direct relationship between these two stone implement production centers...

...There are other reasons for positing a functional link between the two production centers, not the least of which is the strategic location of the Puu Kalepemoa site for providing essential services and goods (e.g., firewood and supplemental foods such as forest birds) to the adze makers working and living in a non-subsistence alpine desert environment...

C. EXISTING USES OF THE HALE POHAKU AREA

Permanent UH Institute for Astronomy Mid-Level Facilities were dedicated in October 1983. The facilities consist of three buildings containing sleeping accommodations for astronomers, technicians and support staff; a common building which contains offices, kitchen/dining facilities and lounge areas; and a maintenance area which houses the generator and provides space for minor equipment repairs and other repair and maintenance functions (Figure 3). A CDUA was recently approved to allow construction of an additional dormitory for use of W. M. Keck Observatory astronomers and technicians (Figure 5).

A 950-square-foot visitor reception area and Information Station was constructed as part of the permanent Mid-Level Facilities. A parking area for 25 vehicles is adjacent to it. This station will serve both as an interpretive center for disseminating information about the man-made and natural features of Mauna Kea and as the control point for managing and monitoring visitors to the upper slopes of the mountain.

There are two stone cabins and one stone restroom located at Hale Pohaku. The large stone cabin has been used by UH Institute for Astronomy; the smaller cabin is rarely used except by the Ski Patrol for overnight accommodations during weekends of heavy snowfall and for storage of equipment during the off-season. The stone restroom is for use by the general public.

DLNR requested that one of the five temporary buildings which made up the original Mid-Level Facilities be given to them for use at Pohakuloa. The two remaining buildings fronting the Mauna Kea Observatory Access Road will be remodeled and moved to the construction camp site (Figure 3, A and B). The two UH buildings (near the large stone cabin) have been used periodically for construction crews (Figure 3, C and D). They will be removed or before the area is required for a permanent dormitory when the permanent Hale Pohaku Mid-Level Facilities are expanded (Figure 5).

D. ENVIRONMENTAL IMPACT ANALYSIS

1.0 Drainage and Erosion

1.1 Existing Conditions:

Ground slopes at the proposed project site vary from about 5 to 12 percent. The erosion hazard is high for soil in the area because there is little ground cover to hold the soil. This is mitigated, however, by the high soil permeability which is very rapid at 20+ inches per hour, and the soil's low moisture-holding capacity. These conditions limit concentration of storm runoff thus reducing the potential for soil erosion, except during periods of exceptionally intense rainfall.

An existing drainage swale crosses the proposed parking area and continues just south of the site. The swale primarily conveys excess storm runoff generated from about a 600-foot one-lane-wide portion of the paved Mauna Kea Observatory Access Road. Little, if any, runoff sheet flows from the site into the swale because of the permeable soil conditions.

1.2 Impacts and Mitigating Measures

The following actions to be taken in the construction of the camp have the potential of causing drainage problems, dust and soil erosion:

- o Addition of surfaced areas for vehicle parking and building roof areas;
- o Removal of vegetation and surface rocks during excavation, grading of roadway and parking areas; excavation and installation of drainage improvements; excavation for concrete footings and for cesspools; and trenching for extensions of utility lines.
- o Temporary generation of small dust particles during construction activities and site preparation. Airborne particulates or dust can also be generated by wind erosion.

Grading for roadway and parking areas and disturbance of the ground surface under and around the buildings would be minimal, since any paved surface would be fairly close to the existing ground and the buildings will be constructed on pier-type foundations. It is possible to pre-construct the cabins at sea level; there will be minimal construction activity at the site. No improvements will be made to the staging area site.

Appropriately designed drainage improvements will be constructed at the site. Runoff from the summit access road will flow onto the proposed parking area, be collected in a catch basin, and piped to a new swale which could either connect back to the existing swale or discharge overland toward the large 84" culverts below the site. Runoff from the parking area would also be collected in catch basins and conveyed to the outlet via drain pipes. Runoff from building roofs would flow into roof gutters and piped to a seepage pit(s), swales or catch basins as appropriate. A cutoff swale above the project site is also proposed as an added safety feature. The project designer will carefully consider the high erosion hazard for soil in the area and the potential adverse impacts of significant flow increases due to diversion and new surfaces.

The construction of appropriately designed drainage structures and improvements will minimize on-site soil erosion which might be caused by excess storm runoff, and directs the storm discharges to areas away from the project site. Rip rap aprons at culvert discharge locations can also help to dissipate flows and flow velocities to minimize down stream erosion. The construction of drainage improvements will also minimize adverse water erosion impacts.

Additional measures to be taken to minimize the problem of dust and soil erosion include:

- o Minimal disturbance of existing ground areas;
- o Immediate planting of all exposed surfaces with native grass, shrub and tree species;
- o Stabilizing all banks by plantings, retaining walls, soil cement or other suitable means. Retaining walls, if needed, could be less than 4 feet tall.

Prior to beginning construction, the contractor should submit a soil erosion control plan to the County of Hawaii and DLNR for approval. The control plan should include a construction schedule, temporary erosion control measures, construction sequence, and timing of erosion control measures.

Dust control during construction will be maintained by exposing the smallest area possible at any time and halting construction until the weather improves. To a degree, water will be sprinkled on exposed surfaces to suppress dust, however, as water must be hauled from Hilo, it will be used sparingly. Impacts from dust and run-off from exposed soils generated during construction can also be mitigated by building specifications in the construction contract and by strict adherence to county regulations concerning grading and excavation.

2.0 Flora and Fauna

2.1 Existing Conditions

Vegetation in the vicinity of the project site consists of scattered clumps of mamane trees with a ground cover of mixed bunchgrass species. Large, bare areas are common. The mamane vary from young plants less than a meter tall to older trees 3 to 6 meters tall. Ground cover is greatest under the older, larger trees. Ripgutgrass, Kentucky bluegrass, and the common groundsel are usually only found under mamane trees. The native mints (*Stenogyne* spp.) are restricted to the shady areas under the larger trees. In open areas, ground cover is sparse; sheep sorrel and the native grasses and he'u-pueo as well as the exotic grasses and two species of *Danthonia* are the most common components of the ground cover. Widely scattered shrubs of 'aheahea, pukiawe and hinahina may sometimes be found. Refer to the Char & Associates, Appendix A, for scientific names of plant species.

The critical habitat of the endangered Palila (*Loxioides bailleui*) encompasses Hale Pohaku and extends above it to an altitude of 10,000 feet. The bird is seen in the Hale Pohaku vicinity on a regular basis. The primary food source of the Palila is the unique seed of the mamane, although its foraging behavior may be modified when mamane seeds are scarce; large mamane produce the heaviest seed set....the project site provides fair cover and food source for native passerines (Stemmerman-Kjargaard, Appendix B).

2.2 Impacts and Mitigating Measures

The primary impacts that could result from construction and operation of the proposed construction camp are: habitat destruction or degradation, noise, and increased erosion. In addition, the use of the area by an increased number of people could adversely affect the biota. Increased foot traffic in surrounding vegetated areas could result in some plants being trampled; their root structures may also be damaged. Crushed-cinder walkways will be provided to discourage walking in vegetated areas.

One potential negative effect of increased usage of the area is the probability of fires. The Hale Pohaku area is very dry and the potential for fire must be addressed. Fire flow from the Mid-Level Facilities will be provided. In addition, UH has acquired a fire engine which is based in the maintenance area. All personnel who use the facilities will be made familiar with the location of fire-fighting equipment and policies concerning fire. (See Section 5.4, Fire Protection, for a more detailed discussion of the present fire fighting capability at Hale Pohaku.)

The U.S. Fish and Wildlife Service was contacted informally during the preparation of the EIS. Their informal opinion was that the proposed construction would not be expected to have a significant impact on the Palila or its critical habitat if conservation measures suggested in the SRCDP are followed (Appendix D). These measures include:

- o Development should be confined within 1/8-mile of the paved Mauna Kea Observatory Access Road;
- o Few, if any, mamane trees should be destroyed. If possible, trees that must be removed should be transplanted to protected areas and cared for until established sufficiently to exist on their own. Disturbed areas should be replanted with appropriate native species.
- o Measures should be taken to control undergrowth in order to prevent natural fires from destroying the existing mamane and any inhabiting species, such as the Palila; and,
- o Construction should not be initiated during the Palila breeding season unless birds are discouraged from nesting in the construction area prior to and continuing into the nest site selection, pairing and breeding/rearing season.

Development of the construction camp on the proposed site will require the removal of only a few smaller mamane; removal of mature larger trees will be avoided. It is intended that the buildings will be sited to nestle among the larger trees. Additional measures that will be taken to mitigate potential impacts on the Palila and other native avian species and their habitat include:

- o Drainage improvements, as described in the previous section;
- o Limiting construction activities (e.g., equipment storage and refueling), as much as possible, to areas that are open and without forest cover;
- o Control of non-native birds by removal of their nests and mist-netting;
- o Provision of a sufficient number of fire extinguishers and fire hose cabinets in the area and education of personnel on fire prevention;

- o Development of an education program to acquaint all personnel with the environmental sensitivity of the area and the importance of not disturbing the vegetation and native avifauna;
- o Encouraging construction workers to walk only on the cinder walkways;
- o Prohibiting pet cats at the construction camp;
- o Storing garbage in elevated rodent-proof containers; and,
- o Continuing the on-going program of trapping rats, feral cats, and other predators and pests.

Landscaping of the site will result in a long-term positive benefit to the area. A mamane replanting program is being undertaken by MKSS to upgrade the forest to a level superior to its existing condition. Other native species are also being planted. Refer to Appendices A and B for a detailed discussion of impacts on flora and fauna.

3.0 Historical/Archaeological Sites

3.1 Existing Conditions

Lithic scatters were discovered on and directly adjacent to the project site. Lithic scatter No. 1 covered an area of about 300 square meters along the erosional channel on the north side of the jeep road. The second scatter was just outside of the project area, near the arboretum site. Two shrines were discovered in the area, neither is located on the proposed construction camp site. The findings of these surveys are believed to constitute the first archaeological evidence of Hawaiian exploitation of the sub-alpine environment in the area and the lithic scatters and associated shrines represent a specialized site type previously unreported in the literature on Hawaiian archaeology. A more detailed discussion of the significance of these findings is presented in Appendix C.

3.2 Impacts and Mitigating Measures

Because of the presence of archaeological remains on the proposed site, an additional intensive survey of approximately one acre--the area selected for the first development increment--was conducted. This survey consisted of a systematic examination of the eroded surfaces around mamane trees--where all of the non-structural remains recorded in the earlier reconnaissance surveys had been found--and the cut banks of a erosional gully. No evidence of surface or buried archaeological residues was found and it was determined that additional subsurface testing was unwarranted.

Additional measures to mitigate adverse impacts should include intensive field studies of the project area prior to development of additional increments of the camp. These studies should include surface collections and systematic test excavations in areas that may be subjected to direct and/or indirect adverse impacts in the future expansion of the camp.

Recommendations directed towards long-term protection and maintenance of other significant findings, not directly affected by the proposed development, are presented in Appendix C. An archaeological mitigation/preservation plan, based on

recommendations presented in Appendix C, will be developed in cooperation and coordination with officials of the State Historic Preservation Office and approved by them. If federal funds are used in future phases of the project, the agency undertaking the project will comply with Section 106 of the National Historic Preservation Act.

4.0 Visual Appearance of the Area

4.1 Existing Conditions

The proposed construction camp site is semi-barren with some large clumps of mamane. The most significant man-made visual feature in the area is the new Mid-Level Facilities and Information Station.

4.2 Impacts and Mitigating Measures

The proposed construction camp will be visible from the paved Mauna Kea Observatory Access Road; views from upslope areas of the camp will primarily be of rooftops. To minimize visual intrusion, structures will be low-rise. The existing features of the area will be retained and additional vegetation will be planted to provide a buffer-zone between the complex and the road. Other design and siting criteria, as described in Part II, will also serve to mitigate adverse visual impacts.

5.0 Infrastructure, Utilities and Services

5.1 Potable Water

Two 40,000-gallon water storage tanks and a water pressure booster pumping system are located in the maintenance area of the facility. Water stored in the tanks is intended for domestic uses and fire protection supply and storage. Water is presently trucked to Hale Pohaku from Hilo twice a week to replenish the supply. Hot water heating is by solar power. A field of 80 3-foot by 8-foot solar panels is located west of the common building and a 2,000-gallon hot water storage tank is located below the building.

Water will be supplied to the construction camp from the Hale Pohaku system via a piping connection and water meter located near the Information Station parking lot. Cold water pipes will be buried in trenches extending from the piping connection. Hot water will be provided by electric water heaters in each building.

If the camp is at maximum capacity, it would be expected that 140 workers would use approximately 8,000 gallons per day of water. Water storage at Hale Pohaku should be adequate to supply this need. Because the water being trucked from Hilo serves over 25 people, the truck carrier has to comply with State of Hawaii, Chapter 20, Title II, Administrative Rules, Section 11-20-31, on use of trucks to deliver drinking water.

The existing water storage tanks can be replenished by increasing the frequency of trips by the water tanker from Hilo. In addition, water-saving fixtures will be used in all buildings. The SRCDP allocated space in the maintenance area for another water storage tank should one be required in the future.

5.2 Sewage Disposal

Cesspools are utilized for sewage disposal at the permanent Mid-Level Facilities. Except for the common building, which is served by 2 cesspools, there is one cesspool per building. The Department of Health approved this method of wastewater disposal at the time the Mid-Level Facilities were designed.

At full development, it is expected that 140 workers would generate approximately 7,000 gallons per day of liquid sewage. Domestic sewage from the construction camp will include wastes from toilets as well as from showers, and kitchen wastes. Since the Mauna Kea facilities are so remote from the major population centers, there is no municipal sewerage system within 20 miles of the project site. Cesspools are the means of wastewater disposal being proposed for the construction camp. This means of disposal is not expected to adversely effect the environment for the following reasons:

- o Subsurface soils investigations previously conducted for the Mid-Level Facilities indicate that the area is suitable for cesspools and that cesspools will perform satisfactorily with low risks of failure.
- o Existing cesspools in the area are functioning satisfactorily without problems.
- o Because of the site's high elevation and location, there are no nearby receiving waters to pollute, and potential contamination of the basal water lens (drinking water source) is extremely remote.
- o Alternative systems such as septic tanks, aerobic units, stabilization ponds, etc., require higher capital costs, regular maintenance, electrical power in some systems, and generally higher operational costs.
- o Flows to cesspools can be controlled by limiting the number of plumbing fixtures served. This will further minimize the potentials for failure.
- o Because of the relatively large land area involved, cesspools at the project location can be sized, located and spaced to satisfy all State Department of Health regulations.

5.3 Power

The current electrical power demands at Hale Pohaku are being met by a 250-KW diesel generator located in the maintenance area of the astronomy complex. Power is distributed throughout the Mid-Level Facilities and to the Information Station via underground direct-burial cables and concealed conduits and wire systems. Construction is scheduled to begin in 1986 on a permanent powerline from the Saddle Road to a substation to be located in the Hale Pohaku area. Upon completion of this line, Hale Pohaku will be connected to the commercial HELCO grid. The generator will be used as a back-up power source.

The existing 250-KW generator has sufficient capacity to satisfy the electrical needs of the first two increments of the construction camp. By the time the camp is fully developed, Hale Pohaku will be connected to the HELCO grid; there will be no problem meeting the maximum electrical demands of the camp.

5.4 Management and Maintenance Services

The Mauna Kea Support Services (MKSS), an organization funded by the telescope users, is responsible for the following services at the Mid-Level Facilities:

Fire Protection: UH has acquired a fire engine which is based in the maintenance area of the astronomy facility. A volunteer fire brigade, made up of MKSS personnel, has been trained in fire fighting techniques. At least two fire hose cabinets, each with 1.5-inch hose gate valve, fire hose and nozzle, are located adjacent to each building at the permanent Mid-Level Facilities. Each building at the proposed construction camp will be similarly equipped. An automatic water pumping system capable of supplying 500 gpm fire flow to the fire hose cabinets is located in the facility's maintenance area. This fire fighting capability will be available in the event of a fire at the construction camp or surrounding area.

Solid Waste: Solid waste generated at Hale Pohaku is trucked daily to a dumpster located at the MKSS headquarters in Hilo. Because open rubbish and garbage bins attract predators, such as rats, feral cats and mongooses, that may prey on the birds in the area, all rubbish containers at the permanent Mid-Level Facilities have tight fitting lids and are emptied daily. The same precautions and procedures will be undertaken at the construction camp.

Management: The permanent Mid-Level Facilities are managed by MKSS which is responsible for the upkeep and operation of the facility. MKSS has the authority to enforce rules and regulations intended to protect the environment of the Hale Pohaku area. It is anticipated that UH through MKSS will also enforce rules governing operations of the construction camp and conduct of the occupants. A management plan for all UH areas from Hale Pohaku to the summit has been approved by DLNR. Rules and regulations for UH management areas are being developed. The rules are subject to public hearing under the State Administrative Procedures Regulations (HRS 91).

6.0 Construction Workers and Astronomy Personnel

Noise will be generated during the construction phase of the camp; this may affect astronomy personnel who sleep during the day. The cabins being proposed for construction worker housing can be partially assembled elsewhere and trucked to the project site, thus minimizing noise from that activity. Noise from machinery can be mitigated by the use of mufflers on combustible engines. Noise impacts from construction activities will be temporary.

Conflict between construction workers and scientists could occur in the early morning hours, when the scientists have just gotten to sleep and the construction workers are leaving for work. The site selected for the construction camp will mitigate that adverse effect.

The hazards of going directly from sea level to work at high elevations (e.g., 14,000 feet) have been documented (Final EIS: Hale Pohaku Mid-Level Facilities Master Plan, DLNR, 1980). In addition to health hazards, productivity of workers is a concern. Workers who do not acclimatize prior to ascending to the summit often experience a reduced capability to function effectively in their jobs; the potential for accidents increases considerably. A recent study on Mauna Kea has confirmed this (Forster, 1983).

At the present time, it is not legally permissible to insist that all construction workers and support staff live at Hale Pohaku; because of the risks, however, it is the policy of the University to encourage acclimatization of all personnel. It is hoped that the provision of adequate housing for construction workers will encourage them to live at Hale Pohaku during the time that they are working in the summit area.

7.0 Visitors and Recreational Users of the Area

Although the Information Station is located adjacent to the construction camp site, conflict between visitors and construction workers is not anticipated as the Information Station will be used primarily during the day when the construction workers are at the summit. Of benefit to visitors will be the presence of the construction camp parking area which may be available for their use on weekends.

Existing jeep trails in the area will continue to be open to the public. Siting of the camp within a corridor extending 1/8-mile from the Mauna Kea Observatory Access Road will minimize the area which will be restricted from hunting.

E. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

1.0 Short-term Impacts

Air Quality: Increased traffic and the use of construction equipment will lead to the temporary generation of emissions from internal combustion engines. Construction activities will also generate dust. Emissions from internal combustion engines utilized during construction will be mitigated by the use of properly functioning emission control devices as required by law. Dust will be mitigated through compliance with State Department of Health rules and regulations (Chapter 43, Section 10) and by covering exposed areas during heavy winds.

Fauna: During construction resident avifauna, including the Palila, may be disturbed. Mitigating measures, as recommended by the U.S. Fish and Wildlife Service, include: removing as few mamane trees as possible and not initiating construction during the Palila breeding season unless birds are discouraged from nesting in the construction area prior to and continuing into the nest site selection, pairing and breeding/rearing season. In addition, construction activities such as storage of equipment and refueling will take place in bare areas.

Noise: Construction noise may disturb the day-sleeping astronomy personnel.

Visual: Construction equipment and materials will be stored on-site. This impact will be temporary and occasional.

2.0 Long-term Impacts

Vegetation: Some vegetation will have to be removed in order to develop the construction camp. This can be mitigated by replanting with vegetation native to Mauna Kea. In addition, use of the area by an increased number of workers could

adversely affect the biota of the area. Increased foot traffic in vegetated areas could result in some plants being trampled, resulting in damage to their root structures.

Fauna: Because of the increased number of people present in the area, some adverse impacts on the Palila and resident avian species can be expected. These can be partially mitigated by insuring that predators are not attracted to the site. Feral cat and rat trapping programs will help to minimize this effect.

Archaeological Features: Although intensive surveys will be taken prior to additional development on the site, some indirect impacts to sites in adjacent areas may occur as a result of increased usage of the area. One mitigating measure would be to fence shrines and other sites. An archaeological mitigation/preservation plan, based on the recommendations presented in Appendix C, will be developed in cooperation and coordination with officials of the State Historic Preservation Office and approved by them.

Visual: A construction camp will be built on currently undeveloped land; the camp will be visible from the paved Mauna Kea Observatory Access Road and other locations in the area. Conformity to the specified siting and design guidelines will serve to mitigate this impact.

F. RELATIONSHIP OF SHORT-TERM USES AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed construction camp is intended to support an important addition to Hawaii's growing research and development industry, an environmentally clean industry, which can continue to provide broadened employment opportunities for State residents. The master plan for the proposed camp has considered the environmental attributes of the area, the guidelines and criteria set forth in the Hale Pohaku Complex Development Plan and the SRCDP, the federal requirements for proposed developments in a critical habitat, and the needs of the workers themselves.

The trade-off of not developing the construction camp would be the health risks to workers who may possibly suffer altitude sickness and the decreased work capacity and increased potential for accidents by workers who are not properly acclimatized. A decrease in worker productivity could also affect the schedules of telescope construction at the summit, possibly resulting in severe economic losses.

G. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The construction and operation of the proposed project would involve the irretrievable commitment of certain natural and fiscal resources. Major resource commitments include land, money, construction materials, manpower and energy. Land committed to this project will be covered with structures for at least 15 years. The capital committed to the construction of the project will be irrevocably committed. Water and fuel will be consumed to meet the needs of the occupants; these resources would be consumed elsewhere if not used in the project area. Vegetation that does not successfully rejuvenate after being transplanted will be lost; wildlife may relocate to another area.

PART IV: EVALUATION OF ALTERNATIVES

A. NO ACTION

The no-action alternative means that construction workers will have to be accommodated in the two existing UH temporary buildings (C and D, Figure 3) or commute from their homes in other areas of the island. The UH buildings can accommodate only 20 people and it is projected that sleeping accommodations for up to 140 workers may be required between now and the year 2000. In addition, the buildings are scheduled for removal or demolition in the near future.

The hazards of going directly from sea level to work at high elevations (e.g., 14,000 feet) have been described in this statement and in previous EISs for the area (RCUH, 1983a; DLNR, 1980a). In addition to health hazards, productivity of workers is a concern. Workers who do not acclimatize prior to ascending to the summit often experience a reduced capability to function effectively in their jobs; the potential for accidents increases considerably.

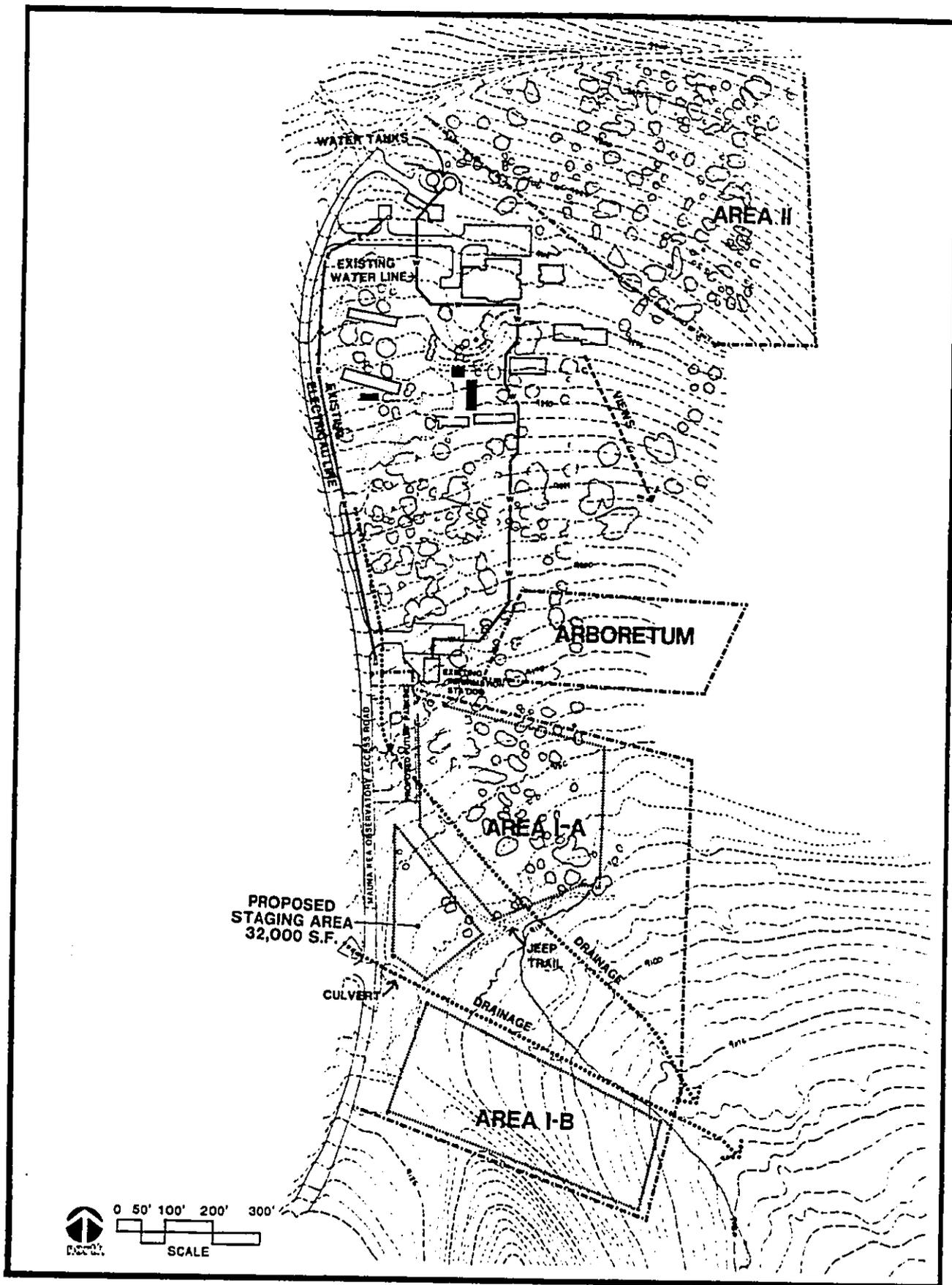
If the construction camp is not built, no additional land at Hale Pohaku will be disturbed for buildings, at least in the short-run. No mamane will be removed or transplanted; no additional water will have to be hauled from Hilo and no cesspools or utility trenches will have to be dug. On the other hand, gully erosion will continue because drainage improvements will not be made.

B. ALTERNATIVE LOCATIONS AT HALE POHAKU

1.0 Selection of Potential Locations

Three areas (Figure 11, Areas I-A, I-B, and II), were selected as potential locations for the site of the proposed construction camp. Prior to assessing and evaluating the suitability of these areas, two other sites were considered. The first was an already disturbed location across the Mauna Kea Observatory Access Road from proposed sites I-A and I-B. It was rejected because of high visibility, the additional cost of constructing utility trenches across the road, and because it was the consensus of UH, other state agencies and the County of Hawaii that all development should be confined to a mauka-makai corridor on one side of the road. The second was a site located between the existing Mid-Level Facilities and the Information Station. Although seriously considered for the construction camp, because it would confine development to the existing disturbed area, the area was rejected prior to the final site selection process for the following reasons:

- o One of the major considerations in the design of the Hale Pohaku Mid-Level Facilities was to minimize conflict between daytime sleepers (astronomers and technicians) and other daytime activities that might disturb that sleep. The common area and maintenance areas of the Mid-Level Facilities--which have heavy daytime use--were purposely sited upslope of the sleeping areas to minimize noise and other conflicts. A construction camp located in the middle area would be directly adjacent to and downslope from the astronomy sleeping areas. It was determined that the degree of potential conflict



**Existing Conditions & Alternate Areas
for Construction Camp Housing
at Hale Pohaku**

Figure 11

Chapman Desai Sakata, Inc. / Fukunaga & Associates, Inc.

between day sleepers and the daytime schedules of the construction workers would be considerable, particularly in the morning hours when the astronomers have just gotten to sleep and the construction workers are leaving for work.

- o Since the SRCDP was adopted by the UH Board of Regents in 1983, the BLNR has approved CDUAs which will allow infrastructure improvements that will facilitate the development of the telescopes projected in the plan. UH fully expects that, given BLNR approval of future individual telescope applications, a total of 13 telescopes will be located on Mauna Kea around the year 2000 as projected.

The current high level of interest in the site is expected to continue within the scientific community, and UH anticipates additional requests from U.S. and foreign institutions to construct and operate telescopes on Mauna Kea into the next century. Because a 5-year lead time is required in telescope development, a decision will be needed in the mid-1990s as to whether to terminate the growth of new astronomical facilities on Mauna Kea by limiting the number of telescopes to the 13 projected in the SRCDP, or to continue to allow additional facilities in accordance with some revised plan. It is premature to anticipate the course of action that will be taken; many factors, including the availability of additional suitable sites and environmental considerations, will enter into the expansion decision.

If it is determined--under a mutually revised SRCDP--that additional telescopes (beyond the projected 13) will be allowed to locate on Mauna Kea after the year 2000, then it is reasonable to assume that the permanent Mid-Level Facilities at Hale Pohaku would also need to be expanded at that time. In addition, use of the construction camp would also have to be extended through the duration of the new telescope construction period. If the construction camp is sited in the area between the Information Station and the existing dormitories now, this would foreclose the option of expanding the Mid-Level Facilities in the most compact, efficient and environmentally compatible manner since the entire camp would have to be relocated to make room for the new dormitories required to support the additional telescopes.

2.0 Evaluation Criteria

The following guidelines were used in evaluating the suitability of each of the three alternative locations:

- o **The Mamane/Naio Forest Ecosystem and Critical Habitat of the Palila:** The selected site should allow construction of the camp with minimal disturbance to the existing ecosystem; few if any mamane trees should be removed. Areas with rare or unique flora should be avoided.
- o **Visibility:** The selected area should allow siting of buildings to minimize visibility of the camp from the main road, the Information Station, and the Mid-Level Facilities.
- o **Archaeological Sites:** The site should be able to accommodate the proposed construction camp without disturbing important archaeological sites.

- o **Separation of User Groups:** The site should allow the maximum separation possible between construction workers and scientists (who are on different work/sleep schedules).
- o **Access and Parking:** Access from the Mauna Kea Observatory Access Road should be accomplished with minimal construction of additional roads. Parking areas should be able to be sited in close proximity to the living areas. Improvements on the site must be accessible to fire fighting equipment.
- o **Site Preparation:** The site selected for the construction camp should require minimal grading and clearing, drainage improvements, terracing and retaining walls prior to construction.
- o **Utilities:** Wherever possible, existing utility systems should be shared with the Mid-Level Facilities; extensions of existing water and electrical lines should be as short as possible in order to minimize disturbance to the land.
- o **Security:** If possible, the construction camp should be located in close proximity to the selected staging area.

3.0 Site Evaluation

3.1 Description

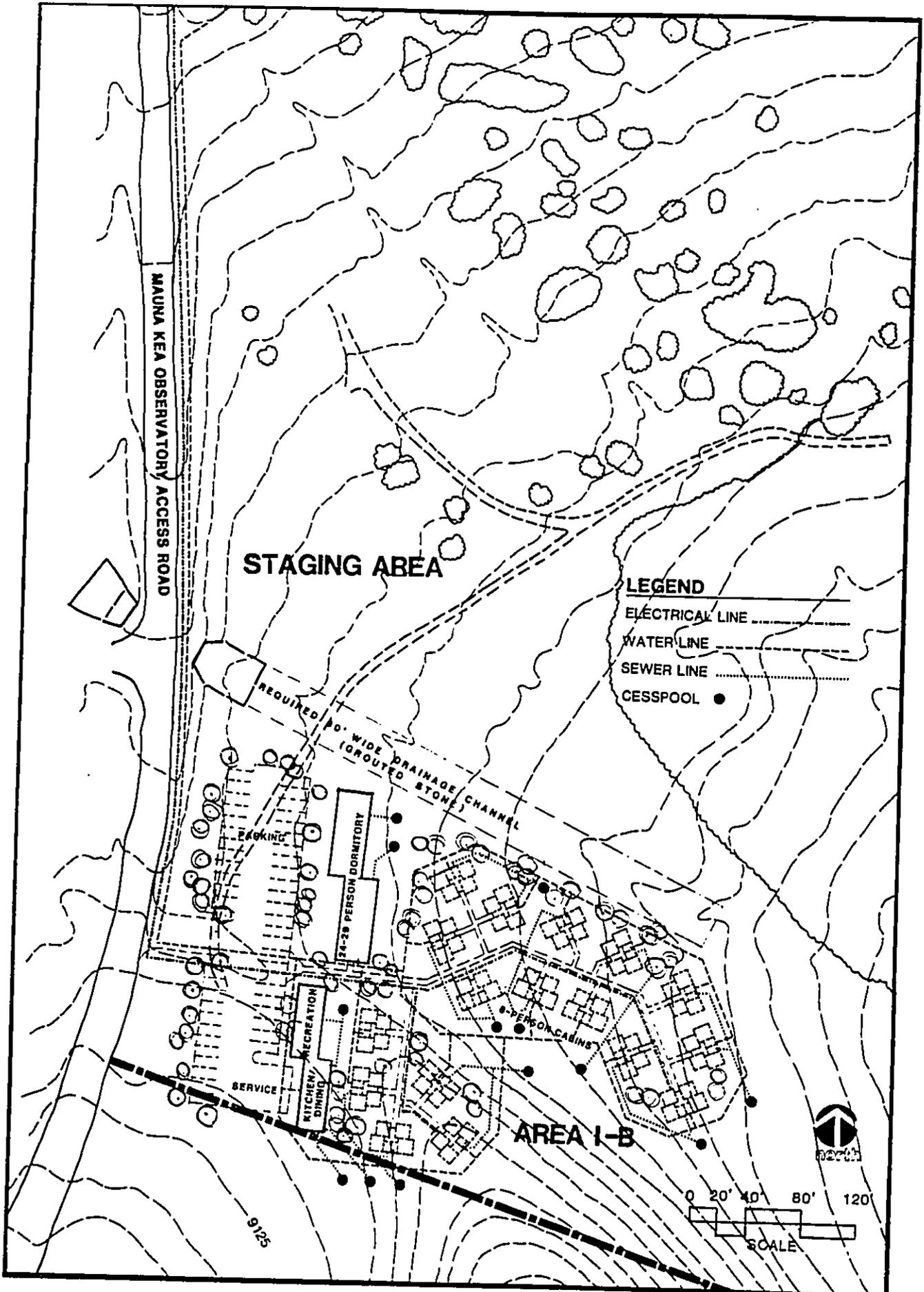
3.1.1. Area I-A: The Project Site

This area is located between the 9130- and 9185-foot elevations, within an area bounded by the Information Station and an existing jeep trail to the south (Figure 6). Ground slopes vary from about 5 to 12 percent. An existing drainage swale crosses the proposed area and continues just south of the site. This swale primarily conveys excess storm runoff generated from about a 600-foot one-lane-wide portion of the paved Mauna Kea Observatory Access Road.

Mamane cover is approximately 25 to 30 percent; ground cover varies in places from 40 to 50 percent. The clumps composed of taller trees, 3 to 6 meters tall, often support a dense tangle of native mints (Appendix A). The clumps of taller mamane provide adequate cover and food sources for native bird species. Two areas of lithic scatters were discovered on or adjacent to the site. The first, covering an area of 300 square meters, is located along an erosional channel on the north side of the jeep road; the second is located just outside of the proposed site, near the arboretum. A description of these scatters and an evaluation of their significance is presented in Appendix C.

3.1.2. Area I-B:

Area I-B is situated between the drainage culvert/jeep trail to the north and a cinder cone at about the 9050-foot elevation to the south (Figure 12). The area was used as a construction staging area when the lower portion of the Mauna Kea Observatory Access Road was paved. Ground slopes in the area average 5 to 12 percent. Two large 84-inch diameter culverts cross the paved access road and discharge adjacent to the site.



Site Plan: Alternative Area I-B

Chapman Desai Sakata, Inc./
Fukunaga & Associates

Figure 12

The area is very sparsely vegetated with no large mamane trees. Only two small mamane plants, less than 1 meter tall, were found during the botanical survey (Appendix A). Ground cover in the area is approximately 25 percent, consisting primarily of sheep sorrel and Danthonia spp. The avian habitat is barren, providing no cover; it is a poor source of food (Appendix B). Two shrines are located at the northern edge of the site. A description and evaluation of their significance is presented in Appendix C.

3.1.3 Area II:

This area is located adjacent to and upslope of the maintenance area of the permanent Mid-Level Facilities (Figure 13). Slopes in the area are steep, averaging about 20 percent. The Mauna Kea summit access road is lower than the north boundary of the site and prevents off-site storm runoff from entering the site.

The area is densely vegetated; there is good regeneration of mamane with many seedlings and saplings observed. Almost all of the large mamane clumps have native mint plants growing up into their branches. A few hinahina shrubs are found in the area. Several rock outcrops are dispersed throughout the site. These rock areas support few mamane trees. The ferns Pellaea ternifolia, Asplenium adiantum-nigrum, and Asplenium trichomanes are frequently found among the rocks. The candidate endangered Silene hawaiiensis, a member of the carnation family, can also be found growing in these rocky areas. A lithic scatter is present on the western edge of the site and encompasses an area of approximately 2,000 square meters. The significance of this scatter is described in Appendix C.

3.2 Evaluation

The sites were evaluated based on the criteria described in section 1.0. The results of the evaluation follow.

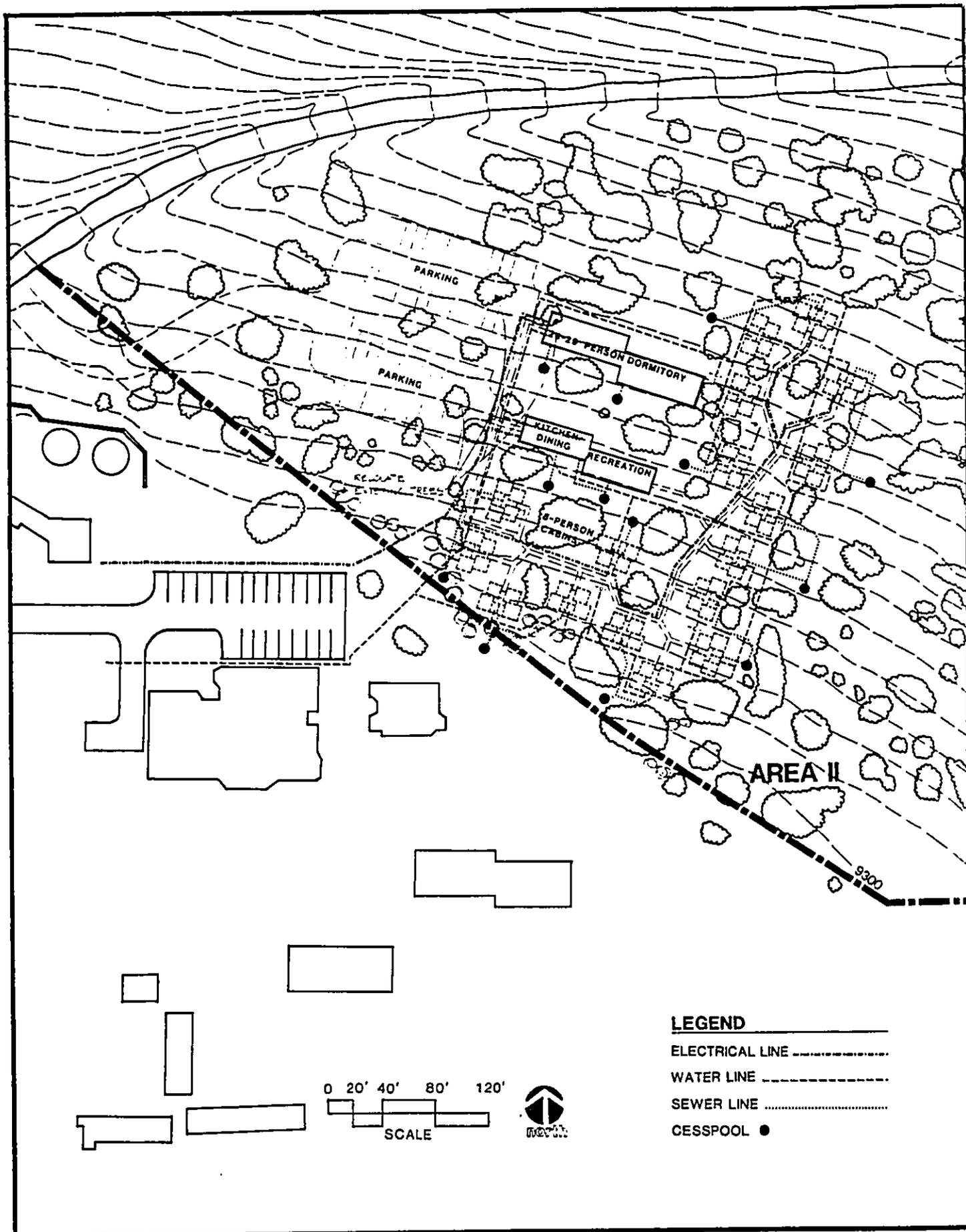
3.2.1 The Mamane/Naio Forest Ecosystem and Critical Habitat of the Palila:

Area I-A: A few of the native minits including Stenogyne microphylla, a candidate endangered species, can be found among the larger, older mamane clumps. Few if any mamane trees would have to be relocated in order to develop the construction camp. The mamane trees that may have to be removed are small, do not support any Stenogyne, and do not provide a good food source for the Palila and other native passerines. The area, in general, is only a fair avian habitat.

Area I-B: The site, which was previously disturbed, is relatively barren with only two small (less than one meter tall) mamane. Construction here would not result in Palila habitat destruction. The area is a poor avian habitat and does not provide a good food source for the Palila.

Area II: This area is more densely vegetated than the other two sites and therefore it is potentially a better avian habitat. Several mature mamane trees would probably have to be removed during site preparation. In addition, several candidate endangered plants are located on the site.

Evaluation: Area I-B would be the most suitable site if minimizing disturbance to the vegetation in the area is the major criterion; however, Area I-A is acceptable if care is taken not to remove any mature trees. Area II is the least suitable and



Alternative Area II

Chapman Desai Sakata, Inc./
Fukunaga & Associates

Figure 13

construction there has the potential of greater disturbance to the ecosystem than either of the other sites.

3.2.2 Visibility

Area I-A: The site is visible from the Mauna Kea Observatory Access Road; large clumps of mamane and other vegetation could be incorporated into the site plan in order to reduce visual impacts. Views of the construction camp from the existing Mid-Level Facilities and other areas upslope would primarily be of roof-tops.

Area I-B: Because of the surrounding terrain and differences in grade, the site would be barely visible from the Mauna Kea Observatory Access Road when approaching to the site. The area is barren; there is no vegetation to incorporate into the site plan. A construction camp located in Area I-B would be very visible from upslope locations in the Hale Pohaku area.

Area II: The area is heavily vegetated and buildings could be sited to take advantage of the natural landscaping to minimize visual intrusion. Because of the steep slopes in the area, a construction camp located in Area II would be visible above the permanent Mid-Level Facilities from areas downslope of the site.

Evaluation: Area I-A is the most suitable site from the standpoint of visibility and ability to blend the new facility into the existing landscape.

3.2.3 Archaeological Sites

Evaluation: There are archaeological remains present in all of the areas; however, Area I-B is the most sensitive and Area II is second. Although actions to minimize impacts must be undertaken on whatever site is chosen for development, based on this criterion, site I-A is more suitable than the others.

3.2.4 Separation of User Groups

Area I-A: Allows adequate separation between permanent Mid-Level Facilities dormitories and construction camp housing.

Area I-B: Allows maximum separation between permanent Mid-Level Facilities dormitories and construction camp housing.

Area II: Although adjacent to the permanent Mid-Level Facilities, the area is upslope from the common building and maintenance area -- areas which have heavy daytime use.

Evaluation: Based on the criteria of maximum separation, Area I-B is the most suitable site.

3.2.5 Access and Parking

Area I-A: Parking could be located in an area fronting the Information Station; it would be available for visitors to the Station when not used by construction workers. Access for the workers would be on foot from the parking area, no additional roads would have to be constructed to service the facility. All improvements on the site could be made accessible to fire fighting equipment.

Area I-B: Access to the site can be provided via improvements to an existing jeep trail; however, there would be no alternative use for the parking area when the construction camp is no longer in use. All improvements on the site could be made accessible to fire fighting equipment.

Area II: A new, relatively long, access road would have to be constructed. The access road and parking areas would require long and high (8- to 10-foot) retaining walls. These improvements could leave permanent scars on the land when the construction camp is terminated. In addition, because of the slope of the land, it would be very difficult for fire fighting equipment to reach all facilities on the site.

Evaluation: From the standpoint of access and parking, Area I-A is the most suitable.

3.2.6 Site Preparation

Area I-A: Minimal grading would be required for roadway and parking areas. Retaining walls, if needed, could be less than 4 feet tall. Disturbance of the ground surface under and around the buildings would be minimal. The potential for wind erosion would not be much greater than existing conditions. Appropriately designed drainage improvements will be necessary in order divert runoff from rooftops and the parking areas. A cutoff swale above the project site may also be required as an added safety feature. The construction of drainage improvements will minimize adverse water erosion impacts.

Area I-B: There would be slightly more grading for roadway and parking areas at this site than at Area IA. Disturbance of the ground surface would be considerable; primarily because of the large drainage channel necessary to protect the site. As with Area IA, disturbance of ground areas under and around the buildings would be minimal. The construction of drainage improvements will minimize adverse water erosion impacts.

A large drainage channel would be necessary to confine anticipated stormflows from the large culverts located adjacent to the site. On-site runoff generated from roadways, parking and roof areas would be collected and piped to the drainage channel. The construction of drainage improvements would protect the development from flooding and would minimize adverse water erosion impacts.

Area II: The site would require extensive grading for roadway and parking areas. High stairways to each unit might be necessary if connecting walkways are at ground level. Disturbance of the ground surface under the buildings could be minimal if the buildings are constructed on pier-type foundations. The potential for wind erosion would not be unlike existing conditions.

Drainage and water erosion would not be considered a major problem at this site, provided adequate drainage facilities are constructed to handle flows from roofs and paved areas.

Evaluation: Area I-A would be the most suitable when grading and disturbance of ground surface are considered. Area I-A and I-B require more extensive drainage improvements than Area II; however, the retaining walls required for roadways and

parking areas have the potential for greater disturbance to the environment at Area II. When all factors are considered, Area I-A is the most suitable based on the criterion of the extent of the site improvements required.

3.2.7 Utilities

Area I-A: Water and electrical lines could be extended from the adjacent Information Station.

Area I-B: Water and electrical lines would have to be extended over 1200 feet from the Information Station to the site, requiring extensive trenching and disturbance to the land.

Area II: Although the area is adjacent to the existing water storage tanks and distribution system, the existing pumps would have to be upgraded to service a facility uphill. The site is adjacent to the generator which provides power for the existing Mid-Level Facilities.

Evaluation: Area I-A is the superior site when efficiency in sharing of utilities with the existing Mid-Level Facilities and minimizing disturbance to the area by trenching is considered.

3.2.8 Security

Evaluation: Both Areas I-A and I-B are located in close proximity to the proposed construction staging area.

4.0 Overall Evaluation and Site Selection

Based on the results of the site evaluation, Area I-B was rejected because of visual impact and the necessity of constructing expensive infrastructure improvements. Area II was rejected because development would require extensive retaining walls for the parking area and access road, and because the entire site could not be made accessible to fire trucks. In addition, rare plants are located on the site. Area I-A was selected because of its relatively flat topography, the presence of scattered trees on the site which could buffer the visual impact of the development, the opportunity to use the parking area for overflow from the Information Station, and the relatively less expensive site development costs. Table 1 presents the results of the site suitability evaluation; rankings range from 1 (lowest) to 3 (highest) suitability.

Table 1: Evaluation of Alternative Sites

Criterion	Site I-A	Site I-B	Site II
Ecosystem & Habitat Disturbance	1.5	1.5	1.0
Visibility	3.0	1.0	2.0
Archaeological Sites	3.0	1.0	2.0
Separation of User Groups	2.0	3.0	1.0
Access & Parking	3.0	2.0	1.0
Site Preparation & Drainage	3.0	1.5	1.5
Utilities	1.5	1.0	1.5
Security	1.5	1.5	1.0
TOTALS	18.5	12.5	11.0

Note: Unweighted scores range from 1.0 least suitable to 3.0 most suitable.

**PART V: RELATIONSHIP OF THE PROPOSED PROJECT TO
POLICIES AND PLANS FOR THE AREA**

A. 1977 DLNR MAUNA KEA PLAN

In addition to being a superior site for ground-based astronomy, Mauna Kea is also a unique locale for other activities. The seasonally snow-covered slopes above the 10,000-foot elevation are used for skiing and snowplay. Hawaiian ecosystems, including rare plants and birds, are found between the 6,000-foot elevation and the summit. Hunting is also a popular activity on the mountain as are general recreation, photography and sightseeing. Mauna Kea is also an ideal site for scientific field research in areas such as archaeology, geology, biology and botany.

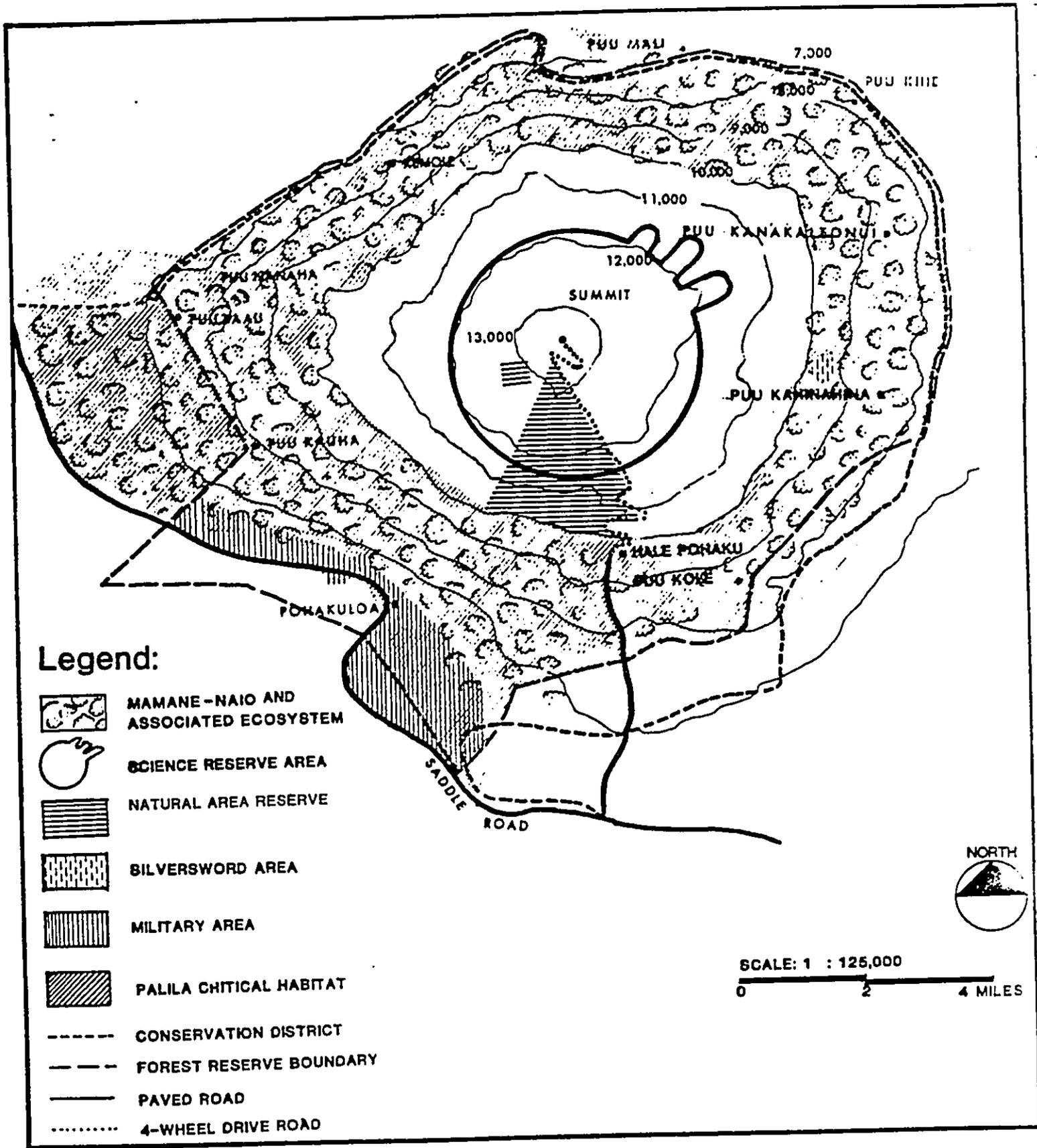
In the early 1970s, it was recognized that an overall plan was necessary in order to control development on the mountain and to resolve the conflicting demands of various users who wanted to use the mountain for their activities. The Mauna Kea Plan, a policy framework for the management of Mauna Kea, was adopted by the DLNR on February 11, 1977 (Figure 14). This plan was amended in 1984 and 1985 to allow for overhead power lines from the Saddle Road to Hale Pohaku, paving of the Mauna Kea Observatory Access Road from Hale Pohaku to the summit, and to delineate areas to be managed by UH (Figure 15).

**B. 1980 DLNR HALE POHAKU MID-LEVEL FACILITIES COMPLEX
DEVELOPMENT PLAN**

The Hale Pohaku Mid-Level Facilities Complex Development Plan (CDP) was prepared in accordance with the requirements set forth in the 1977 DLNR Mauna Kea Plan which specifies that the design of these facilities is to be controlled to minimize disturbances to the mamane/naio forest ecosystem. The plan served as the guide in the design and construction of the recently completed (1983) permanent Mid-Level Facilities and Information Station. Criteria and recommendations developed for the CDP are incorporated by reference into the construction camp master plan and this EIS.

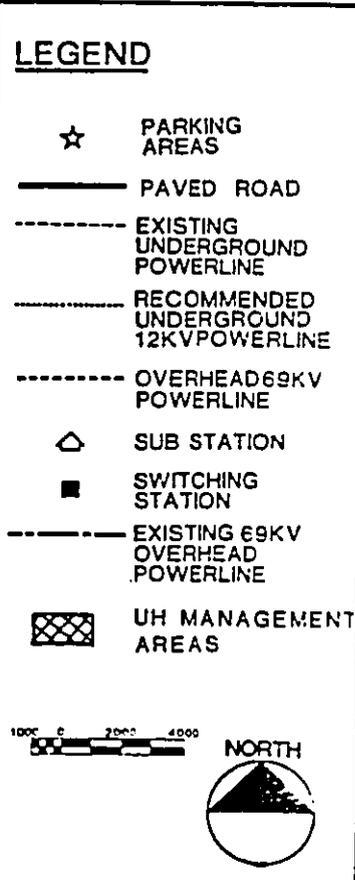
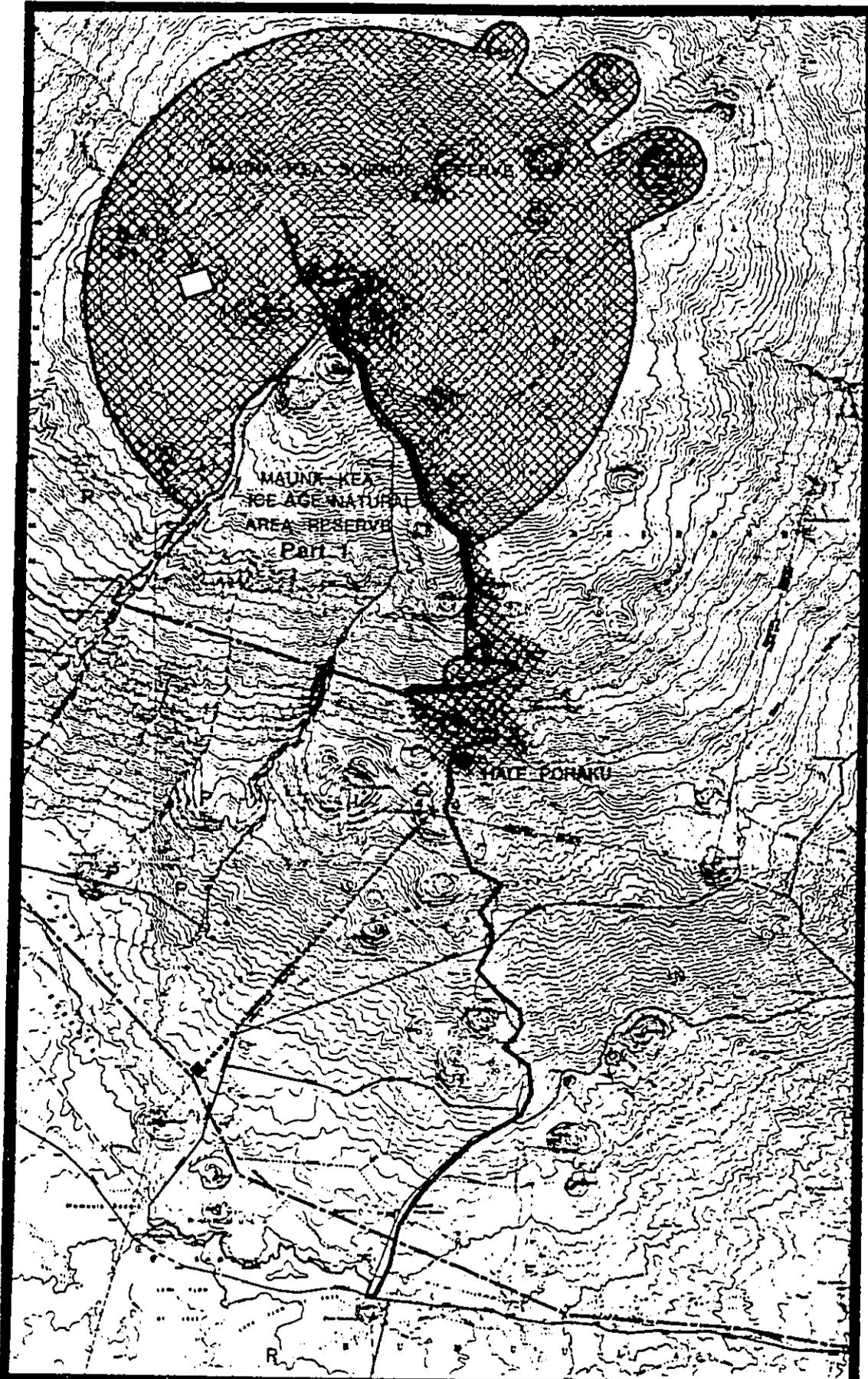
**C. UH RESEARCH DEVELOPMENT PLAN FOR THE MAUNA KEA SCIENCE
RESERVE AND RELATED FACILITIES**

The UH Research Development Plan (UH RDP), which was approved by the UH Board of Regents in January 1982, serves as the programmatic master plan for the continued development of the Mauna Kea Science Reserve. Actions proposed in the plan include: (1) a total of 13 telescopes on the mountain by the year 2000; (2) provision of commercial power from the public utility (HELCO); (3) improvements to and paving of the access road from Hale Pohaku to the summit; (4) expansion of the Mid-Level Facilities at Hale Pohaku; and, (5) possible expansion of the visitor Information Station. The RDP also addresses the procedures by which the University will review and assess applications for new facilities on Mauna Kea and the types of agreements which will be required of all new users of the summit and Hale Pohaku areas.



1977 DLNR Mauna Kea Plan

Figure 14



SRCDP: Amendments to the 1977 DLNR Mauna Kea Plan

Figure 15

The UH RDP was prepared to define planning parameters for the Science Reserve such that detailed CIP plans, environmental impact statements, complex development plans, and administrative and/or Board of Regents policies could be developed. These policies address such matters as management of the telescopes and the supporting infrastructure (including the Mid-Level Facilities at Hale Pohaku) and evaluation and selection of applications for telescope sites. The proposed construction camp is intended to support the developments set forth in the UH RDP.

D. MAUNA KEA SCIENCE RESERVE COMPLEX DEVELOPMENT PLAN

The Mauna Kea Science Reserve Complex Development Plan (SRCDP) was approved by the UH Board of Regents in February 1983. It incorporates the policies and criteria set forth in the previously described plans and recommends amendments to these plans where appropriate. The SRCDP was prepared to provide the physical planning framework necessary to implement the UH RDP. The BLNR also required the SRCDP as a condition to approving further development on the mountain. Approval of the CDUA for the proposed construction camp and acceptance of the supplemental EIS by the Governor should be considered an amendment to this plan.

E. ENDANGERED SPECIES ACT

Hale Pohaku is located within the boundaries of the critical habitat of the rare and endangered Palila (Loxioides bailleui), a bird which is found nowhere else in the world. Development within a federally recognized critical habitat of an endangered species is subject to the rules and regulations of Section 7 of the Endangered Species Act of 1973 (U.S.C. 1536) and 1978 amendments to the Act, if a federal presence is involved in the project. The proposed construction camp is located within the critical habitat. A letter from the U.S. Department of the Interior, Fish and Wildlife Service, stating that the project would not be expected to have any significant impacts on the bird or its habitat is appended to this EIS (Appendix D).

F. RESOURCE SUBZONE, CONSERVATION DISTRICT

The objective of the Resource Subzone is "...to develop, with proper management, areas to ensure sustained use of the natural resources of those areas." (Regulation 4, DLNR)

The proposed construction camp is in support of telescopes on the mountain which are adding to the research capabilities of the Mauna Kea Observatory, and which fulfill the goals of the Resource subzone by utilizing the excellent astronomical resources that Mauna Kea possesses. Drainage improvements to be made at the proposed construction camp site will serve to minimize erosion problems, and thus ensure the sustained use of the natural resources of the area. The removal of mamane trees in order to develop the camp will be minimized. Those that are removed will be transplanted to other locations in the area. Additional mamane will be planted to landscape the construction camp and provide a visual buffer

between the development and the Mauna Kea Access Road. This will also act to improve and sustain the use of the natural resources of the area.

G. SPECIAL MANAGEMENT AREA

The proposed construction camp site is not located within the Special Management Area and is not subject to the requirements of Chapter 205-A HRS relating to Coastal Zone Management or Rule 9 of the Planning Commission of the County of Hawaii relating to the Special Management Area.

H. POLICIES AND PLANS INCORPORATED BY REFERENCE

The proposed construction camp is intended to support the development of telescopes on the summit of Mauna Kea. The SRCDP EIS described the relationship of various policies and plans to this development; these are incorporated into this EIS by reference and include:

- o The Hawaii State Plan: Objectives and policies (Part I) and priority guidelines (Part III) in relation to employment opportunities, environment, etc.
- o The State Higher Education Functional Plan
- o Chapter 344 HRS - The State Environmental Policy Act
- o The Hawaii County General Plan
- o The Northeast Hawaii Community Development Plan
- o Clean Air Act, as amended (42 U.S.C. 1857h-7 et.seq.) -- No effect expected
- o National Historic Preservation Act of 1966, as amended (16 U.S.C. Sec. 470 et. seq.) -- No effect at present time
- o Clean Water Act of 1977 (33 U.S.C. 1251 et. seq.) -- No effect
- o Potable Water Systems, (Chapter 20, formerly Chapter 49, HRS) -- No effect

I. AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL POLICIES ARE THOUGHT TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The Hale Pohaku Complex Development Plan and the Revised Environmental Impact Statement for the plan set forth various criteria for the development of the Mid-Level Facilities. These criteria, and measures to mitigate adverse environmental effects, are incorporated into this EIS by reference. Most of these measures were also incorporated into the CDUAs for the permanent Mid-Level Facilities and the W. M. Keck Observatory dormitory. Additional conditions to insure mitigation of adverse effects were imposed on these CDUAs by the BLNR. A CDUA for the construction camp was filed with the BLNR on June 28, 1985. It

is anticipated that the Board will place restrictions on the permit--intended to mitigate adverse effects of the proposed action--as a condition of approval.

Because Hale Pohaku is located within the boundaries of a critical habitat of an endangered species, the U.S. Fish and Wildlife Service, Office of Environmental Services, was consulted for an informal opinion as to the potential impacts of the proposed construction camp on the endangered Palila. They stated that . . ."The impacts of the construction. . .on the endangered Palila and its designated critical habitat. . .would not be expected to have any significant impact on the bird or its habitat. . .if conservation measures are followed. . ." (Appendix D). These conservation measures have been incorporated into this EIS. In addition, if future increments of the construction camp involve the participation of federal agencies, formal consultation with the Service will be required.

A management plan for the area from Hale Pohaku to the summit has recently been approved by the BLNR. This plan gives UH certain responsibilities for management and monitoring of activities on the mountain. Rules and regulations that will be adopted to implement this plan, including measures to protect the natural environment at Hale Pohaku, will also serve to mitigate adverse impacts of the proposed action.

PART VI: LIST OF NECESSARY APPROVALS

Conservation District Use Permit - Board of Land and Natural Resources - CDUA
filed June 28, 1985.

Department of Health - Individual Wastewater Disposal System and UIC Approval -
No action to date

County of Hawaii Grading and Building Permits - No action to date

Other permits required will be determined during the design phase of the project.

PART VII: UNRESOLVED ISSUES

Final disposition of the camp buildings, when they are no longer needed to house construction workers, has not been determined as yet. A decision on this matter will be made in the mid-1990s, towards the end of the telescope construction period projected in the SRCDP. At this time it will also be determined whether or not to allow additional telescopes, beyond the 13 projected in the SRCDP, to locate on Mauna Kea. If the telescope construction period is extended, the construction camp will continue to be used to house the workers constructing these facilities.

**PART VIII: AGENCIES, ORGANIZATIONS, AND INDIVIDUALS CONSULTED IN
THE PREPARATION OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT**

A. AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONTACTED

The following individuals and firms were contacted for professional services and/or specialized advice during the planning process and the preparation of the EIS. Sub-consultants on the project are indicated with an asterisk (*).

*Chapman Desai Sakata, Inc.	Physical planning, graphics
*Fukunaga & Associates	Civil Engineering
*Char & Associates	Botany
*Maile Stemmerman Kjargaard	Avian Survey
*Bishop Museum	Archaeology
*KRP Information Services	Environmental Policy, Word Processing

Federal Agencies

Department of The Interior: Fish and Wildlife Service

Mr. Ernest Kosaka	Project Leader, Office of Environmental Services
Mr. William R. Kramer	Deputy Project Leader
Mr. Jim Jacobi	Mauna Loa Field Station

State Agencies

Department of Health

Mr. Harold Matsuura	Hawaii County
---------------------	---------------

Department of Land and Natural Resources

Mr. Liebert Landgraf	Administrator, Forestry Division
Mr. Charles Wakida	Hawaii District Forester
Mr. Mike Shimabukuro	Land Management
Mr. Dean Uchida	Planning Office
Mr. Dan Quinn	State Parks, Outdoor Recreation and Historic Sites

Office of Environmental Quality Control

Mr. Roy Sakamoto	Environmental Planner
------------------	-----------------------

University of Hawaii

Botany Department

Mr. Clifford Smith

Facilities Planning Office	
Mr. Walter Muraoka Mr. Tomotsu Sahara	Director Land Specialist
Institute For Astronomy	
Dr. Donald Hall Ms. Ginger Plasch	Director Assistant to the Director
Research Corporation of the University of Hawaii	
Mr. Tom Krieger	General Manager, Mauna Kea Support Services
County of Hawaii	
Building Department	
Department of Water Supply	
Mr. William Sewake	Director
Planning Department	
Mr. Albert Lono Lyman Mr. Rodney Nakano	Director
Individuals and Organizations	
Mr. Alvah Nakamura Mr. Gerald Smith Mr. James Fauli	Hawaii Electric Light Company W. M. Keck Observatory

B. AGENCIES, ORGANIZATIONS AND INDIVIDUALS WHO RECEIVED A COPY OF THE NOP

The EIS Preparation Notice (NOP) was filed with the State Office of Environmental Quality Control (OEQC) on June 3, 1985. Comments on the NOP were requested on or before July 8, 1985, however, all comments received by July 29, 1985 were responded to and, if substantive, were incorporated into the draft EIS. As of that date, 23 comments and 1 request to be a consulted party were received.

The following agencies, organizations and individuals received copies of the NOP. An asterisk indicates those who responded; respondents identified with double asterisks made substantive comments which are included in this section of the draft EIS.

Federal

Advisory Council on Historic Preservation

Department of Agriculture

- **Soil Conservation Service
- **Institute of Forest Service-Pacific Islands Forestry

Department of the Army

- **Army Engineer District
- Headquarters U.S. Army Support Command, Hawaii

Department of the Air Force

Department of the Interior

- **Fish and Wildlife Service, Office of Environmental Services
- Geological Survey, Water Resources Division
- National Park Service

State

**Governor

- *Department of Accounting & General Services
- *Department of Defense
- Department of Hawaiian Homes Lands
- **Department of Health
- **Department of Land & Natural Resources
- **Department of Planning and Economic Development
- *Department of Transportation
- Office of Environmental Quality Control
- Office of Hawaiian Affairs
- University of Hawaii
 - Board of Regents, Hawaii Representative
 - Chancellors Office
 - **Environmental Center
 - Institute For Astronomy
 - Lyon Arboretum
 - Pacific International Center For High Technology Research
 - *Water Resources Research Center

State Legislature

Senate

- Senators, island of Hawaii
- Senate Committees
- Economic Development

House of Representatives

Representatives, island of Hawaii
House Committees
Finance
Planning, Energy, Ecology and Environmental Protection
Water, Land Use, Development & Hawaiian Affairs

County of Hawaii

*Mayor's Office
County Council
*Fire Department
*Parks and Recreation
**Planning Department
*Police Department
*Public Works Department
Research and Development
*Water Supply Department

Organizations and Individuals

Bishop Museum
Conservation Council For Hawaii, Hawaii Chapter
Conservation Council For Hawaii, Hawaii Island Chapter
Construction Industry Legislative Organization, CILO
Hamakua District Development Council
Hawaii Audubon Society
Hawaii Botanical Society
*Hawaii Electric Light Company (HELCO)
Hawaii Island Board of Realtors
Hawaii Island Chamber of Commerce
Hawaii Society of Professional Engineers, Big Island Chapter
*Hawaiian Electric Company
*Hawaiian Telephone Company
Hilo Chamber of Commerce
Hilo Contractors Association
Hunters Association
Mr. Lawrence Katahira, Hawaii National Park
Life of the Land
Mauna Kea Foundation
Mauna Kea Ski Patrol
Mrs. Mae Mull
Mr. Henry A. Ross
Sierra Club, Hawaii Chapter***
Ski Association of Hawaii
Mr. Power Sogo, UHH
Sportsmen of Hawaii
W. M. Keck Observatory

***Note: The NOP was returned because the address was no longer valid. Subsequently a letter was received from the Moku Loa Chapter of the Sierra Club and a copy of the NOP was sent to them. Copies of this correspondence are included in the EIS.

C. COMMENTS AND RESPONSES TO THE NOP

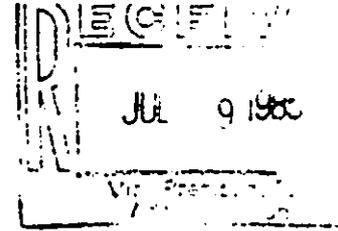
Copies of all substantive comments and responses follow:



United States
Department of
Agriculture

Soil
Conservation
Service

P.O. Box 50004
Honolulu, Hawaii
96850



July 8, 1985

Mr. Harold S. Masumoto
Vice-President for Administration
University of Hawaii at Manoa
2444 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Masumoto:

Subject: Supplemental EIS Preparation Notice--Amendment to the
Mauna Kea Science Reserve Complex Development Plan:
Temporary Construction Camp Housing at Hale Pohaku,
Hamakua, Hawaii

We reviewed the subject document and have the following comment:

The soil at the proposed 4-acre construction camp housing site is very susceptible to erosion. To minimize erosion during the proposed grading phase, conservation measures such as temporary diversions, or mulching of the area should be considered. Revegetating the area may not be feasible because of low annual rainfall (approximately 25 inches) at the 9,000-foot elevation and limited water supply in the area.

Thank you for the opportunity to review this document.

Sincerely,

Francis C.H. Lum

FRANCIS C.H. LUM
State Conservationist

cc:
MCM Planning
P.O. Box 27506
Honolulu, Hawaii 96827
Attention: Ms. Marilyn C. Metz



The Soil Conservation Service
is an agency of the
United States Department of Agriculture



★ U.S. Government Printing Office: 1983-420-939/1578

UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

Mr. Francis C. H. Lum
State Conservationist
U.S. Department of Agriculture
Soil Conservation Service
P. O. Box 50004
Honolulu, HI 96850

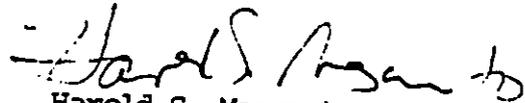
Dear Mr. Lum:

SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the subject notice. Your comments on minimizing soil erosion during the grading phase of the proposed project will be considered during the preparation of the draft EIS.

We look forward to your review of the draft EIS.

Very truly yours,



Harold S. Masumoto
Vice-President

HSM:pz



United States
Department of
Agriculture

Forest
Service

Institute of Pacific Islands Forestry
1151 Punchbowl St., Rm. 323
Honolulu, Hawaii 96813

Reply to: 1950-3-1

Date: June 14, 1985

[Handwritten signature]

Vice-President for Administration
University of Hawaii at Manoa
2444 Dole Street
Honolulu, HI 96822
Attention: Mr. Harold S. Masumoto

Dear Mr. Masumoto:

We have reviewed the "Notice of preparation of supplemental environmental impact statement for temporary construction camp housing at Hale Pohaku, Hamakua, Hawaii." We do not foresee serious problems within the "notice." It appears that most major impacts will be addressed in the EIS. We do wonder, however, at the use of the term "temporary." No time limit is given, implied or otherwise, concerning the length of service that constitutes "temporary."

One possible concern is the potential of erosion from wind and water. Intense rain storms have been known to occur at the same elevation as the proposed development. Wind storms may also be of serious concern. Unless special precautions are taken in the staging area or other heavy use sites, visibility from blowing sand and silt may be affected.

Sincerely,

[Handwritten signature]

C. EUGENE CONRAD
Director of Institute of Pacific
Islands Forestry

cc: MCM Planning
P. O. Box 27506
Honolulu, HI 96827
Attention: Ms. Marilyn C. Metz



UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

Mr. C. Eugene Conrad, Director
Institute of Pacific Islands Forestry
U.S. Department of Agriculture
1151 Punchbowl Street, Room 323
Honolulu, HI 96813

Ref: 1950-3-1

Dear Mr. Conrad:

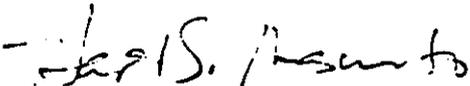
SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the subject notice. In response to your specific comments:

1. The construction camp is intended to be used for approximately 15 years, until the year 2000. The word temporary, however, will be deleted in future references to the project.
2. Minimizing disturbance of existing ground areas, construction of drainage improvements, paving of roads and parking areas, and planting and transplanting of vegetation--such as mamane trees--are actions that are being considered to minimize the problem of soil erosion in the area. Dust control shall be the responsibility of the contractor and will be accomplished according to existing Department of Health and County of Hawaii regulations.

We look forward to your review of the draft EIS.

Very truly yours,


Harold S. Masumoto
Vice-President

HSM:pz



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

June 27, 1985

REPLY TO
ATTENTION OF

Mr. Harold S. Masumoto
Vice-President for Administration
University of Hawaii at Manoa
2444 Dole Street
Honolulu, Hawaii 96822

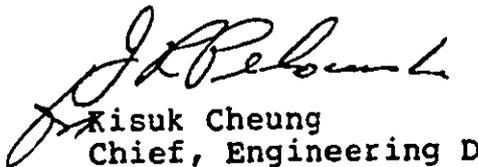
Dear Mr. Masumoto:

Thank you for the opportunity to review and comment on the Supplemental EIS Preparation Notice for Amendment to the Mauna Kea Science Reserve Complex Development Plan: Temporary Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii. The following comments are offered:

a. The Department of the Army permit requirements are not applicable.

b. The entire site for the proposed "Mauna Kea Science Reserve Complex Development" at Hale Pohaku, Hamakua in north Hawaii is designated Zone C or area of minimal flooding under the Flood Insurance Study (FIS) for Hawaii County. The FIS was prepared by the Federal Insurance Administration for the County. All of the Mauna Kea Forest Reserve area is classified Zone C, where mandatory floodproofing requirements are not applicable.

Sincerely,


J. K. Cheung
Chief, Engineering Division

UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

Mr. Kisuk Cheung, Chief
Engineering Division
Department of the Army
U.S. Army Engineer District, Honolulu
Ft. Shafter, HI 96858-5440

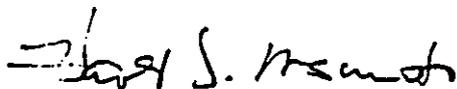
Dear Mr. Cheung:

SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the subject notice. The fact that the entire area is designated Zone C, or area of minimal flooding, will be included in the forthcoming draft EIS.

We look forward to your review of the draft EIS.

Very truly yours,


Harold S. Masumoto
Vice-President

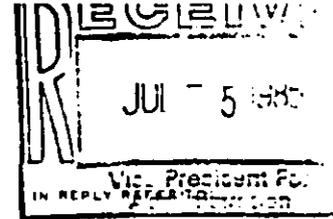
HSM:pz



United States Department of the Interior

FISH AND WILDLIFE SERVICE

300 ALA MOANA BOULEVARD
P. O. BOX 50167
HONOLULU, HAWAII 96850



ES
Room 6307

Vice-President for Administration
University of Hawaii at Manoa
2444 Dole Street
Honolulu, Hawaii 96822
Attn: Mr. Harold S. Masumoto

Re: Supplemental Environmental Impact Statement (SEIS)
Preparation Notice, Amendment to the Mauna Kea Science
Reserve Complex, Hawaii

Dear Mr. Masumoto:

The U.S. Fish and Wildlife Service (FWS) has reviewed the referenced Preparation Notice and offers the following comments for your consideration.

General Comments

The FWS's primary concern regarding the proposed construction camp near the Mid-Level Facilities at Hale Pohaku is the potential negative impacts of increased human presence and activities on the endangered palila (Loxioides bailleui) and its critical habitat. In particular, the FWS is concerned that the increased human presence may result in increased populations of feral cats and rats in the Hale Pohaku area that may negatively affect palila populations in the area.

Specific Comments

The FWS and the Department of Land and Natural Resources, Division of Forestry and Wildlife, conducts annual surveys in the palila critical habitat to determine the population levels of the palila. One of the transects is located approximately a quarter mile from the existing Hale Pohaku facility. The results of these annual surveys suggest that palila densities near the existing facility are approximately 10 birds/square kilometer (S. Mountainspring, pers. comm.). The FWS recommends that the results of these surveys be incorporated into the SEIS. For survey information, please contact the following:

Mauna Loa Field Station
Attn: Mr. Steve Mountainspring
U.S. Fish and Wildlife Service
P.O. Box 44
Hawaii Volcanoes National Park, Hawaii 96718



Save Energy and You Serve America!

It is our understanding that vegetation and faunal surveys of the alternative project sites will be conducted for the SEIS. To assist in determining the potential impacts of the proposed construction camp on the palila critical habitat, the FWS recommends that the results of these surveys be superimposed on a map of the proposed alternatives.

According to the Preparation Notice, the temporary construction camp will be developed incrementally and that during the next 15 years, bedspace for approximately 140 construction workers will be required at Hale Pohaku at any one time. This is a substantial increase from the estimated 25 to 35 workers needed to construct the Keck Telescope. The SEIS should include a discussion of cumulative impacts of the increased numbers of construction workers and associated support facilities on the palila critical habitat.

The SEIS should include a discussion of the measures to reduce the impacts of increased human presence and activities in the palila critical habitat. The FWS recommends that the following measures be implemented:

- a. Pet cats will be prohibited from the Mid-Level Facility and at the proposed construction camp.
- b. Garbage will be stored in elevated rodent-proof containers.
- c. Generators for the proposed construction camp will be equipped with mufflers to reduce noise.
- d. An active feral cat and rat trapping program will be conducted in the vicinity of the Mid-Level Facility and the proposed construction camp. This trapping program will be coordinated with the FWS and the Division of Forestry and Wildlife.

We appreciate the opportunity to comment.

Sincerely yours,



Ernest Kosaka
Project Leader
Office of Environmental Services

cc: RD, FWS, Portland, OR (AHR)
EPA, San Francisco
HDF&W
MLFS

UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

Mr. Ernest Kosaka, Project Leader
U. S. Department of the Interior
Fish and Wildlife Service
Office of Environmental Services
P. O. Box 50167
Honolulu, HI 96850

REF: ES Room 6307

Dear Mr. Kosaka:

SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Mahakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the subject notice. In response to your specific comments:

1. We share your concern about the potential increased populations of feral cats and rats in the Hale Pohaku area that may impact the Palila. At the present time there are no visible cats or rats near the Mid-Level Facilities. A trapping program to rid the area of these animals has recently been completed; this is an ongoing program which will be repeated whenever the problem reoccurs.
2. The ornithologist contracted for this study will include the results of the FWS/DLNR annual survey of the critical habitat in her report. In addition, she will attempt to map the results of her survey; the botanist will do the same.
3. Cumulative impacts of increased numbers of construction workers on the critical habitat will be addressed in the draft EIS.

We look forward to your review of the draft EIS.

Very truly yours,

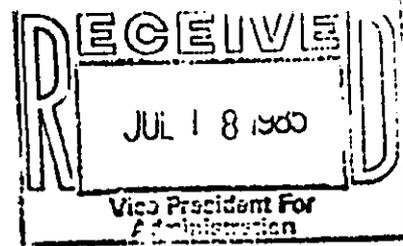


Harold S. Masumoto
Vice-President

HSM:pz



EXECUTIVE CHAMBERS
HONOLULU



GEORGE R. ARIYOSHI
GOVERNOR

July 15, 1985

Mr. Harold Masumoto
Vice-President for Administration
University of Hawaii
2444 Dole Street, Room 202
Honolulu, Hawaii 96822

Dear Mr. Masumoto:

This is in response to your letter of June 8, 1985, regarding the Supplemental Environmental Impact Statement Preparation Notice -- Amendment to the Mauna Kea Science Reserve Complex Development Plan: Temporary Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii.

Our primary environmental health concern is for the quantity of wastewater generated by the projected developments and the means used for its disposal. I would like to suggest that your consulting engineers discuss the various options available for the proper disposal of the wastewater with our Underground Injection Control Program staff, at 548-6410.

With warm personal regards, I remain,

Yours very truly,

A handwritten signature in cursive script that reads "George R. Ariyoshi".
George R. Ariyoshi

UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

The Honorable George R. Ariyoshi
Governor
State of Hawaii
State Capitol
Honolulu, HI 96813

Dear Governor Ariyoshi:

SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the subject notice of preparation.
Your concerns will be addressed in the draft EIS, and we look forward to your
review of that document.

Very truly yours,



Harold S. Masumoto
Vice-President

HSM:pz

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



CHARLES G. CLARK
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH

P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EPHSD-

June 21, 1985

Mr. Harold Masumoto
Vice-President for Administration
University of Hawaii at Manoa
2444 Dole St.
Honolulu, Hawaii 96822

Dear Mr. Masumoto:

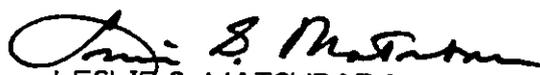
Subject: Request for Comments on Amendment to Mauna Kea Science Reserve
Complex Development Plan: Temporary Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii

Thank you for allowing us to review and comment on the subject
Supplemental EIS Preparation Notice.

Each individual wastewater disposal system is limited to the discharge of 800
gallons per day of sewage. The final disposal system of wastewater treatment
works needs to meet the requirements of Chapter 23, Title II, Administrative
Rules, Underground Injection Control.

We realize that the statements are general in nature due to preliminary plans
being the sole source of discussion. We, therefore, reserve the right to impose
future environmental restrictions on the project at the time final plans are
submitted to this office for review.

Sincerely,


LESLIE S. MATSUBARA
Director of Health

cc: Ms. Marilyn C. Metz, MCM Planning

UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

Mr. Leslie S. Matsubara, Director
State of Hawaii
Department of Health
P. O. BOX 3378
Honolulu, HI 96801

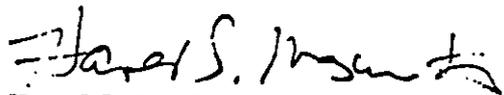
Dear Mr. Matsubara:

SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for your letter of June 21, 1985. The conceptual plan for the construction camp recognizes the fact that each individual wastewater disposal system is limited to the discharge of 800 gallons per day of sewage; a sufficient number of these systems has been planned. The final disposal system will be designed to meet all Department of Health requirements.

We look forward to your review of the draft EIS.

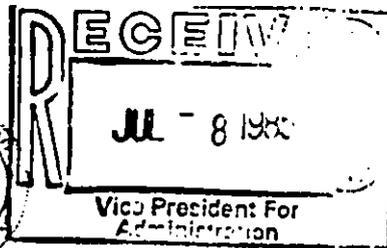
Very truly yours,



Harold S. Masumoto
Vice-President

HSM:pz

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES
EDGAR A. HAMAE,
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT
PROGRAM
AQUATIC RESOURCES
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

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

JUL 5 1985

REF. NO.: CPO-1189-85

Mr. Harold S. Masumoto
Vice-President for Administration
University of Hawaii at Manoa
2444 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Masumoto:

SUBJECT: Preparation Notice on the Supplemental Environmental
Impact Statement for Temporary Construction Camp
Housing at Hale Pohaku, Hawaii

We have reviewed the subject document and have the following
comments:

1. In paragraph 3, page 1, Introduction, it is stated "...it can be physically hazardous for scientists, support staff and construction workers to travel directly from sea-level to work at the summit...". Many construction workers and at least some support staff do commute from their homes to work at the summit. Have any of the commuters suffered significant adverse physical effects?
2. In reviewing the proposed alternate areas for construction camp housing:
 - a. It appears there is one overriding criteria - isolation of construction workers from scientists. The explanation of different work/sleep schedules does not seem valid. Scientists will be away from the housing facilities during the night, and the construction workers will be away during the day. This normal work schedule should pretty well alleviate work/sleep schedule conflicts.
 - b. In our opinion, it appears obvious that from the aesthetic, utility, and/or development cost standpoint, both Area I-B and Area II are poor choices. We question whether other sites were considered, and how these three sites were chosen?

Mr. Harold S. Masumoto, U.H.

CPO-1189-85

- c. In previous discussions with your University staff, our Division of Forestry and Wildlife has indicated that the area between the information station and the existing temporary buildings should be the only area considered. The subject document does not even discuss this area as an alternative.
3. On page 24, Mammals, cattle is listed as inhabiting the area. With reference to the Hale Pohaku area, this is misleading.
 4. We do not object to the proposed staging area use provided access on the existing jeep road is not impeded, and the access area is kept free of any hazardous objects that may puncture vehicle tires or cause other damage to vehicles, or pose a hazard to people.
 5. The users of the facility must be advised that no pets (cats, dogs, birds, white mice, etc.) be allowed in the area.
 6. Construction workers must be warned about illegal hunting, and Mauna Kea support service or someone be assigned to monitor any illegal activity.
 7. Several alternative sites for this camp housing at Hale Pohaku are being considered. The notice states that an archaeological reconnaissance survey is being conducted at these alternative areas by Dr. P. McCoy of the Bishop Museum (p. 25), that the survey's report will be attached to the Draft EIS (30), and that the results of the survey will be considered in planning (30). We assume that this consideration will be to reduce or eliminate any impacts. In this light, the handling of historic preservation concerns seems to be adequate at this state in the environmental review process.

We appreciate the opportunity to comment on the proposed document.

Very truly yours,


SUSUMU ONO, Chairperson
Board of Land and Natural Resources

cc: Marilyn Metz, P.O. Box 27506, Honolulu, HI 96827
OEQC

UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

Mr. Susumo Ono, Chairman
Board of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

REF: CPO-1189-85

Dear Mr. Ono:

SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Mahakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the subject notice. In response to your specific comments:

1. The hazards of going directly from sea level to work at high elevations (eg. nearly 14,000 feet) have been documented (Final EIS: Hale Pohaku Mid-Level Facilities Master Plan, DLNR, 1980). In addition to health hazards, productivity of workers is a concern. Workers who do not acclimatize prior to ascending to the summit often experience a reduced capability to function efficiently, and the potential for accidents increases considerably. At the present time, it is not legally permissible to require all construction workers and support staff to live at Hale Pohaku; because of the risks, however, it is the policy of the University to encourage acclimatization of all personnel. It is hoped that the provision of adequate housing for construction workers will motivate them to live at Hale Pohaku during the time that they are working on the mountain.
- 2.a Conflict between construction workers and scientists occurs primarily in the early morning hours, when the scientists have just gotten to sleep and the construction workers are leaving for work.
- 2.b. Prior to assessing the sites described in the subject NOP, a number of other potential areas were considered, including an already disturbed area across the Mauna Kea Observatory Access Road from proposed sites I-A and I-B and a site located between the existing Mid-Level Facilities and the Information Station. The site across the road from the developed area was rejected early in the process because it is very visible; in addition, development there would require running utilities across the road.

The site located between the existing Mid-Level Facilities and the Information Station was seriously considered as a location for the construction camp. The area was rejected before the final site selection process for the following reasons:

- One of the major considerations in the design of the Hale Pohaku Mid-Level Facilities was to minimize conflict between daytime sleepers (astronomers and technicians) and other daytime activities that might disturb that sleep. The common area and maintenance areas of the Mid-Level Facilities--which have heavy daytime use--were purposely sited upslope of the sleeping areas to minimize noise and other conflicts. A construction camp located in the middle area would be directly adjacent to and downslope from the astronomy sleeping areas. It was determined that the degree of potential conflict between day sleepers and the daytime schedules of the construction workers would be considerable, particularly in the morning hours when the astronomers have just gotten to sleep and the construction workers are leaving for work.
- Since the Science Reserve Complex Development Plan (SRCDP) was adopted by the UH Board of Regents in 1983, the BLNR has approved CDUAs which will allow infrastructure improvements that will facilitate the development of the telescopes projected in the plan. UH fully expects that, given BLNR approval of future individual telescope applications, a total of 13 telescopes will be located on Mauna Kea around the year 2000 as projected.

The current high level of interest in the site is expected to continue within the scientific community and UH anticipates additional requests from U.S. and foreign institutions to construct and operate telescopes on Mauna Kea into the next century. Because a 5-year lead time is required in telescope development, a decision will be needed in the mid-1990s as to whether to terminate the growth of new astronomical facilities on Mauna Kea by limiting the number of telescopes to the 13 projected in the SRCDP, or to continue to allow additional facilities in accordance with some revised plan. It is premature to anticipate the course of action that will be taken; many factors, including the availability of additional suitable sites and environmental considerations, will enter into the expansion decision.

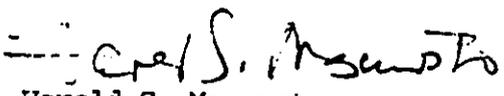
If it is determined--under a mutually revised SRCDP--that additional telescopes (beyond the projected 13) will be allowed to locate on Mauna Kea after the year 2000, then it is reasonable to assume that the Mid-Level Facilities at Hale Pohaku would also need to be expanded at that time. In addition, use of the construction camp would also have to be extended through the duration of the new telescope construction period. If the construction camp were to be sited in the area between the Information Station and the existing dormitories now, this would foreclose the option of expanding the Mid-Level Facilities in the most compact, efficient, and environmentally compatible manner since the entire camp would have to be relocated to make room for the new dormitories required to support the additional telescopes.

The three alternative sites which were evaluated for the construction camp were selected for the following reasons:

- A site just below the Information Station (Area I-A) was selected because it was contiguous to the existing development while still allowing adequate separation between user groups. In addition, the site was relatively flat with clumps of trees that could be used to buffer visual effects of the proposed development.
 - Area I-B, downslope from Area I-A, next to the cinder cone, was selected for evaluation because it was already disturbed.
 - Area II was selected for evaluation because it was contiguous to the existing facility. Unlike the middle site, construction camp buildings in Area II would not be directly adjacent to astronomy dormitories but rather they would be upslope from the common building and maintenance area; the areas that have heavy daytime use. In addition, the vertical distance between the astronomy dormitories and the construction camp would be much greater at Area II than at the middle site.
- 2.c. See response to 2.a.
 3. The reference to cattle will be deleted in the draft EIS.
 4. Portions of the jeep trail may be rerouted; however, access will not be impeded. The contractor will be instructed to keep the access free of any hazardous objects.
 5. There is a rule forbidding pets at the Mid-Level Facilities; this will also be true at the proposed construction camp.
 6. At the present time it is planned that Mauna Kea Support Services (MKSS) will manage the construction camp. MKSS personnel will inform the construction workers of the prohibition against hunting and will also monitor the situation.
 7. An archaeological management plan will be incorporated into the draft EIS.

Your concerns will also be addressed in the draft EIS, we look forward to your review of the document.

Very truly yours,


Harold S. Masumoto
Vice-President

HSM:pz



DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

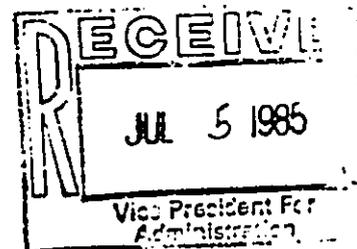
KAMAMALU BUILDING, 250 SOUTH KING ST, HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 • TELEX: 7430250 HDPED

GEORGE R. ARIYOSHI
GOVERNOR
KENT M. KEITH
DIRECTOR
MURRAY E. TOWILL
DEPUTY DIRECTOR
LINDA KAPUNIAI ROSEHILL
DEPUTY DIRECTOR

Ref. No. P-1953

July 2, 1985

DIVISIONS:
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION
ENERGY DIVISION
235 Merchant St. Room 111 Honolulu, Hawaii 96811
FOREIGN-TRADE ZONE DIVISION
LAND USE DIVISION
PLANNING DIVISION
RESEARCH AND ECONOMIC ANALYSIS DIVISION
OFFICES:
ADMINISTRATIVE SERVICES OFFICE
INFORMATION OFFICE



Mr. Harold S. Masumoto
Vice-President for Administration
University of Hawaii
2444 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Masumoto:

Subject: Preparation Notice for a Supplemental EIS on the Proposed
Amendment to the Mauna Kea Science Reserve Complex
Development Plan (SRCDP), Hamakua, Hawaii

We have reviewed the subject document and offer the following
comments.

The proposed activity will be situated in the State forest reserve
which is not in the State's coastal zone management (CZM) area. As long as
the impacts are restricted to the forest reserves, CZM objectives and policies
will not apply.

The preparation notice discusses several siting considerations for
the temporary housing. We note in particular that it does not consider
endangered species and the need to preserve their habitats. The Supplemental
EIS should discuss this and examine appropriate mitigation measures such as
concentrating construction in areas already disturbed, screening areas from
which loud noises are likely to emanate, and considering the unique and
essential biological attributes of a site when assessing its suitability for
the proposed activity.

The EIS should also assess the relationship of the proposed project
to the objectives and policies (Part I) and priority guidelines (Part III) of
the Hawaii State Plan and the State Functional Plans. The assessment should
evaluate the project's relationship to higher education, employment
opportunities, the site's surrounding environment and other relevant impacts.

Mr. Harold S. Masumoto
Page 2
July 2, 1985

Thank you for the opportunity to review and comment on the subject document.

Very truly yours,

Murray E. Towil
Kent M. Keith

cc: Ms. Marilyn C. Metz,
MCM Planning
Office of Environmental Quality Control

UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

Mr. Kent M. Keith, Director
Department of Planning and Economic Development
250 South King Street
Honolulu, HI 96804

Ref. No. P-1953

Dear Mr. Keith:

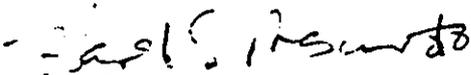
SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the subject notice. In response to your specific comments:

1. Endangered species, in particular the Palila (Loxioides bailleui) will be addressed in the draft EIS. Biological and botanical surveys were conducted at each of the proposed sites in order to assess the impacts of the proposed action at alternative locations. Recommendations emanating from these studies are being used in the site evaluation process.
2. The Mauna Kea Science Reserve Complex Development Plan EIS addressed the policies and plans which you have identified. This analysis will be incorporated into the construction camp EIS by reference.

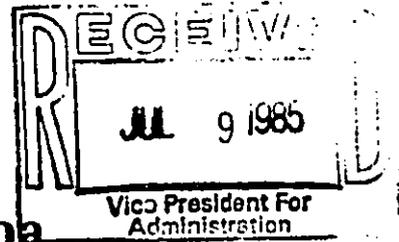
We look forward to your review of the draft EIS.

Very truly yours,



Harold S. Masumoto
Vice-President

HSM:pz



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7381

July 8, 1985

PN:0044

Vice President for Administration
University of Hawaii at Manoa
2444 Dole Street
Honolulu, Hawaii 96822

Attention: Mr. Harold S. Masumoto

Dear Mr. Masumoto:

Supplemental EIS Preparation Notice
Amendment to the
Mauna Kea Science Reserve Complex Development Plan
(Temporary Construction Camp Housing)
Hale Pohaku, Hamakua, Hawaii

In response to your request of June 8, 1985, the Environmental Center has reviewed the above cited document with the assistance of Kenneth Kaneshiro, Entomology; Clifford Smith, Botany; David Welch, Anthropology; and Noreen Tashima, Environmental Center.

We offer the following comments for your consideration in the preparation of the Draft Environmental Impact Statement.

Separation of living quarters (p. 15)

We appreciate the problem of conflicting work/sleep schedules between the construction workers and the astronomers. However, some facilities should lend themselves to sharing to minimize the land area to be disturbed. For example lounge and kitchen facilities might be centrally located, and could be shared. Sleeping areas could be located on either side of the lounge/kitchen area. Consideration of ways to minimize land area disturbance should be discussed in the DEIS.

Impacts to flora and fauna (p. 29)

Our reviewers have pointed out that impacts to the biota are likely to extend beyond the immediate area of construction. These impacts have been observed in the lichen and bryophyte flora to the east of the existing facility during the past three years and are largely the result of people strolling through the area. With the suggested increase in number of construction workers to 140 people at any one time, (not to mention added scientific personnel), it is probable that significant impacts will be experienced in an even broader area. We suggest that the DEIS should include a discussion of the anticipated

AN EQUAL OPPORTUNITY EMPLOYER

recreational "strolling" needs of the personnel (see our comments under "Recreation") as well as the ecological needs of the biota in determining the area to be included in the baseline surveys. The biological surveys should include an additional buffer area, beyond the limits of the designated construction camp housing facility, whose width would be dependent on the sensitivity of the terrain.

Mamane trees and the Palila (p. 29)

We suggest that you consult with the U.S. Fish and Wildlife Service (USFWS) on the matter of disturbance of the Palila and the critical mamane tree habitat. The suggested exclusion of construction during the Palila breeding season (p. 29) seems appropriate. However, "Discouraging the Palila from nesting in the construction area" may be inconsistent with the endangered species act.

The discussion of revegetation and planting of mamane trees should include documentation of the expected success rate as well as assurances that appropriate planting, watering and maintenance care of the seedlings will be provided. It is our understanding that the success rate for older trees is much less than for younger seedlings.

Endangered species (p. 29)

We are pleased to note that rare plants, in addition to endangered species, will be identified and preserved.

Modification of land (p. 29)

Our reviewers have called attention to changes in the drainage patterns and erosion at the present facility. The construction of walkways was a significant improvement in the present system. Potential drainage problems should be carefully addressed in the DEIS.

Historical/Archaeological sites (p. 30)

The proposed archaeological reconnaissance survey by Dr. Patrick McCoy should provide an adequate baseline of information and analysis for the DEIS.

Recreation

The recreational needs of both the construction workers and the scientists should be addressed in the DEIS. A "lounge" may be appropriate for late evening relaxation but facilities for more active recreational needs (ie. hiking, volleyball, baseball, etc.) should be considered. Provision should be made to accommodate these mixed recreational needs to discourage impacts to the fragile ecosystem outside of the designated camp area.

Fire hazard

The DEIS should address the potential fire hazard in the area and fire prevention and control methods both for the structures and the adjacent ecosystem.

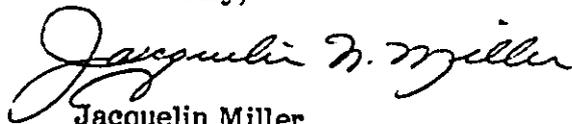
Vice President for Administration

-3-

July 8, 1985

We appreciate the opportunity to comment at the preparation stage and look forward to reviewing the DEIS when it becomes available.

Yours truly,



Jacquelin Miller
Acting Associate Director

cc: OEQC
Marilyn Metz, MCM Planning
Kenneth Kaneshiro
Clifford Smith
David Welch
Noreen Tashima
Patrick Takahashi

UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

Ms. Jacquelin Miller
Acting Associate Director
Environmental Center
University of Hawaii at Manoa
Crawford Hall, Room 317
2550 Campus Road
Honolulu, HI 96822

REF: PN:0044

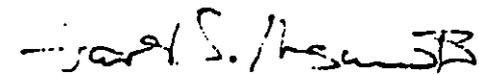
Dear Ms. Miller:

SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the subject notice. Your comments are appreciated and will be considered in the preparation of the draft EIS.

We look forward to your review of the draft EIS.

Very truly yours,



Harold S. Masumoto
Vice-President

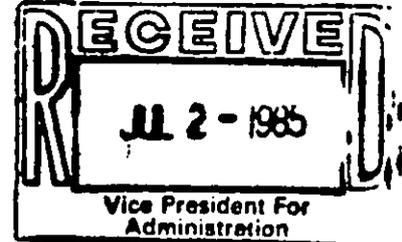
HSM:pz



COUNTY OF
HAWAII

PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 96720
(808) 961-8288



DANTE K. CARPENTER
Mayor

ALBERT LONO LYMAN
Director

ILIMA A. PIANAIA
Deputy Director

June 28, 1985

Vice President for Administration
University of Hawaii at Manoa
2444 Dole Street
Honolulu, HI 96822

Attention: Mr. Harold S. Masumoto

Gentlemen:

Supplemental EIS Preparation Notice
Temporary Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii

We have reviewed the subject preparation notice outlining concerns and aspects of the proposed temporary construction housing which will be addressed in the supplemental EIS.

Of the concerns which have been outlined, in particular the effects of potential grading or excavating of the alternative sites should be discussed in detail. It appears that alternative area 1B lies adjacent to a natural swale and is itself on sloping ground. The discussion should include the potential impacts of erosion due to grading, especially with respect to the alpine environment and the particular soil conditions of the three areas under consideration.

Though we think replanting/planting mamane to regenerate the species is a good idea, we are somewhat skeptical of the effectiveness of using newly planted mamane seedlings as landscaped visual buffers.

We will be providing more comments when the draft supplemental EIS is released.

Should you have any questions, please do not hesitate to contact our office at 961-8288.

Sincerely,

A handwritten signature in black ink, appearing to read "A. Lono Lyman".

ALBERT LONO LYMAN
Planning Director

VKG:lkt
cc: Marilyn C. Metz, MCM Planning

UNIVERSITY OF HAWAII

Vice-President for Administration

July 25, 1985

Mr. Albert Lono Lyman, Director
County of Hawaii
Planning Department
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Lyman:

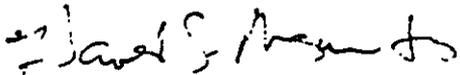
SUBJECT: Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing at
Hale Pohaku, Hamakua, Hawaii - Notice of Preparation
of Supplemental Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the subject notice. In response to your specific comments:

1. The effects of potential grading or excavating, including erosion and drainage, will be addressed in detail in the draft EIS.
2. Existing mamane trees will be the primary visual buffer for the proposed construction camp. Additional mamane will be planted to provide future mitigation of visual effects. In addition, the mamane will be planted to enhance the habitat of the endangered Palila.

We look forward to your review of the draft EIS.

Very truly yours,


Harold S. Masumoto
Vice-President

HSM:pz

UNIVERSITY OF HAWAII

Vice-President for Administration

June 8, 1985

Sierra Club, Hawaii Chapter
P. O. Box 22897
Honolulu, HI 96822

Supplemental Environmental Impact Statement Preparation Notice--Amendment to the Mauna Kea Science Reserve Complex Development Plan: Temporary Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii.

The University of Hawaii is preparing a supplemental environmental impact statement for the subject development. A copy of the environmental assessment and notice of preparation of an environmental impact statement for the project is attached. The proposed action will include:

- o Selection of a site adjacent to the existing Mid-Level Facilities at Hale Pohaku, approximately 4 acres in size, for use as a temporary construction camp to support infrastructure and telescope development activities on Mauna Kea to the year 2000;
- o First phase development of two to three buildings on the selected site to provide accommodations for approximately 25 to 35 workers on the Keck Telescope, including cooking, dining and lounge facilities;
- o Construction of access improvements; parking; drainage improvements; wastewater disposal systems; and water and electrical distribution systems to service the temporary construction camp; and,
- o Selection of a site adjacent to the construction camp site, approximately 1 to 1.4 acres in size, for use as a staging area for equipment and supplies used in construction activities on the mountain.

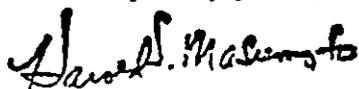
We welcome your comments on the proposed action and any suggestions you may have for additional items to be addressed in the environmental impact statement. Please note that the deadline for comments is July 8, 1985. Comments should be sent to:

Vice-President for Administration
University of Hawaii at Manoa
2444 Dole Street
Honolulu, Hawaii 96822
Attention: Mr. Harold S. Masumoto

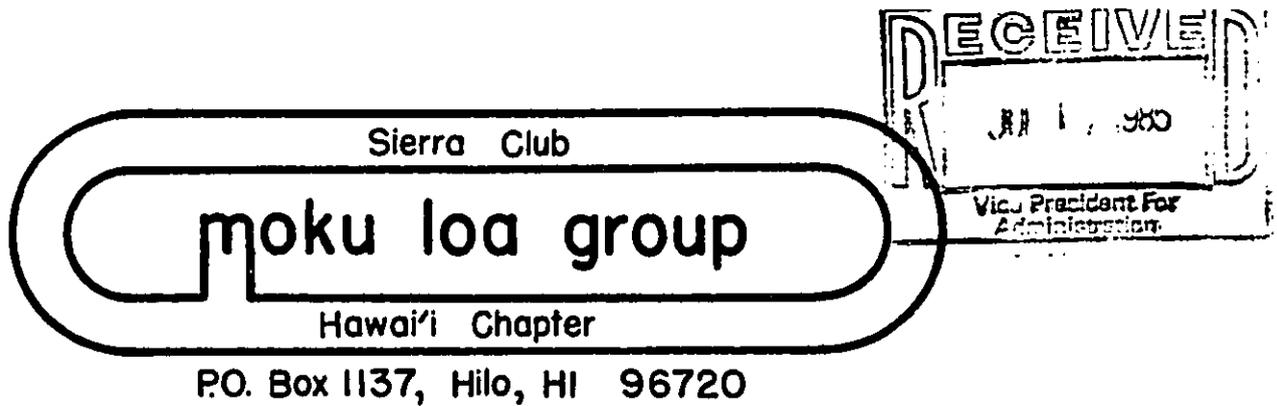
With a copy to the consultant:

MCM Planning
P. O. Box 27506
Honolulu, Hawaii 96827
Attention: Ms. Marilyn C. Metz

Very truly yours,

A handwritten signature in cursive script that reads "Harold S. Masumoto".

Harold S. Masumoto
Vice-President



July 7, 1985

Mr. Harold Masumoto
Vice-Pres. for Admin.
2444 Dole St Honolulu, HI 96822

Sierra Club would like to be a consulted party in the Proposed Amendment To The Mauna Kea Science Reserve Complex Development Plan. Our concerns are the impacts on the Mamane-Naio Forest in the vicinity of Hale Pohaku, the impact on the Palila (Psittirostra bairleui), and the impacts to the archeological history of the area. We understand that there might be some disturbance or destruction of areas that were used as staging areas for the Keanskakoi Adze Quarry Complex.

Please send any correspondence to the Moku Loa Group address listed above (attention : Nelson Ho). Thank you for the opportunity to comment on this assessment.

A handwritten signature in cursive script that reads "Nelson Ho".

Nelson Ho
Conservation Co-Chair
Moku Loa Group

UNIVERSITY OF HAWAII

Vice-President for Administration

July 22, 1985

Sierra Club
Hawaii Chapter
Moku Loa Group
P. O. Box 1137
Hilo, HI 96720

Attn: Nelson Ho

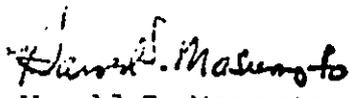
SUBJECT: Notice of Preparation of EIS—Amendment to the
Mauna Kea Science Reserve Complex Development
Plan for Construction Camp Housing at Hale
Pohaku, Hanakua, Hawaii

Dear Mr. Ho:

In reply to your letter of July 7, 1985, a copy of the subject NOP was sent to the Sierra Club at P. O. Box 22897, Honolulu, Hawaii on June 8, 1985 (copy enclosed). It was returned to us with the notation that the P.O. Box had expired. We are sending you a copy of the subject NOP for your use. Because we are planning to file the draft EIS on August 5, 1985, we would appreciate receiving any further written comments from you by July 30, 1985 so that we can publish them in the EIS.

In response to your comments in your letter of July 7, the impacts of the proposed project on the Palila and the archaeological history of the area will be addressed in the draft EIS. Ornithological and archaeological surveys have been conducted in conjunction with the project.

Yours sincerely,


Harold S. Masumoto
Vice-President

HSM:pz

cc: MCM Planning

REFERENCES

- Conant, S. 1980. Recent Records of the 'U'au (Dark-rumped Petrel) and the A'o (Newell's shearwater) in Hawaii. *Elepaio* 41:11-13.
- Dames & Moore. 1982. Geotechnical Evaluation of Telescope Siting Areas, Mauna Kea Science Reserve Area. Draft Environmental Impact Statement for the Mauna Kea Science Reserve Complex Development Plan. Volume II, Appendix E. Honolulu, Hawaii.
- Department of Land and Natural Resources (DLNR). 1977. The Mauna Kea Plan. Honolulu, Hawaii.
- Department of Land and Natural Resources (DLNR). 1980a. Revised Environmental Impact Statement for the Hale Pohaku Mid-Elevation Facilities Master Plan. Honolulu, Hawaii.
- Department of Land and Natural Resources (DLNR). 1980b. Mid-Elevation Facilities Master Plan- Complex Development Report. Honolulu, Hawaii.
- Endangered Species Act of 1973. (U.S.C. 1536) and 1978 Amendments.
- Federal Register. August, 1977.
- Forster, P.J.G. 1983. Work at High Altitude: a Clinical and Physiological Study at the United Kingdom Infrared Telescope, Mauna Kea. Edinburgh: Royal Observatory. (ISBN 0-902553-28-3)
- Price, Saul. Snowfall in Hawaii. *Weatherwise*, December 1962.
- Research Corporation of the University of Hawaii (RCUH). 1983a. The Mauna Kea Science Reserve Complex Development Plan. Honolulu, Hawaii.
- Research Corporation of the University of Hawaii (RCUH). 1983b. Final Environmental Impact Statement for the Mauna Kea Science Reserve Complex Development Plan. Honolulu, Hawaii.
- Scott, J.M., S. Mountainspring, C. Van Riper, C.B. Kepler, J.D. Jacobi, T.A. Burr, and J.G. Giffen. 1984. Annual Variation on the Distribution, Abundance and Habitat Response of the Palila (*Loxioides bailleui*). *Auk* 101:647-664.
- Soil Conservation Service, U.S. Department of Agriculture. 1973. Soil Survey of the Island of Hawaii, State of Hawaii. U.S. Government Printing Office. Washington, D.C.
- U.S. Geological Survey and Hawaii Department of Land and Natural Resources. 1973. Water Resources Summary - Island of Hawaii. DLNR Division of Water and Land Development Report R47. Honolulu, Hawaii.

BOTANICAL SURVEY FOR THE PROPOSED
TEMPORARY CONSTRUCTION CAMP HOUSING AT
HALE POHAKU, MAUNA KEA, ISLAND OF HAWAI'I

by

Winona P. Char

CHAR & ASSOCIATES
Honolulu, Hawai'i

Prepared for

MCM PLANNING

June 1985

BOTANICAL SURVEY FOR THE PROPOSED
TEMPORARY CONSTRUCTION CAMP HOUSING AT
HALE POHAKU, MAUNA KEA, ISLAND OF HAWAI'I

INTRODUCTION

A temporary construction camp is proposed to be located within one of three alternative areas adjacent to the existing Hale Pohaku Mid-Level Facilities, Hamakua, Hawai'i.

A botanical survey of these three areas was conducted on 27 May 1985 to inventory the flora, describe the major vegetation type, search for rare, threatened or endangered plant species, and to identify areas of potential environmental problems or concerns. A team of two botanists was employed to gather the technical data presented in this report.

METHODOLOGY

Prior to undertaking the field survey, a search was made of the pertinent literature to familiarize the investigators with previous studies conducted in the project area.

An intensive walk-through survey method was used. Descriptions of the vegetation present on each of the three sites were made. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium and laboratory. Notes were made on the distribution of species within each of the three sites.

The species recorded are indicative of the season and environmental conditions at the time of the survey. A survey taken at a different season would no doubt yield slight variations in the species list especially of the annual species.

Specimens collected during this survey will be deposited at the University of Hawaii at Manoa Herbarium (HAW).

VEGETATION DESCRIPTION

Some generalized descriptions of the vegetation found on the upper slopes of Mauna Kea are given by Skottsberg (1931), Robyns and Lamb (1939), and Fosberg (1972). Hartt and Neal (1940) provide a rather extensive ecological and floristic account of the vegetation found in the mamane (*Sophora chrysophylla*) parkland.

A few studies (Scowcroft and Giffin 1983, Scowcroft and Sakai 1983) have been done on the effects of browsing pressure by feral herbivores on

mamane regeneration. These studies have included an inventory of the plant species found at several study sites on Mauna Kea. At the Hale Pohaku site, where there is more human activity, the vegetation exhibited less browsing damage by goat and sheep.

Recent studies which have been made adjacent to the proposed construction camp sites include an extensive botanical survey by Gerrish, in June 1979, of the Hale Pohaku Mid-Level Facilities complex and the Hale Pohaku State Park. A total of 32 species of vascular plants were recorded; three of these, Sophora chrysophylla var. circularis, Stenogyne microphylla, and Geranium cuneatum var. hololeucum, are candidate endangered species (U. S. Dept. of the Interior 1980). Botanists with the Endangered Species Program (State Dept. of Land and Natural Resources, Division of Forestry and Wildlife) conducted a survey of the Hale Pohaku area in October 1981.

Vegetation in the area of the three alternative sites consists of scattered clumps of mamane trees with a ground cover of mixed bunchgrass species. Large, bare areas are common. The mamane vary from young plants less than a meter tall to older trees 3 to 6 meters tall. Ground cover is greatest under the older, larger trees. Ripgutgrass (Bromus rigidus), Kentucky bluegrass (Poa pratensis), and the common groundsel (Senecio vulgaris) are usually only found under mamane trees. The native mints (Stenogyne spp.) are restricted to the shady areas under the larger trees. In open areas, ground cover is sparse; sheep sorrel (Rumex acetosella) and the native grasses Deschampsia australis and he'u-pueo (Trisetum glomeratum), as well as the exotic grasses Stipa cernua and two species of Danthonia are the most common components of the ground cover. Widely scattered shrubs of 'aheahea (Chenopodium oahuense), pukiawe (Styphelia tameiameia), and hinahina (Geranium cuneatum var. hololeucum) may sometimes be found.

The amount of plant cover and type of terrain varies among the three areas considered for the temporary construction camp housing.

Area I-A: Area I-A is relatively flat with scattered, large clumps of mamane trees. Mamane cover is roughly 25 to 30%; ground cover varies in places from 40 to 50%. The clumps composed of taller trees, 3 to 6 meters tall, often support a dense tangle of the native mints.

Area I-B: This area is also relatively level but is very sparsely vegetated with no large mamane trees. Two small mamane plants, less than 1 meter tall, were found. Ground cover is roughly 25%, consisting primarily of sheep sorrel and Danthonia spp.

Area II: Area II is located on the steep slopes adjacent to and above the Mid-Level Facilities' maintenance area. Among the three sites, Area II is the most densely vegetated. Many mamane seedlings and saplings were found. Almost all of the large mamane clumps have native mint plants growing up into their branches. A few scattered hinahina shrubs were found only in this area. Several rocky outcrops are scattered throughout the site. These rocky areas support few mamane trees. The ferns Pellaea ternifolia, Asplenium adiantum-nigrum, and Asplenium trichomanes are frequently found

among the rocks. The candidate endangered Silene hawaiiensis, a member of carnation family, can also be found growing in these rocky areas.

RECOMMENDATIONS

Site selection - Either Area I-A or I-B should be selected for the proposed construction camp housing. Both are on relatively flat terrain and have open areas on which buildings could be sited. The proposed housing would have the least biological impact on Area I-B as it is sparsely vegetated, however, the proposed housing would be highly visible. Area I-A has a number of scattered, large clumps of mamane trees among which buildings could be placed to reduce visual impact.

Area II would be the poorest choice as it is located on steep slopes; construction activity and other related disturbances would hasten soil erosion. This site is the most densely vegetated of the three sites and a number of mamane trees would probably have to be removed. Several candidate endangered species (Geranium cuneatum var. hololeucum, Silene hawaiiensis, Stenogyne microphylla, etc.) are also found in Area II.

Impacts and Mitigation Measures - Construction of the temporary housing will generate several impacts on the surrounding vegetation. The most serious of these impacts is loss of vegetation. This will lead to increased soil erosion. It is recommended that the vegetation be disturbed as little as possible during construction. If ground cover is needed for heavily disturbed areas, such as where cesspools or water or electrical lines have been placed, then seeds from grasses in the area can be collected and sown. The elevated walkways between buildings, which will be incorporated into the housing plans, will greatly decrease the impact of trampling on the surrounding vegetation.

Any mamane trees which may have to be removed should be transplanted to another site in the area. If additional mamane or other native species are to be used for landscaping, then plant material, such as seeds or seedlings, must come from the Hale Pohaku area. Only those species already found in the Hale Pohaku area should be used.

The potential for fires increases with human activity in the area, especially during the summer months when the dry vegetation is particularly vulnerable. Each building should have a fire extinguisher and a fire hose cabinet in a prominent and readily accessible location. All personnel who will be using the housing facilities should be familiar with the regulations concerning disturbing the vegetation and fires.

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Alternative sites</u>	
			<u>I-A</u>	<u>I-B</u> <u>II</u>
<u>FERNS</u>				
<u>ASPLENIACEAE</u>				
Asplenium adiantum-nigrum L.	'iwa'iwa	I	-	+
Asplenium trichomanes L.	'owali'i	I	-	+
<u>SINOPTERIDACEAE</u>				
Pellaea ternifolia (Cav.) Link	kalamcho	I	-	+
<u>MONOCOTYLEDONS</u>				
<u>CYPERACEAE</u>				
Carex macloviana D'Urv. var. subfusca (W. Boott) Kuek.	St. Malo's sedge	I	+	-
<u>GRAMINEAE</u>				
Agrostis sandwicensis Hbd.	Hawaiian bent	E	-	+
Anthoxanthum odoratum L.	sweet vernal grass	X	+	+
Bromus rigida Roth	ripgutgrass	X	+	+
Dactylis glomerata L.	orchardgrass	X	+	-
Danthonia semiannularis (Labill.) R. Br.	wallabygrass	X	+	+
Danthonia pilosa R. Br.	hairy oatgrass	X	+	+
Deschampsia australis Nees ex Steud.		E	+	+
Festuca dertonensis (All.) Aschers. & Graebn.		X	-	+
Festuca megalura Nutt.	foxtail fescue	X	+	+
Poa pratensis L.	Kentucky bluegrass	X	+	+
Stipa cernua Stebbins & Love		X	+	+
Trisetum glomeratum (Kunth) Trin.	He'u-pueo, mountain pili	E	+	+

PLANT SPECIES CHECKLIST

Proposed Temporary Construction
Camp Housing, Hale Pohaku, Hawai'i

In the plant species checklist, families are arranged alphabetically within each of three groups: Ferns, Monocotyledons and Dicotyledons. Taxonomy and nomenclature of the ferns follow C. H. Lamoureux's unpublished checklist of Hawaiian ferns; taxonomy and nomenclature of the flowering plants (monocotyledons and dicotyledons) follow St. John (1973) except where more commonly accepted names are listed. Hawaiian names used in the checklist are in accordance with Porter (1972) or St. John (1973).

The following information is given in the checklist:

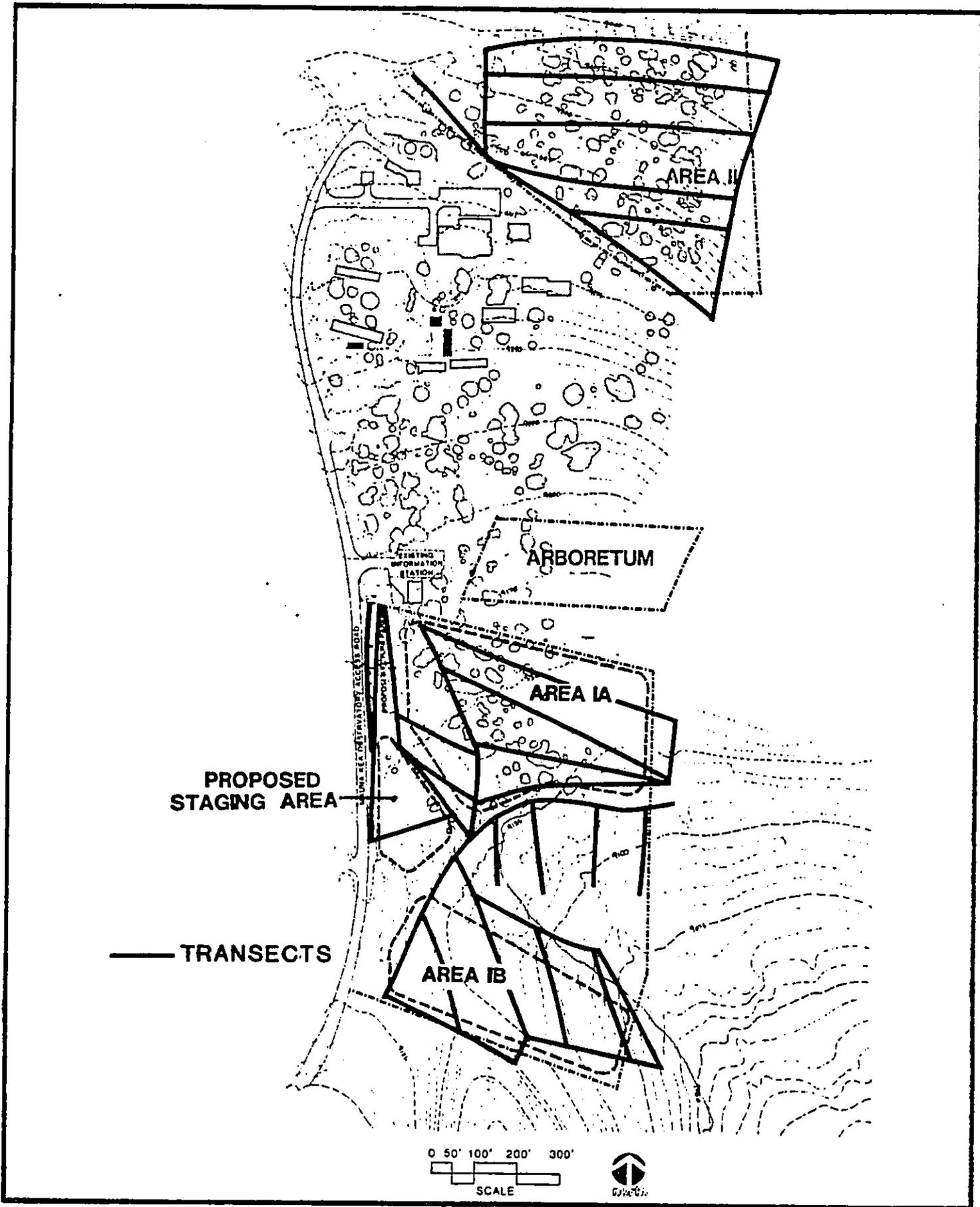
1. Botanical name with author citation
2. Common English or Hawaiian name, when known
3. Biogeographic status of each species. The following symbols are used:
 - E = endemic = native to the Hawaiian Islands only, not occurring naturally elsewhere
 - I = indigenous = native to the Hawaiian Islands and also to one or more other geographic areas
 - X = exotic or introduced = not native to the Hawaiian Islands; brought here by man, accidentally or deliberately after Western contact
4. Presence (+) or absence (-) within each of the three areas being considered as potential locations for the site of the temporary construction camp.

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Alternative sites</u>	
			<u>I-A</u>	<u>I-B II</u>
<u>DICOTYLEDONS</u>				
<u>CARYOPHYLLACEAE</u>				
Polycarpon tetraphyllum (L.) L.	allseed	X	-	+
Silene hawaiiensis Sherff		E	-	+
<u>CHENOPODIACEAE</u>				
Chenopodium oahuense (Meyen) Aellen	'aheahea	E	-	+
<u>COMPOSITAE</u>				
Achillea millefolium L.	common yarrow	X	+	+
Cirsium vulgare (Savi) Tenore	bull thistle	X	+	+
Erigeron canadensis L.	Canada fleabane	X	+	+
Gnaphalium sandwicense Gaud.	'ena'ena	E	+	+
Hypochoeris radicata L.	hairy cats-ear	X	+	+
Senecio vulgaris L.	common groundsel	X	+	+
Sonchus oleraceus L.	sowthistle, pua-lele	X	+	-
<u>CRUCIFERAE</u>				
Lepidium virginicum L.	wild peppergrass	X	+	+
<u>EPACRIDACEAE</u>				
Styphelia tameiameia (Cham.) F. Muell.	pukiawe	I	-	+
<u>GERANIACEAE</u>				
Erodium cicutarium (L.) L'Her ex Ait.	filaree	X	+	+
Geranium cuneatum Hook. var. hololeucum Gray	hinahina	E	-	+

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Alternative sites</u>	
			<u>I-A</u>	<u>I-B II</u>
LABIATAE				
<i>Stenogyne microphylla</i> Benth.		E	+	+
<i>Stenogyne rugosa</i> Benth.	ma'ohi'ohi	E	+	+
LEGUMINOSAE				
<i>Melilotus officinalis</i> (L.) Lam.	yellow sweet clover	X	-	+
<i>Melilotus</i> sp.		X	-	+
<i>Sophora chrysophylla</i> (Salisb.) Seem. subsp. <i>circularis</i> Chock var. <i>circularis</i>	mamane	E	+	+
<i>Sophora chrysophylla</i> (Salisb.) Seem. subsp. <i>glabrata</i> (Gray) Chock var. <i>ovata</i> Chock	mamane	E	+	+
MALVACEAE				
<i>Malva parviflora</i> L.	little mallow	X	+	-
ONAGRACEAE				
<i>Epilobium cinereum</i> A. Rich.	willow herb, pukamole	X	+	-
PAPAVERACEAE				
<i>Eschscholtzia californica</i> Cham.	California poppy	X	+	-
POLYGONACEAE				
<i>Rumex acetosella</i> L.	sheep sorrel	X	+	+
SCROPHULARIACEAE				
<i>Verbascum thapsus</i> L.	common mullein	X	+	+
<i>Verbascum virgatum</i> Stokes ex With.	virgate mullein	X	+	+

LITERATURE CITED

- Fosberg, F. R. 1972. Field Guide to Excursion III, Tenth Pacific Science Congress. Revised Edition, Department of Botany, University of Hawaii, Honolulu. (Original edition published in 1961)
- Gerrish, G. 1979. Botanical survey of principal site (Hale Pohaku) and two alternate sites for the proposed Mauna Kea observatory mid-elevation facility and the Hale Pohaku State Park. Prepared for Group 70, Inc., Honolulu.
- Porter, J. R. 1972. Hawaiian names for vascular plants. College of Tropical Agriculture, Hawaii Agricultural Experiment Station, University of Hawaii, Departmental Paper 1. March 1972.
- Robyns, W. and S. H. Lamb. 1939. Preliminary ecological survey on the island of Hawaii. Bulletin du Jardin Botanique de l'Etat, Bruxelles XV(3): 241-293.
- Scowcroft, P. G. and J. G. Giffin. 1983. Feral herbivores suppress mamane and other browse species on Mauna Kea, Hawaii. Journal of Range Management 36(5): 638-645.
- Scowcroft, P. G. and H. F. Sakai. 1983. Impact of feral herbivores on mamane forests of Mauna Kea, Hawaii: Bark stripping and diameter class structure. Journal of Range Management 36(4): 495-498.
- Skottsberg, C. 1931. Remarks on the flora of the high Hawaiian volcanoes. Acta Horti Gothob. 6: 47-65.
- St. John, H. 1973. List and summary of the flowering plants in the Hawaiian Islands. Pacific Tropical Botanical Garden, Memoir No. 1, Lawai, Kauai, Hawaii.
- U. S. Department of the Interior, Fish and Wildlife Service. 1980. Endangered and threatened wildlife and plants: Review of plant taxa for listing as Endangered or Threatened species. Part IV. Federal Register 45(242): 82480-82569.



Transects: Botanical Survey

Appendix A

AVIAN SURVEY
of the
HALE POHAKU AREA

by

Maile Stemmermann Kjargaard
Volcano, Hawaii

July 1985

ORNITHOLOGICAL SURVEY
Maile Stemmermann

Introduction

Prior to construction of Mid-Level Facilities at Hale Pohaku, Mauna Kea, Hawaii, a preliminary ornithological survey was performed to provide a general overview of the avifauna of the area (Stemmermann, 1979). Recent plans for additional structures in the area have made a more recent and in-depth survey necessary. The following report is the result of two days and one night of field work at Hale Pohaku in May 1985. Avian habitats are described more fully in this report than in the original EIS, and specific recommendations regarding construction camp sites and mitigation measures are provided.

Avian Habitats

Four different avian habitats are found in the Hale Pohaku area. Each of these is characterized by its plant species composition and vegetation structure (e.g., cover values and canopy heights by species). Habitats are described below in order of decreasing quality.

1. Closed Canopy Mamane Forest

Several small patches of this habitat type occur to the west of the present Hale Pohaku Mid-Level Facilities and the Mauna Kea State Park complex. Here, mature, large mamane grows in association with other native plant species. Alien plant species are common, but they are not as abundant as in more open habitats.

Of the four habitat types, this is the rarest in the immediate vicinity of Hale Pohaku; it is also the best bird habitat. Excellent cover, nest sites, and food resources are provided for the native passerine species that frequent the Hale Pohaku area. Fewer non-native bird species are found there than elsewhere in the site.

2. Open Canopy Mamane Forest

This habitat type is the commonest at Hale Pohaku, with most of the mamane forest in the area being of this type. The primary differences between the open and closed mamane forests are the density of the mamane and cover values for both grasses (native and alien) and herbaceous weed species. The frequent open areas with heavy grass cover that occur in this habitat provide favored feeding areas for game birds and non-native passerine species. Both the European Skylark (Alaudia arvensis) and the California Quail (Callipepla californica) use these open areas for breeding (most of Area I-A).

3. Barren and Semi-Barren

These areas are the least used as avian habitats in the Hale Pohaku vicinity. Due to a lack of significant vegetation, these habitats provide almost no cover and are poor sources of food. The two largest barren or near-barren areas are north of the Arboretum, and south of the Information Station (Area

I-B). This habitat is characterized by lack of vegetative cover with the exception of occasional native and alien grasses and weedy plant species such as Mullen.

4. Buildings and Adjacent Areas

Structures and nearby areas are excellent habitats for alien commensal species such as the house finch (Corpodacus mexicanus) and the house sparrow (Passer domesticus). Older buildings at Hale Pohaku are very heavily used by the House Sparrow for nest sites, and both the House Finch and the House Sparrow utilize nearby vegetation for cover and food sources. Alien plants such as the large eucalyptus are particularly favored in this regard. Native bird use of these areas is rare and usually limited to occasional foraging bouts of the Hawai'i 'Amakihi (Hemignathus virens) in blooming mamane.

Annotated Species List

The following checklist was compiled from two days of field work at Hale Pohaku in May 1985. Classification and nomenclature follow the American Ornithologists' Union Checklist of North American Birds (1982)

Phasianidae (Pheasant family):

Callipepla californica. California Quail

Small numbers of this species were found in the Hale Pohaku vicinity. They were particularly common south and east of the state park Information Station and east of the Mid-Level Facilities proper.

Alaudidae (Lark family):

Alaudia arvensis. Eurasian Skylark

This species was absent from the Hale Pohaku site in the 1979 survey, but was found there in moderate numbers in 1985. The skylark was distributed throughout the shady area, but was slightly less common in the immediate vicinity of the Hale Pohaku Mid-Elevation Facilities than elsewhere.

Zosteropidae (White-eye family):

Zosterops japonicus. Japanese White-eye

Present in very low densities in the immediate vicinity of the Hale Pohaku Mid-Level Facilities.

Fringillidae (Finch family):

Subfamily Drepaniinae (Hawaiian Honeycreepers):

Hemignathus virens (Gmelin). 'Amakihi

Very common throughout the area, especially in forested portions of the site removed from human disturbance. Young fledglings were seen, indicating that this species is successfully breeding here.

Himatione sanguinea. 'Apapane

The 'Apapane was much commoner during this survey than in 1979. It was present in moderate numbers in the forested portion of the site east of the Mid-Level Facilities, and in lower densities south and east of the Hale Pohaku State Park Informaton Station.

Subfamily Carduelinae (Cardueline Finches):

Carpodacus mexicanus. House Finch

This species was the commonest bird species in the Hale Pohaku area. It was found in great numbers in flocks of up to 15 individuals in the vicinity of the state park, the eucalyptus trees, and the Hale Pohaku Mid-Level Facilities proper. There is some evidence that this species is using these buildings and the non-native vegetation near them for breeding. Smaller numbers of house finch were found throughout the mamane forest in the remaining portions of the site.

Passeridae (Passerine Finch family):

Passer domesticus. House Sparrow

A relatively small flock of house sparrow is resident near the older buildings in the Hale Pohaku area and is using these sites for breeding. Several active nest sites were present in the other buildings during this survey. Birds were also seen taking water from a dripping faucet nearby. Nest sites and easily accessible water undoubtedly are important for this species as house sparrow were absent from the rest of the study site.

Endangered Species

Two endangered bird species are known to occur on the upper slopes of Mauna Kea (the Dark-rumped Petrel, Pterodroma phaeopygia, and the Palila, Loxioides bailleui). Although neither was detected during the present survey, the latter has been seen at or near Hale Pohaku with some consistency in recent years (Scott et al., 1984).

The Dark-rumped Petrel is an endangered pelagic seabird that breeds on many of the Hawaiian Islands between the months of May and October. Although presently known only from high altitude and/or fairly accessible areas, this species may once have been fairly common throughout the archipelago (Olson and James, 1982). On the island of Hawai'i, Dark-rumped Petrel are known from Mauna Loa and Hualalai in addition to Mauna Kea (Conant, 1980). At present, precise locations of breeding colonies of Dark-rumped Petrel on Hawai'i are unknown. Although detections on Mauna Kea are most common in the Kanakaleonui area, these birds have been found at Puu Kole, below Hale Pohaku (Banko, 1981). Detections from diverse

localities on the Big Island indicate the likelihood of three separate breeding populations. A record of sightings on Mauna Kea of this species from Banko (1981) is presented in Appendix B. The most recent detections of Petrel actually in the Puu Kole area were in 1954.

The Palila is of more direct importance to the Hale Pohaku site than the Petrel as it is seen in the vicinity on a regular basis. The Palila is endemic to the island of Hawai'i, where its range is now limited to mamane forest on the upper slopes of Mauna Kea (Van Riper, 1978, Scott et al., 1984). The primary food source of the Palila is the unique seed of the mamane, although its foraging behavior may be modified when mamane seeds are scarce. As large mamane produce the heaviest seed set, the Palila is apparently limited to habitats with large numbers of tall trees. Thus, this bird is most common from Pu'u La'au southeastward around the mountain towards Pohakuloa Gulch, and from near Hale Pohaku northward to Kanakaleonui and Kahinahina (see maps in Van Riper, 1978, and Scott, et al., 1984). During the non-breeding season, Palila are found over a large portion of Mauna Kea within relatively narrow elevational limits, while during the breeding season the species disperses over a much broader range of elevations, but in fewer locations (particularly in the easternmost part of its range) (Van Riper, 1978).

The patterns of habitat use by the Palila as initially described in Van Riper (1978) have remained consistent in the intervening period of time, in spite of rather large fluctuations in population densities from one year to the next (Scott, 1984). High densities observed in 1981 were likely due to high precipitation and the resultant high mamane seed set the previous year, while low Palila numbers in 1984 were the result of adverse weather conditions.

The critical habitat of the Palila encompasses Hale Pohaku and extends above it to an altitude of 10,000 feet. The demonstrated importance of forests, such as those near Hale Pohaku for feeding and as breeding areas for Palila, must be kept in mind while considering sites for additional development.

The most important negative impacts of further construction on both the Palila and other native bird species stem from direct habitat disturbance during construction. The removal of any mature mamane would be expected to significantly reduce resource availability for both the common nectivorous native birds ('Amakihi and 'Apapane) and the frugivorous Palila. Even if these trees are eventually replaced, flowering and seed set would not return to previous levels for some time since younger mamane are less productive than large mature ones (Van Riper, 1980). Increased human activity may also lead to reduced reproductive success of native bird species. While many of these species appear to be quite tame while feeding (this is particularly so of the Palila), they are often unusually sensitive to perturbations during the breeding season (especially the early portions during nest building and egg laying). Palila raise only one brood of young per year (Van Riper, 1978), and disturbance of breeding birds would be expected to have a far more serious effect on Palila productivity than that of multiple brooded species such as 'Amakiki and 'Apapane.

Recommendations

1. Site of future development. The two sites most suitable for additional construction at Hale Pohaku are the two large areas of barren habitat mentioned above. Utilization of either of these two areas would not require destruction of mamane forest and would thus minimize impacts to native

avifauna. The lower of the two sites (below the Information Station) is preferable, being larger, more disturbed and easier of access.

2. Mitigation of impacts. The primary impacts of construction are habitat destruction or degradation, noise and increased erosion. The recommendations made with respect to the initial construction of the Mid-Level Facilities (PP. C-8 -- C-10, Hale Pohaku Mid-Elevation Facilities EIS, 1979) are still pertinent for the present project. Several recommendations more specific to the proposed construction follow:
 - a. Construction activity and the resultant disturbance (eg., equipment storage and refueling, etc.) should be limited as much as possible to areas that are open and without forest cover. Such activities decrease habitat quality for native bird species through increased disturbance of bird activities, and by disturbance of soil with the resultant invasion of alien weed species.
 - b. Non-native weeds invasion of mamane forest reduces their potential as native bird habitats by crowding out native understory plants and by greatly increasing fire hazards. Spread of such weeds from existing and future areas of development needs to be strictly controlled. One species that has rapidly spread from Hale Pohaku in recent years is Escholtzia californica; it is still controllable.
 - c. Landscaping should be done exclusively with native plants known from the surrounding area. This will reduce the attractiveness of sites to non-native species, and will encourage use by native birds. Mamane is an obvious choice for long term landscaping.
 - d. High densities of non-native birds at Hale Poahku continue to be a problem. Alien birds such as the House Sparrow, House Finch, and Japanese White-eye act to suppress native bird populations by means of competition and disease transmission. Further construction will provide more habitat for these troublesome commensal species. Control of their populations by mist-netting and removal or by other means should be a very high priority. Such control would greatly enhance the qualities of the area for native bird habitat. In addition, nesting activities in new structures should be discouraged, and old nests destroyed. Alien plants heavily used by these species (especially the large eucalyptus) should be removed.
 - e. Unshielded bright lights are known to be particularly attractive to Dark-rumped Petrel fledglings as they embark on their first seaward flights in October and November (Reed, et al., 1985). Accidental mortality of these birds due to groundings, predators and collision with structures has been quite high in some parts of the state. If lights are necessary during construction, adequate shields should be used to prevent this potential problem.
 - f. The potential for erosion of the recommended sites is great due to lack of substantial plant cover, and present drainage patterns. Care should be taken in both the planning and construction phases of the project to reduce this impact. Plantings of native grass, shrub and tree species should be made as soon as possible to provide immediate and long-term mitigation.

Table 1. Numbers of birds observed, May 1985, Hale Pohaku

Bird Species	Locations*					
	A	B	C	D	E	F
Calif. Quail	-	-	1	2	-	-
Eurasian Skylark	1	-	2	3	1	1
Japanese White-eye	-	-	-	-	-	1
'Amakihi	1	1	4	5	3	2
'Apapane	-	-	2	4	-	-
House Finch	12	2	3	8	17	8
House Sparrow	7	-	-	-	-	-

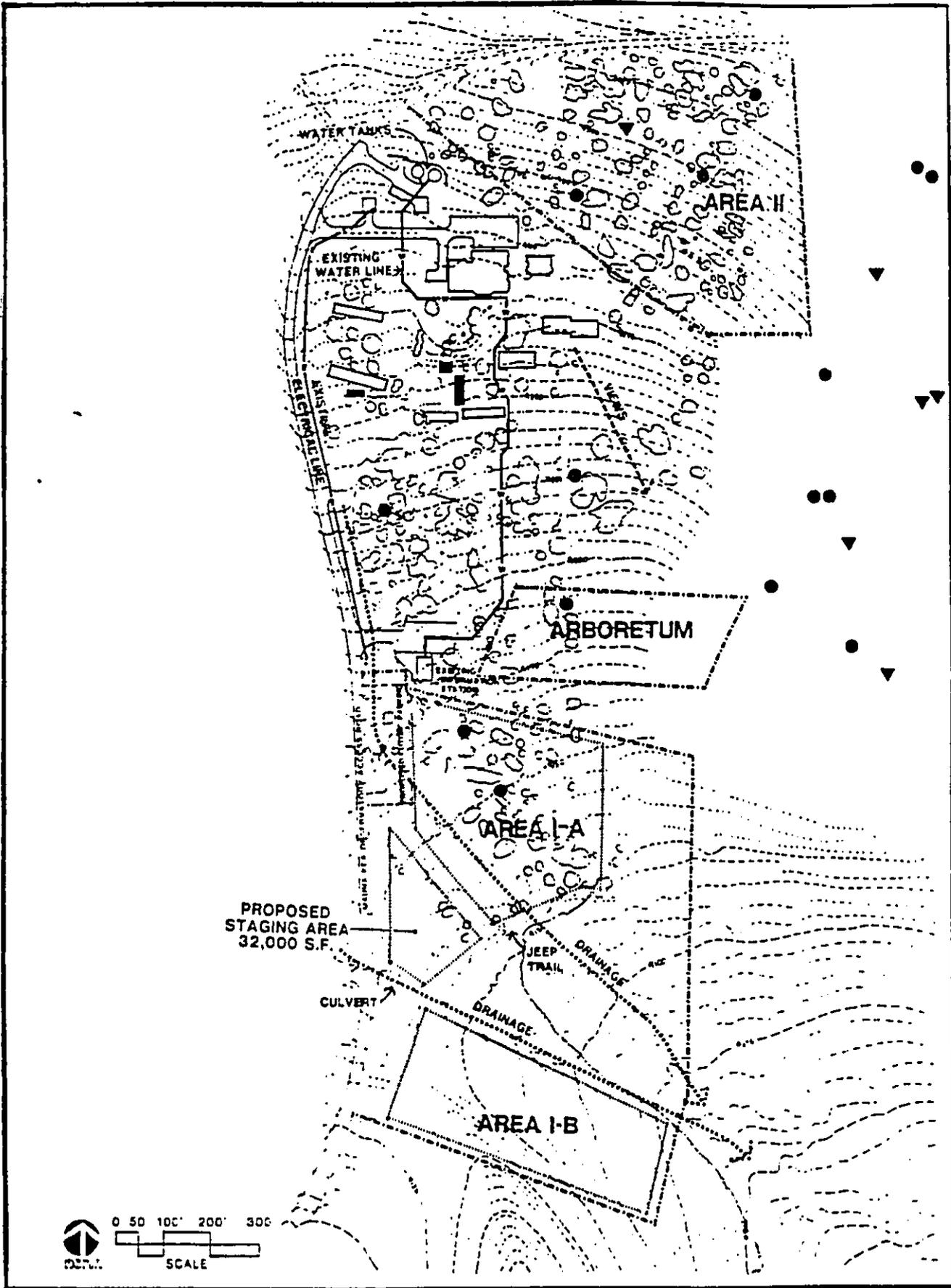
*Locations are as follows

- A. Immediate vicinity of Hale Pohaku Mid-Elevation Facilities and Old Stone Buildings
- B. Area north of Mid-Elevation Facilities to Mauna Kea summit road; also east of this area for 100 meters (Area II)
- C. Forested area parallel to summit road east of area and for 160 meters (0-50 meters south of road) (Area II and eastward)
- D. Forested area east of Facilities
- E. Information Station, open and forested areas south and west of these buildings (Area I-A and Area I-B)
- F. Area between Information Station and Hale Pohaku Mid-Elevation Facilities

*No birds sighted in Area I-B.

References

- American Ornithologists' Union. 1982. Check-list of North American Birds. Supplement to the Auk 99(3), July 1982.
- Banko, W. 1981. C.P.S.U./U.H. Avian History Report. History of Endemic Hawaiian Birds, Part I. Population Histories--Species Accounts. Dark-rumped Petrel.
- Conant, S. 1980. Recent Records of the 'U'au (Dark-rumped Petrel) and the A'o (Newell's Shearwater) in Hawai'i. Elepaio 41:11-13.
- Olson, S. and H.F. James. 1952. Prodrum of the Fossil Avifauna of the Hawaiian Islands. Smithsonian Contributions to Zoology No. 365.
- Reed, J.R., J.L. Sincock, and J.P. Hailman. 1985. Light attraction in endangered procelliform birds: reduction by shielding upward radiation. Auk 102(2): 377-383.
- Scott, J.M., S. Mountainspring, C. Van Riper, C.B. Kepler, J.D. Jacobi, T.A. Burr, and J.G. Giffin. 1984. Annual Variation on the Distribution, Abundance and Habitat Response of the Palila (Loxioides bailleui). Auk 101:647-664.
- Stemmermann, M. 1979. Preliminary Avian Survey of Hale Pohaku and Alternatives sites, Mauna Kea, Hawaii. Appendix C, Mauna Kea Mid-Elevation Facilities Environmental Impact Statement.
- Van Riper, C., J.M. Scott, and D. Woodside. 1978. Distribution and abundance patterns of the Palila on Mauna Kea, Hawaii. Auk 95:518-537.
- Van Riper, C. 1980. The phenology of the dryland forest of Mauna Kea, Hawaii, and the impact of recent environmental perturbations. Biotropica 1037(12):282-291.



Approximate locations of native passerine sightings in the Hale Pohaku area, May, 1985. ● = 'Amakihi, ▼ = 'Apapane.

APPENDIX 1. Palila detections in the Hale Pohaku Area on USFWS Palila Surveys (Scott, et al, 1984, and Jacobi, pers. comm.).

Annual surveys of Palila populations on Mauna Kea have been conducted by USFWS personnel since 1980. These surveys are generally performed during the non-breeding season (January-March) along 17 census transects distributed around Mauna Kea. One of these transects (#109) extends in a north-south direction from near treeline at Hale Pohaku to the lower woodland boundary about 1.5 km away.

Twenty stations placed 150 m apart were the sample points for counting birds on transect 109. Total Palila counts for this transect are as follows: 1980 0 birds, 1981 3 birds, 1982 0 birds, 1983 3 birds, 1984 0 birds, and 1985 0 birds.

The maps below (from Scott, et al, 1984) provide a general picture of Palila densities at Hale Pohaku as they compare with densities on Mauna Kea as a whole for the year 1980 through 1984.

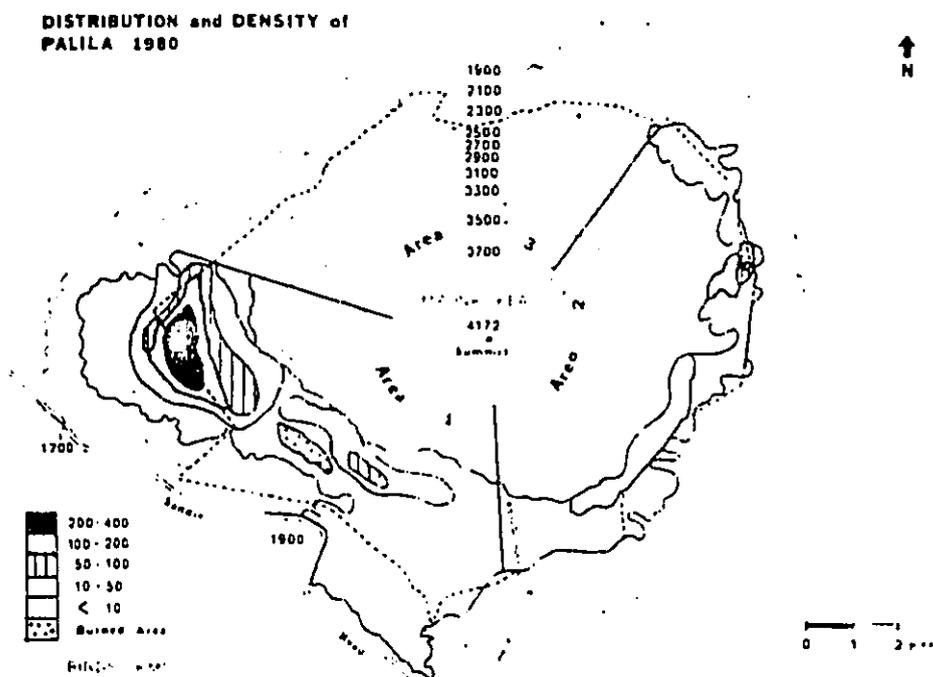


Fig 3 Distribution and abundance of Palila in 1980

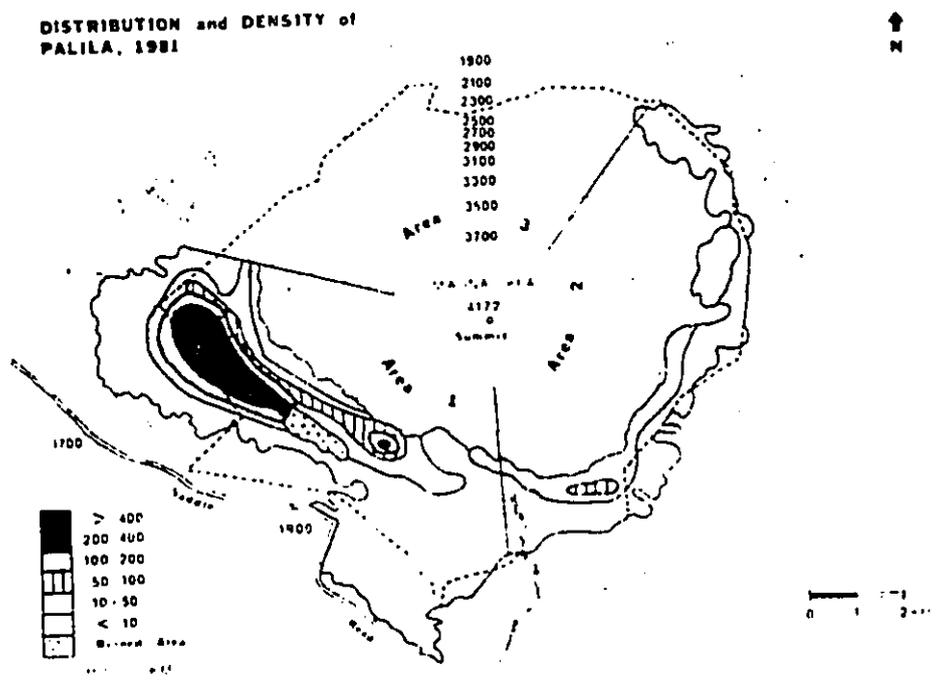


Fig 4 Distribution and abundance of Palila in 1981

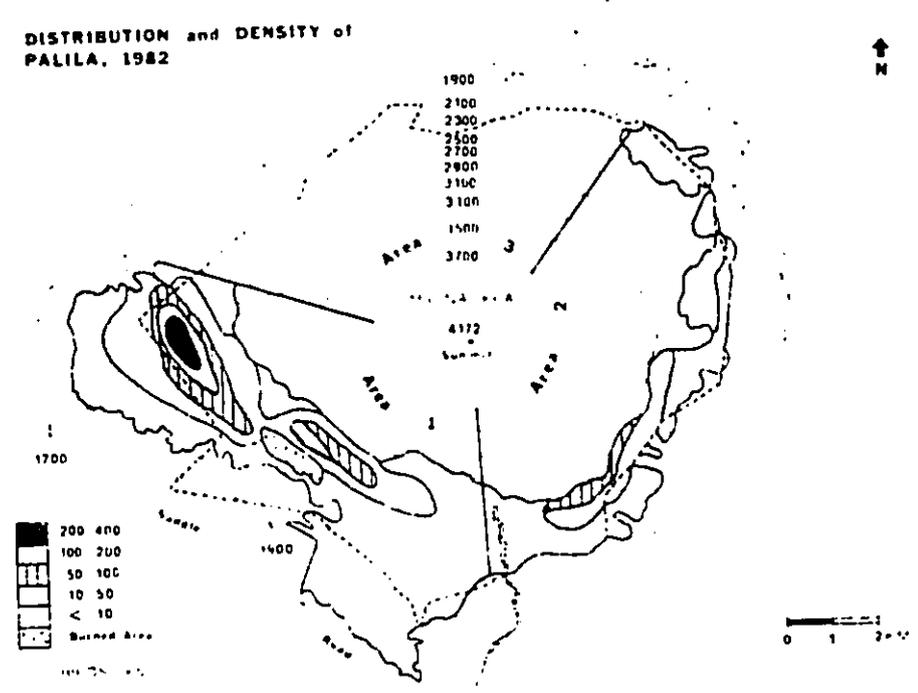


Fig 5 Distribution and abundance of Palila in 1982.

DISTRIBUTION and DENSITY of
PALILA, 1983

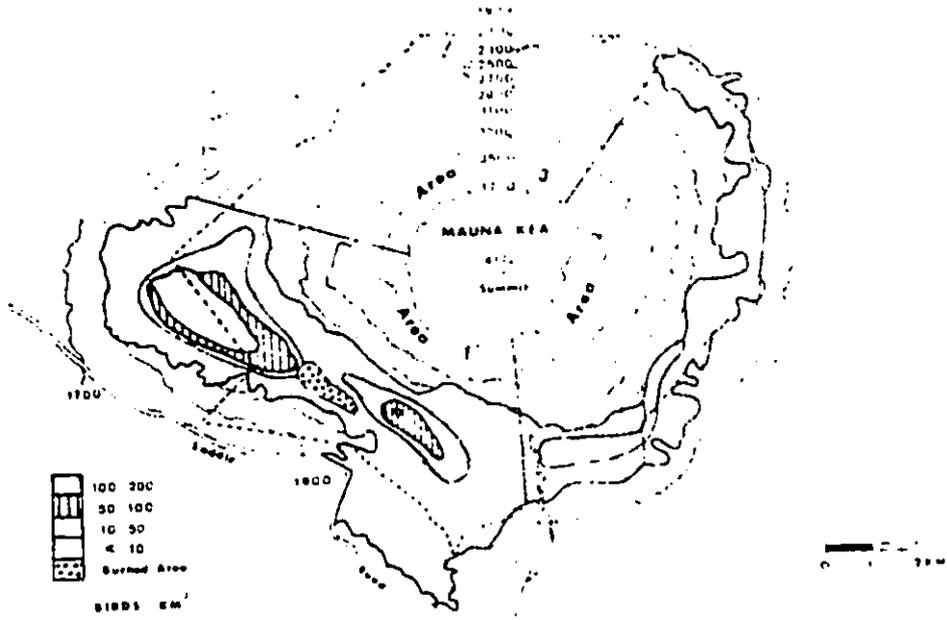


Fig. 6. Distribution and abundance of Palila in 1983

DISTRIBUTION and DENSITY of
PALILA, 1984

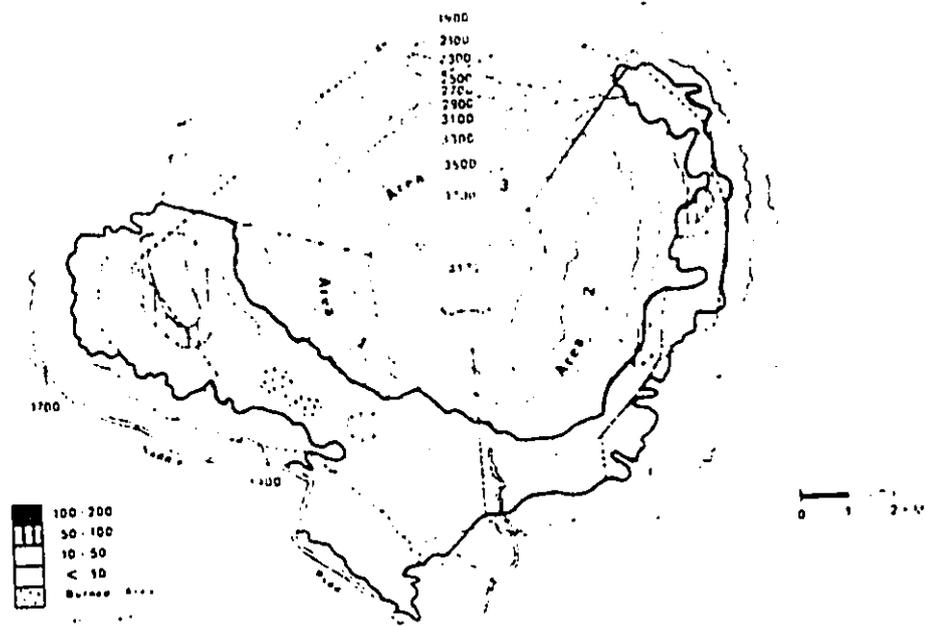


Fig. 7. Distribution and abundance of Palila in 1984

APPENDIX 2. Excerpts from History of Endemic Hawaiian Birds, 'ua'u on Mauna Kea (W. Banko, 1982, pp.36-40)

UMIKOA

Heard uttering its peculiar call from a nearby hill after dark / (Kaluamakani cabin)	7000	July 1962	WALR62
Banko: none heard during 26 5-minute listening periods, 0.5 mile interval stop survey...2000-2400 hours / along State jeep trail on N and W slopes of Mauna Kea, from Puu Kanakaleonui to near Kemole (MAKA-HALAU QUAD.)	ca. 9000	3 May 1968	(1)

AHUMOA

Banko: none heard during 11 5-minute listening periods, 0.5 mile interval stops, 2015-2115 hours / starting at 10,100 ft. el. at end of State jeep trail on W slope of Mauna Kea down to Puu Laau 7900 ft. el.	3 July 1968	(1)
--	-------	-------------	-----

MAUNA KEA

To owners belong sole privilege of capturing 'Ua'u / land of Hamakua (Mauna Kea)	(1875)	LYOC75
Complete dead specimen found / near Kanakaleonui...on the E slope of Mauna Kea	9400	29 April 1954	RICF54
Five fresh burrows found / near Puu Kole...SE slope of Mauna Kea	8800	12 June 1954	RICF54
Fergerstrom obtained remains of three / above 9000 ft. on the E slopes of Mauna Kea (Puu Kole area)	8800	Spring of 1954	RICF54
Feathers and part of beak found / on S slope of Mauna Kea	ca. 10,000	Spring of 1954	RICF54
Many bones found with Hawaiian artifacts / Hopukane Shelter Cave, S side of Mauna Kea	ca. 10,000	(1954)	RICF54
One of featured foods found in middens of early Hawaiians dated tentatively A.D. 1264 to 1657 / adze quarry sites, S slopes Mauna Kea	11,000-12,400	(1975/1976)	MCCP77

Banko: picked up old wing; confirmed as 'Ua'u later by Banks and Laybourne, USNM / State Forestry cabin below Puu Kanakaleonui	9400	29 May 1968	(5)
Banko: none heard during 20 5-minute listening periods, 2015-2300 hours, half-mile interval stops / along State Fish & Game jeep road on E slope Mauna Kea, from near Puu Kole 10 miles to camp at Puu Kanakaleonui	8800 9400	29 May 1968	(1)
Banko: none heard during 17 5-minute listening periods, 2015-2155 hours, 300 ft. el. interval stops / starting at 12,000 ft. el. on summit road down to Hale Pohaku construction camp 9200 ft. el.	2 July 1968	(1)
Banko: Crapo (construction foreman for first Mauna Kea telescope): heard and saw no birds resembling 'Ua'u / Hale Pohaku construction camp and along access road to summit of Mauna Kea	9200- 13,500	April-June 1968 (interview of 2 July 1968)	(1)
Banko: Crapo saw and heard nothing of 'Ua'u since interview of 2 July 1968 / Hale Pohaku to site of observatory construction, summit of Mauna Kea	9200- 13,500	22 Aug. 1969	(1)
Banko: negative results for four 10-minute listening stations, 1945-2044 hours / along jeep trail E flank Mauna Kea beginning at 8800 and ending 9400 ft. el. switchback area above Puu Kole	15 June 1969	(6)
Banko: negative results during three 5-minute night listening periods / site of 'Ua'u burrows located by Fergustrom in 1954, and long State Fish & Game jeep road 0.5 on either side (above Puu Kole)	ca. 8800	22 Aug. 1969	(1)
Banko: Santos brought in old dried-up carcass picked up / black sand flats 0.25 mile S of Kanakaleonui	9400	28 Oct. 1969	(1)
Banko: heard rush of wings and one call of 'Ua'u at 1935; two calls at 1942, several more weak calls at 1950 hours toward Kanakaleonui cone / 500 yards S Kanakaleonui	9400	2 June 1970	(1)

Banko: listened 2003 to 2015 hours hearing one clear 'Ua'u call / 1.25 miles S of Kanakaleonui 9000 2 June 1970 (1)

Banko: heard none in four 10-minute listening periods at 1 mile interval stops, from 2022 to 2130 hours / 2.25, 3.25, 4.24, 5.25 miles S of Kanakaleonui 8900, 8700, 8800, 9100 2 June 1970 (1)

Banko: none heard in four 10-minute listening periods at 0.5 mile interval stops, 1945-2044 hours / N along State Fish & Game jeep road starting W of unnamed volcanic cone N of Puu Kole 8800, 9000, 9300, 9400 15 June 1970 (1)

NAOHUELEELUA

Remains of five found...fragile...skeletons nearly complete...not recent / on floor of lava tube edge of 1859 lava flow, Grid 18-73, Impact Area, Pohakuloa Training Area (U.S. Army) (1976-1977) SHAR77

Leg and sterna bone middens in lava tube apparently used as sleeping cave by early Hawaiians / Grid 16, 17-81, 82, Area 7, P.T.A. (U.S. Army) (1976-1977) SHAR77

PUU OO

Natives report formerly...nested in great numbers / in the lava between Mauna Kea and Mauna Loa (1894-1902) HENH02

APPENDIX C

Ms. 080285

PRELIMINARY ARCHAEOLOGICAL SURVEY
OF THE PU'U KALEPEAMOA SITE, MAUNA KEA, HAWAI'I

by
Patrick C. McCoy

prepared for
MCM Planning

August 1985

Department of Anthropology
Bernice Pauahi Bishop Museum
Honolulu, Hawai'i

Abstract

Five lithic scatters and two shrines recorded in an archaeological survey of a proposed construction camp at Hale Pohaku, on the south flank of Mauna Kea, are interpreted as functionally integrated components of a previously unknown site, that has been given the name of a prominent cinder cone, Pu'u Kalepeamo'a. On present evidence the primary activity at this site was centered on the manufacture of a variety of stone implements (hammerstones and octopus lure sinkers) made of two locally occurring crystalline rocks (dunite and gabbro) procured from the slopes of Pu'u Kalepeamo'a. A brief analysis of the data obtained in this project suggests a possible link between this site and the Mauna Kea Adze Quarry.

ACKNOWLEDGMENTS

The following individuals are sincerely thanked for their participation in the fieldwork: (1) Phase I reconnaissance (July 28-29, 1984)--Dr. Paul Cleghorn, June Cleghorn, Mary Riford, and my wife, Judy McCoy; (2) Phase II reconnaissance (May 15, 1985)--Dr. Alan Haun, Dr. Hiro Kurashina, and Aki Sinoto; 3) Phase III Intensive Survey (June 17, 1985)--Aki Sinoto. The following persons are gratefully acknowledged for their part in the production of the final report: Marc Smith and Aki Sinoto (drafting); Peter Gilpin (photography), and Maureen Liu-Brower (editing).

PRELIMINARY ARCHAEOLOGICAL SURVEY
OF THE PU'U KALEPEAMO A SITE, MAUNA KEA, HAWAI'I

Introduction

This report presents the results of a series of three archaeological surveys undertaken for the Hawaii Institute for Astronomy, which is in the process of selecting an appropriate location for a new construction laborer camp at Hale Pohaku (TMK 4-4-15:01) on the south flank of Mauna Kea, island of Hawai'i (Fig. 1). Two sites, designated Area I and Area II, were surveyed. They are located above and below the Institute's Mid-Level Facility, and encompass a total of c. 40 acres of land on the west and east sides of the Mauna Kea Observatory Access Road between the c. 9,080 and 9,400 ft elevations (Fig. 2).

The Project Area

Environmental Setting

Hale Pohaku is located along the south rift zone of Mauna Kea ("White Mountain"), the highest (13,796 ft) and second largest of five massive shield volcanoes that have coalesced over time to form the island of Hawai'i. The landscape around

RECEIVED AS FOLLOWS

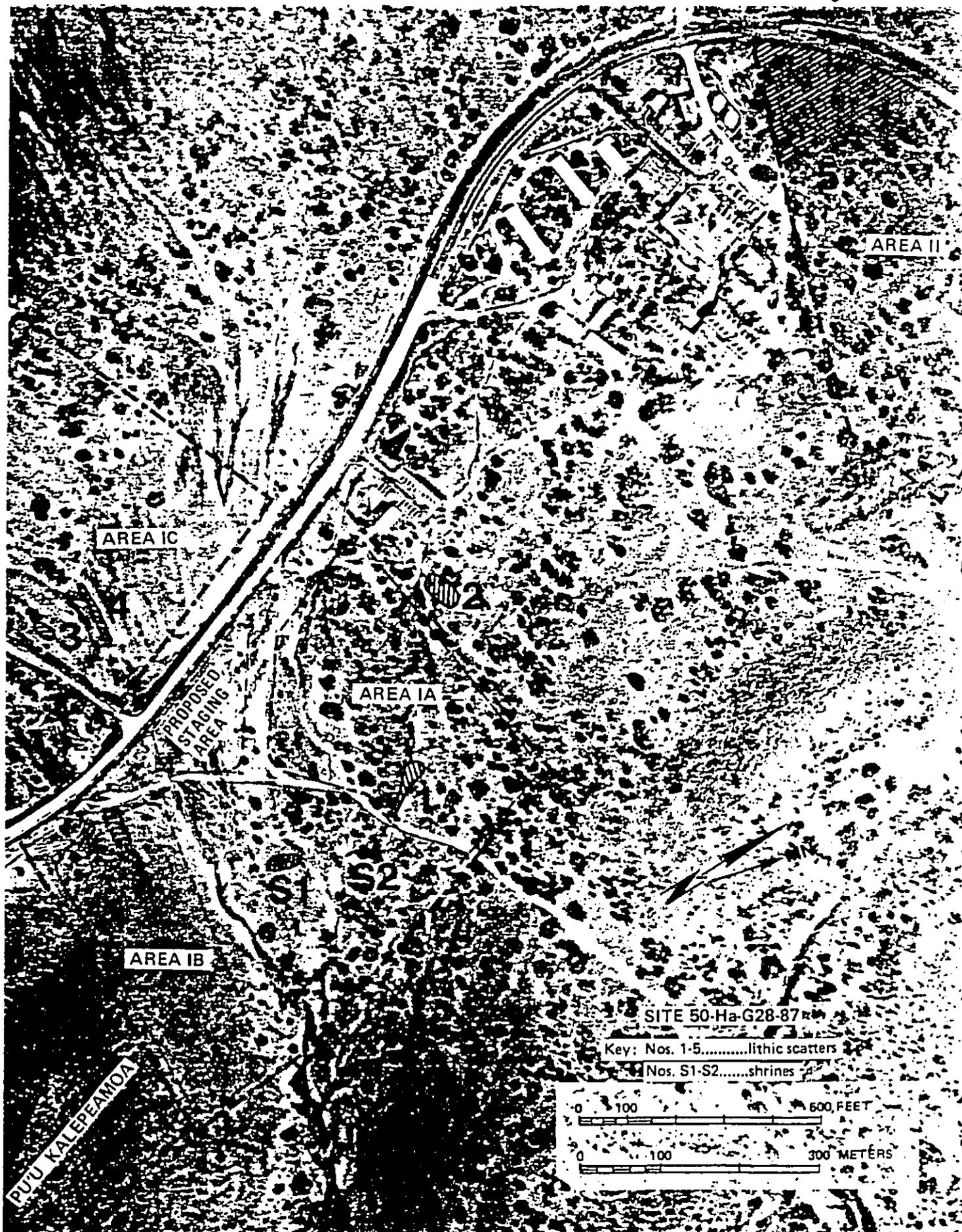


Fig. 2 SURVEY AREAS AND LOCATIONS OF ARCHAEOLOGICAL REMAINS, PU'U KALEPEAMOA SITE (50-Ha-G28-87) [R. M. Towill Corp. Aerial Photograph No. 8299-5, March 26, 1984]

Hale Pohaku is entirely of volcanic origin, lying below the lower altitudinal limits of Pleistocene glaciation that is evidenced in locally unique landforms at higher elevations on the mountain (Porter 1979a, 1979b).

The cinder cones and associated lava flows in the project area and immediately to the west of Hale Pohaku are of uncertain age. On present evidence they are probably less than 40,000 years old, based on petrographic similarities to what Porter (1979a) has termed the Kemolean and Kaulan stages of volcanism. Pu'u Kalepeamo, a large cinder cone through which the modern road passes (Fig. 1), is of particular interest from both a geological and archaeological point of view. This cone contains a large number of "cored bombs" (fragments of older rocks, cf. Stearns 1966:47), many of which are formed of angular mafic blocks with dunite and gabbro inclusions (Porter 1974:244). The minerals (primarily olivine, feldspar and pyroxene) in these rocks have made this a popular collecting locality for local rockhounds (Manhoff and Uyehara 1976:70). Data obtained in this project indicate that Hawaiians were similarly attracted to these same rocks, albeit for different reasons, which are denoted in the descriptions of archaeological remains that follow.

Of the several other cinder cones located in the immediate environs of Hale Pohaku, perhaps the second most important to the present discussion is Pu'u Haiwahine. According to Porter, "Pu'u Haiwahine tephra has been extensively reworked in the vicinity of Hale Pohaku where colluvium thickly mantles the surface and small dunelike bodies of coarse sand have

accumulated near timberline" (Porter 1973:1929; fig. 4). A shallow soil, called "Huikau extremely stony loamy sand" in a U.S.D.A. Soil Conservation Service study, covers much of the project area surface except for the southern and western portions of Area I, which are classified as "cinder land" (U.S.D.A. Soil Conservation Service 1973:Sheet 62; 14, 20).

The climate at Hale Pohaku is relatively dry and cool, with an annual mean rainfall of about 25 inches (State of Hawaii, Department of Land and Natural Resources, Division of Water and Land Development 1970:61), and a temperature range of 30^o to 70^o F. Mist and fog derived from moisture laden convection clouds frequently cover the area in the afternoon. Snow is a rare occurrence at this elevation. Prevailing winds are from the northeast. There are no permanent streams on the south flank of Mauna Kea, and the nearest sources of permanent water to Hale Pohaku are springs and seeps located along Waikahalulu Gulch (Wentworth and Powers 1943).

Hale Pohaku is situated at treeline in an ecotone (a transitional zone between two overlapping vegetation communities). The two communities are a sub-alpine xerophytic scrub and a Sophora chrysophylla (mamane) parkland. The treeless scrub is characterized by a variety of low shrubs: Styphelia tameiameia (pukiawe); Geranium cuneatum (noho-anu); Vaccinium reticulatum ('ohelo); Raillardia ciliolata (na'ena'e), as well as a small fern, Pellaea ternifolia (kalamoho). In addition to the mamane and noho-anu, the parkland community contains Chenopodium oahuense ('aheahea), Coprosma montana (pilo), and a variety of native and exotic grasses and forbs.

Observable differences in the vegetation patterns in the study area (Fig. 2) appear to be related to the two soil substrates, with the loamy sand supporting a more dense and varied flora than the cinder land.

There have been significant changes in the Hale Pohaku landscape and ecology in modern times, including the decimation of the mamane forest and sub-alpine scrub community by feral sheep, goats, and pigs. Both of these vegetation communities are rejuvenating since the forced "removal" of the sheep and goats, though the effects are still evident in patches of dead mamane trees and the gullying that has resulted from the removal of the ground cover.

Cultural-Historical Background

On present evidence the slopes of Mauna Kea, above the limits of inland agriculture, were a vast montane wilderness area known to probably only a small number of Hawaiians engaged in primarily special-purpose activities, such as bird catching, canoe making, stone-tool manufacture, or burial of the dead (McEldowney 1979, 1982). Ethnographic information relating to a specific locality in this and other similarly remote mountainous regions in Hawai'i is either sketchy, or, as is more frequently the case, lacking altogether. The latter presently pertains to the area now called Hale Pohaku, though it is possible that some information may exist in the Boundary Commission testimonies from the latter part of the nineteenth century.

The apparent lack of ethnographic data pertaining to the modern site of Hale Pohaku notwithstanding, some circumstantial

evidence existed prior to the present survey to suggest that some Hawaiians were generally, if not intimately familiar, with this locale prior to European contact in 1778. The earliest known map of this area (Wiltse 1862), though lacking place names for any topographic features or other landmarks near the present site of Hale Pohaku, evinces a general knowledge of the higher elevation hinterlands on Mauna Kea in a number of other named localities. An adze manufacturing site (50-Ha-G28-11) located 3 km to the northwest of Hale Pohaku on Waikahalulu Gulch, the eastern boundary of the Mauna Kea Adze Quarry (McCoy 1977a, 1983), is further testimony to a pre-contact Hawaiian knowledge of this general area.

Of the several known place names in the vicinity of Hale Pohaku, Pu'u Kalepeamoā (lit. "the comb [acquired] by [a] chicken"--Pukui, Elbert, and Mookini 1974:77) is the only one to appear on early government survey maps (Lepe o Moa--Alexander 1892) and in the literature on late nineteenth century expeditions to the summit of Mauna Kea (Ka Lepe a Moa--Preston 1895:596, 601, illustration no. 32). Other local place names, including Pu'u Haiwahine and Kilohana, are probably of more recent origin. The uncertain origins and probable recency of many place names in current use on Mauna Kea also applies to the Mauna Kea-Humuula and Mauna Kea-Umikoa trails to the summit (McEldowney 1982:12-15). The Mauna Kea-Humuula Trail, first plotted by Alexander in 1892, is shown as passing through the project area on two later maps (U.S. Coast and Geodetic Survey 1925-26 and U.S. Geological Survey 1956).

There have been a number of land alterations and other

impacts on the ecosystem in the immediate vicinity of Hale Pohaku during the last 50 years, most of them related to recreational and scientific activities. In 1936 the Civilian Conservation Corps (CCC) made improvements to what is believed to have been a section of the old Mauna Kea-Humuula Trail from near the Humuula Sheep Station at Kalaieha to the summit (Bryan 1939:11). According to Bryan (1939:11), the first stone cabin, from which this locality takes its name (Hale Pohaku--"House of Stone") was built by the CCC about this same time. Prior to the construction of a road above Hookomo (Fig. 1), the cabin at Hale Pohaku provided a convenient overnight rest spot for hikers and ski enthusiasts.

Previous Archaeological Investigations

Prior to this project only one archaeological survey had been undertaken in the Hale Pohaku area. In 1979 the Bishop Museum conducted a one-day reconnaissance for Group 70, Inc., in preparation for the Hale Pohaku Mid-Level Facilities Complex Development Plan. No archaeological remains were found in either of the two areas surveyed, which included the site of the recently completed Mid-Level Facility and a second parcel of land at the 8,000 ft elevation on the east side of the summit road (McCoy 1979).

Summary of Work and Survey Methodology

The first of three phases of work, a reconnaissance of Areas I, IA, IB and IC (Fig. 2), was undertaken on July 28-29, 1984 under contract to the Hawaii Institute for Astronomy. A second

reconnaissance of a new alternative area (II) for the proposed construction camp was conducted on May 15, 1985 for MCM Planning. The final phase of work, also undertaken under contract to MCM Planning, was carried out on June 17, 1985. This final phase involved an intensive survey of a roughly one acre portion of Area IA, which at this stage in the planning process had been selected as the preferred location for the first increment of the proposed housing development.

In the reconnaissance surveys (a level of work aimed at simply establishing the presence/absence of archaeological remains) the focus of attention was on those portions of the landscape (the mamane clumps and rock outcrops) most likely to reveal evidence of archaeological remains. The intensive survey of the one acre parcel in Area IA consisted of a systematic examination of: (1) the eroded surfaces around mamane trees where all of the nonstructural remains recorded in the earlier reconnaissance surveys had been found, and (2) the cut banks of a proximately close erosional gully. No evidence of surface or buried archaeological residues was found, thus leading to the conviction that subsurface testing was unwarranted.

The locations of all findings were initially established on the basis of compass bearings and altimeter readings, and plotted on contour maps prepared for preliminary design work. Due to a variety of problems with these base maps, locations have been plotted on an aerial photograph (Fig. 2) obtained from R. M. Towill Corporation. In addition to the problems with the base maps, a further limitation in the conduct of the fieldwork was the absence of staked or flagged survey area boundaries.

Archaeological visibility over the whole of the project area ranged from excellent in the open areas of stony ground, to fair beneath the mamane trees where the ground surface is partially to completely obscured by humus and understory of forbs and grasses.

Site recording procedures included: (1) the preparation of sketch maps; (2) a description of topographic location, size, form, and contents; and (3) photographic documentation (black-and-white film and color slides). All field records are on file in the Department of Anthropology, Bernice P. Bishop Museum.

The Pu'u Kalepeamo'a Site

An unexpected variety and number of archaeological remains, including five lithic scatters and two shrines, were recorded in the two survey areas. The co-occurrence on the lithic scatters and shrines of the previously described dunite and gabbro cored bombs, as modified artifacts and unmodified manuports respectively, is the basis for interpreting these two different kinds of activity remains as having been functionally integrated components of a single site. On current evidence the primary activity was centered on the exploitation of the cored bombs in the manufacture of a variety of stone implements. The presence of unmodified pieces of the raw material on the shrines is analogous to the manufacturing by-products on a number of shrines in the Mauna Kea Adze Quarry (McCoy 1976, 1977a, 1977b, 1978, 1981) with which this site evinces a possible relationship in terms of other lithic residues. Pu'u Kalepeamo'a, the source of the raw material, is itself an integral part of the site, for

which reason it has been given this Hawaiian name. The Bishop Museum designation for this site is 50-Ha-G28-87.

Non-Structural Remains

Lithic Scatter No.1

This scatter, covering an estimated area of 300 m², is located along a 55 m long and 2 to 6 m wide stretch of a shallow erosional channel on the north side of the jeep road in Area I (Fig. 2). The size and form of this feature are clearly related to the effects of post-abandonment erosion, which on current evidence appears to have displaced an unknown quantity of the smaller-sized residues (flakes) comprising part of a single, small workshop located at the upper elevation extremity of the present scatter area. The locus of this workshop is suggested by an aggregate of some 15 or more dunite/gabbro cored bomb fragments and 4 hammerstones/abraders resting on a surface resembling a desert pavement, and covering an area of roughly 18 m². The latter, which vary between 10 and 15 cm in diameter, include 1 discoidal and 3 angular to slightly spherical forms of a non-locally occurring dense vesicular stone.

Lithic Scatter No. 2

The second lithic scatter, located just outside of the project area between Area I and the Arboretum (Fig. 2), covers an area of ca. 300 m² or more. The primary concentration of material of c. 100 m² is located on a southerly exposed and partially eroded slope at the toe of what appears to be one of the dunelike bodies of reworked Pu'u Haiwahine tephra noted to

occur in this area (Fig. 3). On top of this "dune" is a clump of large mamane trees, beneath which is a fairly substantial deposit of humus and undecomposed leaf litter. The artifact assemblage is comprised of the following categories of materials: (1) some 15 dunite/gabbro cored bomb fragments; (2) at least 5 hammerstones of varied materials and textures, including 1 made from a dunite cored bomb; (3) 4 or more flakes of dark to light grey, fine-to-coarse grained hawaiite. One of the hammerstones exhibits edge battering as well as a series of surface striations, thus indicating a variety of uses that are suggested to have involved the pecking and abrading into final form hammerstones, and possibly other implements made of the dunite/gabbro cored bombs that are not amenable to controlled flaking.

Lithic Scatters No.3 and No.4

Area IC contains the remains of what currently appear to be two spatially discrete lithic scatters covering a total area of roughly 1,225 m² (Fig. 2). Each of these scatters is comprised of primarily small-to medium-sized (<10 cm long) flakes of a dark grey, fine-grained material called hawaiite, the dominant lithology in all of the younger rocks on Mauna Kea (Porter 1979b). Most of these flakes, which probably do not exceed 200 total, appear to be decorticated (i.e., the cortex or exterior weathering rind has been removed). Associated with these flakes are a couple of edge-battered cobbles of a non-vesicular material. At least one of these also exhibits a slightly rounded edge, suggestive of its use as an abrader.



Fig. 3 LITHIC SCATTER NO. 2, PU'U KALEPEAMOA SITE
(50-Ha-628-87), LOOKING NORTH

On current evidence neither of these two flake scatters has any real depth, though some material is probably buried just below present ground surface as the result of post-depositional slopewash. The effects of this process are particularly evident in the larger of the two scatters. This roughly lobate-shape mass of unevenly dispersed flakes evinces a central tendency towards decreasing flake frequency or density with distance from an upslope source that conceivably could have been a single, small workshop.

Lithic Scatter No.5

This scatter, located on the western edge of Area II (Fig. 2), encompasses an area of roughly 2,000 m². The vast majority of the artifactual material, which probably does not exceed 75 to 100 pieces total, is confined to a single concentration at the base of a clump of living and dead mamane trees situated on a slight eminence believed to be another example of the dunelike bodies of reworked Pu'u Haiwahine tephra.

A re-examination of this scatter in the final phase of fieldwork on June 17, 1985 revealed that some of the dead mamane wood had been cut, in addition to a fresh set of vehicle tracks virtually on top of the primary concentration. In view of the potential for further serious damage, some 46 pieces of material, including dunite/gabbro cored bomb fragments,

hammerstones/abraders, flakes, and a possible octopus lure sinker blank made from a block of gabbro, were mapped and collected in an area covering 9 m².

Structural Remains

Situated along the western margin of the aa outcrop terrain in Area I (Fig. 2) are the structural remains of two shrines (kuahu). The diagnostic feature of these and a large number of other structures in the summit region of Mauna Kea that have been labelled shrines (McCoy 1977, 1981, 1982a, 1982b) is the presence of one or more upright stones. Apart from this one shared, quintessential attribute, the shrines on Mauna Kea and elsewhere in the Hawaiian Islands are of highly variable form and structural complexity, as the two recorded in this project illustrate.

Shrine 1

The southernmost structure, designated Shrine 1, is a low, rectangular stone-filled terrace with three and possibly five uprights located on the eastern edge of a rubbly aa outcrop (Fig. 4). The terrace measures 5.5 m long, 1.5 m wide, and 35 to 50 cm in maximum height along the east, downslope wall. All three walls are crudely stacked chunks of aa, one to several courses high. The east wall is partially collapsed, thus explaining the irregular profile in the planview map (Fig. 5). The row of uprights, which define the back side of the shrine,



FIG. 4 SHRINE NO. 1, PU'U KALEPEAMOA SITE
(50-Ha-G28-87), LOOKING NORTHWEST

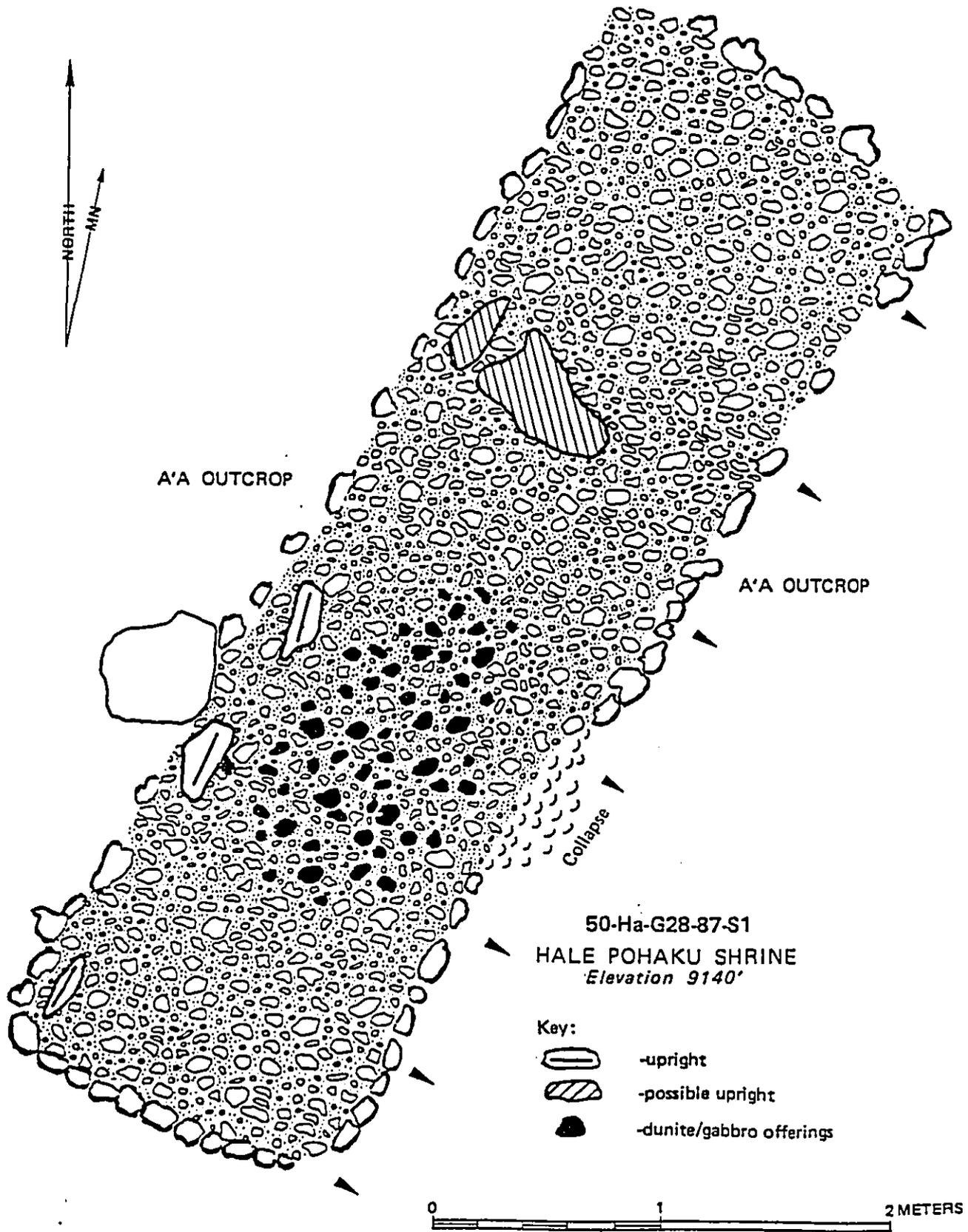


Fig. 5 PLAN OF SHRINE NO. 1, PU'U KALEPEAMO'A SITE (50-Ha-G28-87).

are located on essentially level ground, which is the basis for describing the main structure as a terrace rather than a platform since not all four sides are free-standing walls. There are three standing uprights of similar dimensions projecting 50 cm above ground surface and oriented 21° E of magnetic north, and two other elongated stones that are tentatively regarded as possible uprights. They are all unmodified chunks of aa, like the rest of the structure.

On the surface of the terrace, centered in front of the two central uprights, is a "cache" of some 40 angular to subangular stones in the 5 to 10 cm size range (avg. c. 7 cm), with a distinctively red cortex, except for a few smaller broken pieces revealing the internal crystalline matrix of light and dark minerals. These rocks, subsequently identified as dunite and gabbro, were clearly deposited on the shrine after it was built, thus leading to the conclusion that they are offerings.

Two smaller caches of these same rocks (also interpreted as ritual offerings) were found in close proximity to the shrine on the south, in a similar topographic position on the eastern edge of the same aa outcrop. The first cache, located 4.7 m to the southwest of upright No. 1, consists of two chunks and a number of smaller fragments at the downslope base of a stacked pile of aa rubble, one to two courses high. This feature, which can be described as a cairn, has a basal diameter of 90 cm. The height above the outcrop varies between 35 cm on the upslope side to 80 cm on the lower side. Further to the south, near the southern edge of the aa outcrop and downslope of a solitary mamane tree (Fig. 3), is the second cache, comprised of three stones adjacent to some larger chunks of naturally occurring aa rubble.

Shrine 2

The second shrine, located c. 47 m to the northeast of the first, is similarly located on the eastern edge of an aa outcrop (Fig. 2). A single upright of aa lava, measuring 38 cm high, 35 cm wide, and 17 cm thick, is situated in the approximate center of a small terrace demarcated by the edge of the lava flow and a possible stone alignment on the southwest. A line through the north-south axis of the upright is oriented 8° E of magnetic north. The perpendicular azimuth through the middle of the upright is 78° W of magnetic north, which is aligned with the approximate center of one of the volcanic cone peaks. Five stones of the same type as those described above, including the same colored cortex, are located on the eastern side of the upright on the surface. A few meters northwest is a second possible artificial terrace measuring c. 2 by 2 m.

Discussion

A preliminary interpretation of the data obtained in this project has already been made in terms of the argument that the constellation of dispersed lithic scatters and shrines represent functionally integrated components of a single activity system. In support of this argument, reference has been made to the patterned association of workshops and shrines with comparable material offerings in the Mauna Kea Adze Quarry. It is on the strength of this evidence, denoting ritual as an integral part of the manufacturing process, that the same site definition

criteria and rationale employed in the Mauna Kea Adze Quarry research have been adopted in the definition of the Pu'u Kalepeamoia site.

The Pu'u Kalepeamoia site evinces more than a commonly shared expression of ritual behavior in the organization of work with the Mauna Kea Adze Quarry. A variety of circumstantial evidence exists to suggest a possible direct relationship between these two stone implement production centers. The primary evidence is contained in the lithic scatters and, more particularly, in the material and morphological characteristics of the pecking/abrading tools and flakes. There is no known local source of raw material for either of these two classes of artifacts, thus leading to the conclusion that they were imported. On current evidence the nearest and most likely source of both items was the adze quarry, where there exists in great abundance: (1) in glacial drift deposits small cobbles with the same texture and sub-rounded form as many of the hammerstones/abraders, and (2) in any number of workshops, the small-to-medium-size, decorticated flakes representative of a later stage in the manufacturing process. The presence of several gabbro hammerstone fragments in one of the adze quarry rockshelters suggests the further intriguing possibility that one of the products of the Pu'u Kalepeamoia manufacturing industry was exported for use in the quarry.

There are other reasons for positing a functional link between the two production centers, not the least of which is the strategic location of the Pu'u Kalepeamoia site for providing essential services and goods (e.g., firewood and supplemental

foods such as forest birds) to the adze makers working and living in a nonsubsistence alpine desert environment (McCoy 1985). While there is no direct archaeological evidence for the existence of this conjectured support base, the movement of people back and forth between the two manufacturing centers does provide a reasonable explanation for the occurrence of "exotic" lithic residues at each locality.

Significance Evaluation

The inherent limitations of reconnaissance-level data and the lack of a regional research design notwithstanding (Glasgow 1977; Moratto and Kelly 1978; McCoy 1983), Site 50-Ha-G28-87 is significant for a variety of reasons. It constitutes the first archaeological evidence of Hawaiian exploitation of the subalpine xerophytic scrub/upper montane forest parkland ecotone on the south flank of Mauna Kea, outside of the lower reaches of the Mauna Kea Adze Quarry in the Waikahalulu and Pohakuloa Gulch drainage areas (McCoy 1984). The lithic scatters and associated shrines represent, moreover, a specialized site type previously unreported in the literature on Hawaiian archaeology. This, combined with the possible relationship to the Mauna Kea Adze Quarry, points to a site with exceptional cultural-historical significance.

The Pu'u Kalepeamoia site assumes further importance in terms of the study of culture process. This site, like stone tool quarries in general, represents a clear cut adaptive response to a pervasive environmental selection pressure--the uneven

geographical distribution and oftentimes highly localized occurrence of tool-quality lithic resources.

Site 50-Ha-G28-87 possesses additional significance in terms of its potential to elucidate the organizational dynamics of a particular stone implement production system and the yet poorly known pecking-abrading manufacturing technology on which it was based. The evidence relating to the importation of manufacturing tools and the performance of rituals are relevant in this regard. Both of these behaviors suggest a craft specialist industry exploiting a resource with inferred trade and/or exchange value.

Recommendations

The presence of archaeological remains in both survey areas indicates that implementation of the proposed action to locate a temporary construction camp in either will have a generally adverse effect on the integrity of a site of local and probable national significance. The extent to which earlier man-made land alterations and natural disturbances have adversely affected the condition and integrity of this previously unknown site, with as yet undetermined boundaries, is difficult to objectively measure; but that such deleterious impacts have occurred is abundantly clear. The recommendations that follow are aimed at minimizing continued adverse impacts to ensure the future research and interpretive potential of the Pu'u Kalepeamoia Site. They are based on an assessment of both direct and indirect impacts, and include a discussion of alternative mitigation measures.

A review of the scope of work for the first increment of the proposed housing development denotes the potential for a number of direct adverse impacts over a large area. Excluded are the proposed staging area and parking lot; both areas have been extensively disturbed and are known to be devoid of archaeological remains. The intensive survey of the one acre parcel of land in Area IA, adjacent to the proposed parking lot, demonstrated a similar lack of archaeological evidence on the surface and in the banks of the proximate erosional gully. Apart from these three specific locations, additional field studies should be required for reasons outlined below.

While it is possible to avoid a direct adverse impact on the locations of known archaeological remains, the probability that there exist, in surface and/or buried contexts, residues of similar and/or different activities constitutes one basis for recommending additional fieldwork and analysis prior to the expansion of the housing development. The lithic scatter-mamane tree association or pattern denoted in this project suggests that the forested portions of each area possess the highest probability of revealing additional archaeological evidence, including the suspected remains of a dwelling and cooking area.

The need to house 25 to 35 construction workers in the immediate future, and upwards of 140 at any one time during the next 15 years, suggests the possibility of a significant increase in the potential for indirect adverse impacts on the lithic scatters due to such factors as inadvertent trampling and the seemingly harmless collection of unusual "rocks and minerals" (artifacts) from the ground around the cabins and on

the slopes of Pu'u Kalepeamoā. One means of mitigating these potentially adverse effects is fencing. Though feasible in the case of the small workshops, it is clearly impractical for the source of the raw material (the dunite and gabbro cored bombs) on Pu'u Kalepeamoā. This cinder cone poses the most difficult management problem, especially given the fact that it is a well-known collecting area to local rockhounds. The fencing alternative is not wholly satisfactory in either case for another reason--slopewash and sheet erosion, two on-going natural processes that are continually displacing the artifacts at each workshop locality. The combination of potential and real or existing risk factors favors the collection, analysis, and display of the lithic assemblages, rather than the normally preferred mitigative action of avoidance and preservation in place.

In contrast to the various problems surrounding the preservation and management of the lithic scatters and raw material source, there is little question that the shrines can and should be preserved if for no other reason than the respect they should be rightfully accorded. It is further recommended that they be restored and incorporated into the plans for the Information Station, which provides the ideal setting for exhibits and other public programs relating to the natural and cultural history of Hale Pohaku and the higher elevation areas on Mauna Kea.

For immediate and longer term planning and management purposes the following sequence of specific actions are recommended:

- (1) A determination of eligibility for inclusion of the Pu'u Kalepeamo'a Site on the State and National Registers of Historic Places by the State Historic Preservation Office (SHPO).
- (2) The preparation of a research design and scope of work for an intensive site survey, surface collections, and systematic test excavations in areas that may be subjected to direct and/or indirect adverse impacts in the future expansion of the housing development.
- (3) Implementation of (2) followed by analysis, report preparation, and evaluation of the need for continued excavations and/or post-excavation monitoring.
- (4) The development of a cooperative agreement with clearly defined responsibilities, between the appropriate parties to protect and maintain the site, and to implement a public awareness program on the significance of this site and its effective environment through exhibits.

BIBLIOGRAPHY

- Alexander, W. D.
1892 Map of the Island of Hawaii.
- Bryan, L.W.
1939 Lake Waiiau of Hawaii. Paradise of the Pacific
51(2):10,11.
- Glassow, M.A.
1977 "Issues in Evaluating the Significance of
Archaeological Resources." American Antiquity
42(3):413-20.
- Manhoff, Milton and Mitsuo Uyehara
1976 Rockhounding in Hawaii: Our Rocks, Minerals and
Semiprecious Stones. Honolulu, Hawaii: Hawaiiana
Almanac Publishing Co.
- McCoy, Patrick C.
1976 "The Mauna Kea Adz Quarry Project: A First
Analysis." Proceedings of the First Conference in
Natural Sciences (Hawaii Volcanoes National Park),
pp. 135-142.
- 1977a "Archaeological Investigations at the Mauna Kea
Adz Quarry Complex, Hawaii: Preliminary Results
of the 1975-76 Fieldwork." Paper presented at the
42nd Annual Meeting of the Society for American
Archaeology, New Orleans, Louisiana.
- 1977b "The Mauna Kea Adz Quarry Project: A Summary of
the 1975 Field Investigations." Journal of the
Polynesian Society 86(2):233-244.
- 1978 "The B. P. Bishop Museum Mauna Kea Adz Quarry
Project." Ms. in Dept. Anthropology.
- 1979 Letter report to Mr. Francis Oda, Group 70,
regarding archaeological reconnaissance survey for
the Mauna Kea Mid-Elevation Facilities Master
Plan, Aug. 22, 1979.
- 1981 "Stones for the Gods: Ritualism in the Mauna Kea
Adz Quarry Industry, Hawaii." Paper presented at
the 46th Annual Meeting of the Society for
American Archaeology, San Diego, California.
- 1982a "Archaeological Reconnaissance Survey." IN
Patrick C. McCoy and Holly McEldowney, "Cultural
Resources Reconnaissance of the Mauna Kea Summit
Region." Ms. in Dept. Anthropology, B. P. Bishop
Museum.

- 1982b "Archaeological Survey of the Proposed Site of the Caltech 10-Meter Telescope on Mauna Kea, Hawai'i." Ms. in Dept. Anthropology, B. P. Bishop Museum.
- 1983 "Subsistence in a Non-Subsistence Alpine Desert Environment: The Economic Base of the Mauna Kea Adze Quarry Industry, Hawaii." Paper presented at the 15th Pacific Science Congress, Dunedin, New Zealand.
- 1984 "Archaeological Reconnaissance of Hopukani, Waihu, and Lilo Springs, Mauna Kea, Hawai'i." Ms. in Dept. Anthropology, B. P. Bishop Museum.
- 1985 "Biogeoclimatic Factors of Production in a Hawaiian Alpine Desert Adze Quarry." Paper presented at the 50th Annual Meeting of the Society for American Archaeology, Denver, Colorado.
- McEldowney, Holly
1979 "Archaeological and Historical Literature Search and Research Design, Lava Flow Control Study, Hilo, Hawai'i." Ms. in Dept. Anthropology, B. P. Bishop Museum.
- 1982 "Ethnographic Background of the Mauna Kea Summit Region." IN Patrick C. McCoy and Holly McEldowney, "Cultural Resources Reconnaissance of the Mauna Kea Summit Region." Ms. in Dept. Anthropology, B. P. Bishop Museum.
- Moratto, Michael J., and Roger E. Kelly
1978 "Optimizing Strategies for Evaluating Archaeological Significance." IN Michael B. Schiffer, ed., Advances in Archaeological Method and Theory, pp. 1-30. New York: Academic Press.
- Porter, Stephen C.
1973 "Stratigraphy and Chronology of Late Quaternary Tephra Along the South Rift Zone of Mauna Kea Volcano, Hawaii." Geological Society of America Bulletin 84:1923-1940.
- 1974 Mauna Kea. IN Guidebook to the Hawaiian Planetology Conference, edited by Ronald Greeley, pp. 240-246. Santa Clara. University of Santa Clara Press.
- 1979a "Geologic Map of Mauna Kea Volcano, Hawaii." The Geological Society of America.

- 1979b "Quaternary Stratigraphy and Chronology of Mauna Kea: A 380,000 Year Record of Mid-Pacific Volcanism and Ice-Cap Glaciation." Geological Society of America Bulletin 90(7):980-1093.
- Preston, E. D.
1895 "Determination of latitude, gravity, and the magnetic elements at stations in the Hawaiian Islands, including a result for the mean density of the earth, 19-891, 1892." IN Report of the Superintendent of the United States Coast and Geodetic Survey for the Fiscal Year Ending June 30, 1893, part II. Washington, D. C.: Government Printing Office.
- Pukui, Mary Kawena, Samuel Elbert, and Esther T. Mookini
1974 Place Names of Hawaii. Honolulu. University of Hawaii Press.
- State of Hawaii Department of Land and Natural Resources,
Division of Water and Land Development
1970 "An Inventory of Basic Water Resources Data: Island of Hawaii." Report R34. Honolulu, Hawaii.
- Stearns, Harold T.
1966 Geology of the State of Hawaii. Pacific Books, Palo Alto, California.
- U.S. Coast and Geodetic Survey
1925-26 Lake Waiau Quadrangle map.
- U.S. Dept. Agriculture, Soil Conservation Service
1973 Soil Survey of Island of Hawaii, State of Hawaii. Washington, D.C.: U.S. Government Printing Office.
- U.S. Geological Survey
1956 Mauna Kea Quadrangle map. Washington, D. C.: U.S. Department of the Interior.
- Wentworth, Chester K., and William F. Powers
1943 "Glacial Springs on the Island of Hawaii." Journal of Geology 51(8):542-547.
- Wiltse, C. S.
1862 Humuula, 1862. Register Map 623, Survey Office, State of Hawaii.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

300 ALA MOANA BOULEVARD
P. O. BOX 50167
HONOLULU, HAWAII 96850

IN REPLY REFER TO:

1-2-85-TA-183

JUN 25 1985

Ms. Marilyn C. Metz
MCM Planning
P. O. Box 27506
Honolulu, Hawaii 96827

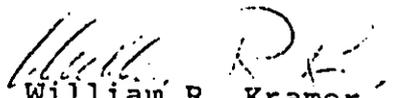
Dear Ms. Metz:

This follows up on our conversation earlier today concerning the new alternatives now being considered for the siting of the temporary construction camp housing proposed to be constructed at Hale Pohaku, Hawaii. On January 29, 1985 we commented to Ms. Ginger Plasch of the University of Hawaii on the possible impacts of siting the construction at Site "F" at Hale Pohaku. A copy of those comments is enclosed. The site now under consideration is designated as Area 1A on page 14 of the June 1985 Amendment to the Mauna Kea Science Reserve Complex Development Plan.

The impacts of the construction at this new alternative site on the endangered Palila and its designated critical habitat would be expected to be essentially identical to those expressed in our January letter; it would not be expected to have any significant impact on the bird or its habitat. Our comments concerning the overall project and recommended conservation measures remain the same as those expressed in that letter.

Thank you for the opportunity to comment on this project. If we can be of further assistance, please contact us again.

Sincerely yours,


William R. Kramer
Deputy Project Leader
Office of Environmental Services

Enclosure



Save Energy and You Serve America!

1-2-85-TA-066

Ms. Ginger Plasch
Assistant to the Director
University of Hawaii Institute for Astronomy
2680 Woodlawn Drive
Honolulu, Hawaii 96822

JAN 29 1985

Dear Ms. Plasch:

This summarizes yesterday's telephone conversation between William Kramer of this office and Ed Yamai of the Institute for Astronomy concerning the construction of temporary living quarters for construction workers at Hale Pohaku on Mauna Kea, Hawaii. Mr. Yamai had visited our office last week, described the proposed project to Mr. Kramer, and provided us with a copy of the site drawing titled Alternative Sites A¹, C, E For Temporary Construction Camp, Mauna Kea, Hawaii. A copy of that site map is enclosed. As the area is within the designated critical habitat for the palila, an endangered species of bird, our comments were requested.

It is our understanding that the specific site under consideration for the construction is indicated as area "F" on the map. This lies directly adjacent to, and slightly uphill from, the existing main Hale Pohaku facility. All work is to be confined within 1/8-mile of the existing main summit access road. As such, work will occur within the corridor referenced in the Mauna Kea Science Reserve Complex Development Plan of January 1983. Construction on that specific parcel (Area F) would not be expected to have a significant impact on the palila or its critical habitat if conservation measures suggested in the Plan are followed. These measures include the recommendation that as few, if any, mamane trees be destroyed. If possible, trees that must be removed should be transplanted to protected areas and cared for until established sufficiently to exist on their own (see pages 151-161, 166, and 173 of the Draft Plan). Disturbed areas should be re-planted with appropriate native species.

Section 7 of the Endangered Species Act directs all federal agencies to formally consult with this Service if any action funded or authorized by that agency may affect a listed species or modify a designated critical habitat. Mr. Yamai stated that the building of the subject housing facility has no such federal funding or authorization. Likewise, the activities in which the workers who will be living in that housing will be involved (the construction of an observatory facility on the summit) have no such federal funding or authorization. If this is not the case,

1-2-85-TA-066

Ms. Ginger Plasch
Assistant to the Director
University of Hawaii Institute for Astronomy
2680 Woodlawn Drive
Honolulu, Hawaii 96822

JAN 29 1985

Dear Ms. Plasch:

This summarizes yesterday's telephone conversation between William Kramer of this office and Ed Yamai of the Institute for Astronomy concerning the construction of temporary living quarters for construction workers at Hale Pohaku on Mauna Kea, Hawaii. Mr. Yamai had visited our office last week, described the proposed project to Mr. Kramer, and provided us with a copy of the site drawing titled Alternative Sites A¹, C, E For Temporary Construction Camp, Mauna Kea, Hawaii. A copy of that site map is enclosed. As the area is within the designated critical habitat for the palila, an endangered species of bird, our comments were requested.

It is our understanding that the specific site under consideration for the construction is indicated as area "F" on the map. This lies directly adjacent to, and slightly uphill from, the existing main Hale Pohaku facility. All work is to be confined within 1/8-mile of the existing main summit access road. As such, work will occur within the corridor referenced in the Mauna Kea Science Reserve Complex Development Plan of January 1983. Construction on that specific parcel (Area F) would not be expected to have a significant impact on the palila or its critical habitat if conservation measures suggested in the Plan are followed. These measures include the recommendation that as few, if any, mamane trees be destroyed. If possible, trees that must be removed should be transplanted to protected areas and cared for until established sufficiently to exist on their own (see pages 151-161, 166, and 173 of the Draft Plan). Disturbed areas should be re-planted with appropriate native species.

Section 7 of the Endangered Species Act directs all federal agencies to formally consult with this Service if any action funded or authorized by that agency may affect a listed species or modify a designated critical habitat. Mr. Yamai stated that the building of the subject housing facility has no such federal funding or authorization. Likewise, the activities in which the workers who will be living in that housing will be involved (the construction of an observatory facility on the summit) have no such federal funding or authorization. If this is not the case,

the federal agency involved should be notified that Section 7 regulations may apply. This letter does not constitute formal consultation nor does it fulfill any federal obligation vis-a-vis Section 7 requirements.

Thank you for the opportunity to comment on this project. If we can be of further assistance, please contact us again.

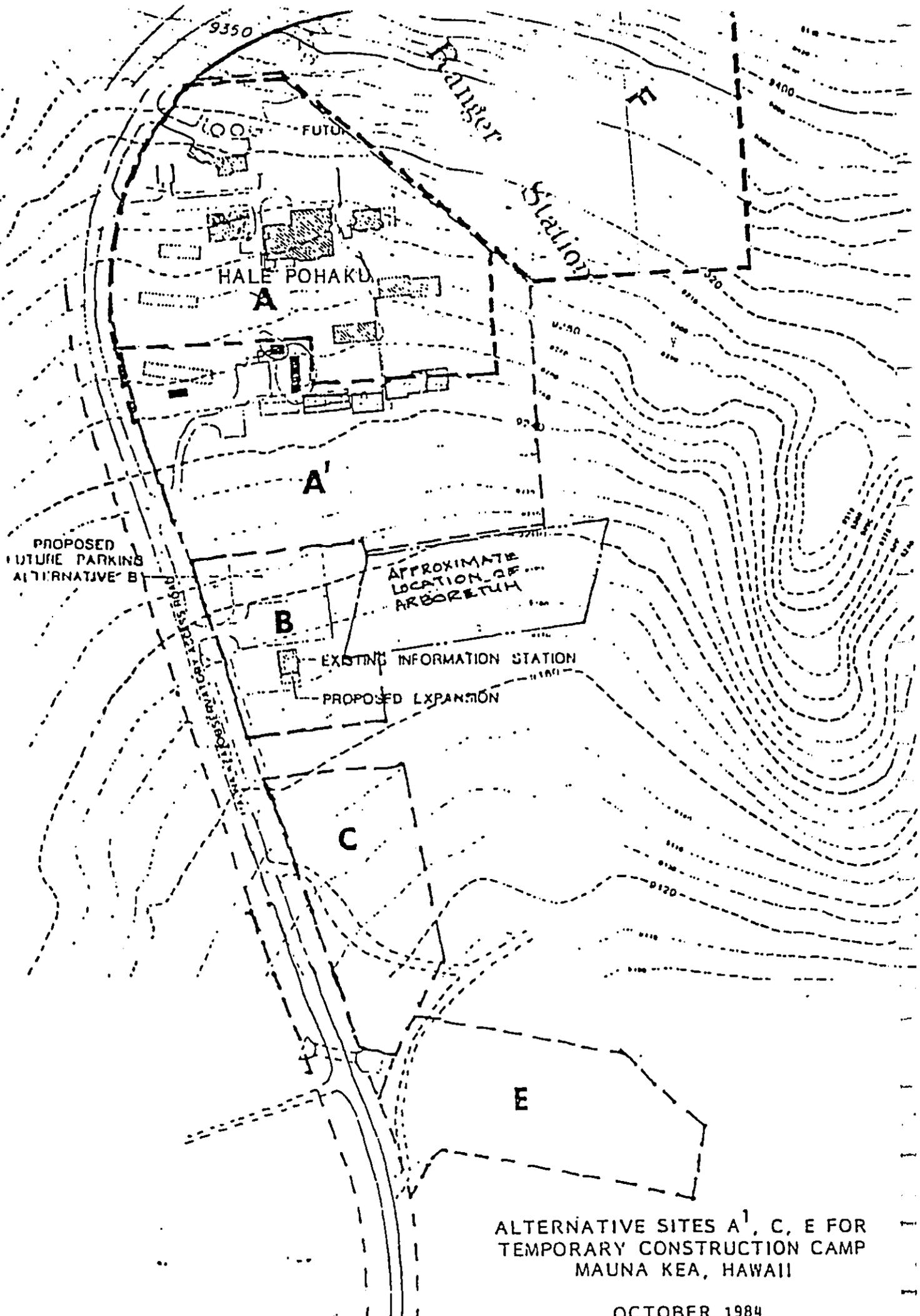
Sincerely yours,

Ernest Kosaka
Project Leader
Office of Environmental Services

Enclosure

WRKramer:wrk:1/29/85

RECEIVED AS FOLLOWS



ALTERNATIVE SITES A¹, C, E FOR
TEMPORARY CONSTRUCTION CAMP
MAUNA KEA, HAWAII

OCTOBER 1984

ES
Room 6307

MAY 3 1982

NK 4/3
CK 4/3
CCE
7/15/82
C. J. Smith
5/1/82

Mr. Nathaniel B. Cohen
Director, Management Support Office
National Aeronautics and Space Administration
Washington, D.C. 20546

Dear Mr. Cohen:

This responds to your April 22, 1982 request for consultation under Section 7 of the Endangered Species Act of 1973, 16 U.S.C. 1531, et seq, on the possible impacts of the most recent plan for construction of the Hale Pohaku Mid-level Facility on Mauna Kea, Hawaii on the palila, an endangered species. The National Aeronautics and Space Administration's (NASA) contribution of funds for the construction and use of the facility requires this consultation.

This letter represents the biological opinion of the U.S. Fish and Wildlife Service in accordance with Section 7, "Interagency Cooperation Regulations" (50 CFR 402, 43 FR 870) on the project as modified by recent changes to building design and positioning.

On April 30, 1982, we completed our review of the information provided by you along with other related information in our files. We also contacted some of those familiar with the biology, management and recovery of the species involved. Copies of pertinent documents and documentation are contained in an administrative record maintained in this office.

Biological Opinion

It is our biological opinion that the recent changes and additions to the original plan (submitted for our review in 1979) will not jeopardize the continued existence of the palila, Psittirostra bairdii, nor would they be expected to destroy or adversely modify Palila Critical Habitat.

The following summarizes some of those factors considered in this determination, and recommends several actions which would help to minimize negative impacts which the project may generate in relation to the listed species.

Project Description and Consultation History

On May 14, 1979, NASA requested formal consultation with this Service in reference to their funding of operation and use (no construction) of a mid-level facility for observatory personnel at the Hale Pohaku area on Mauna Kea, Hawaii. At that time, it was determined that the palila and its designated critical habitat might be affected by NASA's action. After investigation by this Service, a biological opinion was issued on November 12, 1979. It con-

cluded that NASA's participation would not be likely to jeopardize the continued existence of the palila or its critical habitat.

Early in 1981, the University of Hawaii informed us that they would be funding the construction segment of the project. This was to be done with private, not Federal, funds. We advised them on precautions which should be taken in relation to the palila.

During the first months of fiscal year 1982, we learned that two changes had occurred concerning Hale Pohaku. First, several major building plan modifications were incorporated into the total design. The number of structures to be built, their size, and their positioning were changed (a copy of the State of Hawaii's amendment to the original environmental impact statement is enclosed). Secondly, NASA's role in funding had shifted from just support of the use and operation of the facility to funding for construction as well. As the last paragraph of our 1979 opinion states "If site selection or project modifications beyond those submitted to the Service or discussed above occur, reinitiation of consultation may be appropriate", NASA has complied by their reinitiation request.

Species Account

Palila:

This member of the Hawaiian honeycreeper family (Drepanididae) received Federal recognition as an endangered species in 1966. The primary reasons for this status classification were that it no longer occupied a significant portion of its historical range, its present habitat was being adversely modified by feral sheep browsing, and its total population had decreased to the low hundreds. Originally occurring widely over the Island of Hawaii, its present range is believed to be limited to the mamane-naio ecosystem above approximately 6,000 feet on Mauna Kea. Although the details of this decline are not well known, feral sheep browsing on mamane trees is established as the major factor in the birds' decline. Because mamane provides most of the food, nest sites, and shelter for the palila, the implications of the trees' decline can be easily recognized. In response to the circumstances of the birds' decline, a critical habitat was designated for the palila on August 11, 1977.

The nesting season for the palila usually starts in the late spring and lasts from five to six months.

Analysis of Impacts

The possible impact of the construction and use of the Hale Pohaku facility is three-fold. First, the facility (buildings, parking areas, sidewalks, etc.) will be constructed in the designated Palila Critical Habitat and will require the removal of several mamane trees. Secondly, increased noise and other disturbances created during construction and use of the facility may directly disturb area birds. Third, the impact of the project on other factors in the general area may indirectly affect the palila.

As with the original (1979) plan, as few trees as is possible will be removed or transplanted. No significant increase in the number of trees to be removed is expected. Therefore, the impact of tree removal on the birds does not appear to be greater than that addressed in our 1979 opinion.

Of primary importance is that the palila be disturbed as little as possible during the period of active nesting. The University of Hawaii requested our recommendations on this issue, and readily accepted our advice that birds should be discouraged from nest building in trees scheduled for removal or within the area of forecast construction disturbance. Owing to the high elevation of the site (9,000 feet) and inclement winter weather, the desirable construction season and the palila nesting season overlap. Since construction is scheduled to commence during the 1982 nesting season, the University is discouraging nest construction by using facility generators and construction site perimeter roads as much as possible. Palila nesting in the affected area have not been noted in the past, and, hopefully, palila will continue to nest outside of the construction area again this year. Once the construction is completed, disturbances will be greatly lessened.

The third consideration is the effects of the project on the area ecosystem as a whole. There will be increased use of the Hale Pohaku road, expected increases in roadside litter, a greater use of the facility resulting in increased sewage and water demand and general human activity.

All proposed activities will be conducted within 1/8 mile of the existing Hale Pohaku road. Increased use of the road and resulting litter would not be expected to be significant in relation to the palila, its reproduction and recovery. Water will be trucked in, and septic tanks will be designed to accommodate sewage flows. One possibly beneficial effect is that increased activity will discourage sheep from entering the area. As sheep destroy young mamane trees, their absence may result in more mature trees, an improvement of palila habitat.

In consideration of the data available and the proposed scope of the project, it is our biological opinion that your action of funding construction and use of the Hale Pohaku facility will not jeopardize the continued existence of the palila nor will it result in the destruction or adverse modification of Palila Critical Habitat.

Conservation Measures

Section 7 (a) (1) of the Endangered Species Act also requires federal agencies, in consultation with this Service, to utilize their authorities to carry out programs for the conservation of listed species. We believe that you have this opportunity by incorporating the following stipulations and measures in your project considerations. The goal is to allow the proposed project to be completed while assuring as much protection of the palila and its habitat as possible.

1. As few mamane trees as possible are to be removed or transplanted from the project site.

- 2. If possible, mamane and ulei (Osteomeles anthylidifolia) are to be planted to enhance the project site and adjacent areas and also to replace the mamane trees removed or damaged as a result of construction.
- 3. Construction is not to be commenced during the palila breeding season unless birds were discouraged from nesting in the construction area prior to and continuing into the nest site selection, pairing, and breeding/rearing period.

Note: In informal communication with the University of Hawaii, it is our understanding that this is currently being accomplished.

NASA is reminded of its continuing responsibility to review its activities and programs in light of Section 7 and to reinstate this consultation if new information becomes available which identifies that the project may affect species listed or proposed for listing in ways not addressed in this opinion, the action described is modified, or if a new species or new critical habitat area is listed that may be affected by your action.

Sincerely yours,

(sgd) Dale T. Coggeshall
Pacific Islands Administrator

Enclosures:
List of References
Amendment to EIS

cc: Regional Director, FWS, Portland, OR (AFA-SE)

LKRAMER:md:4-29-82

POURI 2C

References

State of Hawaii Department of Land and Natural Resources. The Mauna Kea Plan.
May, 1977.

State of Hawaii Department of Land and Natural Resources. Amendment to the
Hale Pohaku Mid-level Facilities Master Plan Environmental Impact State-
ment. 1982.

U.S. Fish and Wildlife Service. Falila Recovery Plan. 1977. 7

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

APPENDIX E
COMMENTS AND RESPONSES TO THE DRAFT SUPPLEMENTAL EIS

COMMENTS AND RESPONSES ON THE DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

The following agencies, organizations and individuals reviewed and commented on the draft Supplemental Environmental Impact Statement. Those who made substantive comments concerning the proposed action received written responses to their concerns. They are indicated by an asterisk (*) in the following list. All of the letters received or postmarked during the 30-day review period (August 8 to September 7, 1985), together with responses to all substantive comments, are reproduced on the following pages of this Appendix.

Federal Agencies

Department of Agriculture
Institute of Forest Service-Pacific Islands Forestry
Department of the Army
*Army Engineer District
Department of the Interior
Fish and Wildlife Service
Office of Environmental Services
*Mauna Loa Field Station
National Park Service
*Hawaii Volcanoes National Park

State Agencies

Department of Accounting and General Services
Department of Agriculture
Department of Defense
Department of Health
Department of Planning and Economic Development
Department of Transportation
*Office of Environmental Quality Control
University of Hawaii
*Environmental Center
*Water Resources Research Center

County of Hawaii

*County Council
*Fire Department
Parks and Recreation
Planning Department
*Public Works Department
Water Supply Department

Organizations and Individuals

Hawaii Electric Light Company (HELCO)
*Sierra Club, Hawaii Chapter, Moku Loa Group



United States
Department of
Agriculture

Forest
Service

Institute of Pacific Islands Forestry
1151 Punchbowl St., Rm. 323
Honolulu, Hawaii 96813

Reply to: 1950

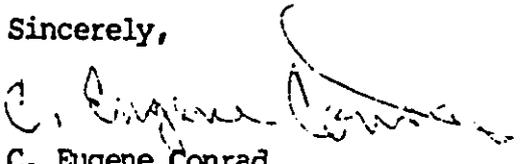
Date: September 9, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Rm 301
Honolulu, HI 96813

Dear Director Uyehara:

We have reviewed the Draft Supplemental EIS - Amendment to the Mauna Kea Science Reserve Complex Development Plan for Hale Pohaku. We do not find concerns beyond those expressed in earlier reviews. We believe impacts from the activities will be sufficiently mitigated if the proposed actions are followed as presented.

Sincerely,


C. Eugene Conrad
Institute Director

cc Mr. Harold S. Masumoto, Vice-President for Administration
Ms. Marilyn C. Metz, MCM Planning





DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858

August 26, 1985

REPLY TO
ATTENTION OF

Mr. Harold S. Masumoto
Vice-President for Administration
University of Hawaii
2444 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Masumoto:

Thank you for the opportunity to review and comment on the Draft Supplemental EIS - Amendment to Mauna Kea Science Reserve Complex Development Plan for Hale Pohaku, Hale Pohaku, Mauna Kea, Hamakua, Hawaii. The following comments are offered:

a. The Department of the Army permit requirements are not applicable.

b. The EIS indicated that an archaeological management plan will be incorporated into the draft EIS. No formal plan is included in the discussions on page 26. Reference is made to recommendations contained in Appendix C without stating that these recommendations will be followed. In addition, we suggest that the boundaries of the site be included.

c. The document states that at sometime in the future it might be advisable to investigate the installation of a field of solar panels to provide hot water for the camp. However, it appears to be equally logical to investigate that possibility now, and include the option of rooftop panels. Orientation of roofs could be planned for optimum solar exposure. Planning for rooftop solar collectors now and including them in project construction would also probably be more cost-effective.

d. Page 20. The EIS notes that pollutants do not cause any particular problem at Hale Pohaku provided that they are generated below the inversion level (ca. 7,000 feet). Discussion should include any pollution problems that will be created by increasing numbers of vehicles and activities at Hale Pohaku, which is located above the inversion level.

28

Copy to be made to

Director / Institute

RECEIVED

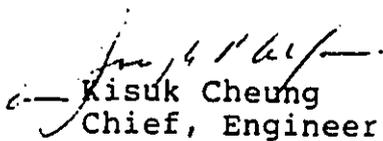
DIRECTOR
INSTITUTE FOR ASTRONOMY

e. Page 21. Drepanididae is a subfamily name and should not be underlined.

f. Pages 24-25. The EIS states on page 24 that the native mints (Stxnogyne spp.) are restricted to shady areas under the larger trees, yet this is where the proposed cabins are to be nestled. Since some of the mint species are candidates for listing as endangered species and since the botanical survey reports the presence of some mints, a discussion is suggested on the impact of the proposed project on the mint species and the effect on the future listings. We suggest other candidate taxa listed on page 20 be included in the environmental impact analysis.

g. Page 32. The "already disturbed" location across the access road was rejected without much explanation. The high visibility of the site implies that there are no mamane or other trees which could be affected there. Lack of trees contributes to the efficiency of solar panels on roof-tops. The site seems to offer less impact on vegetation and avifauna. Furthermore, no explanation is given as to why placing utility trenches across the road would be a significant problem. This "already disturbed" location seems to merit the same degree of evaluation as sites I-A, I-B, and III, and we suggest it be included in Table I (p. 42).

Sincerely,


Kisuk Cheung
Chief, Engineering Division

UNIVERSITY OF HAWAII

Vice-President for Administration

October 3, 1985

Mr. Kisuk Cheung
Chief, Engineering Division
U.S. Army Engineer District, Honolulu
Ft. Shafter, Hawaii 96858

Dear Mr. Cheung:

**SUBJECT: Draft Supplemental Environmental Impact Statement--Amendment
To The Mauna Kea Science Reserve Complex Development Plan
For Construction Camp Housing At Hale Pohaku, Hamakua, Hawaii**

Thank you for reviewing and commenting on the subject draft EIS. In response to your specific concerns:

- a. We note the fact that Department of the Army permit requirements are not applicable.
- b. The intent of the response to the Notice of Preparation of EIS that you refer to was that an archaeological mitigation plan would be recommended. These recommendations were incorporated into the draft EIS in Appendix C. An official formal plan cannot be adopted without the approval of the Historic Sites section of the Department of Land and Natural Resources (DLNR). Discussions will be held with that office.
- c. Rooftop solar panels were considered in the design of the permanent mid-level facilities and rejected in favor of a field of solar panels for two reasons: (1) the reflections from these panels would be visible for many miles on the mountain (the design criteria specify no reflective roofs); and, (2) access to the roof would have been difficult due to the slope of the land. The installation of a field of solar panels was considered during the planning of the proposed construction camp, however, it was felt that it was not warranted at the present time. The option is still open, however, and we will recommend that the design consultant consider installing solar panels in the initial increment of development.
- d. Air quality impacts at Hale Pohaku were addressed in the EIS for the Mauna Kea Science Reserve Complex Development Plan (SRCDP EIS) and were incorporated into this supplemental EIS by reference. It states:

Increased traffic to the area may result in an increase in localized pollutants from vehicle emissions. The prevailing winds will facilitate the dispersal of these pollutants.

Letter to Mr. Kisuk Cheung
October 3, 1985

Page Two

Paving of the parking area and landscaping at the astronomy facility will have a positive long-term impact on the air quality of the area as the improved surface will be less susceptible to erosion by wind than the existing exposed surfaces.

The expanded parking area which was discussed in the SRCDP EIS will now be used by construction workers as well; no additional parking is being added to accommodate construction workers' vehicles. In addition, the unpaved condition of the road from Hale Pohaku to the summit appears to be the major cause of locally generated pollution in the area. DLNR has approved a CDUA which will allow the road to be paved. When this is accomplished this problem will be ameliorated.

e. Your comment that Drepanididae should not be underlined is noted and will be corrected in the Final EIS.

f. Mamane trees in the Hale Pohaku area are freely branching, small trees with multiple trunks. The canopy of branches and leaves is held about 1 to 1.7m above the ground. The native mint species grow directly under the mamane canopy, close to the trunks. The cabins will not be placed under or nestled in among the canopy (a physical impossibility without removing a significant portion of the plant) but rather behind or between the trees, away from the canopy. The impact on plants is expected to be minimal. Impacts on other taxa that you mention are discussed in the botanical report (Appendix A).

g. Visual impact was an important consideration in selecting sites for evaluation. Although, as it turned out, development in Area I-B would also be highly visible, at the time I-B was selected it was thought that the construction camp could be partially hidden by the cinder cone. Subsequent site layouts indicated that this wasn't possible.

One major consideration that led to rejecting the site opposite the existing facilities was the consensus of UH, other State agencies and the County of Hawaii that all development should be confined to a mauka-makai corridor on one side of the road. During the development of the Hale Pohaku Complex Development Plan (DLNR, 1980), a potential site for the permanent mid-level facilities (which was also located across the road) was rejected for the same reason. This rationale will be added to the discussion of the site in the Final EIS.

Utility trenches crossing the road would be longer and more costly to construct and to maintain. Longer water and electrical service line connections would also have to be installed. Refer to our response to Item 3 above for an explanation of why roof-top solar panels are not being planned.

We do not feel that it is appropriate to include the evaluation of the site in Table I because botanical and biological surveys were not conducted for that area.

Letter to Mr. Kisuk Cheung
October 3, 1985

Page Three

We appreciate your careful review of the document and hope that we have adequately addressed your concerns.

Very truly yours,



Harold S. Masumoto
Vice President for Administration

HSM:pz

cc: D. Hall
M. Metz ✓



United States Department of the Interior

FISH AND WILDLIFE SERVICE

300 ALA MOANA BOULEVARD
P. O. BOX 50167
HONOLULU, HAWAII 96850

AUG 9 1985

Ms. Letitia N. Uyehara
Director, Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Re: Draft Supplemental EIS - Amendment to the
Mauna Kea Science Reserve Complex Development
Plan for Hale Pohaku, Hawaii

Dear Ms. Uyehara:

We have reviewed the referenced document and it sufficiently
addresses our concerns. We have no additional comments to offer
at this time.

Sincerely yours,

for: Ernest Kosaka
Project Leader
Office of Environmental Services

cc: H. Masumoto, Vice-President for Administration, UH, Manoa
✓ M. Metz, MCM Planning, Honolulu



Save Energy and You Serve America!



United States Department of the Interior
FISH AND WILDLIFE SERVICE

MAUNA LOA FIELD STATION
P. O. BOX 44
HAWAII NATIONAL PARK, HI 96718

4 September 1985

Ms. Letitia Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

Dear Ms. Uyehara:

SUBJECT: Draft Supplemental Environmental Impact Statement for
Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii -- Amendment
to the Mauna Kea Science Reserve Complex Development Plan

The University of Hawaii has requested my comments on the draft supplemental environmental impact statement (SEIS) noted above because of my past interest in developments on Mauna Kea. Please note that my comments have bearing on the biological issues involved, and do not satisfy legal requirements for consultation with the U. S. Fish and Wildlife Service under the Endangered Species Act.

The plan is to be commended for attempting to minimize environmental impacts to the endangered Palila bird and the mamane-naio ecosystem that comprises its habitat. I believe, however, that insufficient weight is given to the indirect impacts related to worker housing at Hale Pohaku. These concerns were addressed briefly by Mr. Ernest Kosaka of the Honolulu Area Office of the U. S. Fish and Wildlife Service in his response to the Preparation Notice for the SEIS. Mr. Kosaka recommended several measures to abate potential mammalian predator problems. The University of Hawaii stated in reply that at present no visible rats or cats were near the facility, and mentioned an ongoing trapping program. I feel this reply is inadequate for the following reasons:

- (1) As opposed to pet cats, feral cats are very secretive and difficult to observe. The Hale Pohaku facilities have the potential as serving as a source of feral cats (i.e., stray pet cats that manage to survive). I believe that the only way to prevent this problem is to prohibit pet cats at the facility. The observed lack of visible cats at present may merely reflect the lack of expertise of the observer(s).
- (2) As with feral cats, the black and Polynesian rats are also very secretive and difficult to observe. Without a professional trapping program by trained mammalogists, the observed lack of visible rats at present may merely reflect the inexperience of the observer. As details are lacking as to the sort of trapping recently conducted at the Mid-Level Facility, I can't comment on what the probabilities of detecting existing rat (or feral cat) populations are. Trapping is a sufficiently general term to include setting snap-traps in kitchen areas (an ineffective

technique); most trapping programs to control rats or feral cats need to be continual (not "recently completed"). In response to the comment in the SEIS that the trapping program "will be repeated whenever the problem reoccurs," I would seriously question how the recurrence of the problem is determined in the absence of any sort of trapping program to monitor problems that are difficult to observe.

An ornithological survey is also included in the SEIS. This survey was conducted over two days and one night in May 1985. Based on USFWS studies of Palila in this area, this is an inadequate amount of effort to determine the use of the area by Palila. Not surprisingly, the survey revealed no Palila in the area, probably because of the low densities that Palila often occur at, as well as the Palila's habit of seasonal movements that would have been unnoticed during a one-point survey. Although Mr. Kosaka pointed out that I could be contacted for data on the occurrence of Palila in this area, I was not. The effort to survey for Dark-rumped Petrels (one night) was totally inadequate, and the question of what populations may occur in the area is best considered unattempted. The SEIS ornithological survey also inaccurately and misleadingly portrays the records of Dark-rumped Petrels on Mauna Kea. Richardson and Woodside (1954, "Rediscovery of the nesting of the Dark-rumped Petrel in the Hawaiian Islands," *Condor* 56: 323-327) reported finding five fresh petrel nest burrows at 8800' on Puu Kole. The SEIS ornithological survey cites Banko's avian history report which includes this very record, but no mention is made of the Puu Kole records, raising the possibility that these records were deliberately overlooked. The Puu Kole records are very significant, because Puu Kole is sufficiently near Hale Pohaku that feral cats derived from upgrading the Hale Pohaku facility (in the absence of a well-designed control program) could easily wander to Puu Kole; the petrel is very susceptible to predation by cats and mongooses. In fact, Richardson and Woodside mention several petrels that had been killed by cats on the south and east slopes of Mauna Kea in the general vicinity of the proposed development. In conclusion, far more importance is due the feral cat and rat problems attendant to facility development than the superficial replies and inquiries that have so far been made.

If petrels do occur in the Hale Pohaku area, then an additional issue should be considered: light pollution. As well documented on Kauai, seabirds such as the petrel are attracted at night to bright outdoor lights under certain circumstances, resulting in injury, disorientation, and greater vulnerability to feral cats and mongooses. The solution would be to shield upward-directed lights.

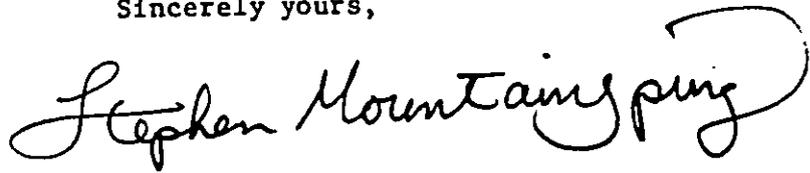
The ornithological survey mentions that a small flock of House Sparrows occurs in the area. House Sparrows commonly follow facility development, but are a potential source of another problem that may severely impact Palila: avian disease. Efforts should be made to exterminate the local House Sparrow population, which may harbor avian malaria and avian pox, both of which are probably fatal to Palila. Transmission of avian malaria would require the presence of a vector, usually a mosquito. Although Hale Pohaku is too high for mosquitoes to establish a breeding population, transport of construction materials from Hilo may make the vector present on an occasional basis sufficient to

infect Palila.

On a more general level, continual development of Hale Pohaku has been an ongoing phenomenon for nearly the past twenty years. I feel there is a need for planned long-term development here, i.e., when will it all stop? This question would seem to be a suitable area of discussion in the SEIS.

Thank you for the opportunity for commenting on the SEIS. I hope these comments are of use in designing an environmentally sound plan for developing the Mid-level Facility.

Sincerely yours,

A handwritten signature in cursive script that reads "Stephen Mountainspring". The signature is written in black ink and is positioned above the typed name.

Stephen Mountainspring
Wildlife Biologist

cc H. S. Masumoto
M. C. Metz
E. Kosaka
C. B. Kepler
D. D. Taylor

UNIVERSITY OF HAWAII

Vice-President for Administration

October 3, 1985

U.S. Department of the Interior
Fish and Wildlife Service
Mauna Loa Field Station
P.O. Box 44
Hawaii Volcanoes National Park, Hawaii 96718
Att: Mr. Steve Mountainspring

SUBJECT: Draft Supplemental Environmental Impact Statement--Amendment
To The Mauna Kea Science Reserve Complex Development Plan
For Construction Camp Housing At Hale Pohaku, Hamakua, Hawaii

Thank you for reviewing and commenting on the subject draft EIS. In response to your specific concerns:

Predator Control

No pets are allowed at Hale Pohaku; this is a condition of the CDUA for the area and it is strictly enforced. Mauna Kea Support Services (MKSS) personnel are working with the State Department of Land and Natural Resources, Forestry Division, and the State Department of Health, Vector Control, to control the population of feral cats and other predators and pests which are observed from time to time at Hale Pohaku. This is an on-going program. No rats have been observed in the area recently; mice are present, however. If you would like further information about the predator and pest prevention and control measures that are being undertaken at Hale Pohaku, or if you have any suggestions that we could adopt that would improve our current program, please feel free to call Mr. Tom Krieger at MKSS headquarters in Hilo (935-3371).

Ornithological Survey

The ornithological report was primarily intended as an update of previous surveys of the Hale Pohaku area. Its limited scope was supplemented by U.S. FWS data on Palila densities at Hale Pohaku and on the nearby census transects. (See Appendix 1 of the ornithological survey and accompanying maps). Mr. Jim Jacobi of the U.S. Fish and Wildlife Service Mauna Loa Field Station was consulted in regard to these data as you were unavailable at the time.

Letter to Mr. Steve Mountainspring
October 3, 1985

Page Two

Petrel sightings at Puu Kole were not cited in the avian survey report because of lack of recent detections there. Both Banko and the present investigator failed to find the species either at Puu Kole or Hale Pohaku. The Richardson and Woodside sightings were 31 years ago, in 1954. Records of 'Ua'u sightings for Mauna Kea from Banko's 1981 report will be presented in full in Appendix B of the Final EIS.

Questions about light pollution, alien bird species control, and avian disease are discussed on page 5 of the ornithological report (Appendix B). Only downward directed low pressure sodium lights are used at Hale Pohaku. Light pollution is also of great concern to the scientists using the telescopes at the summit of Mauna Kea.

Development at Hale Pohaku

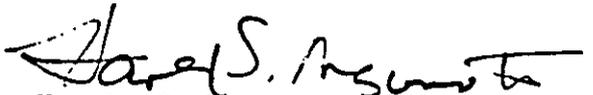
The Mauna Kea Science Reserve Complex Development Plan (SRCDP), which was approved by the UH Board Regents in 1983, projected that a total of 13 telescopes would be operational on Mauna Kea by the year 2000. The plan also addressed expansion of Hale Pohaku to accommodate the scientists who would be working at these telescopes. At the time the SRCDP was prepared, it was recognized that construction workers would also require housing at Hale Pohaku during the time that they were working at the summit. (The economic impact study which was prepared for the SRCDP EIS projected the total number of these workers that would be required for the planned developments.) It was not anticipated, however, that this type of housing would be required for more than one telescope construction crew at a time.

Based on interest shown by potential telescope projects in the past two years, there is a strong probability that, in the near future, there may be parallel or overlapping construction of a number of major telescopes on Mauna Kea. This has necessitated the planning of a construction camp that can be expanded to accommodate a relatively large number of construction workers over the long term.

In summary, housing for construction workers was planned for; however, the need to house a large number of workers at one time was only recently identified. Therefore, it is now necessary to amend the SRCDP to reflect these new conditions.

I sincerely hope that we have been able to alleviate your concerns. We are always open to suggestions as to how we can better manage our projects.

Very truly yours,


Harold S. Masumoto
Vice President for Administration

HSM:pz

cc: D. Hall
M. Metz



United States Department of the Interior

NATIONAL PARK SERVICE
HAWAII VOLCANOES NATIONAL PARK
HAWAII 96718 - 0052

IN REPLY REFER TO:

L7621 (HAVO)

August 27, 1985

Ms. Letitia N. Uyehara
Director
Office of Environmental Quality Control
550 Halekauwila Street
Room 301
Honolulu, HI 96813

Dear Ms. Uyehara:

We appreciate the opportunity to comment on the Draft Supplemental Environmental Impact Statement (EIS) - Amendment to the Mauna Kea Science Reserve Complex Development Plan for Hale Pohaku.

We agree with the introductory statements about the worth of astronomical research and the suitability of Mauna Kea summit for this, and with statements about the value of Hale Pohaku as an acclimatizing location for astronomers and other summit workers. However, we regret the sacrifice of four more acres of Mamane-naio vegetation community for the construction of camp housing. As pointed out in several places in the EIS, this vegetation type is unique and is furthermore critical habitat for the endangered palila.

We concur with concerns over feral cats and rats, as expressed by Chairman Susumu Ono (Department of Land and Natural Resources) and Project Leader Ernest Kosaka (US Fish and Wildlife Service) in letters responding to the EIS preparation notice. We suggest instituting deliberate measures which would prevent increases in pest populations such as: prohibit the introduction of pets, provide mongoose and rat-proof garbage containers, collect garbage frequently, and carry out long-term monitoring to detect population changes of rats, cats, and mongooses.

We are glad you have selected small modules, built on posts, interspersed among native trees rather than larger barracks-type structures, which would cause the removal of trees. We also support the concept of subtle colors and low lines to minimize esthetic impact.

Thank you for including us on your list of consulted agencies.

Sincerely,



David B. Ames
Superintendent

cc:
Vice President for Administration, Univ. of Hawaii
Ms. Marilyn C. Metz, MCM Planning

UNIVERSITY OF HAWAII

Vice-President for Administration

October 3, 1985

Mr. David B. Ames, Superintendent
U.S. Department of the Interior
National Park Service
Hawaii Volcanoes National Park
Hawaii 96718-0052

Dear Mr. Ames:

**SUBJECT: Draft Supplemental Environmental Impact Statement--Amendment
To The Mauna Kea Science Reserve Complex Development Plan
For Construction Camp Housing At Hale Pohaku, Hamakua, Hawaii**

Thank you for reviewing the subject draft EIS; we respect your concerns for the unique environment of the Hale Pohaku area. Although, as you accurately state, an additional four acres of Palila habitat will be disturbed, care will be taken to avoid removing mature trees. Past experience has shown that, with careful design, development can be accomplished with minimal disturbance to this critical habitat (only three clumps of mamane required removal during the development of the permanent mid-level facilities).

No pets are allowed at Hale Pohaku; this is a condition of the CDUA for the area and it is strictly enforced. Refuse containers are rat and mongoose-proof (although no mongoose have been observed at Hale Pohaku). Most garbage is disposed of in an electric garbage disposal; garbage not suitable for the disposal and other solid waste is trucked daily to a dumpster at the MKSS headquarters in Hilo.

MKSS personnel are working with the State Department of Land and Natural Resources, Forestry Division, and the State Department of Health, Vector Control, to control the population of feral cats and other predators and pests which are observed from time to time at Hale Pohaku. This is an on-going program. No rats have been observed in the area recently; mice are present, however. If you would like further information about the predator and pest prevention and control measures that are being undertaken at Hale Pohaku, or if you have any suggestions that we could adopt that would improve our current program, please feel free to call Mr. Tom Krieger at MKSS headquarters in Hilo (935-3371).

Letter to Mr. David B. Ames
October 3, 1985

Page Two

We appreciate your support of small modules for the construction camp. Not only are they more environmentally and aesthetically suitable for the area than large barracks-type structures, but they allow us maximum flexibility in responding to future requirements for construction worker accommodations. For example, we will not have to build a large 25-person structure to meet the need for housing four or five workers. Reuse of existing buildings will be facilitated, thereby minimizing the amount of land that will be disturbed by development.

We appreciate your thoughtful comments.

Very truly yours,



Harold S. Masumoto
Vice President for Administration

HSM:pz

cc: D. Hall
✓ M. Metz

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 119, HONOLULU, HAWAII 96810

HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

LETTER NO. (P) 1450.5

AUG 19 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Draft Supplemental EIS - Amendment to
the Mauna Kea Science Reserve Complex
Development Plan for Hale Pohaku

We have reviewed the subject document and have no
comments to offer.

Very truly yours,

A handwritten signature in black ink, appearing to read "Teuane Tominaga".

TEUANE TOMINAGA
State Public Works Engineer

CT:jk

cc: Mr. Harold S. Masumoto
Ms. Marilyn C. Metz

GEORGE R. ARIYOSHI
GOVERNOR



JACK K. SUWA
CHAIRPERSON, BOARD OF AGRICULTURE

SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822

August 29, 1985

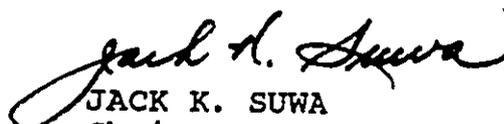
MEMORANDUM

To: Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control

Subject: Draft Supplemental Environmental Impact Statement
Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Hale Pohaku
TMK: 4-4-05: 01 Mauna Kea, Hawaii
Acres: 4

The Department of Agriculture has reviewed the subject document and has no comments to offer.

Thank you for the opportunity to comment.


JACK K. SUWA
Chairman, Board of Agriculture

cc: Mr. Harold S. Masumoto, Vice-President for
Administration, UH
Ms. Marilyn C. Metz, MCM Planning

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96816-4495

ALEXIS T. LUM
MAJOR GENERAL
ADJUTANT GENERAL

DANIEL K. C. AU
COLONEL
DEPUTY ADJUTANT GENERAL

HIENG

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Hale Pohaku
Hale Pohaku, Mauna Kea, Hamakua, Hawaii

Thank you for providing us the opportunity to review the draft supplemental environmental impact statement for the above subject project.

We have no comments to offer at this time.

Yours truly,

A handwritten signature in black ink that reads "Jerry M. Matsuda".

Jerry M. Matsuda
Major, Hawaii Air
National Guard
Contr & Engr Officer

Enclosure/EIS

cc: University of Hawaii/Mr. Harold S. Masumoto
MCM Planning/Ms. Marilyn C. Metz

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

LESLIE S. MATSUBARA
DIRECTOR OF HEALTH

in reply, please refer to:
EPHSD

August 30, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila St., Room 301
Honolulu, Hawaii 96813

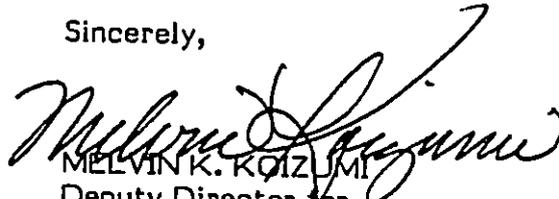
Dear Ms. Uyehara:

Subject: Draft Supplemental EIS - Amendment to the Mauna Kea Science Reserve
Complex Development Plan for Hale Pohaku, Hamakua, Hawaii

Thank you for allowing us to review and comment on the subject draft Supplemental
EIS.

If the cafeteria has no problem meeting the 800-gallon per day wastewater disposal
requirement, there are no additional concerns.

Sincerely,


MELVIN K. KOIZUMI
Deputy Director for
Environmental Health

cc: Mr. Harold S. Masumoto
Ms. Marilyn C. Metz



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 • TELEX 7430250 HDPED

GEORGE R. ARIYOSHI
GOVERNOR

KENT M. KEITH
DIRECTOR

MURRAY E. TOWILL
DEPUTY DIRECTOR

LINDA KAPUNIAI ROSEHILL
DEPUTY DIRECTOR

Ref. No. P-2589

September 5, 1985

DIVISIONS
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION
ENERGY DIVISION
FOREIGN-TRADE ZONE DIVISION
LAND USE DIVISION
PLANNING DIVISION
RESEARCH AND ECONOMIC ANALYSIS DIVISION
OFFICES
ADMINISTRATIVE SERVICES OFFICE
INFORMATION OFFICE

MEMORANDUM

TO: Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control

FROM: Kent M. Keith *Murray E. Towill*

SUBJECT: DSEIS - Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Hale Pohaku, Hawaii

We have reviewed the subject draft supplemental environmental impact statement and have no comments.

Thank you for the opportunity to review the subject document.

cc: Mr. Harold S. Masumoto, UH
Ms. Marilyn C. Metz, MCM Planning

8/30 SENT CDS TO UH VIA FAX

GEORGE R. ARIYOSHI
GOVERNOR

WAYNE J. YAMASAKI
DIRECTOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
800 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

DEPUTY DIRECTORS
JONATHAN K. SHIMADA, Ph.D.
WALTER T. M. HO
CHERYL D. SOON
ADAM D. VINCENT

IN REPLY REFER TO

STP 8.10801

August 26, 1985

Ms. Letitia Uyehara
Director
Office of Environmental
Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Mauna Kea Science Reserve
Complex Development Plan
Hale Pohaku, Mauna Kea, Hawaii
TMK: 4-4-15: 01(Portion)

We do not anticipate any significant impacts from the
proposed project upon our facilities.

Very truly yours,

Wayne J. Yamasaki
Wayne J. Yamasaki
Director of Transportation

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
650 HALEKAUWILA STREET
ROOM 301
HONOLULU, HAWAII 96813

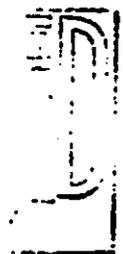
LETITIA N. UYEHARA
DIRECTOR

TELEPHONE NO.
548-6915

August 28, 1985



30



Mr. Harold S. Masumoto
Vice President for Administration
2444 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Masumoto:

Subject: Comments to Draft Supplemental EIS for the Mauna
Kea Science Reserve Complex Development Plan for
Hale Pohaku, Mauna Kea, Hamakua, Hawaii

We have reviewed the draft supplemental EIS and offer the
following comments for consideration:

1. Although housing will be provided for construction workers at Hale Pohaku, they do not have to stay at the site. Will workers who go home lose acclimation to the high altitude by spending the night at sea level? If not, the number of housing units can be reduced.
2. As new telescopes are constructed on Mauna Kea, additional housing for astronomers will have to be constructed at the Hale Pohaku mid level facility. If the housing area is constructed first, workers could occupy these quarters while the telescope is under construction relieving the need for constructing worker housing.

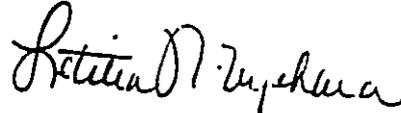
RECEIVED AS FOLLOWS

Mr. Harold S. Masumoto
August 28, 1985
Page 2

3. Since construction workers and scientists are on different work/sleep schedules, maximum separation between these two groups does not seem necessary. If there is a shortage of sleeping quarters, these two groups could conceivably share quarters on a temporary basis.

Thank you for providing us the opportunity to comment on this EIS.

Sincerely,



Letitia N. Uyehara
Director

cc: Marilyn C. Metz, MCM Planning

UNIVERSITY OF HAWAII

Vice-President for Administration

October 7, 1985

Ms. Letitia N. Uyehara, Director
State Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

SUBJECT: Draft Supplemental Environmental Impact Statement--Amendment
To The Mauna Kea Science Reserve Complex Development Plan
For Construction Camp Housing At Hale Pohaku, Hamakua, Hawaii

Thank you for reviewing and commenting on the subject draft EIS. In response to your specific concerns:

1. Workers who return to sea level each night are not able to become acclimatized to the summit area. Therefore, they are more apt to suffer from various ailments associated with high altitude and are more likely to show impairment in motor skills than are workers who acclimatize by living at Hale Pohaku during the periods that they are working at the summit. As stated in the draft EIS, construction worker housing will only be built as it is needed, and it may be that the total number of units projected in the plan will not be required.
2. You are correct in pointing out that if the dormitories were constructed first, construction workers might be able to occupy them while the telescope is under construction. Unfortunately, the construction camp is required for the construction workers who will be working through a period when the first scientists and technicians come on board. We anticipate building the dormitory in time for the scientists and technicians to use it while the construction workers are also still at Hale Pohaku.
3. Conflict in sleeping schedules between construction workers and scientists occurs primarily in the early morning hours, when the scientists have just gone to sleep and the construction workers are leaving for work. Because of this overlap (scientists return to Hale Pohaku 5:00 a.m. and construction workers go to work around 7:00 or 8:00 a.m.), sharing sleeping quarters is not feasible.

Letter to Ms. Letitia N. Uyehara
October 7, 1985

Page Two

Thank you for your comments on optimizing the use of space in the Hale Pohaku area.

Very truly yours,



Harold S. Masumoto
Vice President for Administration

HSM:pz

cc: D. Hall
/M. Metz



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

September 6, 1985

RE:0424

Ms. Letitia Uyehara
Office of Environmental Quality Control
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Draft Supplemental EIS
Mauna Kea Science Complex Development Plan
(For Construction Camp Housing at Hale Pohaku)
Hamakua, Mauna Kea, Hawaii

The above cited Draft Supplemental Environmental Impact Statement (EIS) addresses the potential environmental impacts associated with the construction of camp housing at Hale Pohaku, Mauna Kea, Hawaii.

The Environmental Center's review has been prepared with the assistance of Kenneth Kaneshiro, Entomology; Matthew Spriggs, Anthropology; Clifford Smith, Botany; Leonard Freed, Zoology; and Martha Diaz, Environmental Center

We offer the following comments for your consideration in the preparation of the Final EIS.

Drainage and Erosion Controls (p. 23)

The DEIS correctly notes the high erosion hazard for soil in the area and describes the proposed runoff and catchment systems that will be incorporated. The timing of these erosion control measures is important so as to minimize erosion during the construction phase as well as after the facilities are completed. The Final EIS should emphasize the immediate as well as longer term need for erosion control measures. We understand that erosion has been a serious problem in the the past and that the construction of walkways at the existing facility significantly decreased this problem. This underscores the need for the timely implementation of erosion control plans so as to avoid unnecessary environmental degradation.

The DEIS indicates that runoff may be collected in catch basins and diverted to either a new or existing swale. The high erosion hazard of the soils noted in the DEIS suggests that the creation of new swales may initiate erosion problems and that existing swales are likely to be adversely affected if significant flow increases are experienced due to diversion.

AN EQUAL OPPORTUNITY EMPLOYER

Flora and fauna (p. 24)

The DEIS appropriately recognizes the impact of foot traffic to surrounding vegetation areas and recommends the construction of crushed cinder walkways to discourage walking in vegetated areas. We might add, as a point of information, that in loose soil environments, such as are present at Hale Pohaku, many of the plants have their roots in the surface layer so that they can rapidly absorb any available moisture. Hence one of the main impacts of foot traffic, in addition to the obvious trampling or destruction of the above ground plant, is the damage to the root structure. Plant germination and establishment of seedlings is also impeded by the rigorous climate.

The discussion of the potential fire hazard and the proposal to mitigate "natural" fire hazards by controlling undergrowth is of concern. First, it should be recognized that "natural" fires are started in Hawaii only by lightning or lava flows. Neither of which is likely in this area. What is a concern, however, is the risk of fire caused by the carelessly tossed cigarette or other man related activities. A fire prevention program for all personnel should be incorporated as a substantive part of the fire-fighting and training procedures cited in the EIS. Since there is such a limited water supply available for fire control, the total fire management, ie. prevention as well as control plan, is of concern. The importance of careful protection of the habitat both from the biological as well as the Science Reserve perspective cannot be over emphasized.

The control of undergrowth must be done with considerable care. It is our understanding that this area contains some very rare plants including several taxa in the genus Stenogyne. Several of these taxa are listed as candidates for endangered species classification. Since the project is to be incrementally developed over the next 15 years, it is quite likely that one or more of these species will be declared endangered during that period. Provision should be made for periodic botanical surveys prior to the incremental construction activities. In this regard, concern has been expressed that whereas the preparation notice stated that "rare plants would be identified and preserved," this statement has apparently been dropped from the DEIS.

What is meant by the statement that "Fire flow from the Mid-Level Facilities will be provided?"

Infrastructure, utilities and services (pp. 27 - 29)

We note that sewage and grey water will be disposed in cesspools. Since water is in such short supply and must be trucked to the site, could the waste water be used for landscape irrigation?

On page 29 under "management" the EIS states that "MKSS has the authority to enforce rules and regulations intended to protect the environment of the Hale Pohaku Area." Because of the general concern for protection of this critical habitat and because the EIS will be used as a guide for decision makers, we urge that these rules and regulations (or pertinent summaries thereof if they are too voluminous) be appended to the Final EIS. We remain concerned, for example, that the ecosystem outside of the immediate construction area may be significantly affected and that adequate recognition of the sensitivity of the surrounding area, beyond the actual building sites, may be overlooked.

Long Term Impacts (p. 30)

We note that site Area I-A was selected (p. 41) partially because of the presence of scattered trees on the site. This brings up a point of concern with regard to impacts on the Palila. According to Appendix A, the Botanical Survey, area I-A has large clumps of mature mamani trees, 3 to 6 meters tall, and thus provides habitat for the Palila. Furthermore, it is noted in Appendix B that Palila may be unusually sensitive to human and environmental perturbations during the breeding season. Since the plan is to construct the buildings near the trees to minimize the visual impact (p. 41) there is some potential for impacts to the Palila who frequent these mamani trees. We call attention to this potential user conflict between endangered birds and people only to encourage awareness of the issue and to encourage the designers of this project to keep in mind the sensitive nature of the habitat and the biota so that any unnecessary disturbances can be avoided.

We note that feral cats and rats will be controlled through an active program. We suggest that mongooses be controlled.

Construction Workers and Astronomy Personnel (p.29)

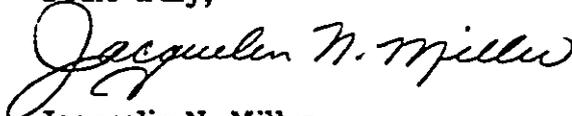
The need for an education program to acquaint all personnel with the environmental sensitivity of the area should be included in the final EIS. The concern encompasses construction, operation and recreational activities which may affect the area.

Biological surveys (Appendices A and B)

The botanical and avian surveys are excellent examples of professional analyses and we commend their authors on a job well done. Will there be any studies or discussions initiated with members of the entomological community regarding invertebrate species in the area? If so, a summary of these discussions or their reports would be a valuable addition to the EIS.

We appreciate the opportunity to comment on this EIS and hope you will find our comments useful in the preparation of the final document.

Yours truly,



Jacquelin N. Miller
Acting Associate Director

cc: Marilyn Metz, MCM Planning
Harold Matsumoto, UH Vice-President for Administration
Patrick Takahashi, Act. Dir., Env. Ctr.
Kenneth Kaneshiro
Clifford Smith
Leonard Freed
Matthew Spriggs
Martha Diaz

UNIVERSITY OF HAWAII

Vice-President for Administration

October 3, 1985

Ms. Jacquelin N. Miller
Acting Associate Director
University of Hawaii at Manoa
Crawford 317
2550 Campus Road
Honolulu, HI 96822

Dear Ms. Miller:

SUBJECT: Draft Supplemental Environmental Impact Statement--Amendment to the Mauna Kea Science Reserve Complex Development Plan for Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii

Thank you for reviewing and commenting on the subject draft Supplemental EIS. In answer to your specific concerns:

Drainage and Erosion Controls (p. 23)

Part III, Section D, paragraph 1.2 will be revised to emphasize that the project designer should consider soil erosion control measures in the design and that the contractor should be required to submit a soil erosion control plan to the County of Hawaii and/or the Department of Land and Natural Resources (DLNR) for approval prior to construction. The soil erosion control plan should include the following: a construction schedule; temporary erosion control measures; permanent erosion control measures; construction sequence; and timing of erosion control measures. In addition, a sentence will also be added which will state.. "the project designer shall carefully consider the high erosion hazard for soil in the area and the potential adverse impacts of significant flow increases due to diversion and new paving."

Flora and Fauna (p. 24)

You comment that one of the main impacts of foot traffic--in addition to the obvious trampling or destruction of the above ground plant--is the damage to the root structure. This fact will be noted in the Final EIS.

The University of Hawaii (UH) does not control the undergrowth; this is done by DLNR. Although the recommendation was included in the Hale Pohaku EIS (DLNR, 1980) and the Mauna Kea Science Reserve Complex Development Plan (SRCDP) EIS (RCUH, 1983), we shall discuss the implications of deleting it with DLNR. Fire protection facilities are described more fully on pages 28-29 of the draft EIS.

Letter to Ms. Jacquelin N. Miller
October 3, 1985

Page Two

General rules for fire prevention are in effect at Hale Pohaku (e.g., no "hibachis or other open fires; throwing or dropping of lighted cigarettes, cigars, pipe heels, matches, live coals, or other burning material on the premises is prohibited). UH has the authority to impose these rules on people staying at or visiting the astronomy mid-elevation facilities or at the proposed construction camp. In addition to protecting the Palila habitat, UH is also very concerned about potential fires because the astronomy mid-elevation facilities consist of wooden buildings. Your comment points up the fact that a more comprehensive prevention/education program is necessary; we will consult with the Hawaii County Fire Department in developing this plan. In addition, UH is presently preparing a comprehensive set of rules to implement the management plan for the UH areas on Mauna Kea which was recently approved by the Board of Land and Natural Resources (BLNR). These rules will be subject to public hearing under State Administrative Procedures regulations.

Rare plants were identified during the survey and are listed in the species inventory. The largest numbers and kinds of rare and endangered plants are found on Area II; an area that was rejected for the housing camp site, in part because of the presence of these plants. Area IA, the site chosen, contains two rare and candidate endangered species--Sophora chrysophylla ssp. circularis var. circularis (mamane) and Stenogyne microphylla, a native mint. The latter is found only growing in close proximity to the trunks of a few of the larger mamane trees on Area IA. These large trees will be preserved. It should be noted that since human activity has increased in the area and animals have been removed from the mountain, grazing by feral sheep and goats has virtually been eliminated. The mints, which were once considered rare, are now becoming more commonly observed in the Hale Pohaku area.

The few small mamane trees which will be removed will be transplanted to a different location on site IA. The taxonomy of the Hawaiian Sophora currently is being revised in the flora being prepared by Bishop Museum and many of the taxa currently recognized below the specific level may be eliminated.

Water to the construction camp will be piped from the storage tanks at the astronomy Mid-Level Facilities; this direct connection can provide sufficient volume and fire flows to the camp. The statement was intended to indicate that there was sufficient storage capacity and water pressure at the Mid-Level Facilities to provide this protection. The fire flow system is more fully described on page 29 of the draft EIS.

Infrastructure, Utilities and Services (pp. 27-29)

Landscaping materials will primarily consist of vegetation present in the existing eco-system; vegetation which will adapt easily to the low moisture conditions of Hale Pohaku without the need for artificial watering. Irrigation will be used primarily to establish the new plantings in the area. Wastewater reclamation and reuse requires a high degree of treatment to remove bacteria, putrescible matter, and other suspended solids. Such treatment is necessary to prevent the spread of pathogens, creation of noxious odors, and

Letter to Ms. Jacquelin N. Miller
October 3, 1985

Page Three

clogging of irrigation systems. To produce the high effluent, a complete "packaged" treatment plant would be required; this system must include chlorination facilities, effluent pumping equipment, and seepage pits to dispose of the excess water. In addition, a separate landscape irrigation system would also be required to convey treated effluent from the pumps to the irrigation distribution system. Because artificial irrigation will only be used for a short period of time, it was felt that the additional expense necessary to recycle wastewater was not justified.

As stated previously, MKSS only has the authority to enforce rules when infractions involve people staying at or visiting the astronomy facilities. These rules are based on the 1980 DLNR Complex Development Plan for the Mid-Elevation Facilities and conditions placed on the CDUA for the facility by the BLNR. In addition to the rules described in the discussion on fire prevention, there are provisions prohibiting pets, excessive noise, hunting equipment (including rifles, shotguns, bows and arrows), and littering. Although people staying at the Hale Pohaku Mid-Level Facilities are told that they should stay on the walkways and not wander around the area, it is probable that we do not adequately emphasize the sensitivity of the surrounding area, beyond the immediate area of the building sites. We will endeavor to do so in the future. The regulations being developed to implement the management plan will probably be more effective in protecting the environment of the Hale Pohaku area than the existing house rules. Enforcement responsibilities will be more clearly defined at that time.

Long-Term Impacts (p. 30)

According to the ornithological consultant for the project, impacts to the Palila would be most severe during construction of the facilities. Although the density of the bird is low in the Hale Pohaku area, conservation recommendations of the U.S. Fish and Wildlife Service will be followed during the construction period.

Mauna Kea Support Services (MKSS) personnel are working with the DLNR Forestry Division and the State Department of Health, Vector Control, to control the population of feral cats and other predators and pests which are observed from time to time at Hale Pohaku. This is an on-going program. Although not observed in the Hale Pohaku area, mongoose are included in the control program.

Construction Workers and Astronomy Personnel (p. 29)

The need for an education program to acquaint personnel with the environmental sensitivity of the area has been stressed in previous EISs and plans for the area. We will, however, repeat it in the draft EIS. When the Information Station is operational, exhibits and pamphlets will serve to also educate visitors about the need for protecting the fragile eco-system of the area.

Letter to Ms. Jacquelin N. Miler
October 3, 1985

Page Four

Biological Surveys (Appendices A and B)

We have conveyed your compliments to our botanical and ornithological consultants. In addition, Ms. Maile Stemmermann discussed entomological concerns with Mr. Kenneth Kaneshiro. Although the presence of rare or endangered invertebrate species in the area was never brought to our attention in past EISs for Hale Pohaku (a survey of the summit area was conducted in conjunction with the SRCDF), and we are not aware of any studies which would indicate that such is the case today, we will certainly take this into consideration if future environmental work is required.

Thank you for your careful review of the EIS.

Very truly yours,



Harold S. Masumoto
Vice President for Administration

HSM:pz

cc: M. Metz ✓
D. Hall



University of Hawaii at Manoa

Water Resources Research Center
Holmes Hall 283 • 2540 Dole Street
Honolulu, Hawaii 96822

3 September 1985

Ms. Letitia N. Uyehara, Director
Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

SUBJECT: Draft Supplemental Environmental Impact Statement for
Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii,
August 1985

We have reviewed the subject DSEIS and offer the following comment. On p. 50, "Unresolved issues", the final disposition of the camp buildings when they are no longer needed, is given as an unresolved issue. The proposing agency needs to seriously consider mobile homes as a housing alternative to building cabins. Mobile homes come in a wide range of models and sizes, with insulation and central heating, and are virtually turn-key housing not requiring much labor on site. Costs are very competitive. After the housing need has dissipated, the tires can be put back on and the entire unit moved to anywhere else it may be needed. Result, no unresolved issue. Appropriate painting done imaginatively can do wonders to help blend it into the background.

Thank you for the opportunity to comment. This material was reviewed by WRRC personnel.

Sincerely,

Edwin T. Murabayashi
Edwin T. Murabayashi
EIS Coordinator

EIM:jm

cc: H. Masumoto, UH
M. Metz, MCM

UNIVERSITY OF HAWAII

Vice-President for Administration

October 3, 1985

Mr. Edwin T. Murabayashi
EIS Coordinator
Water Resources Research Center
Holmes Hall 283
2540 Dole Street
Honolulu, Hawaii 96822

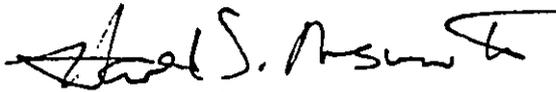
Dear Mr. Murabayashi:

**SUBJECT: Draft Supplemental Environmental Impact Statement--Amendment
To The Mauna Kea Science Reserve Complex Development Plan
For Construction Camp Housing At Hale Pohaku, Hamakua, Hawaii**

Thank you for reviewing and commenting on the subject draft EIS. Your suggestion for mobile homes was interesting and because of the possible savings in cost and the ease of construction we investigated its potential. We found that there are several drawbacks to the proposal, however, which preclude its implementation for the construction camp. Because of the slope of the land, the high winds and the potential for earthquakes (all of the island is earthquake zone 3, the zone of highest occurrence) the mobile homes would have to be placed on foundations. This would entail the same amount or more extensive site work than is anticipated for the proposed cabins. In addition, even though they are painted "imaginatively", the mobile homes would still have a barracks-type appearance and flat roofs which would detract from the overall appearance of the area which is dominated by the well-designed permanent MidLevel Facilities. Also, we are not certain that such a development would be approved by the County of Hawaii building department.

Thank you for your suggestion, though. It certainly merited consideration.

Very truly yours,



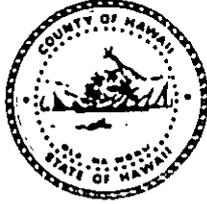
Harold S. Masumoto
Vice President for Administration

HSM:pz

cc: D. Hall
M. Metz

4/3 sent CC TO UNIT MORE PLANNING

STEPHEN K. YAMASHIRO
Chairman & Presiding Officer



COUNTY COUNCIL

County of Hawaii
Hawaii County Building
Hilo, Hawaii 96720

August 26, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Thank you very much for allowing me this opportunity to comment on the "Draft Supplemental Environmental Impact Statement For Construction Camp Housing At Hale Pohaku, Hamakua, Hawaii." I write to you in support of this project.

The Hawaii County Council, through its adoption of Resolution 179, September 2, 1981, expressed its support of the Hale Pohaku Master Plan and Report as being consistent with the Mauna Kea Conceptual Plan. Upon reviewing the draft environmental impact statement for the construction camp housing, I find that the proposed project is necessary for the development of the Mauna Kea Science Reserve and critical for the well-being of observatory construction workers.

The summit of Mauna Kea is known world-wide as the best site for astronomical observation. As such, numerous telescopes have been located there and many more research facilities are anticipated to be built in the near future. The Hale Pohaku Mid-level Facilities were built to house those working on the summit because its altitude has been shown to be ideal for acclimatization purposes. Potential areas of environmental impact were addressed at the inception of the project and due to the fact that there have been no significant adverse effects as a result of this construction, it is apparent that the mitigating measures were adequate to deal with environmental concerns.

COUNTY COUNCIL

County of Hawaii
Hawaii County Building
Hilo, Hawaii 96720

Ms. Letitia N. Uyehara, Director

Page 2

August 26, 1985

Several areas of possible impact as a result of the proposed housing construction have been identified in the draft environmental impact statement (e.g., drainage and erosion, flora and fauna, historical/archaeological, visual, infrastructure, utilities, and services). I am confident that the mitigating measures being proposed will more than adequately deal with these potential areas of impact as done with the initial Hale Pohaku construction project. I therefore, find the draft environmental impact statement to be sufficient in addressing the proposed construction camp housing at Hale Pohaku and express my support of the project.

Sincerely,


Stephen K. Yamashiro, Chairman
HAWAII COUNTY COUNCIL

UNIVERSITY OF HAWAII

Vice-President for Administration

October 7, 1985

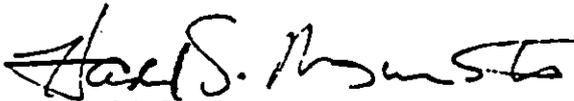
The Honorable Stephen K. Yamashiro
Chairman, County Council
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

Dear Steve:

**SUBJECT: Draft Supplemental Environmental Impact Statement--Amendment to
the Mauna Kea Science Reserve Complex Development Plan for
Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii**

Thank you for taking the time to review and comment on the draft EIS for the construction camp. I particularly appreciate your strong support of this project, since it is essential to our continuing success on Mauna Kea, and represents an important component of our ability to attract the future telescope projects.

Yours sincerely,


Harold S. Masumoto
Vice President for Administration

cc: D. Hall
/M. Metz

DANTE K. CARPENTER
MAYOR

HAWAII COUNTY FIRE DEPARTMENT

466 KINOOLE ST. HILO, HAWAII 96720

PHONE 935-2978



FRANCIS E. SMIT
FIRE CHIEF

DON COLOMA
DEPUTY FIRE CHIEF

August 12, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

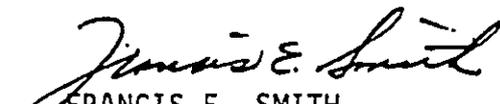
Dear Ms. Uyehara:

Thank you for the opportunity to offer comments regarding the Hale Pohaku Housing Environmental Impact Statement.

In the fire protection area, I recommend that a quick acting type sprinkler system be installed in all new dormitories or cabins, and that retro-fitting present structures with this system be considered.

Sprinkler systems offer the greatest property and life safety protection available. Recent cost reductions in the field, coupled with insurance discounts, make the system an attractive alternative or supplement to the fire protection plan.

Very truly yours,


FRANCIS E. SMITH
FIRE CHIEF

FES/mo

cc: Mr. Harold S. Masumoto
Ms. Marilyn C. Metz

RECEIVED

AUG 15 1985

DIRECTOR
INSTITUTE FOR ASTRONOMY

UNIVERSITY OF HAWAII

Vice-President for Administration

October 3, 1985

Mr. Francis E. Smith
Fire Chief
Hawaii County Fire Department
466 Kinoole Street
Hilo, Hawaii 96720

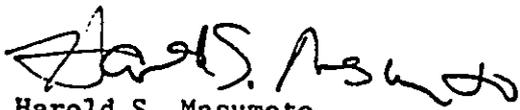
Dear Chief Smith:

SUBJECT: Draft Supplemental Environmental Impact Statement--Amendment
To The Mauna Kea Science Reserve Complex Development Plan
For Construction Camp Housing At Hale Pohaku, Hamakua, Hawaii

Thank you for reviewing and commenting on the subject draft EIS. A sprinkler system will be considered in the design of the construction camp; however, it may not be economically feasible to install given that the camp will consist of small, one-story buildings and will be temporary in nature. This will be discussed with you during the building permit stage. In any event, fire alarms will be installed to protect human life and we are recommending that properly outfitted fire hose cabinets be located adjacent to each building and fire extinguishers be available at strategic locations within the living areas.

The question of retro-fitting the existing buildings with sprinklers should be discussed directly with Institute for Astronomy personnel.

Very truly yours,


Harold S. Masumoto
Vice President for Administration

HSM:pz

cc: D. Hall
✓ M. Metz



DEPARTMENT OF PARKS & RECREATION
COUNTY OF HAWAII

Dante K. Carpenter, Mayor
Patricia Engelhard, Director

August 27, 1985

Ms. Letitia Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Re: Draft Supplemental EIS - Amendment to Mauna Kea SRCDP for
Hale Pohaku

We have no comments to offer on the revised report. Thank you
for the opportunity to review the proposal.



PATRICIA ENGELHARD
Director

PE:GM:dl

Enclosure - EIS being returned

xc Harold Masumoto
Marilynn Metz



COUNTY OF
HAWAII

PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 96720
(808) 961-8288

DANTE K. CARPENTER
Mayor

ALBERT LONO LYMAN
Director

ILIMA A. PIIANAIA
Deputy Director

September 6, 1985

Ms. Letitia Uyehara, Director
Office of Environmental
Quality Control
550 Halekauwila St., Room 301
Honolulu, HI 96813

Dear Ms. Uyehara:

Draft Supplemental EIS - Amendment to the Mauna Kea
Science Reserve Complex Development Plan for Hale Pohaku
Mauna Kea, Hamakua, Hawaii

Although we have some concerns regarding development of areas that are not contiguous with the existing observatory staff housing, we feel that this concern is adequately addressed in the Draft Supplemental EIS.

Sincerely,

Ilimala Piianaia
for ALBERT LONO LYMAN
Planning Director

ALL:lkt

cc: Harold S. Masumoto
Marilynn C. Metz

UNIVERSITY OF HAWAII

Vice-President for Administration

October 8, 1985

Mr. Albert Lono Lyman
Planning Director
County of Hawaii
Planning Department
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Lyman:

SUBJECT: Draft Supplemental Environmental Impact Statement--Amendment to the Mauna Kea Science Reserve Complex Development Plan for Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii

Thank you for reviewing and commenting on the draft EIS for the construction camp. I am pleased that we have addressed your concerns adequately.

If you have any questions about it, please feel free to call me.

Yours sincerely,



Harold S. Masumoto
Vice President for Administration

HSM:pz

cc: D. Hall
M. Metz



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

25 ALPUNI STREET • HILO HAWAII 96720

August 21, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

DRAFT SUPPLEMENTAL EIS
AMENDMENT TO THE MAUNA KEA SCIENCE
RESERVE COMPLEX DEVELOPMENT PLAN FOR
HALE POHAKU, MAUNA KEA, HAMAKUA, HAWAII

Thank you for giving us the opportunity to comment on the subject EIS. We have no comments to offer at this time.

We are returning the EIS to you.

William Sewake
H. William Sewake
Manager

CS

Enc.

cc (w/o enc.) - Ms. Marilyn C. Metz
Mr. Harold S. Masumoto

... *Water brings progress...*



DEPARTMENT OF PUBLIC WORKS

COUNTY OF HAWAII - 25 AUPUNI STREET - HILO HAWAII 96720 - TELEPHONE (808) 961-8321

DANTE K. CARPENTER
Mayor

HUGH Y. ONO
Chief Engineer

BRUCE C. McCLURE
Deputy Chief Engineer

RECEIVED

AUG 15 1985

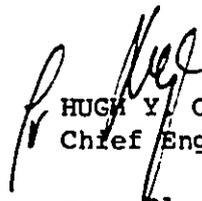
August 13, 1985

DIRECTOR
INSTITUTE FOR ASTRONOMY

MR HAROLD S MATSUMOTO
VICE PRESIDENT FOR ADMINISTRATION
UNIVERSITY OF HAWAII
2444 DOLE STREET
HONOLULU HI 96822

SUBJECT: DRAFT SUPPLEMENTAL EIS
AMENDMENT TO THE MAUNA KEA SCIENCE RESERVE COMPLEX
DEVELOPMENT PLAN FOR HALE POHAKU
Location: Hale Pohaku, Hamakua, Hawaii
TMK: 4-4-15:09 (Por.)

We have reviewed the subject document and have noted various references to the road beginning at the Saddle Road up to Hale Pohaku as being a County road. This should be changed to indicate that this is a road under State jurisdiction. The only road in this vicinity under County jurisdiction is the Saddle Road.


HUGH Y. ONO
Chief Engineer

cc: Planning Director

UNIVERSITY OF HAWAII

Vice-President for Administration

September 19, 1985

Mr. Hugh Y. Ono
Chief Engineer
County of Hawaii
Department of Public Works
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Ono:

SUBJECT: Draft Supplemental Environmental Impact Statement--
Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing
at Hale Pohaku, Hamakua, Hawaii

Thank you for reviewing and commenting on the subject draft EIS. References to the road beginning at the Saddle Road up to Hale Pohaku as being a County road will be changed in the Final EIS to reflect State jurisdiction.

Very truly yours,

Harold S. Masumoto
Vice President for Administration

HSM:pz

ENV
H-W/G



August 27, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Draft Supplemental EIS - Amendment to the Mauna Kea
Science Reserve Complex Development Plan for Hale Pohaku

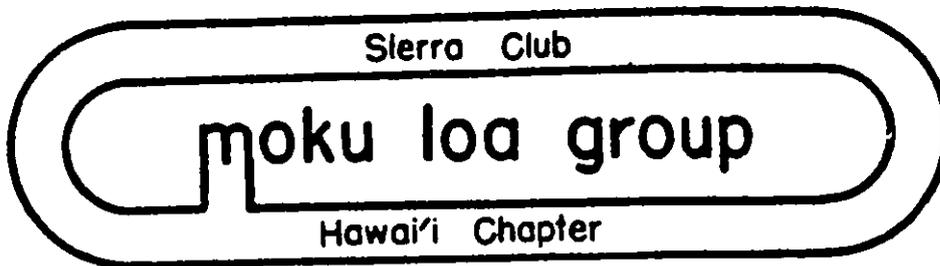
Thank you for the opportunity to review the Draft Supplemental
Environmental Impact Statement for the above entitled development.

We do not have any comments on the EIS.

Very truly yours,

Alva K. Nakamura, Manager
Engineering Department

AKN:EKN:ts
Enclosure - EIS
cc: Mr. Harold S. Masumoto
Ms. Marilyn C. Metz



P.O. Box 1137, Hilo, HI 96721

September 4, 1985

✓ Ms. L. Uyebara, Director
Office of Environmental Quality Control
550 Halekauwila St., Rm. 301
Honolulu, HI 96813

Dear Ms. Uyebara:

DRAFT SUPPLEMENTAL EIS --
CONSTRUCTION CAMP, HALE
POHAKU

We have examined in some detail the subject document dated August 1985.

The discovery of archaeological evidence in the Mid-level Facility area places a new dimension on choice and use of building/development sites which might infringe on these early places of human activity.

As an aside, it appears to be a remarkable coincidence that a prehistoric staging area for high-elevation quarry technology should have been placed at the location chosen later for the original Hale Pohaku development, and for the present mid-level facility.

Our view is that the Draft Supplement EIS is thorough and that it addresses adequately the necessary cautions for construction in this environmentally and archaeologically sensitive area, under criteria spelled out on page 11.

Selection of Area 1-A as the Project Site is entirely appropriate (pages 32-42), and the work should begin with Phase I here, as outlined on page 17.

We would like to be assured that the caveats identified throughout the EIS will be observed in the construction phase and in subsequent use of the facility.

Sincerely yours,

P. Quentin Tomich

P. Quentin Tomich,
Co-chair for Conservation

CC: Jack Straka,
Ex-Comm. Chair

Mr. Masumoto,
UH Administration

Ms. Metz,
MCM Planning

UNIVERSITY OF HAWAII

Vice-President for Administration

September 19, 1985

Co-Chair for Conservation
Moku Loa Group
Sierra Club, Hawaii Chapter
P. O. Box 1137
Hilo, HI 96720

Dear Mr. Tomich:

SUBJECT: Draft Supplemental Environmental Impact Statement--
Amendment to the Mauna Kea Science Reserve Complex
Development Plan for Construction Camp Housing
at Hale Pohaku, Hamakua, Hawaii

Thank you for reviewing and commenting on the subject draft supplemental environmental impact statement. Coordination between the University of Hawaii and the State Historic Preservation Office of the Department of Land and Natural Resources will assure that appropriate measures will be taken to mitigate potential impacts to the archaeological resources of the site. The University of Hawaii is committed to minimizing disturbances to the natural features and fragile ecosystem at Hale Pohaku.

Very truly yours,

Harold S. Masumoto
Vice President for Administration

HSM:pz