

Revised **SUPPLEMENTAL**
ENVIRONMENTAL IMPACT STATEMENT

for the
KULIOUOU HOUSING DEVELOPMENT
Kau Hale Aupuni O'Kuliouou
Kuliouou, Oahu, Hawaii

STATE OF HAWAII
HAWAII HOUSING AUTHORITY

May
March 5, 1979

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SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

FOR

KULIOUOU PLANNED DEVELOPMENT HOUSING

KAU HALE AUPUNI O'KULIOUOU

KULIOUOU VALLEY, HONOLULU, HAWAII

February 21, 1979

Prepared for: Hawaii Housing Authority
Department of Social Services and Housing
1002 North School Street
Honolulu, Hawaii 96817
Contact: Mr. Ken Harada

Prepared by: KVA/HD&C Joint Venture

FORWARD

This report was prepared as a supplemental statement to the original Environmental Impact Statement in fulfillment of Chapter 343, Hawaii Revised Statutes. It was necessitated by modifications to the original proposal. As originally conceived, this development was proposed as a town house development of 408 3 bedroom 1½ bath units for which an EIS was accepted and approved on May 20, 1976.

The original EIS, available for public view at the offices of the Office of Environmental Quality Control, is hereby made a part of this document.

INTRODUCTION

This supplement to the Environmental Impact Statement for the Kau Hale Aupuni O'Kuliouou project was prepared in compliance with Chapter 343, HRS which states that such a statement may be necessary "when the scope of an action has been substantially increased, when the intensity of environmental impacts will be increased, when the mitigating measure originally planned are not to be implemented, or where new circumstances or evidence have brought to light different or likely increased environmental impacts, not previously dealt with."

Since the E.I.S. was written, the proposed action has been substantially modified. The initial proposal called for the construction of 408 multi-family housing units. As amended, the development presently proposed, consists of 203 units.

This statement will address the revised environmental impacts resulting from this change in scope of the project, as well as new or different evidence and circumstances. In addition, comments received regarding the Kau Hale Aupuni O' Kuliouou project and their responses are also included.

LOCATION

The project site is in Kuliouou Valley in the east sector of Honolulu. It is situated above the developed residential area in Kuliouou but below the Conservation District. The site is approximately 0.6 miles north of Kalaniana'ole Highway.

The parcels are identified by tax map key: 3-8-11-1 and 3-8-10-5,6, and 7. (See Location Maps, Figures 1 and 2.)

PROJECT DESCRIPTION

As previously stated, the project will consist of 203 residential units instead of the original 408 units. There are 195 single-family residential homes on individual lots ranging in size from 4,500 to over 10,000 square feet. The remaining eight units are zero lot line duplexes on lots of 4,050 square feet each. Anticipated prices for these house and lot units range from \$60,000 to \$90,000. There is no change in project location and size in terms of affected area.

STORAGE RESERVOIR

A concrete storage reservoir will be constructed in compliance with the Board of Water Supply to serve the development. The 0.2 million gallon reinforced concrete structure is approximately 20 feet in height. The proposed reservoir will be located at the 335-foot elevation, 35 feet lower than the original 0.3 million gallon storage tank. The modified tank will require less grading than previously anticipated, creating one cut bank and graded bench instead of the earlier three. Maintenance access to the tank will be via paved road with a locked gate. Existing Board of Water Supply sources will provide the water to the tank through a new booster pump station located at the entrance to the project.

Upon the satisfactory completion of the reservoir and its appurtenances, the system will be deeded to the BWS.

APPLICANT

Hawaii Housing Authority
Department of Social Services and Housing
P. O. Box 17907
Honolulu, Hawaii 96817

LAND OWNERSHIP

There are two separate parcels of lands in this development. The large parcel of 160.89 acres is owned by the State and administered by the Department of Land and Natural Resources. The smaller parcel of 9 acres is owned by the Hawaii Housing Authority.

ZONING

The two parcels of land including TMK: 3-8-11-1 and 3-8-10-5,6,7 are within the Urban District designation with the steeper slopes of the larger parcel located in the Conservation District. Approximately 56 acres of the larger parcel are zoned urban. The only construction planned to be located in the Conservation District is a reservoir and access road.

Present zoning by the City and County's Department of Land Utilization has the Urban District areas as R-4, Single Family Residential District.

EXEMPTIONS FROM CITY STANDARDS

Exemptions from the provisions of the Comprehensive Zoning Codes of the City and County of Honolulu has been requested and granted under the provisions of Act 359G of the Hawaii Revised Statutes. (See Attachment)

SOURCES OF INFORMATION

Federal U.S. Department of the Army, Corps of Engineers
U.S. Department of Agriculture, Soil Conservation Service

State Department of Education
Department of Health
Department of Land and Natural Resources
Department of Social Services and Housing
Department of Transportation

City and County of Honolulu

Board of Water Supply
Department of Land Utilization
Department of Parks and Recreation
Department of Public Works
Department of Transportation Services
Department of Waste Water Management
Honolulu Fire Department
Honolulu Police Department

Private Sector

Hawaiian Electric Company
Hawaiian Telephone Company
Gasco
Alan M. Voorhees and Associates, Inc.
Morris Fox
Muroda and Associates
Ernest K. Hirata and Associates, Inc
Kuliouou Valley Associates
Kuliouou Community Association
Hawaiian Dredging and Construction Company

SITE DESCRIPTION

Land Use: The project site is presently unimproved and used to graze livestock. Vegetative cover consists of exotic volunteer species. There are no structures other than the temporary ones used as corrals, barns and storage shed. Along the west boundary of the larger parcel is the intermittent Kuliouou Stream. Access into this site is by unimproved jeep road.

Soils: Principal soils found on the parcels are the Luaualei clay and extremely stony clays. These soils are generally deep along the lower areas and becoming shallower on the steeper slopes. Physical properties of the soils are very sticky clay, dark gray in color and well drained. The shrink-swell potential is high indicating that the soil will swell on wetting and crack on drying. Under these characteristics, a firm and substantial foundation will be required. Soil studies have been made and recommendations have been received from the soil consultant.

Topography: Terrain of the parcels include the gently sloping bottomlands to the sloping plateau areas to the steep talus slopes. Only the lands on the lower talus slopes and the bottomlands will be developed. There will be cutting and filling where needed.

The escarpments along the stream will be eliminated when the stream is relocated and lined.

Climate: The median annual rainfall is estimated at 40 inches with irregular distribution of rainfall. As a rule the summer months are the drier period and the winter months are the wetter period. Most damages to the lands are experienced during the intense tropical

rainstorms. During these storms, the large surface runoff can flood the bottomlands unless the stream channel is improved.

The prevailing wind is the northeasterly trades that sweep down the valley. The winds usually mitigate the high humidity and temperature. It also aids in the dispersal of the noxious gaseous emissions from the automobile engines.

Drainage: As the development will be located along the Kuliouou Stream, it is vital that the stream channel be improved to accommodate the maximum runoff expected during heavy rainstorms. The stream channel will be improved according to the Corps of Engineers specifications. Present estimate is that 5,100 cfs can be expected from the 1.6 square mile watershed. This channel improvement will join with the existing improved section of the lower portion.

Development of this project is not expected to cause any significant increase in the volume of surface runoff. The project area amounts to seven per cent of the 1.6 square mile watershed.

At the head of this improved channel will be a large entrapment basin to remove any debris and rocks deposited in the channel which could obstruct the stream flow.

Diversion channels and outlets will be constructed as needed.

FLORA AND FAUNA

No endangered native plants were observed at the project site. However, there were native plants observed in the adjoining Conservation District. The plant species were essentially exotic. Among the observed species are:

| | |
|----------------------------------|-----------------|
| • <u>Acacia farenisiana</u> | Klu |
| • <u>Amaranthus spinosus</u> | Spiny amaranth |
| • <u>Cynodon dactylon</u> | Bermuda grass |
| • <u>Desmanthus virgatus</u> | Lahaina koa |
| • <u>Lantana camara</u> | Lantana |
| • <u>Leucaena glauca</u> | Ekoa |
| • <u>Schinus terebinthifolus</u> | Christmas berry |
| • <u>Trichachne insularis</u> | Sour grass |
| • <u>Xanthium strumarium</u> | Cockle bur |

No native fauna were observed. Fauna observed or known to frequent this site are:

| | |
|----------------------------------|--------------|
| • <u>Acridotheres tristis</u> | Mynah |
| • <u>Asio flammeus</u> | Hawaiian owl |
| • <u>Lonchura punctulata</u> | Rice bird |
| • <u>Richmondia cardinalis</u> | Cardinal |
| • <u>Streptopelia chinensis</u> | Spotted dove |
| • <u>Mus musculus</u> | House mouse |
| • <u>Herpestes auropunctatus</u> | Mongoose |
| • <u>Bos taurus</u> | Cattle |
| • <u>Equus caballus</u> | Horse |

TRAFFIC

There will be an increase in the number of vehicles travelling over Kuliouou and Elelupe Roads. This increase will be readily evident and with this increase will be the associated noise, dust, auto hazard and noxious gaseous emissions. However, the estimated 145 automobile trips during the morning peak hours from this development is about half of the number of trips that would have been generated if the 408 housing units were developed rather than

the 200+ units now planned. To accommodate this increase in traffic, one suggestion calls for no parking along the road leading out from the valley in the peak morning hours and no parking along the road leading into the valley in the peak afternoon hours.

Traffic on Kalaniana'ole Highway will also be increased by the vehicles from this development. Several alternative methods are in use by the Department of Transportation to accommodate the heavy morning and afternoon traffic. Among the alternatives suggested are:

1. Spread out peak hours over a longer period of time.
2. Increase carpooling.
3. Increase use of bus transportation.

See letter from R. Higashionna, Director, Department of Transportation, State of Hawaii, dated May 30, 1978.

AIR AND NOISE POLLUTION

The reduction in the number of housing units will significantly reduce the noxious gaseous emissions and noise usually associated with automobiles. The impact on the ambient air quality will not be significantly affected and that the state air quality standards will not be violated. Greater concern will be the lowering of the air quality along the Kalaniana'ole Highway corridor during heavy traffic.

Noise problems are not expected to exceed 55 decibels except during construction phases when large earth moving equipment are used.

UTILITIES

As the number of residential units will be reduced from 408 to 200+ units, the consumption of energy and natural resources will be cut to about half of the initial proposed development.

Electricity: Hawaiian Electric Company will provide energy to this development by extending service via underground cables.

Water: All water will be from Board of Water Supply source. To provide storage capacity, a reservoir will be built above the development.

Telephone: Hawaiian Telephone Company will be able to provide telephone service to the project. The company will plan their expansion program so this development will be served.

Gas: Gas service may be provided by Honolulu Gas Company

Sewer: All liquid wastes will be discharged into the Hawaii-Ka, sewer system. This will be included in the allocation provided to the City and County. The increased discharge will not deprive present users of the system in Kuliouou Valley.

ANTICIPATED ADVERSE ENVIRONMENTAL EFFECTS IF PROJECT IS IMPLEMENTED

The present open area of about 65 acres will be dotted with residences. However, as now proposed there will be only 200+ units instead of the 408 units as earlier proposed. There will be approximately 800 persons living on the 65 acres where no one is presently occupying the area. Although the number of units and residents are reduced from the earlier plan, it would still cause

limited adverse environmental impact. Among these are the increase in traffic and consumption of energy and natural resources. However, not all of the consumption can be considered as new as they are merely relocated from other locations.

By eliminating livestock from this valley, it would decrease the coliform population of the surface runoff during the rainy periods.

The single story structures are not expected to block the view of the Koolau Range for all residents of the valley.

ALTERNATIVES TO THE PROPOSED ACTION

Among the alternatives for the use of this area are:

1. To retain the acreage in grazing.
2. To develop this area for crops.
3. To place this acreage in the Conservation District.

The retention of this acreage in grazing use will continue to cause coliform bacteria to be discharged into the surrounding water. Unless a more intensive grazing land practices are utilized, soil erosion will continue with volunteer exotic vegetation making the area low quality grazing land.

Use of this area for crop lands will require the availability of irrigation water as the annual rainfall is too low. Cultivation will cause dust to blow into the residential areas as well as any insecticides, herbicides and fungicides used. Soils are not the most productive and easy to cultivate.

Retention of this area in the Conservation District will require management to maintain control of the exotic volunteer

vegetation. As the area is zoned Urban, a more intensive use appears to be prudent in providing homes for those interested in buying.

AMENDED ENVIRONMENTAL IMPACTS

Due to the substantial reduction in total number of additional residents to the Kuliouou Valley area, the following conclusions can be drawn:

1. Long term impacts will be appreciably reduced most notably in terms of (a) generation of additional traffic on Kalaniana'ole Highway and (b) additional burden on existing utilities, services and institutions.
2. Short term impacts will remain essentially the same since most of the impacts are construction related.

In light of the implied lessening of overall environmental impacts, this statement is primarily in response to new information regarding the possible significance of the various archaeological sites in the project area. As the proposed action will impact these sites, appropriate mitigative measures are being taken to minimize these impacts.

Environmental impacts related to the construction and operation of the storage reservoir are as follows:

Short term - the resultant impacts are construction related and will occur only during the construction of the tank. This phase will produce noise, dust, noxious gaseous

emissions and cause the removal of existing vegetative cover due to excavation of the site and the use of heavy earth-moving equipment.

Long term - these impacts are primarily of a visual nature. The tank and cut bank will be visible from parts of the Valley. Because of the revised location of the reservoir and attendant site work, these impacts will be less than originally anticipated. Mitigative measures are outlined in the following section.

Beneficial impacts will accrue due to the storage facility serving the new residents of the development, thus reducing the burden of connecting directly into existing water lines in adjacent residential areas.

MITIGATIVE MEASURES PROPOSED TO MINIMIZE IMPACTS

Archaeological sites - Prior to the start of any excavation and grubbing of the project site, an archaeologist will be engaged to retrieve data from those sites considered to have significant archaeological value. The guidelines to be used and the conduct in which the data is to be gathered will be prepared under the direction of the State Historic Preservation Office.

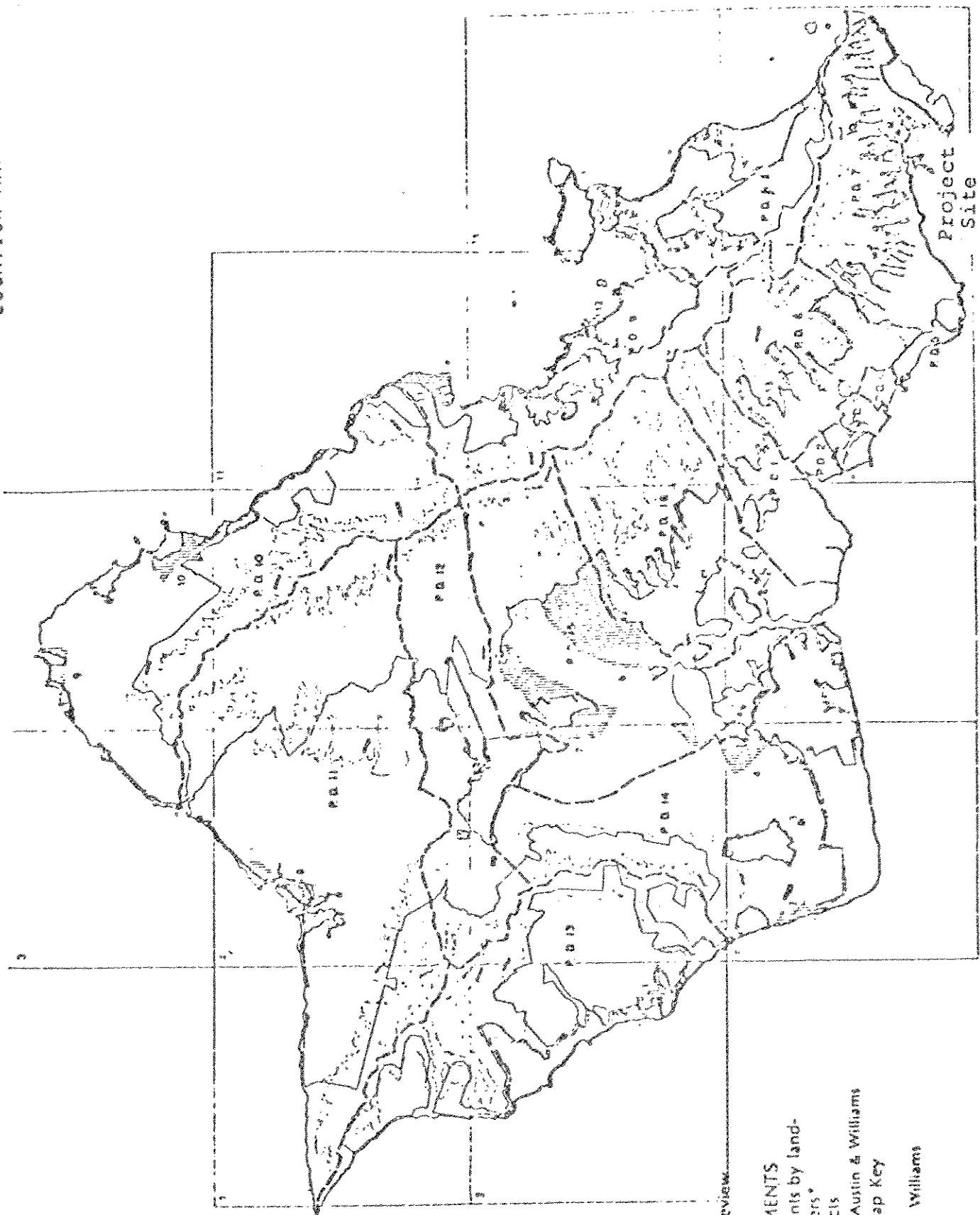
Reservoir - In Order to minimize environmental impacts caused during construction of the reservoir, all construction related activities will be confined to normal work days and hours. In addition, all applicable laws and environmental ordinances will be adhered to, including a grading permit, building permit, and noise permit. As the site is within lands designated as Conservation by the State Land Use Commission, a Conservation District Use Application will be obtained. The tank structure will be painted an earth tone to blend as much as possible with the surrounding landscape. The area immediately about the reservoir and the cut bank will be landscaped with appropriate plants to further mitigate the visual impact of the storage tank.

CONCLUSION

The proposed Kuliouou Housing Development will result in a significantly less adverse environmental impact from the earlier proposal. As the number of residences will be about half, from 408 to 203 units, the impact will be correspondingly less. The single family residences will make this development more desirable than the earlier proposed townhouses. It will also provide housing for those seeking improved housing facilities.

Prepared by: Tamotsu Sahara
3219 Paty Drive
Honolulu, Hawaii 96822

LOCATION MAP



State of Hawaii Land Use Districts & Regulations Review

Island of Oahu

PROPOSED DEVELOPMENTS

- Proposed developments by land-owners and developers*
- Existing Urban Districts

Source: Eckbo, Dean, Austin & Williams
 District Boundary Map Key
 See Appendix D
 Eckbo, Dean, Austin & Williams
 August 1969

Figure 1

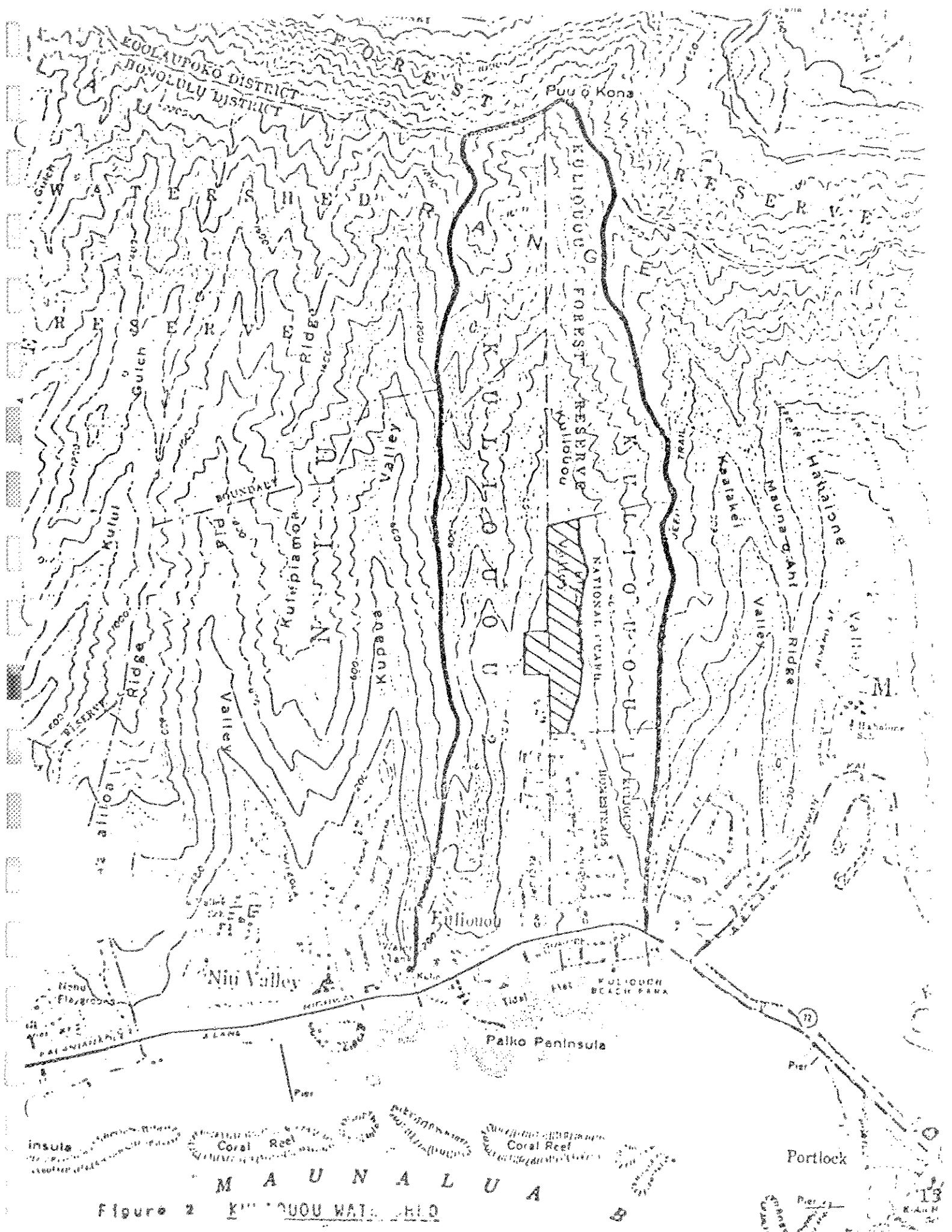
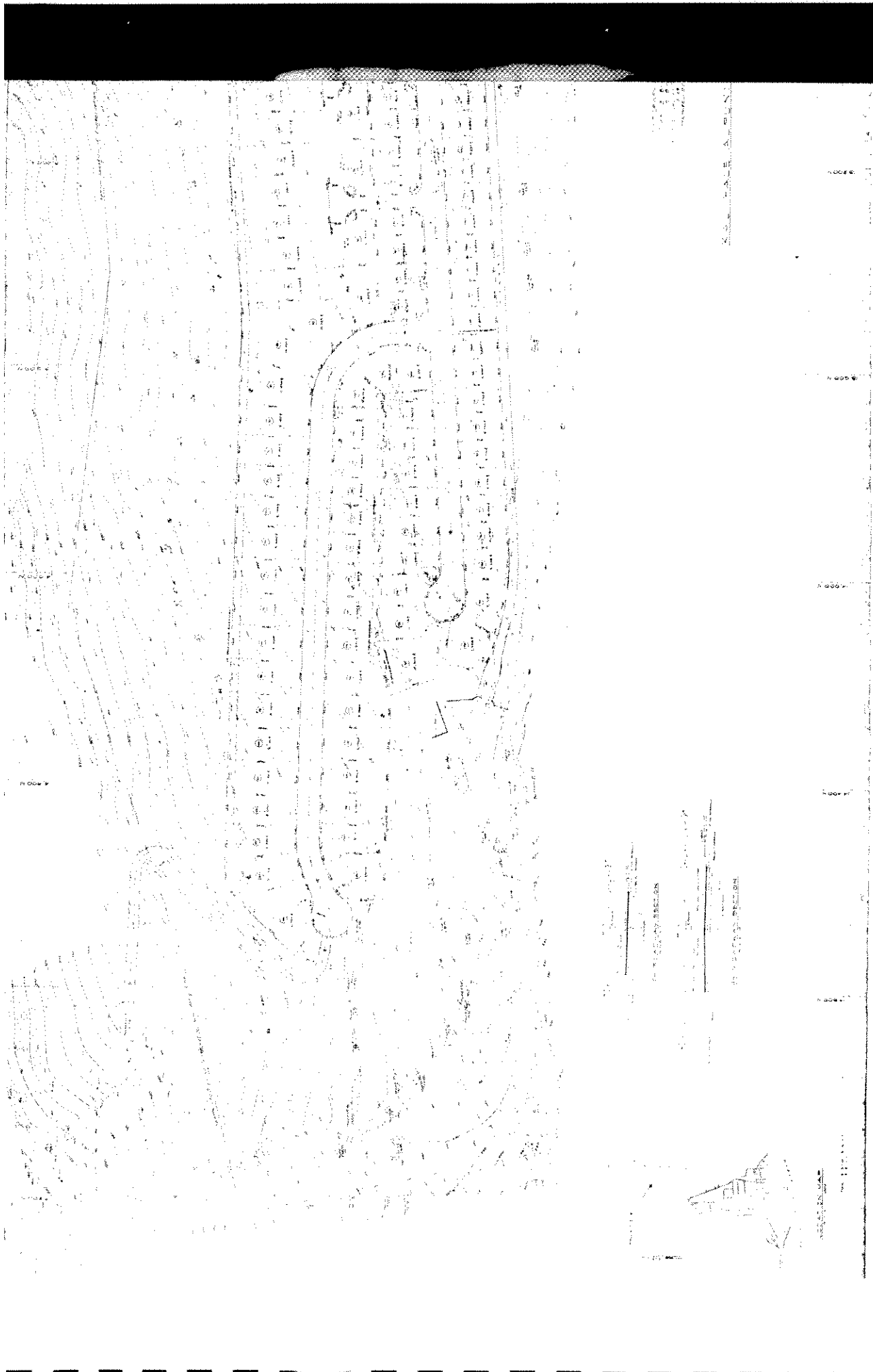


Figure 2 KULIYOUOU WATERSHED



7500

SECTION





STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 425 KULIYOUOU STREET
 HONOLULU, HAWAII 96813

100

IN REPLY REFER TO

May 30, 1978

STF 8.4858

RECEIVED
 DIVISION OF
 LAND MANAGEMENT
 JUN 5 2 11 PM '78

The Honorable William Thompson
 Department of Land and
 Natural Resources
 P. O. Box 621
 Honolulu, Hawaii 96809

Dear Mr. Thompson:

Subject: Proposed Kuliouou Planned
 Residential Development

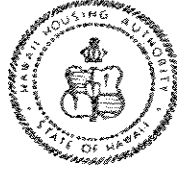
This further clarifies our position regarding the above-captioned development as documented in our Memorandum, LT-PS 2.44448, dated May 19, 1978. In that Memorandum, we stated that the assumptions made in the traffic impact study by Alan M. Voorhees and Associates, Inc., for trip generation during the A.M. peak period are reasonable; that Kalaniana'ole Highway is already loaded to its capacity at Aina Koa; and that the peak hour condition could be maintained at a tolerable level if mass transit will attract most of the overage.

It should be noted that improvements to Kalaniana'ole Highway are for present and future users of the corridor. Residential developments are anticipated for Hawaii Kai as well as for areas along the Kalaniana'ole Highway corridor, but we see no one housing area having the sole right of use of this highway corridor. In this regard, proposed improvements to Kalaniana'ole Highway would be adequate to serve the above-captioned development when taken alone.

Sincerely,

R. Higashionna
 R. Higashionna

APPENDIX



GEORGE R. ARIYOSHI
GOVERNOR

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY

P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

January 8, 1979

TO:
0-518.1/44

The Honorable Rudolph Pacarro, Chairperson
and Members of the City Council
Honolulu Hale
Honolulu, HI 96813

Dear Chairperson Pacarro and Members:

Subject: Kau Hale Aupuni O'Kuliouou
Kuliouou, Oahu

On behalf of the State of Hawaii, the Hawaii Housing Authority proposes to develop a residential subdivision in Kuliouou Valley on State-owned lands identified by Tax Map Key: 3-8-10:5, 6, & 7 and portion of 3-8-11: 1.

The project title will be "KAU HALE AUPUNI O'KULIOUOU."

The development is designed to meet the great housing needs of the "gap group." Many alternative designs have been studied in order to provide the most economical housing package.

To the extent the project is non-conforming to City standards, the Hawaii Housing Authority seeks to effect the exemption of the Project therefrom under the provisions of Chapter 359G of the Hawaii Revised Statutes which requires, among other things, the prior approval of the Project by the legislative body of the County in which a project is to be developed.

Pursuant to said Section 359G and, in particular, Sections 359G-4 and 359G-4.1 of the Hawaii Revised Statutes, the Hawaii Housing Authority respectfully presents to the City Council of the City and County of Honolulu for its consideration and approval, the Project:

I. THE PROJECT

The total subdivision of approximately 50 acres will include the following:

1. 203 residential lots
 - a. 4 duplex (attached) buildings on 8 lots of 4,050 sq. ft.; 45' wide x 90' deep.

- b. 26 single family lots of 4,500 sq. ft.; 50' wide x 90' deep.
 - c. 169 single family lots of 5,000 sq. ft. minimum lot area with minimum average width of 55'.
2. One 5+-acre park site by Executive Order from Department of Land and Natural Resources to the City.
 3. One 7,000+-sq. ft. lot for a water lift station.
 4. One lot for a water storage tank.

The proposed 203 dwelling units contain floor areas ranging from 1,030 sq. ft. to 1,182 sq. ft. and will have minimum yard setbacks of 10 feet for front yards, 5 feet for side yards and 5 feet for rear yards. Double carports will be provided for each dwelling unit.

The house and lot package will be sold in leasehold. The buyers will be granted an option to purchase the fee simple interest.

All units will be sold to the general public in accordance with the provisions of the HUD's Sections 203 & 245 and other appropriate mortgage financing programs and/or the provisions of the State of Hawaii's Act 105 and policies of the HHA.

The State Land Use designation is "Urban" and "Conservation." The residential subdivision will be within the "Urban" designation. The water storage tank and portion of the access road will be located in the "Conservation" zone.

II. VARIANCES FOR WHICH EXEMPTIONS ARE REQUESTED

The Hawaii Housing Authority requests of the City Council of Honolulu exemption from certain zoning provisions and subdivision standards as allowed under Chapter 359G-4 and 359G-4.1, Hawaii Revised Statutes. The following exemptions are requested:

1. Exemptions from General Plan:

| <u>General Plan Designation</u> | <u>Proposed Use</u> |
|---------------------------------|---------------------|
| residential | Residential |
| School | Residential |
| Park | Park |

No school site will be provided as designated on the General Plan because the Department of Education will not require a new school in this vicinity from projected school enrollment. Copy of the letter from the Department of Education dated May 6, 1975 is enclosed herewith.

2. A waiver from the provisions of Section 21-206 of the Comprehensive Zoning Code "Waiver of Requirements for Public Uses of Utility Installations" including landscaping requirements for pad-mounted transformers within the subdivision is also requested.

3. Exemptions from the provisions of Section 21-533 of the Comprehensive Zoning Code:

| | <u>Code Requirement</u> | <u>Exemptions Requested</u> |
|---------------------------|-------------------------|--|
| Zoning | R-4 | N/A |
| Minimum Lot Area | 7,500 s.f. | 4050 s.f. (common wall, 8 lots) 4500 s.f. (single family, 26 lots) 5000 to 7500 s.f. (single family, 88 lots) 7500 s.f. & larger (single family, 81 lots) |
| Minimum Lot Widths | 65 feet | 45 ft. (8 lots) 50 ft. (26 lots) 55 ft. average (169 lots) |
| Minimum Front Yard | 15 feet | 10 ft. (203 lots) |
| Minimum Side & Rear Yards | 6 feet | 5 ft. (195 lots) 0 ft. (8 lots) |

4. The Authority also requests exemption from the provision of Section 6-602 and 6-606 of the Subdivision Rules and Regulations relating to the submission of agreements and surety bonds.

5. The Authority also requests exemption from provisions of Ordinance No. 4621 and the Rules and Regulations pertaining to park dedication.

The Honorable Rudolph Pacarro, Chairperson
and Members of the City Council
Page 4
January 8, 1979

III. MAINTENANCE OF PUBLIC WELFARE AND SAFETY IS NOT PREJUDICED
BY THE VARIANCES REQUESTED

The realization of housing for lower and moderate income families requires efficient utilization of the land and economical development costs without sacrificing the quality of housing that is desired by the homeowner. The Authority believes the proposed project has these ingredients. The smaller lots requested result in efficient use of the land. The Authority believes that the dwelling units are highly desirable and are readily marketable.

All dwelling units will be designed and constructed to meet the standards and requirements of the Department of Housing and Urban Development. All roadways will be constructed to City and County standards and will be dedicated to the City and County.

Additional data concerning the project may be found in the enclosed Environmental Impact Statement. A copy of the acceptance letter of the EIS by the Governor of the State of Hawaii is enclosed. However, based on recent information not previously available, it is possible that there may be one or more significant archaeological sites within the subject project area that will warrant investigation and appropriate conservation measures. In this respect, the project is subject to compliance with Chapter 343, HRS, and Chapter 6-E, HRS. Enclosed is a confirmation memorandum by the Governor of the State of Hawaii.

The Hawaii Housing Authority submits plans for the subject project pursuant to Sections 359G-4 and 359G-4.1 and respectfully requests the following:

1. Approval of the project by the City Council and all City departments and agencies.
2. Approval of construction plans and specifications as submitted for the "KAU HALE AUPUNI O'KULIOUOU" project. It is noted, however, that said plans and specifications are subject to review and approval by HUD. In this respect, please be assured that you and the City Council will be informed of any changes required by HUD that result in variances over and above those noted herein or increases in density.

The Honorable Rudolph Pacarro, Chairperson
and Members of the City Council

Page 5

January 8, 1979

If there are any exhibits or additional information you deem necessary for examination in this matter, we shall promptly submit them to you upon request.

Sincerely yours,



FRANKLIN Y. K. SUNN
Executive Director

Attachments:

- 3 copies of Construction Plans (half scale) & Specifications
- 1 copy of Soils Report
- 19 copies of Governor's project approval
- 19 copies of Governor's acceptance letter of EIS
- 19 copies of Letter from Department of Education
- 1 copy of Environmental Impact Statement

REPORT OF THE
COMMITTEE
on
PLANNING and ZONING

George G. Akahane, Chairman; Tom T. Nekota, Vice-Chairman
Marilyn Bornhorst, Daniel Clement, Jr., Hiram L. Fong, Jr., Frank W. C. Loo, Toraki Matsumoto,
Rudy Pacarro, Andrew K. Poepe, Members

Committee Meeting
held: February 13, 1979

Mr. Chairman:

Your Committee on Planning and Zoning to which was referred the following communication:

Act 105 Project - Kau Hale Aupuni O'Kuliouou

- M-15 - from Franklin Y. K. Sunn, Executive Director, Hawaii Housing Authority, requesting approval of the proposed "Kau Hale Aupuni O'Kuliouou", a residential subdivision proposed by the Hawaii Housing Authority under the provisions of Act 105;
- D-157 - from the Chief Planning Officer, informing that they have no objection to the waiver of amendment requirements under Chapter 359G-4 for the proposed Kau Hale Aupuni O'Kuliouou project;
- D-158 - from the Director of Land Utilization, informing that they have no objections to the exemptions requested for the Kau Hale Aupuni O'Kuliouou project; however, recommending that the project subdivision map and construction plans be processed in accordance with Subdivision Rules and Regulations, and that a supplemental EIS will be required to be prepared for review and acceptance by the HHA and the Office of Environmental Quality Control;
- D-159 - from the Acting Director of Transportation Services, informing that their review of the preliminary construction plans indicates that there are some roadway sections that do not conform to City standards and that they are working with the design consultants to arrive at an acceptable design; further, that it may be necessary to remove curbside parking along some stretches of the valley roads;
- D-160 - from the Kuliouou-Kalani Iki Neighborhood Board No. 2, recommending that the Council return the proposed Kau Hale Aupuni O'Kuliouou project to HHA until such time as they can furnish a proper EIS;

(CR 113)

CITY COUNCIL

CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

I hereby certify that the foregoing COMMITTEE REPORT was, on the date and by the vote indicated to the right hereof, adopted by the CITY COUNCIL of the City and County of Honolulu.

ATTEST:

Paul H. Maeda
PAUL H. MAEDA
CITY CLERK

Rudy Pacarro
RUDY PACARRO
CHAIRMAN & PRESIDING OFFICER

Dated FEB 14 1979

| ADOPTED Meeting Held | | FEB 14 1979 | |
|----------------------|----|-------------|---|
| AYE | NO | A | E |
| AKAHANE | | | |
| BORNHORST | | | |
| CLEMENT | | | |
| FONG | | | |
| LOO | | | |
| MATSUMOTO | | | |
| NEKOTA | | | |
| PDEPDE | | | |
| PACARRO | | | |

Reference:

Resolution No.

Bill No.

COMMITTEE REPORT NO.

9 00

REPORT OF THE
COMMITTEE
on
PLANNING and ZONING

George G. Akahane, Chairman; Tom T. Nekota, Vice-Chairman
Marilyn Bornhorst, Daniel Clement, Jr., Hiram L. Fong, Jr., Frank W. C. Loo, Toraki Matsumoto,
Rudy Pacarro, Andrew K. Poepeo, Members

Act 105 Project - Kau Hale Aupuni O'Kuliouou

- M-89 - from the State Department of Health, informing that they do not have any comments or objections to offer in regard to Council's consideration of the proposed Kau Hale Aupuni O'Kuliouou project;
- M-113 - from the State Department of Health, submitting their comments to the HHA Director concerning the supplemental EIS for the Kau Hale Aupuni O'Kuliouou project;

and in consideration of communications:

- D-201 - from the Manager and Chief Engineer, submitting comments concerning the Kau Hale Aupuni O'Kuliouou, by stating that the water service can be made available for the proposed 203 residential units and that the developer will be assessed his pro rata share for our development of water sources that are necessary to serve the project;
- D-214 - from the Director and Building Superintendent, submitting his comments concerning the Kau Hale Aupuni O'Kuliouou project
- M-125 - from Senator Steve Cobb, supporting Mr. Art Mori's stand that no action on the proposal be acted upon by the Council until HHA has furnished a proper supplemental EIS;

recommends that the foregoing application by the Hawaii Housing Authority for the Kau Hale Aupuni O'Kuliouou project in compliance with the provisions of Act 105 be approved, subject to the condition that no building permit for the project be issued until the supplemental Environmental Impact Statement is completed and approved by the State.

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

I hereby certify that the foregoing COMMITTEE REPORT was, on the date and by the vote indicated to the right hereof, adopted by the CITY COUNCIL of the City and County of Honolulu.

ATTEST:

Paul H. Maeda *Rudy Pacarro*
PAUL H. MAEDA RUDY PACARRO
CITY CLERK CHAIRMAN & PRESIDING OFFICER

Dated FEB 14 1979

| ADOPTED Meeting Held | |
|----------------------|--|
| FEB 14 1979 | |
| AYE/NO/A/E | |
| AKAHANE | |
| BORNHORST | |
| CLEMENT | |
| FONG | |
| LOO | |
| MATSUMOTO | |
| NEKOTA | |
| POEPEO | |
| PACARRO | |

Reference:

Resolution No.

Bill No.

COMMITTEE REPORT NO. 113

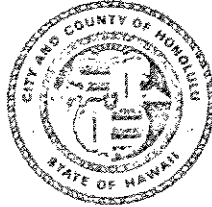
9,00

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
 HONOLULU, HAWAII 96813

PLANNING
 AUTHORITY

FEB 6 9 25 AM '79



FRANK F. FASI
 MAYOR

TYRONE T. KUSAO
 DIRECTOR

LUI/79-304 (JW)

| | | Info | Com-ments |
|---|----------|--------------|-----------|
| 2 | ED | | |
| | AED | | |
| | Dev. | | |
| | Fin | | |
| | Engr | | |
| | SP/Plan | | |
| | Occ | | |
| | Inf | | |
| | Purch | | |
| | HVLP | | |
| | Land Ref | | |
| | Other | | |
| 1 | CFD | | |
| | File | 0-158.1/448a | |

February 5, 1979

Mr. Franklin Y.K. Sunn
 Executive Director
 Department of Social Services
 & Housing
 Hawaii Housing Authority
 State of Hawaii
 Honolulu, Hawaii

ATTENTION: Mr. Ken Harada

Dear Mr. Sunn:

Supplemental EIS Preparation Notice for
 the Proposed Kauhale Aupuni O Kuliouou
 Residential Subdivision, Kuliouou, Oahu

Your Supplemental EIS Preparation Notice raises some questions:

1. Are impacts of the revised project expected to be significantly more adverse than those described in the original EIS? If not, the basis for preparing a Supplemental is unclear.
2. Is the original EIS now considered to be inadequate in its discussion of impacts? If so, the Governor should consider rescinding his acceptance of that EIS.
3. If the major inadequacy is the incompleteness of archeological information, why isn't the Supplemental confined to that topic?
4. If impact on archeological resources is the principal topic, why doesn't the Preparation Notice contain more information on the location, characteristics and potential impact on historic sites?

If there are any questions about these comments, please contact Mr. John Whalen of our staff at 523-4077.

Very truly yours,

TYRONE T. KUSAO
 Director of Land Utilization

TTK:ey

R. Harada
 K. Harada

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

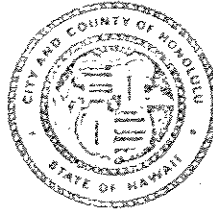
650 SOUTH KING STREET
 HONOLULU, HAWAII 96813

RECEIVED
 HAWAII HOUSING
 AUTHORITY

JAN 24 9 06 AM '79

SUSPENSE LACE MIYAHIRA,
 DIRECTOR AND CHIEF ENGINEER

FRANK F. FASI
 MAYOR



January 25, 1979

Mr. Ken Harada
 Hawaii Housing Authority
 Department of Social Services and Housing
 State of Hawaii
 P. O. Box 17907
 Honolulu, Hawaii 96817

Dear Mr. Harada:

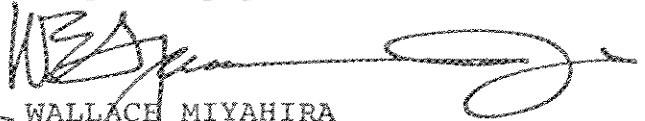
| | Info | ENV 79-19 | ACT | INT |
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| 2 ED | | | | 70 |
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| 3 Dev. | | | | |
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| HAMP | | | | |
| Land Ref | | | | |
| Other | | | | |
| 1 CFD | | | | |
| File | 0-158.1/123 | | | 324a |

Subject: Supplemental EIS Preparation Notice
 for the Proposed Kauhale Aupuni
 O Kuliouou Residential Subdivision,
 Kuliouou, Oahu, Hawaii

We have the following comments in response to your letter,
 Reference O-158.1/123, dated January 18, 1979.

1. Channel improvements of Kuliouou Stream should be constructed through the project area to ensure continuity of the existing flood control project.
2. An evaluation of the adequacy of the existing Kuliouou sewer pump station and the trunk sewers to handle the flows from the proposed development should be made and discussed in the EIS. The additional sewer service charges which will be assessed by Hawaii Kai on the City should also be included in the discussion.

Very truly yours,

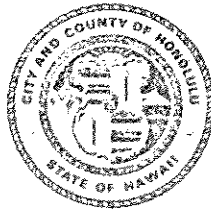

 MR WALLACE MIYAHIRA
 Director and Chief Engineer

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU

1455 S. BERETANIA STREET, ROOM 305
 HONOLULU, HAWAII 96814

HAWAII HOUSING
 AUTHORITY

R. Christman
K. Harada



January 29, 1979

JAN 30 9 42 AM '79

B. K. AIU
 CHIEF

Mr. Ken Harada
 Hawaii Housing Authority
 P.O. Box 17907
 Honolulu, Hawaii 96817

Dear Mr. Harada:

Subject: Supplemental EIS Preparation Notice
 For the Proposed Kauhale Aupuni O
 Kuliouou Residential Subdivision,
 Kuliouou, Oahu

We have no objections to the proposed subdivision development since fire protection services are adequate from the Hawaii-Kai Fire Station with supportive services from the Wailupe Fire Station.

Your staff may contact Battalion Chief John A. Ferreira at 955-8304 for further information.

Sincerely,

Boniface K. Aiu
 BONIFACE K. AIU
 Fire Chief

BKA:JAF:eya

| | Info | Comments | Act | Int'l |
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| ✓ AED | | | | |
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| Sec | | | | |
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| Purch | | | | |
| Environ | | | | |
| Land Use | | | | |
| Other | | | | |
| 1 CFB | | | | |
| File | 0-1581/356a | | | |

R. Harada
L. Harada

HAWAIIAN ELECTRIC COMPANY, INC.
Box 2750 / Honolulu, Hawaii / 96840



February 5, 1979

JOHN C. McCAIN, Ph.D.
DIRECTOR, ENVIRONMENTAL DEPARTMENT

ENV 2-1
General
NV/G/NV

RECEIVED
HAWAII HOUSING
AUTHORITY
FEB 7 9 35 AM '79

State of Hawaii
Department for Social Services & Housing
Hawaii Housing Authority
P. O. Box 17907
Honolulu, Hawaii 96817

Dear Sirs:

Subject: Comments on Supplemental EIS Preparation Notice for the Proposed Kauhale Aupuni O Kuliouou Residential Subdivision, Kuliouou, Oahu

Several members of the staff of Hawaiian Electric Company have reviewed the document cited above. We have a few comments which may be of interest to your agency.

Hawaiian Electric Company does not see any problem in serving the additional load due to the subdivision. The new load due to the substation may hasten the need for construction of the new Niu Substation. Hawaiian Electric Company holds an easement of 25 feet in width for the future construction of a second 46 kv feed to the new Niu Substation (shown in red on attached map). This line will be visible to future residents and the EIS should, therefore, contain a statement to this effect so that new residents of the subdivision may be apprised of this fact.

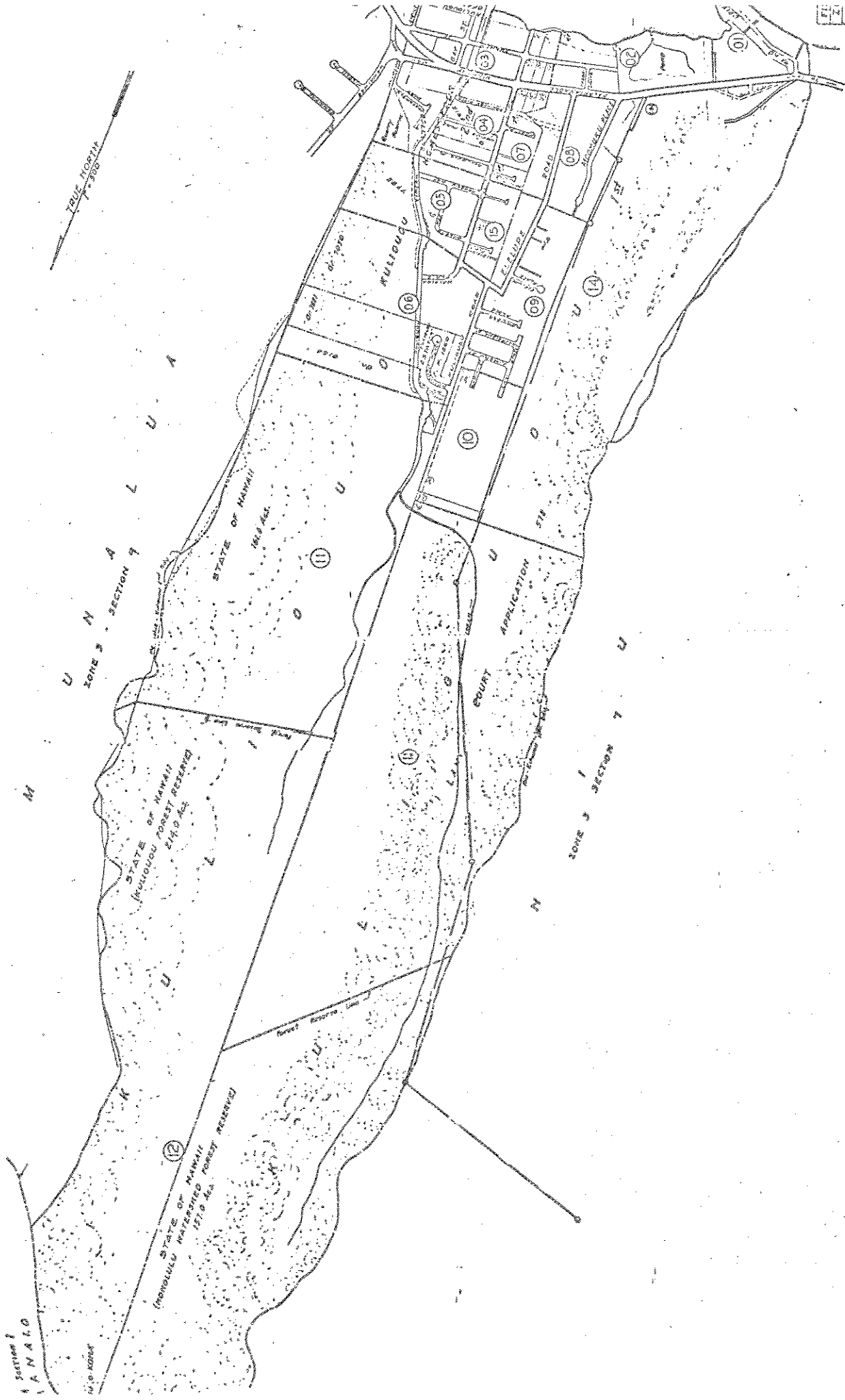
Sincerely yours truly,

John C. McCain

JCMc:cal
Enclosure

| | Info | Comments | Act | Infl |
|---|-----------|----------|-----|------|
| 2 | ED | | | |
| | 7 ED | | | |
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| | Purch | | | |
| | HMP | | | |
| | Leas. Ref | | | |
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Section 1
A N A T O



SECTION 3 SHEET
PART 3 COUNTY

1051
COUNTY OF OAHU

PRINTED

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

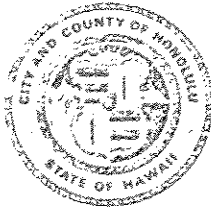
1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 AREA CODE (808) 955-8111

K. Harada
K. Harada

HANK F. FASI
MAYOR
ARD Y. HIRATA
AGING DIRECTOR

FRANCIS KEALA
CHIEF
EUGENE FLETCHER
DEPUTY CHIEF

FEB 13 10 14 AM '79



Suspense

OUR REFERENCE NM-JS
YOUR REFERENCE 0-158.1/123

February 8, 1979

Mr. Franklin Y. K. Sunn
Executive Director
Department of Social Services and Housing
Hawaii Housing Authority
P. O. Box 17907
Honolulu, Hawaii 96817

Attention: Mr. Ken Harada

Dear Mr. Sunn:

Subject: Your letter of January 18, 1979, relating to
Supplemental EIS Preparation Notice For the Proposed
Kauhale Aupuni O Kuliouou Residential Subdivision,
Kuliouou, Oahu

We have reviewed the above-mentioned subject.

To provide your department with a more accurate description of what our department looks at, in terms of an Environmental Impact Statement, we are assuming 200 households as a bottom-line figure for our purposes. But we will utilize your figure of 800 persons for estimating Police Service Requirements.

Residential Population

800 persons to be expected with the construction of the proposed project. (As an example, we use a current ratio of 3.4 persons per household for estimating residential population increases, e.g., assuming 200 dwellings to be constructed, a population increase of 680 inhabitants could be expected).

Vehicles Per Household

An assumption of 200 dwellings to be built and using a current ratio of 2.0 vehicles per household, an increase of 400 vehicles can be expected.

| | | POLICE DEPARTMENT | |
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| 1 | CFD | | |
| | File | 0-158.1 | 5372 |

Mr. Franklin Y. K. Sunn

-2-

February 8, 1979

Police Service Requirements

Based on our current ratio of 2.1 police officers per one-thousand populace, an estimated population increase of 800, along with the attendant workload increase, could justify an additional police officer.

Traffic Flow

Assuming an estimated increase of 400 vehicles, you can expect an increase in traffic on Elelupe, Kuliouou, and more congestion on Kalaniana'ole Highway, especially during morning and afternoon peak hour traffic. This is a definite concern for the local residents.

Access

The two roadways (Elelupe and Kuliouou) leading in and out of the area appear to be adequate for handling the additional traffic load.

We hope this information will be of assistance to you.

Sincerely,

FRANCIS KEALA
Chief of Police

Mr. Franklin Y. K. Sunn
February 8, 1979
Page 2

The long-delayed Kuliouou Neighborhood Park is meant to serve not only the 800 residents expected to occupy the new residential subdivision, but also the 3,253 existing residents (1970 Census) in Census Tract 1.03.

I hope this clarifies our position on this problem.

Warm regards.

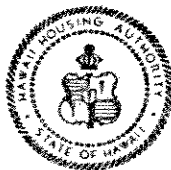
Sincerely,


RAMON DURAN, DIRECTOR

RD:1s

cc: Office of Environmental Quality Commission
Department of Land and Natural Resources
Mrs. Jeri Tam, President
Kuliouou Community Association

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

IN REPLY REFER

TO:

0-158.1/496

February 28, 1979

Mr. Ramon Duran, Director
Department of Parks and Recreation
City and County of Honolulu
650 S. King Street
Honolulu, HI 96813

Dear Mr. Duran:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

Thank you for your response of February 8, 1979 to the supplemental EIS Preparation Notice for our project in Kuliouou Valley.

We fully realize that the proposed park is intended for use by all of the residents of Kuliouou Valley. Therefore, to assure the adequacy of the park site, we have taken your guidelines for a neighborhood park and placed it within the confines of the area. The attached map shows what kind of facilities which can be considered for the proposed park.

We hope this clarifies our position on this matter.

Please be assured that your comments will be incorporated in the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

Sincerely,

RICHARD HIRATA

for HAROLD I. KURIHARA
Development Administrator

Attachment
cc: KVA/HD&C Joint Venture

PICNIC AREA

Mound E-E
1032'

TRUE NORTH

11,600 N

Mound E-D

FUTURE PARK SITE

(SOCCER)

SOFTBALL FIELD

BASKETBALL - VOLLEYBALL COMBINATION COURT

10 CAR PARKING

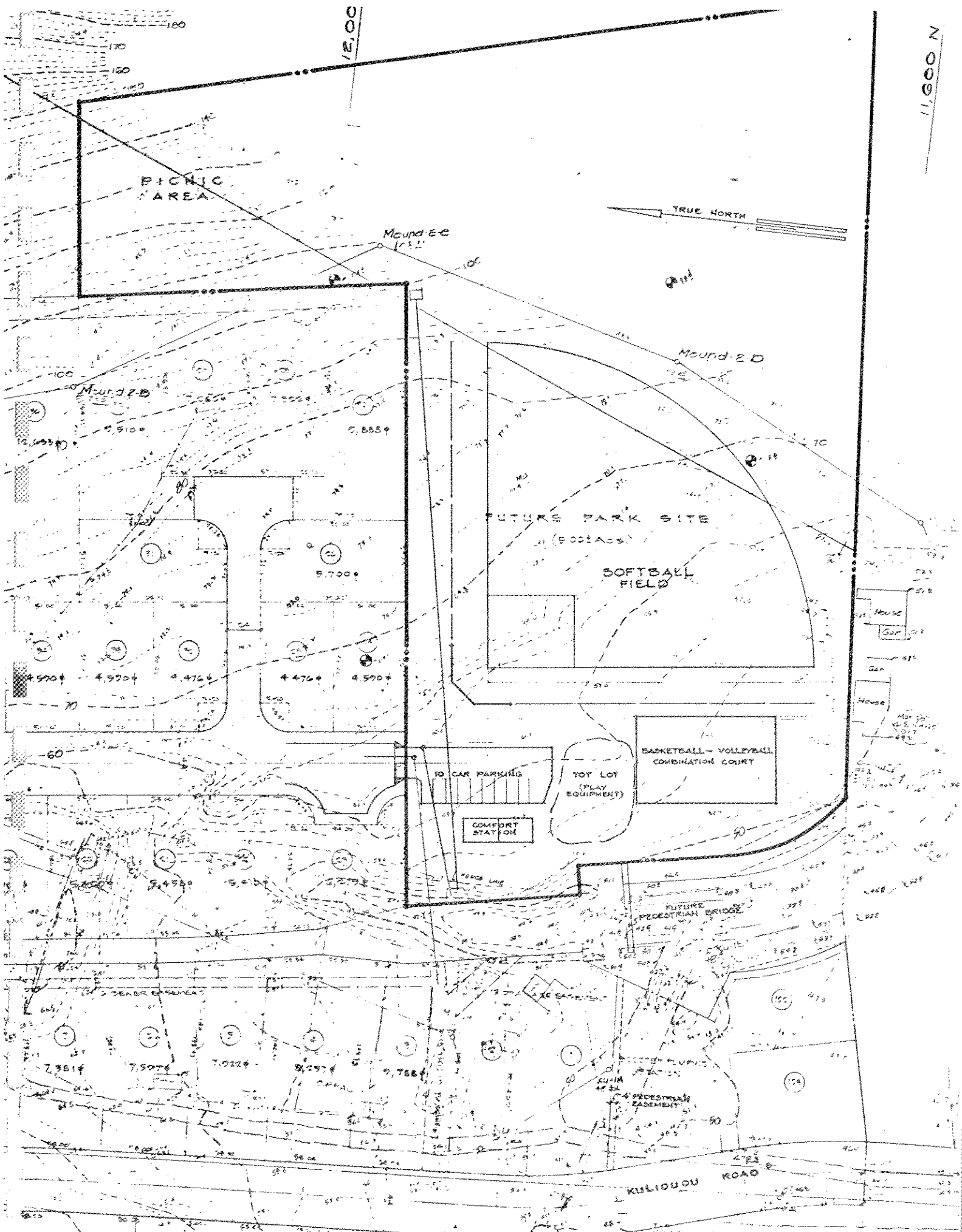
TOY LOT (PLAY EQUIPMENT)

COMFORT STATION

FUTURE PEDESTRIAN BRIDGE

PEDESTRIAN EASEMENT

KULIQUOU ROAD





GEORGE R. ARIYOSHI
GOVERNOR

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:

0-158.1/465

February 26, 1979

Mr. Robert Way, Director
Department of Transportation Services
City & County of Honolulu
650 S. King Street
Honolulu, HI 96813

ATTENTION: Mr. Akira Fujita


Gentlemen:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

Thank you for your response of February 1, 1979 to the EIS preparation notice and your comments on traffic flow. We concur with your statements. Please be assured that your comments will be incorporated into the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

Sincerely,


HAROLD I. KURIHARA
Development Administrator

cc: KVA/HD&C Joint Venture



GEORGE R. ARIYOSHI
GOVERNOR

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

February 26, 1979

TO:

0-158.1/464

Mr. Boniface Aiu, Fire Chief
Fire Department
City & County of Honolulu
1455 S. Beretania Street, Room 305
Honolulu, HI 96814

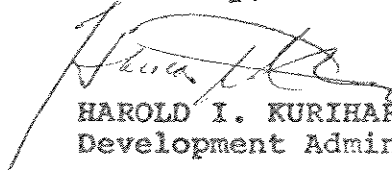
Dear Mr. Aiu:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

Thank you for your letter of January 29, 1979. It is encouraging to learn that there will be adequate fire protection services from the Hawaii Kai and Wailupe Fire Stations. Please be assured that your comments will be incorporated into the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

Sincerely,


HAROLD I. KURIHARA
Development Administrator

cc: KVA/HD&C Joint Venture

GEORGE R. ARIYOSHI
GOVERNOR



FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

February 26, 1979

TO-158.1/462

Dr. John McCain, Manager
Environmental Department
Hawaiian Electric Company
P. O. Box 2750
Honolulu, HI 96840

Dear Dr. McCain:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

This is to acknowledge the information provided in your letter of February 5, 1979. Please be assured that your comments will be incorporated into the supplemental EIS.

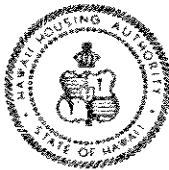
Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

Sincerely,


HAROLD I. KURIHARA
Development Administrator

cc: KVA/HD&C Joint Venture

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

February 26, 1979

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

IN REPLY REFER

TO 0-158.1/461

Mr. Howard J. T. Lee
Gasco, Inc.
P. O. Box 3379
Honolulu, HI 96842

Dear Mr. Lee:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

Thank you for your letter of January 31, 1979 informing the Authority of the availability of synthetic natural gas service to the Kuliouou Project site. Please be assured that your comments will be incorporated into the supplemental EIS.

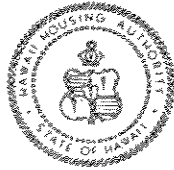
Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

Sincerely,


HAROLD I. KURIHARA
Development Administrator

cc: KVA/HD&C Joint Venture

GEORGE R. ARIYOSHI
GOVERNOR



FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:

February 26, 1979

MEMORANDUM

TO: The Honorable George Yuen, Director
Department of Health

ATTN: Dr. James S. Kumagai
Deputy Director of Environmental Health

FROM: Mr. Franklin Y. K. Sunn
Executive Director

SUBJECT: Kauhale Aupuni O'Kuliouou - Supplemental EIS Preparation
Notice

Thank you for your letter dated February 1, 1979. This is to advise you that prior to and during the construction of the project, the contractors will be required to secure all necessary permits and to abide by all applicable regulations. They will be requested to minimize disturbance to the neighborhood as much as possible. Please be assured that your comments will be incorporated into the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Harold Kurihara at 848-3211.

FRANKLIN Y. K. SUNN
Original Signed

FRANKLIN Y. K. SUNN
Executive Director

cc: KVA/HD&C Joint Venture

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

IN REPLY REFER

TO:

0-158.1/467

February 26, 1979

Mr. Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
City & County of Honolulu
630 S. Beretania Street
Honolulu, HI 96843

Dear Mr. Hayashida:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

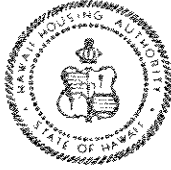
Thank you for your comments of February 7, 1979 on the proposed development. Rest assured that the water system will be designed in full accordance with your standards and that you will be kept informed as to the status of the project. Also, please be assured that your comments will be incorporated into the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

Sincerely,


HAROLD I. KURIHARA
Development Administrator

cc: KVA/HD&C Joint Venture



GEORGE R. ARIYOSHI
GOVERNOR

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

February 28, 1979

TOO-158.1/493

Mr. Francis Keala, Chief
Police Department
City & County of Honolulu
1455 S. Beretania Street
Honolulu, HI 96814

Dear Chief Keala:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

Thank you for your analysis of February 8, 1979 on the impact the Kauhale Aupuni O'Kuliouou development will have on your department. Your prompt response was greatly appreciated.

Please be assured that your comments will be incorporated in the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

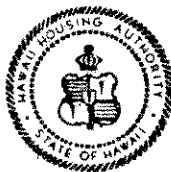
Sincerely,

RICHARD HIRATA

for HAROLD I. KURIHARA
Development Administrator

cc: KVA/HD&C Joint Venture

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

February 28, 1979

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

IN REPLY REFER

TO 0-158.1/494

Mr. Jack P. Kanatz
State Conservationist
U. S. Department of Agriculture
Soils Conservation Service
P. O. Box 50004
Honolulu, HI 96850

Dear Mr. Kanatz:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

Thank you for your comments of February 15, 1979 on the type of soil in Kuliouou Valley. We are well aware of the problems and have secured analysis from two soils engineers. Attached is a copy of their conclusions and recommendations.

Please be assured that your comments will be incorporated in the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

Sincerely,

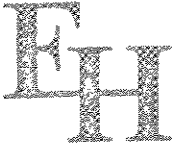
RICHARD HIRATA

for

HAROLD I. KURIHARA
Development Administrator

Attachment

cc: KVA/HD&C Joint Venture



ERNEST K. HIRATA & ASSOCIATES, INC.

Soils and Foundation Engineering

905 Makahiki Way, Makai Suite • Honolulu, Hawaii 96826 • Phone 941-5055

October 17, 1978
W. O. 281-C

Kuliouou Valley Associates
Suite 1818, Pacific Trade Center
190 South King Street
Honolulu, Hawaii 96813

Attention: Mr. Kiku Yanagi

Gentlemen:

Our report, "Preliminary Soils Investigation, Kau Hale Aupuni O'Kuliouou, Kuliouou Valley Project, Kuliouou, Oahu, Hawaii, TMK: 3-8-10: 5, 6, & 7 and 3-8-11: 1", dated October 17, 1978, our Work Order 281-C is enclosed. This is the report requested by you, and planned in cooperation with Media Five Limited, Architects, and Muroda & Associates, Inc., Civil Engineers.

With the exception of some surface fill, all soils encountered on the site can be classified as talus or alluvium deposits formed during the weathering of the Koolau Mountain Range. The surface soils consisted of a grayish brown silty clay with numerous cobbles and boulders. Underlying the silty clay was a mottled orangish brown clayey silt with cobbles and boulders in a stiff condition.

It is our opinion that the site is feasible for development. We recommend that development be restricted within the talus and alluvium deposits. Development should be restricted to areas with slope gradients of approximately 25 percent or less. Recommendations are presented in this report for the development of the site.

We appreciate this opportunity to be of service. Should you have any questions concerning this report, please feel free to call on us.

Very truly yours,

Ernest K. Hirata & Associates, Inc.


Ernest K. Hirata President

EKH:yk

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

IN REPLY REFER

TO:

0-158.1/495

February 28, 1979

Peter D. Stearns
Colonel, Corp of Engineers
Department of Army
U. S. Army District, Honolulu
Building 230
Fort Shafter, HI 96858

Dear Colonel Stearns:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

Thank you for your comments of February 9, 1979 on the impact of the subdivision on the existing flood control channel. Our engineers will be in contact with your office to assure that the channel will meet all governmental agency standards.

Please be assured that your comments will be incorporated in the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

Sincerely,

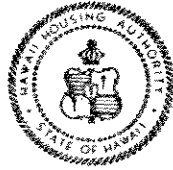
RICHARD HIRATA

for

HAROLD I. KURIHARA
Development Administrator

cc: KVA/HD&C Joint Venture

GEORGE R. ARIYOSHI
GOVERNOR



FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:

0-158.1/466

February 26, 1979

Mr. Tyrone T. Kusao, Director
Department of Land Utilization
City & County of Honolulu
650 S. King Street
Honolulu, HI 96813

Dear Mr. Kusao:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

Your letter of February 5, 1979 is hereby acknowledged.

Due to the reduction in the scope of the project from the original PDH of 408 units to a subdivision of 203 units and the subsequent lessening of the demands on the infrastructure of the area, it is our belief that the impact to the environment of the revised plans for the development would be significantly reduced.

The retrieval of the archeological data prior to the start of the development has been an ongoing process and the developers have been working with the Historic Preservation Office of the Department of Land and Natural Resources to provide guidelines for the retrieval of information. (See attachments)

However, this report is being prepared due to the determination by the Director of the Office of Environmental Quality Control that a supplemental EIS is required.

Please be assured that your comments will be incorporated into the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

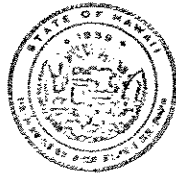
Sincerely,


HAROLD I. KURIHARA
Development Administrator

Attachments

cc: KVA/HD&C Joint Venture

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



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

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

January 23, 1979

Mr. Kikuo Yanagi
Valley Associates
190 S. King Street, Suite 1818
Honolulu, Hawaii 96813

Dear Mr. Yanagi:

Thank you for the opportunity of reviewing the proposal for test excavations in Kuliouou Valley submitted to you by Chiniago Inc. on 22 January 1979. It is the opinion of Dr. Hommon that the proposed work is sufficient to accomplish the task of gathering data upon which a program of major salvage excavations can be based.

Please inform this office of the starting date for test excavations as soon as it has been determined. Thank you for your cooperation in this matter.

Very truly yours,


Raiston H. Nagata, AIA
Acting Director
Historic Preservation Office

CHINIAGO INC.

Archaeological Consulting

76 N. King St. Room 202 · Honolulu, Hawaii 96817 · (808) 521-2785

January 22, 1978

Mr. Kikuo Yanagi
Valley Associates
Suite 1818
190 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Yanagi:

In order to more accurately assess the nature and extent of cultural deposits in archaeological sites to be affected by construction activities in Kuliouou Valley, Chiniago Inc. proposes to conduct test excavations in the following sites:

1403

1405, Features A and C

1408, Features A and E

1414, Features A, I, and M

1416, Features A, B, C, D, E, G, K, and O

As the specific purpose of these excavations is to provide a basis for the preparation of a final scope of work for the archaeological salvage of the sites, final analysis of the materials is not included, but will await the completion of the entire project.

Sincerely yours,



William Barrera, Jr.
President



GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

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

November 15, 1978

Mr. Kikuo Yanagi
KVA-HD&C (Joint Venture)
1818 Pacific Trade Center
Honolulu, HI 96813

Dear Mr. Yanagi:

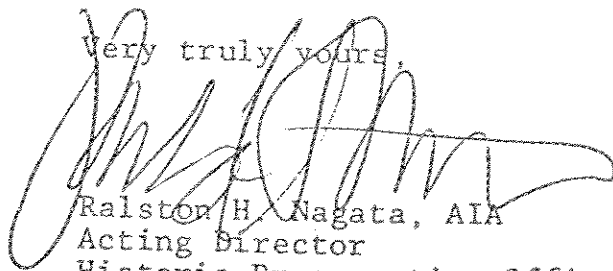
Subject: Kuliouou Valley Subdivision

Thank you for your letter of November 14, 1978. During our recent discussion with you, we understand that prior to any construction work in the area of archaeological sites recorded by William Barrera, you will engage the services of an archaeologist to retrieve data from the existing physical remains.

The guidelines for the retrieval of information will be provided through a scope of work to be provided by this office under separate cover.

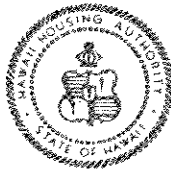
Based on this understanding, the provisions of Chapter 6-E, HRS will be met and our approval is granted.

Very truly yours,



Ralston H. Nagata, AIA
Acting Director
Historic Preservation Office

cc: Allen Lock, HC&D
Ken Harada, HHA



GEORGE R. ARIYOSHI
GOVERNOR

FRANKLIN Y. K. SUNN
EXECUTIVE DIRECTOR

WILLIAM A. HALL
ASSISTANT EXEC. DIRECTOR

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:

0-158.1/463

February 26, 1979

Mr. Wallace Miyahira, Director
Department of Public Works
City & County of Honolulu
650 S. King Street
Honolulu, HI 96813

Dear Mr. Miyahira:

Subject: Kauhale Aupuni O'Kuliouou
Supplemental EIS Preparation Notice

The following is our response to your comment of January 25, 1979.

1. Channel Improvements of Kuliouou Stream will be constructed through the project site. To assure continuity with the existing flood control project, the new channel will be designed in accordance with the design standards of the Department of Public Works, City and County of Honolulu.
2. The Division of Sewers of the Department of Public Works has informed the project's engineer that sewer connection will be permitted to the existing SMH #81 and that the existing public sewer facilities are adequate to accommodate the subject development. (See attachments)

Please be assured that your comments will be incorporated into the supplemental EIS.

Should you have any questions regarding the above, please do not hesitate to contact Mr. Kenneth Harada at 848-3211.

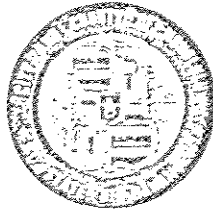
Sincerely,


HAROLD I. KURIHARA
Development Administrator

Attachments
cc: KVA/HD&C Joint Venture

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



RANK F. FASI
MAYOR

WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

SPSS 77-295

October 24, 1977

Mr. Carl Muroda
Muroda & Associates, Inc.
1259 South Beretania Street
Honolulu, Hawaii 96814

Dear Mr. Muroda:


Subject: Your Letter of September 22, 1977, Relating
to the Proposed 195-unit Subdivision
Tax Map Key: 3-8-10: 5, 6, 7 and 3-8-11: 1

The existing public sewer facilities are adequate to accommodate the subject development. Based on the proposed 195 units and the future 130 townhouse units, our revised computations show no need for the relief line which would have been required for the earlier proposal of 550 units on the subject property.

There will be no sewer assessment or connection charge for connecting to the City's system. However, the developer will be required to construct the necessary sewer lines and laterals at his own expense. Also, after completion of the development and after the homes are occupied, each owner will be charged the prevailing monthly sewer service fee. The present monthly rates are \$4.85 for single-family and duplex units and \$3.40 for multiple units.

If there are any questions regarding this matter, please contact Mr. Albert Imamura or Mr. Godfrey Ching at 523-4409.

Very truly yours,


FOR WALLACE MIYAHIRA
Director and Chief Engineer

NOV 3 1977

City and County of Honolulu

INFORMATION FOR SEWER CONNECTION

(Items 1 to 10 to be filled by Applicant)

1. Project Name: KAU HALE AUPUNI O'KULIOUOU
2. Address or Location: KULIOUOU VALLEY
3. Tax Map Key: 3-8-10: 5, 6, & 7 and 3-8-11: 1
4. Type Development: PD-H Cluster Subdiv. 203
Apt. Other:
5. Total No. of Units: 203 (Give breakdown below)
Studio 1 Bdrm. 2 Bdrm. 3 Bdrm. 203
4 Bdrm. Other:
6. Sewer Connection Work Desired: (Give length, size, depth, etc.)
Connection to Existing SMH #81 at end of Kuliouou Road. - 8" Sewer main.
7. Approximate Date Connection is Required: August 1979
8. Number and Type of Existing Structures on Property: Shacks, Sheds and Corrals
(Check One: Structures to Remain To be Demolished)
9. Remarks: Request extension of time for connection. Previous approval of connection expired on October 21, 1978.
10. Information Provided By:
Name: CARL T. MURODA Date: February 6, 1979
Firm: MURODA & ASSOCIATES, INC. Phone: 531-5959
Address: 1259 South Beretania Street Honolulu 96814
Street City Zip

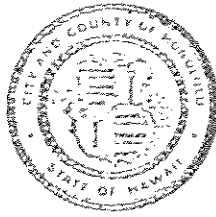
(Items 11 to 15 to be filled by Division of Sewers)

11. Present Zoning: _____ General Plan: _____
12. Sewers: Adequate Inadequate Not Available
Other: _____
13. Charges: Yes No
a. Sewer Assessment X sq. ft.. \$ _____
Rate Area
b. Sewer Connection Work..... \$ _____
c. Total Estimated Charge..... \$ _____

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

HONORABLE
FRANK F. FASI
MAYOR



WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER

SPECIAL NOTICE

Dear Applicant for Sewer Connection:

The National Pollutant Discharge Elimination System (NPDES) Permit for the facility which will serve your development, required that the City improve the treatment process by July 1, 1977. Although every effort was made, the City was not able to meet the requirement. Consequently, the Federal Environmental Protection Agency (EPA) or the State Department of Health (DOH) may restrict the use of the treatment facility until the requirement is met.

As of June 20, 1977 the State Department of Health, which administers the permit requirements for the Environmental Protection Agency has not been able to advise us as to the consequences we might face for noncompliance. One of the penalties might take the form of a restriction on the quantity of sewage flowing into the treatment facility. If this penalty is imposed, we would not be allowed to permit your development to connect to the system.

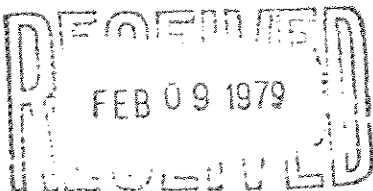
We wish to inform you therefore that although connection permits will continue to be issued, we may be required to revoke the permits or restrict additional discharge from your development into our system depending on the action taken by EPA and DOH. In the meantime, we will press for a firm resolution of the situation so as to minimize disruptions to your project planning.

If you are not the owner, or developer, you should inform your client about this notice.

Very truly yours,

Wallace Miyahira

WALLACE MIYAHIRA
Director and Chief Engineer



GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



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

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

November 15, 1978

Mr. Kikuo Yanagi
KVA-HD&C (Joint Venture)
1818 Pacific Trade Center
Honolulu, HI 96813

Dear Mr. Yanagi:

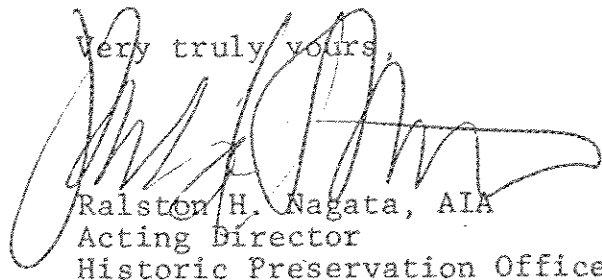
Subject: Kuliouou Valley Subdivision

Thank you for your letter of November 14, 1978. During our recent discussion with you, we understand that prior to any construction work in the area of archaeological sites recorded by William Barrera, you will engage the services of an archaeologist to retrieve data from the existing physical remains.

The guidelines for the retrieval of information will be provided through a scope of work to be provided by this office under separate cover.

Based on this understanding, the provisions of Chapter 6-E, HRS will be met and our approval is granted.

Very truly yours,



Ralston H. Nagata, AIA
Acting Director
Historic Preservation Office

cc: Allen Lock, HC&D
Ken Harada, HHA

CHINIAGO INC.

Archaeological Consulting

76 N. King St. Room 202 • Honolulu, Hawaii 96817 • (808) 521-2785

February 28, 1979

Mr. Kikuo Yanagi
Valley Associates
81 S. Hotel Street, #211
Honolulu, Hawaii 96813

Dear Mr. Yanagi:

Our test excavations at Kuliouou Valley have demonstrated that the archaeological deposits located there are not as extensive as we had originally supposed. These test pits revealed the presence of a primarily geologically-deposited soil high in clay content, almost certainly the result of alluviation during periods of high stream flow, on the alluvial terrace adjacent to the present stream-bed. Beneath this deposit, at depths varying between 20 and 40 centimeters, were the remains of pre-Hawaiian stream deposits. On the slopes of the valley, above the present alluvial terrace, the test pits revealed the presence of naturally-deposited slope-wash and talus materials.

It appears that the Hawaiian utilization of this part of Kuliouou Valley did not involve permanent, and probably not even temporary, habitation. The only cultural materials found were fragments of basaltic glass and charcoal. None of the midden remains ordinarily found in Hawaiian occupation sites [shell remains, bone, basalt artifacts, etc.] were found. For this reason, the suggested scope of work for the project has been modified so as to concentrate on geological and sedimentological studies of the sequence of deposition and the precise nature of the Hawaiian exploitation of the area. It seems most likely at this point that agricultural pursuits were the primary focus of Hawaiian utilization, and the archaeological investigation of this research problem should receive a primary emphasis in the excavation project.

The revised scope of work previously transmitted to you takes into account all of the above factors.

Sincerely yours,



William Barrera, Jr.
President

CHINIAGO INC.

Archaeological Consulting

76 N. King St. Room 202 . Honolulu, Hawaii 96817 . (808) 521-2785

January 22, 1978

Mr. Kikuo Yanagi
Valley Associates
Suite 1818
190 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Yanagi:

In order to more accurately assess the nature and extent of cultural deposits in archaeological sites to be affected by construction activities in Kuliouou Valley, Chiniago Inc. proposes to conduct test excavations in the following sites:

1403

1405, Features A and C

1408, Features A and E

1414, Features A, I, and M

1416, Features A, B, C, D, E, G, K, and O

As the specific purpose of these excavations is to provide a basis for the preparation of a final scope of work for the archaeological salvage of the sites, final analysis of the materials is not included, but will await the completion of the entire project.

Sincerely yours,



William Barrera, Jr.
President



GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

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

January 23, 1979

Mr. Kikuo Yanagi
Valley Associates
190 S. King Street, Suite 1818
Honolulu, Hawaii 96813

Dear Mr. Yanagi:

Thank you for the opportunity of reviewing the proposal for test excavations in Kuliouou Valley submitted to you by Chiniago Inc. on 22 January 1979. It is the opinion of Dr. Hommon that the proposed work is sufficient to accomplish the task of gathering data upon which a program of major salvage excavations can be based.

Please inform this office of the starting date for test excavations as soon as it has been determined. Thank you for your cooperation in this matter.

Very truly yours,


Raiston W. Nagata, AIA
Acting Director
Historic Preservation Office

KULIOUOU VALLEY ARCHAEOLOGICAL SURVEY

[REVISED]

William Barrera, Jr.

For: Kuliouou Valley Associates
Suite 1818
190 South King Street
Honolulu, Hawaii 96813

By: Chiniago Inc.
76 North King Street
Honolulu, Hawaii 96817

December 31, 1978

PREFACE

This report is being revised in order to clarify an ambiguity present in the original report which might lead to serious misunderstandings regarding the recommendations which were made for two of the sites included herein. Table 1 indicates a recommendation of "preserve" for Sites 1416 and 1417, while on page 23 it is stated that archaeological excavations of these two sites, as well as others, should be conducted if the sites are to be endangered by development of the project area. At the time of the original preparation of this report it was believed that Sites 1416 and 1417 would not be endangered by that development, and the preserve recommendation was made because we felt that their presentation to the public in a museum-type atmosphere would be beneficial to the community. This recommendation was not intended to preclude the possibility of archaeological excavations. It has since come to our attention that the most recent development plans include the area of these two sites, and this report is therefore being modified to indicate a recommendation of "excavate" for them. This is in no way an alteration of the original recommendations, but rather, a clarification of the above-mentioned ambiguity.



December 31, 1978

William Barrera, Jr.
Chiniago Inc.

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I. INTRODUCTION

The archaeological survey presented in this report was done for Kuliouou Valley Associates, who are planning a residential development in the area. Because State-owned land is involved, Hawaii State Law requires that archaeological research be done prior to any construction.

Previous research in Kuliouou has been limited. Emory and Sinoto (1961) have reported the results of excavations in three caves at the mouth of the valley, which produced a wide range of artifacts reflecting both marine and terrestrial exploitation. Walk-through surveys were conducted by Bernice P. Bishop Museum in 1974 and 1975 at the request of private parties who required only a cursory assessment of the archaeological remains for general planning purposes. The necessarily brief reports on these reconnaissance projects provided tantalizing hints of the prehistoric resources of the valley, but a detailed survey was lacking.

II. PHYSICAL BACKGROUND

Kuliouou Valley is located on leeward Oahu near the southeastern end of the Koolau Range (Figure 1). The lower part of the valley has been turned into a residential neighborhood, but the inland portion is relatively untouched. At present it is used for grazing, and occasional hikers utilize the trail.

The relatively flat floodplain of the valley is situated between slopes which are as great as 80% near the ridges. The slope is more gradual (circa 35%) in the survey area, which encompasses the floodplain and the hillsides to an elevation of about 300 feet above sea level at the north end and 70 feet above sea level at the south.

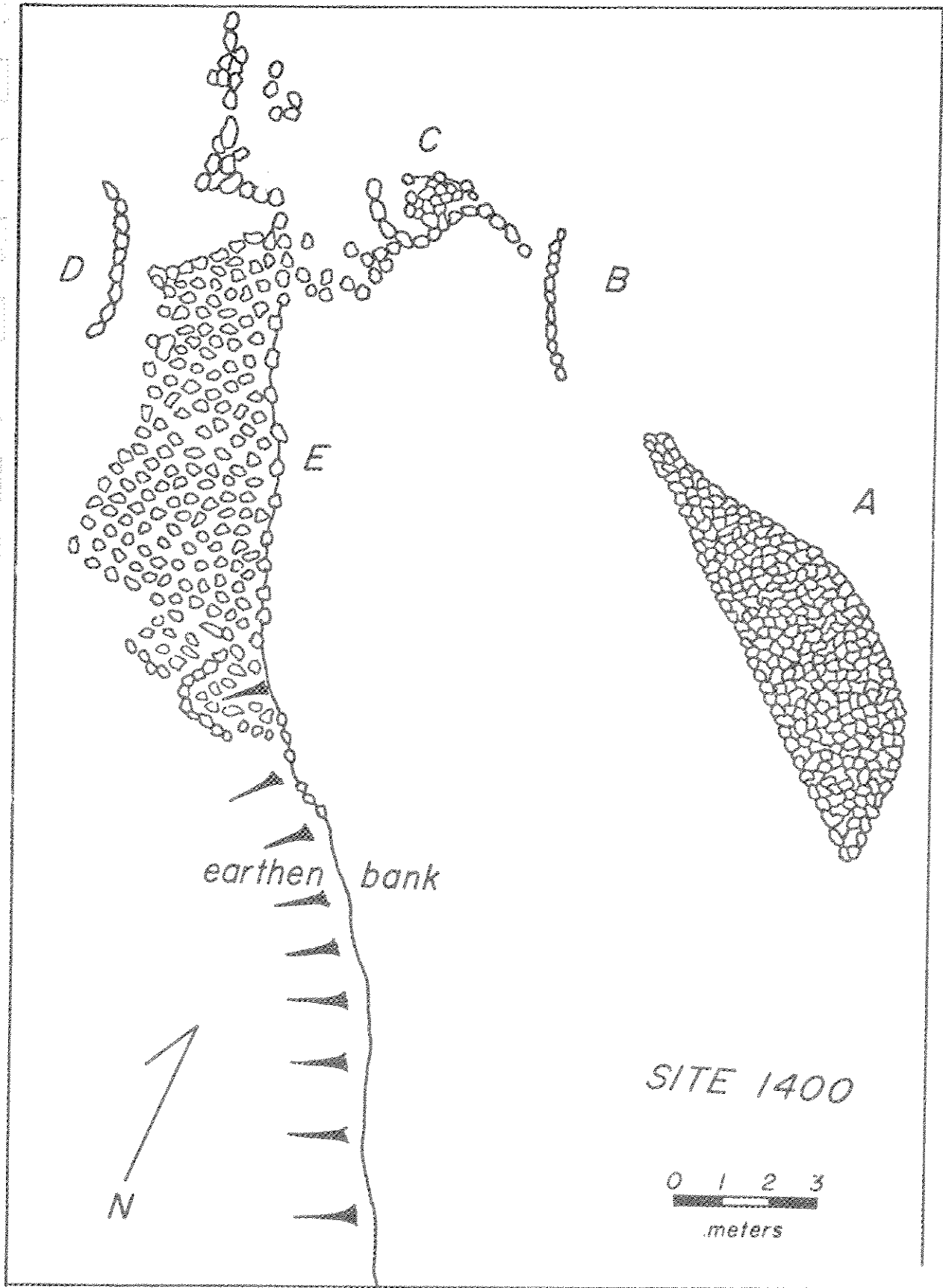


Figure 3. SITE 1400

by 1.6 meters and standing 45 centimeters high.

FEATURE D - This is a stone alignment 3.5 meters long, about 30 centimeters wide and standing to a height of 40 centimeters.

FEATURE E - This is an area of rock rubble approximately 15 meters long and 4.2 meters at its widest. The upslope edge of the feature is fairly well delineated, and follows the top of a natural earthen bank. The lower portion is collapsed, and might represent the remains of a terrace.

SITE 1401

This is a crude stone mound, approximately 25 centimeters in height, situated on a large boulder. The mound measures 45 by 80 centimeters, and is situated on a sloping hillside on the east side of the valley.

SITE 1402

This is a crude mound of rocks standing to 40 centimeters in height, and measuring approximately 4 by 9 meters. It is situated on the east side of the valley on a sloping hillside. This site would be of little interest but for the fact that a number of basalt flakes and a hammerstone were found on the surface.

SITE 1403

(Figure 4)

This is the remains of a crude L-shaped shelter measuring 3 meters along one arm and 4 meters along the other, and standing to a height of 1 meter. The long arm is free-standing, but the last 1.3 meters of the other arm

is constructed on top of a large boulder, resulting in a total height at that end of 1 meter.

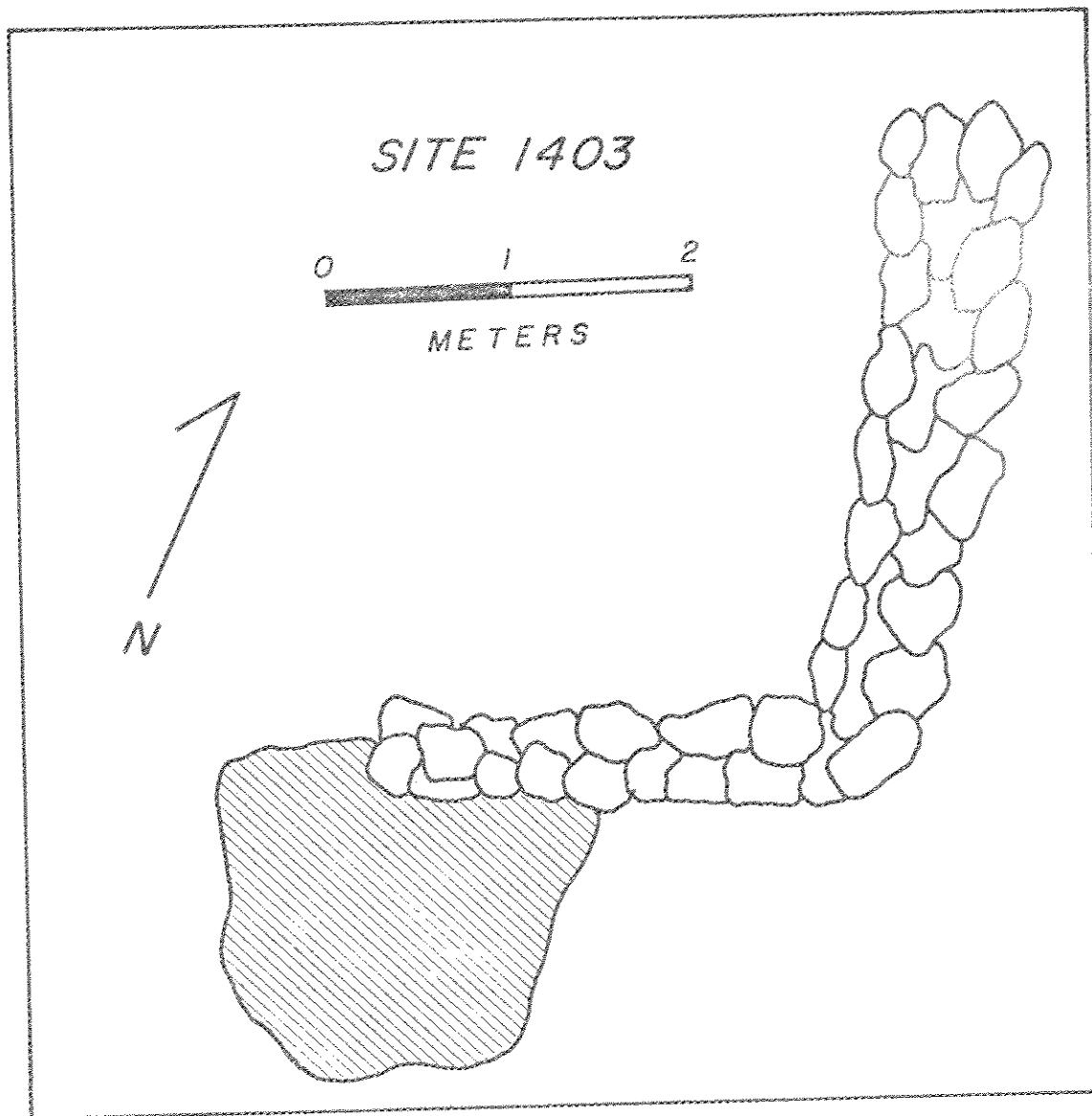


Figure 4. SITE 1403

SITE 1404

This is a crude mound of rocks measuring 30 by 80 centimeters, sitting on a large boulder on the east slope of the

valley, near the lower end of the survey area.

SITE 1405
(Figure 5)

This is a complex of possible habitation features and a mound on the west side of the valley. Three features are included.

FEATURE A - This is a possible house platform measuring 2.8 by 3 meters and standing to a height of 40 centimeters.

FEATURE B - This is a possible house platform measuring 2.8 by 4 meters and standing to 75 centimeters in height. Approximately one-half of the area of the feature is composed of an exposure of basalt bedrock.

FEATURE C - This is a mound of rock measuring 2 by 3.8 meters and standing 75 centimeters high. It was constructed by placing an outline of large rocks (circa 60 to 70 centimeters in length) on the ground and then filling in the interior space thus created with smaller rocks.

SITE 1406

This is a segment of wall approximately 55 meters in length, 1.25 meters wide and 50 to 60 centimeters high. Much of the feature is deteriorated, and the ends of the wall have been destroyed by earthmoving activities.

SITE 1407
(Figure 6)

This site consists of two walls, one on either side of a side stream on the west side of the valley. The walls total approximately 105 meters in length, and are to 90

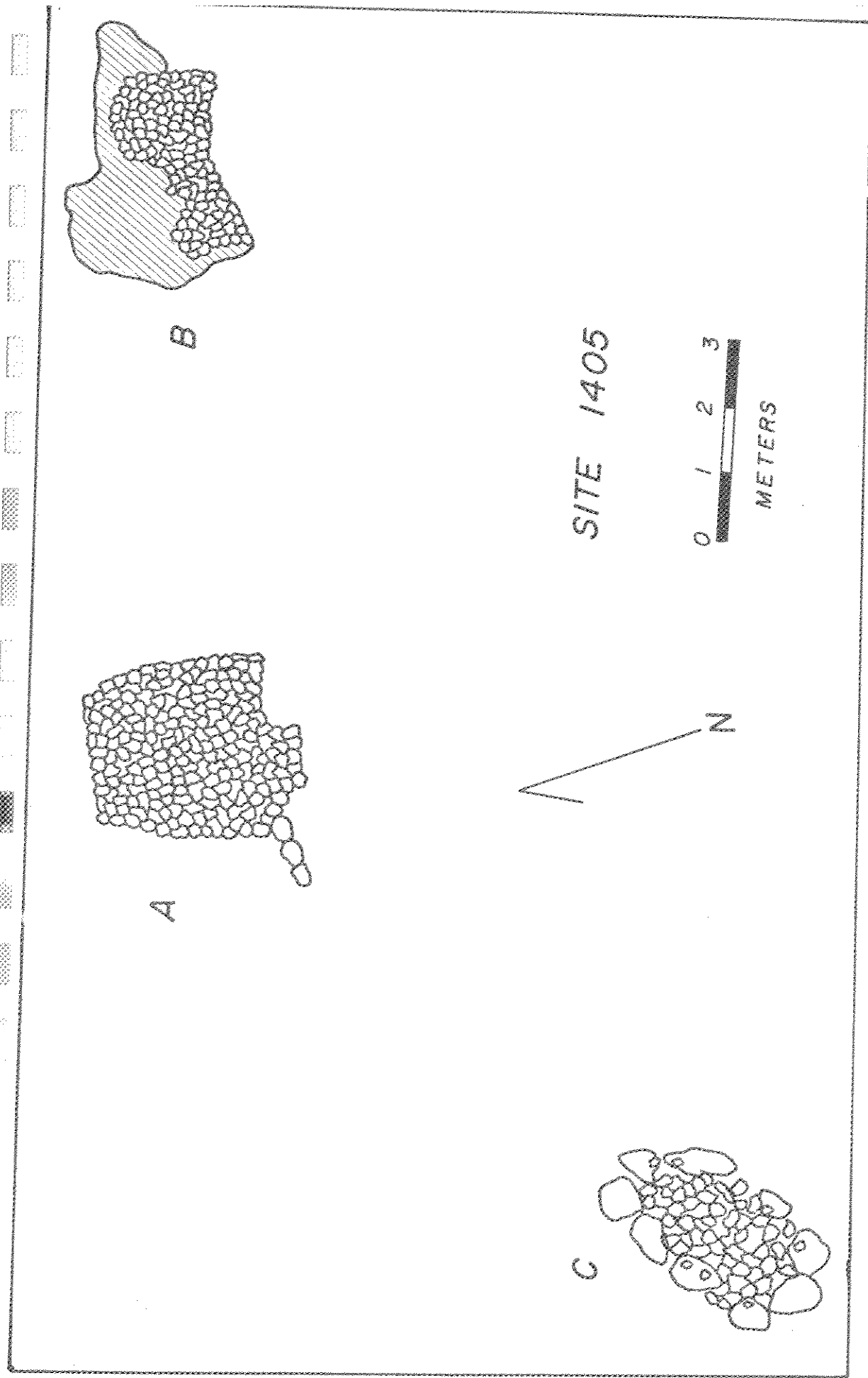


Figure 5. SITE 1405

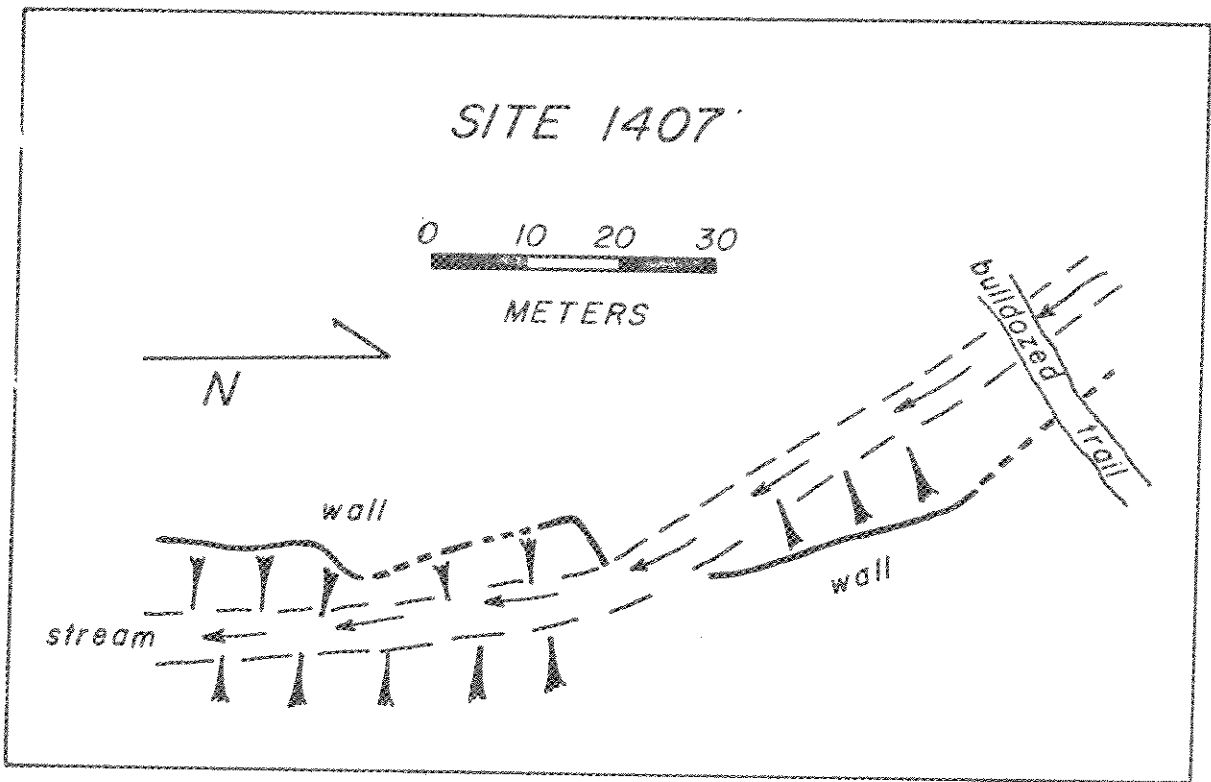


Figure 6. SITE 1407

centimeters in height and 70 centimeters in width. They are quite deteriorated in places, and at no point are they in better than fair condition. These features are probably historic, and associated with the raising of livestock.

SITE 1408
(Figure 7)

This is a large enclosure measuring 45 by 110 meters, with walls standing 40 to 60 centimeters in height and measuring about 50 centimeters in width. The main stream is located immediately adjacent to the enclosure, on the east. Five features are associated with the site.

FEATURE A - This is a 40 centimeter wide alignment of rocks situated outside the enclosure on the west, measuring

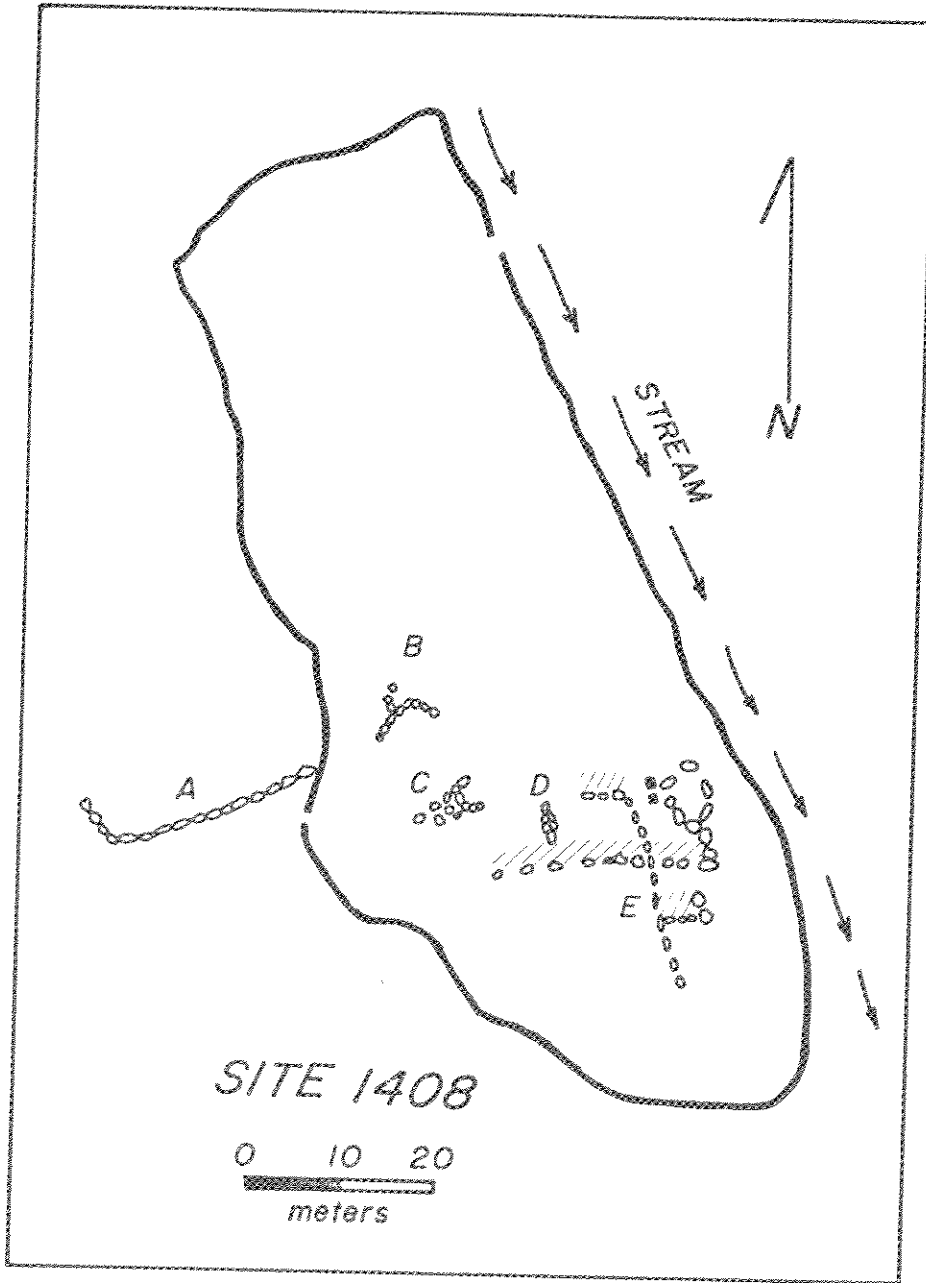


Figure 7. SITE 1408

23 meters in length, with a 5 meter long alignment attached to its west end. It possibly represents a deteriorated terrace or platform.

FEATURE B - This is an L-shaped shelter measuring 4 by

6 meters and standing 1 meter high.

FEATURE C - This is a C-shaped shelter measuring 3 by 4 meters and standing 60 centimeters high.

FEATURE D - This is a mound measuring 1.2 by 4 meters and standing 60 centimeters in height.

FEATURE E - This consists of four crude terraces, with retaining walls standing to a height of 40 centimeters. This feature covers an area of about 23 by 24 meters.

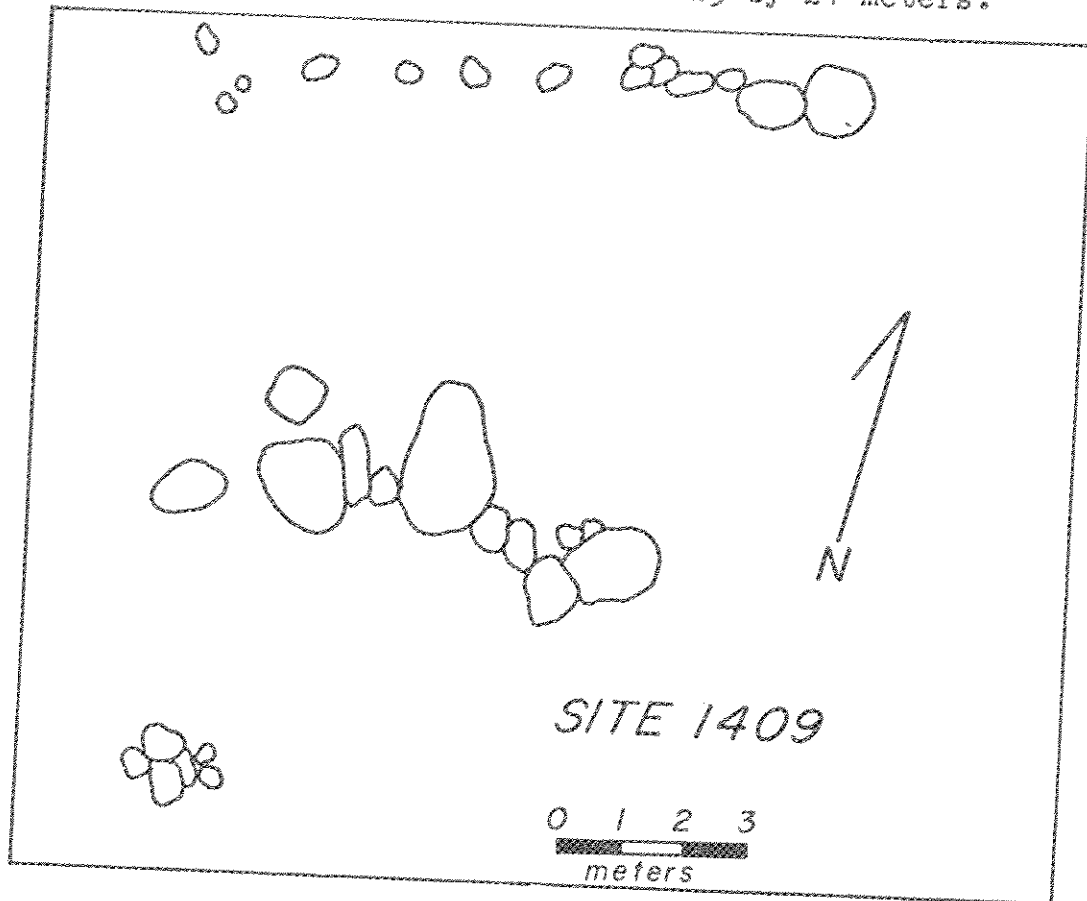


Figure 8. SITE 1409

SITE 1409
(Figure 8)

This site consists of two deteriorated walls, possibly

representing the remains of a platform or terrace and a C-shaped shelter. The north portion forms the south wall of the possible platform/terrace, and measures 11 meters in length, 60 centimeters in width, and stands to 60 centimeters high. The south wall measures about 2 by 7 meters, and stands to 90 centimeters high on the South side. The north side is almost level with the ground surface.

SITE 1410

This is a crudely built wall of large boulders, 27 meters in length, 2 to 3 meters in width, and to 1 meter in height.

SITE 1411

This is a walled enclosure measuring approximately 24 by 42 meters, each end of which abuts the slope on the west side of the valley. The wall stands to a height of 1.5 meters and averages about 1 meter in width.

SITE 1412

(Figure 9)

This site consists of a number of possible agricultural and/or habitation features at the base of the steep slope on the west side of the valley, approximately 15 meters from the main stream.

FEATURE A - This is a platform measuring 1.3 by 2.0 meters and standing to about 90 centimeters in height.

FEATURE B - This is a shelter measuring 1.5 by 1.7 meters, standing 90 centimeters high. One wall is shared with Feature A.

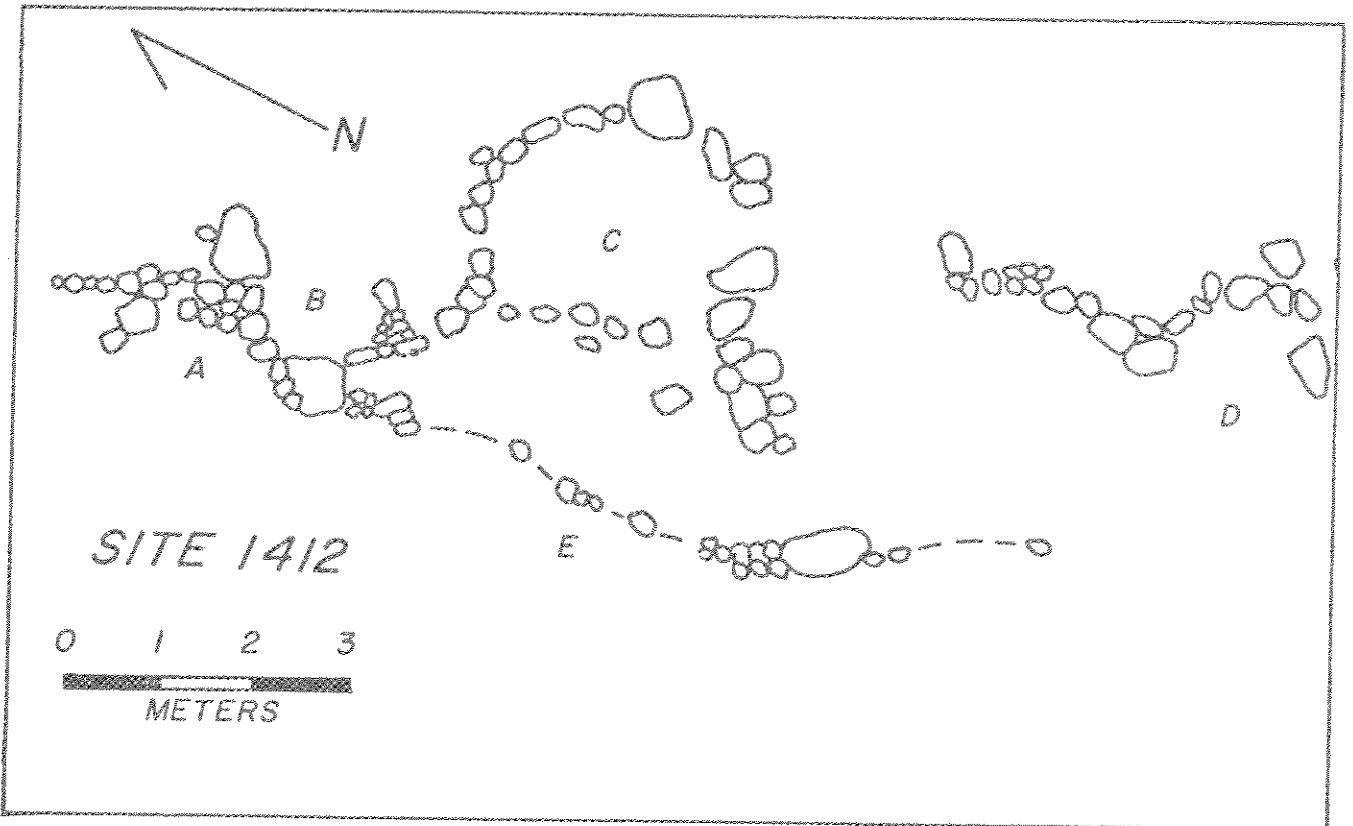


Figure 9. SITE 1412

FEATURE C - This is a platform measuring 2.7 by 3.4 meters, standing 45 centimeters high.

FEATURE D - This is a 4.3 meter length of wall, measuring 60 centimeters wide and to 90 centimeters high. Alluvium from the slope behind the feature is resting against its west side.

FEATURE E - This is a 7.6 meter long section of wall, indistinct in places, standing to 60 centimeters in height. As at Feature D, alluvium is piled against its upslope side.

SITE 1413

This site is possibly an extremely deteriorated platform, but may be detritus deposited by the adjacent streambed. It

measures approximately 1.3 by 4.8 meters and stands to a height of 15 centimeters.

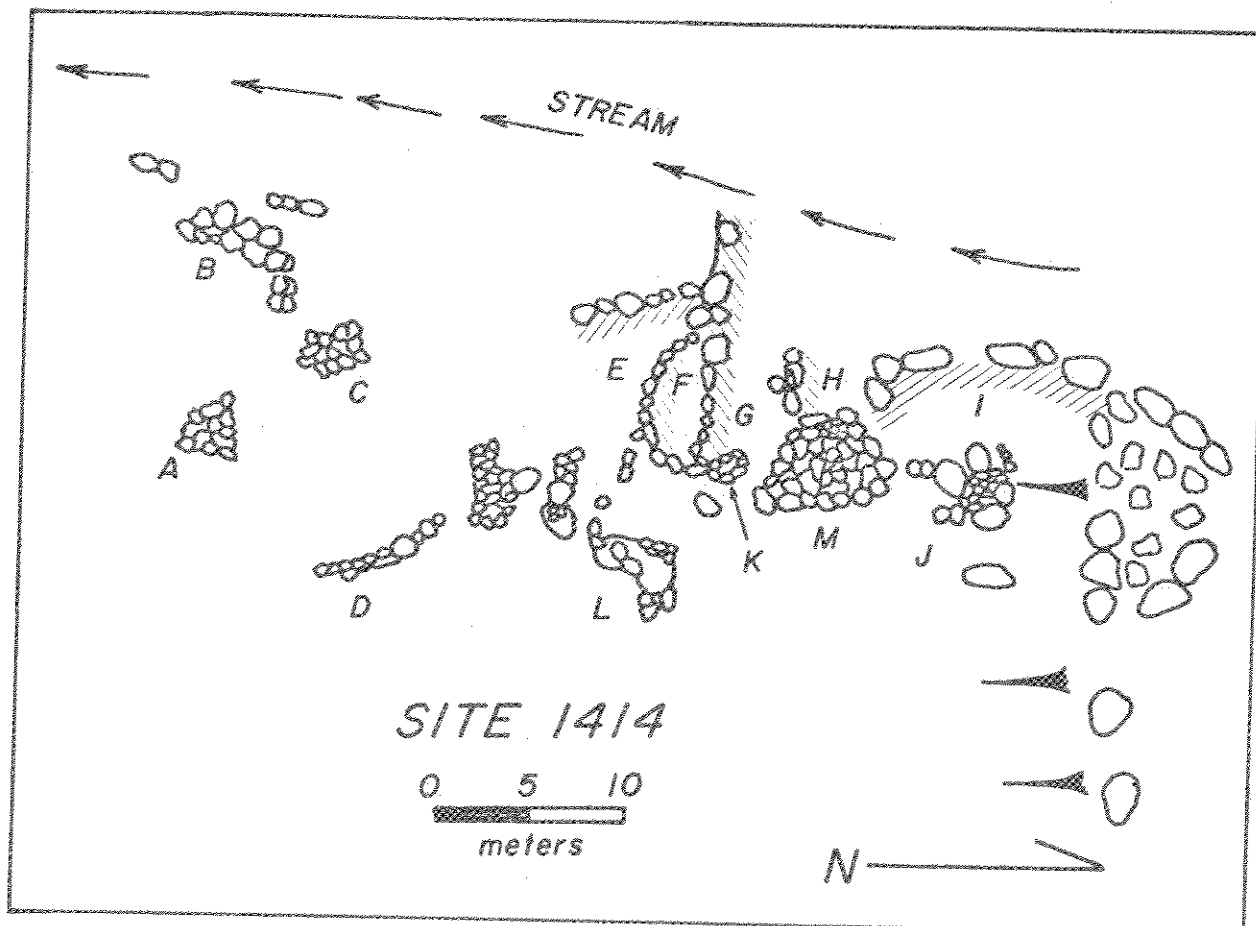


Figure 10. SITE 1414

SITE 1414
(Figure 10)

This is a complex of agricultural and other features measuring approximately 25 by 60 meters, situated on the floodplain on the east side of the main stream.

FEATURE A - This is a rock mound measuring 3 by 4 meters and standing 60 centimeters high.

FEATURE B - This is a rock wall, faced on the east side, forming a shallow L-shaped enclosure. The west wall is built

of rather large boulders, up to 1.4 meters in length, and stands to a height of 70 centimeters.

FEATURE C - This is a rock mound measuring 2.8 by 3.5 meters and standing 60 centimeters high.

FEATURE D - This is an elongate mound measuring 1 by 8 meters and standing 75 centimeters high.

FEATURE E - This is a terrace measuring approximately 5 by 11 meters, the front of which is not clearly delineated.

FEATURE F - This is a terrace measuring 3 by 6 meters. The front retaining wall stands 30 centimeters high. The back wall retains Feature G and stands 40 centimeters high.

FEATURE G - This is a terrace measuring approximately 4 by 7 meters. The retaining wall at the front is common with Feature F, and stands 40 centimeters high. The rear retaining wall, which is shared with Feature H, stands 55 centimeters high.

FEATURE H - This is a terrace measuring 3 by 5 meters, the front retaining wall of which is shared with Feature G.

FEATURE I - This is a terrace measuring approximately 4 by 11 meters. One side is delineated by large boulders, and another side by an area of scattered boulders.

FEATURE J - This is a small enclosure measuring 5 by 6 meters and standing 1.2 meters high. It is constructed of large boulders that form the exterior wall, with an interior fill of smaller rocks.

FEATURE K - This is an enclosure measuring 1.5 by 2.5 meters and standing to 95 centimeters in height.

FEATURE L - This is a C-shaped shelter measuring 4 by 6 meters and standing to 1 meter in height.

FEATURE M - This is a crude mound of rock, measuring 5 by 8 meters and standing 95 centimeters high.

SITE 1415

This is a crude L-shaped shelter constructed of large (to 1.5 meters in length) boulders. It measures 2.6 by 3 meters, and stands to a height of 1 meter.

SITE 1416

(Figure 11)

This is a habitation complex situated on the floodplain on the east side of the main stream, between the main stream and a possibly pirated watercourse to the east (see page 2). It measures approximately 38 by 86 meters, and contains 18 features.

FEATURE A - This is a retaining wall on the edge of the pirated stream. It measures 8 meters in length and 1.5 meters in width, and stands to a height of 40 centimeters.

FEATURE B - This habitation feature measures 5.5 by 7 meters. It is a C-shaped structure with walls to 2 meters wide and 1.1 meters high, the interior of which consists of a terrace standing 30 centimeters in height.

FEATURE C - This is an earthen platform or terrace measuring 6 by 6.7 meters and standing to a height of 55 centimeters. There is an exposure of rock rubble on the south side, which suggests that the structure was at least partially constructed of stone, but this cannot be definitely ascertained because of the deteriorated nature of the feature.

FEATURE D - This consists of three terraces. The east terrace measures 5 by 8 meters, and its retaining wall stands 40 centimeters high. The west terrace is roughly triangular, and measures 4 by 4.5 meters and stands 30 centimeters high. The north terrace measures approximately 2 by 5 meters, and stands 50 centimeters high.

FEATURE E - This is a small mound of rocks measuring 0.8 by 2 meters and standing 30 centimeters high.

FEATURE F - This is a rock mound measuring 3 by 3.2 meters and standing 75 centimeters high.

FEATURE G - This is a terrace measuring 5 by 8 meters with a retaining wall at the edge of the pirated watercourse. It stands as high as 60 centimeters.

FEATURE H - This is a terrace, the 40 centimeter high retaining wall of which is formed by the north side-wall of Feature G. It measures 2.5 by 6 meters.

FEATURE I - This is a mound of rocks measuring 1 by 1.9 meters and standing 80 centimeters high.

FEATURE J - This is a crude wall measuring about 12 meters in length and standing between 20 and 60 centimeters in height. The west half of the feature is situated in the pirated watercourse.

FEATURE K - This is a terrace measuring 5 by 6 meters, the front of which is formed by a 90 centimeter high retaining wall (Feature O).

FEATURE L - This is a mound or remnant of a wall measuring 2.5 meters in length, to 80 centimeters in width, and standing to a height of 60 centimeters.

FEATURE M - This is a rock mound measuring 3.3 by 5 meters and standing 60 centimeters high.

FEATURE N - This is a rock mound measuring 1 by 2.8 meters, standing to a height of 1 meter.

FEATURE O - This is a retaining wall measuring 17 meters in length and standing to a height of 90 centimeters. Features K and L are situated on the terrace formed by this wall.

FEATURE P - This is a mound measuring 1 by 1.4 meters and standing 60 centimeters high.

FEATURE Q - This is a mound of rocks measuring .7 by .7 meters and standing to a height of 50 centimeters.

FEATURE R - This is a 14 meter length of stone wall measuring up to 1.5 meters in width and 40 centimeters in height. It is situated opposite Feature O, 17 meters away, on the opposite side of the pirated stream, but is not shown on the map because of space considerations.

SITE 1417
(Figure 12)

This is a complex consisting of four features which probably comprise a single habitation structure. It is separated from Site 1416 by a bulldozed trail, and was probably originally the southernmost extension of that site.

FEATURE A - This is a mound measuring 2.1 by 5.5 meters and standing to a height of 60 centimeters. A 20 centimeter high stone alignment connects this feature to Feature B.

FEATURE B - This is a possible platform measuring 2.1 meters in width and 2.4 meters in length, and standing to a maximum height of 50 centimeters.

FEATURE C - This is a mound measuring 1 by 1.8 meters and standing 30 centimeters high. The perimeter of the feature consists of large rocks (to 40 centimeters in length) and the inside of smaller ones (10 to 20 centimeters long).

FEATURE D - This is a short wall segment measuring .8 by 2.1 meters. It stands 60 centimeters high on the West side, which faces the main stream, and 40 centimeters high on the east, which is a terraced area extending to Feature A.

SITE 1418

This is a mound measuring .7 by 1.5 meters and standing 60 centimeters high.

they depended upon rainfall for their water source. At no site were artificial ditches for the channeling of stream water to a terrace system observed.

The probability that dry agriculture practices were much more intensive than is directly indicated by the terraces themselves should not be ignored. Such techniques would have been well suited to the alluvial floodplain and the gentler slopes of the valley with minimal disturbance to the ground, and surface evidence of these activities would at best be slight.

No information on the archaeological remains of the valley between the north end of our survey area and the mountain ridges was gathered, but because this is the wettest part of the valley (rainfall averages between 35 and 60 inches annually in one section) one could reasonably expect irrigated agricultural remains.

Comparisons of the Kuliouou remains with those of Makaha and Kahana Valleys of Oahu are certainly in order:

"The archaeological evidence for the dry-agriculture aspect of (Kahana) - in the form of dry terraces, clearings, and field shelters - is interesting when compared to that of Makaha...The Makaha dry-agricultural pattern includes more than 150 small terraces and clearings... On the lower-valley talus slopes and side valleys of Kahana Valley we found no C- or L-shaped shelters and very few features that were identifiable as dry-agriculture garden plots..." (Hommon and Barrera 1971: 76).

The presence in Kuliouou of small, crude field shelters in association with dry agricultural terraces (Sites 1400, 1408, 1412 and 1414) is thus similar to the Makaha situation. Makaha and Kuliouou are both leeward valleys, so it is not unexpected that the patterns of utilization of each should

be roughly similar. Kahana's windward situation and wide, flat lower alluvial valley was much better suited to irrigated pondfield agriculture.

A distinct contrast between Kuliouou and both Makaha and Kahana Valleys is evident in the location of habitation sites. The fact that such an extensive, and probably permanent, living area as Site 1416 is situated so far from the coast is quite noteworthy. Possible habitations have been found so situated in Kahana and Makaha (Hommon and Barrera 1971: 59-68; Hommon 1970), but a nucleated settlement of this nature was quite unexpected. Hommon states in the Kahana report:

"Most of the habitation structures and probable habitation structures found in the survey were located in the lower valley, though for the most part they did not occur in clusters. Though the Hawaiians did not usually live in the type of nucleated settlement called a village, the usual settlement pattern recorded in the ethno-historic literature does seem to have consisted of a relatively dense concentration of houses near the shore and scattered houses farther inland" (Hommon and Barrera 1971: 77).

The presence of a pirated streambed adjacent to Site 1416, if confirmed as such by geological investigations, would be of considerable interest to an ecologically oriented prehistorian. Again, a parallel with Makaha Valley is indicated. There, the possibility of human-induced or -assisted environmental degradation was suggested:

"One point rests with the inundation of the first phase of the pond-field agriculture and the building up of soil levels for a second phase, only to be buried again. Already attributed to erosion, this

sequence may have been simply the reflection of a naturally unstable environment from a geological point of view. That the process could have been either initiated or accelerated by man, however, is a proposition that cannot be dismissed" (emphasis added) (Yen et al. 1972: 91).

One of the hypotheses forwarded for Makaha is essentially that burning of the valley slopes for the purpose of agricultural clearing and the concomitant change in ground cover either accelerated erosional processes already in effect, or contributed substantially to the initiation of erosional processes:

"If...the destruction of native forests was accelerated by pressures on the productive capacity of the agricultural system, then those forests, shrinking to the upper mountain sections of the upper valley, could have decreased the catchment area for rainfall and thus accelerated the erosion process" (Yen et al. 1972: 94).

With this in mind, one hypothesis generated by the Kuliouou survey is that the pirated streambed was the original water channel for Kuliouou Valley, that swidden agricultural activities on the slopes led to deforestation on a large scale followed by erosion of the hillsides, and that the increased burden of water placed on the mainstream led to the formation of the present steep-sided and rapidly flowing Kuliouou Stream. There can be little doubt that the present vegetation of the valley is substantially altered from its original state. As one example, the presence of only a few koa trees in the upper valley implies the existence of a much larger stand in the past.

It is clearly evident that Kuliouou Valley's archaeological remains are of considerable interest and importance to an understanding of Hawaiian prehistoric cultural development.

They take on added significance because of the extent of destruction that has occurred with the development of the metropolis of Honolulu. Residential construction in such areas as Hawaii Kai, Nuuanu, Kalihi, Manoa and Kalama, to mention only a few, has obliterated vast numbers of prehistoric remains. This gives the archaeological resources of Kuliouou a significance of such magnitude that they cannot, and must not, be dismissed in a casual manner. Archaeological excavations of Sites 1400, 1402, 1403, 1405, 1408, 1409, 1412, 1413, 1414, 1415, 1416 and 1417 are imperative if these sites are to be endangered by any development of Kuliouou Valley.

Table 1 summarizes the significance of each site, and presents recommendations for further action with regard to their protection. As can be seen from this table, it is recommended that prior to the construction of the housing development certain sites be excavated and the information derived from them be collected and filed.

| <u>SITE</u> | <u>PROTECTION</u> | <u>CATEGORY</u> | <u>FURTHER ACTION</u> |
|-------------|-------------------|-----------------|-----------------------|
| 1400 | State Register | Reserve | Excavate |
| 1401 | SHPO Files | Marginal | None |
| 1402 | State Register | Reserve | Excavate |
| 1403 | State Register | Reserve | Excavate |
| 1404 | SHPO Files | Marginal | None |
| 1405 | State Register | Reserve | Excavate |
| 1406 | SHPO Files | Marginal | None |
| 1407 | SHPO Files | Marginal | None |
| 1408 | State Register | Reserve | Excavate |
| 1409 | State Register | Reserve | Excavate |
| 1410 | SHPO Files | Marginal | None |
| 1411 | SHPO Files | Marginal | None |
| 1412 | State Register | Reserve | Excavate |
| 1413 | State Register | Reserve | Excavate |
| 1414 | State Register | Reserve | Excavate |
| 1415 | State Register | Reserve | Excavate |
| 1416 | National Register | High Value | Excavate |
| 1417 | National Register | High Value | Excavate |
| 1418 | SHPO Files | Marginal | None |

Table 1. Summary of Recommendations for Protection of Archaeological Remains on State of Hawaii Property Planned for Development in Kulicouou Valley, Oahu. [REVISED 12/31/78]

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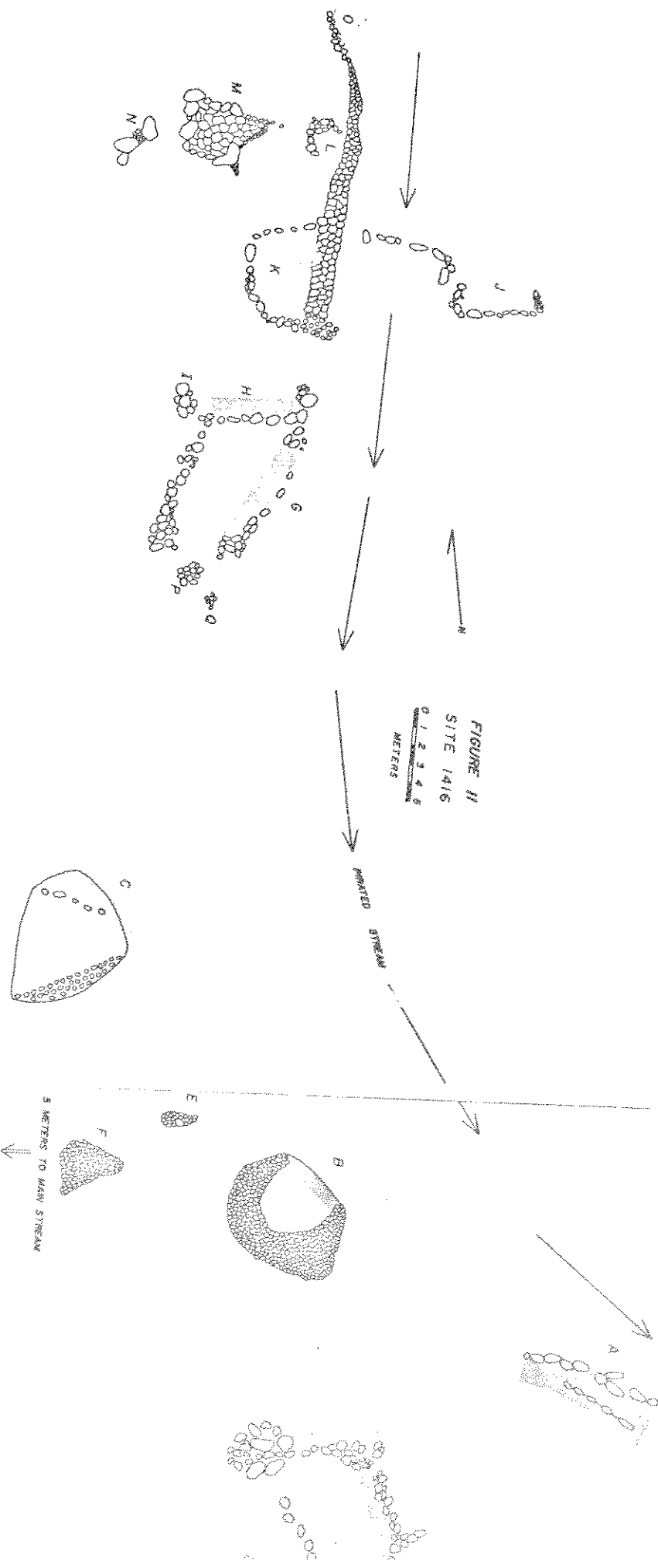


FIGURE II
SITE 1416
0 1 2 3 4 5
METERS

POLLUTED STREAM

5 METERS TO MAIN STREAM

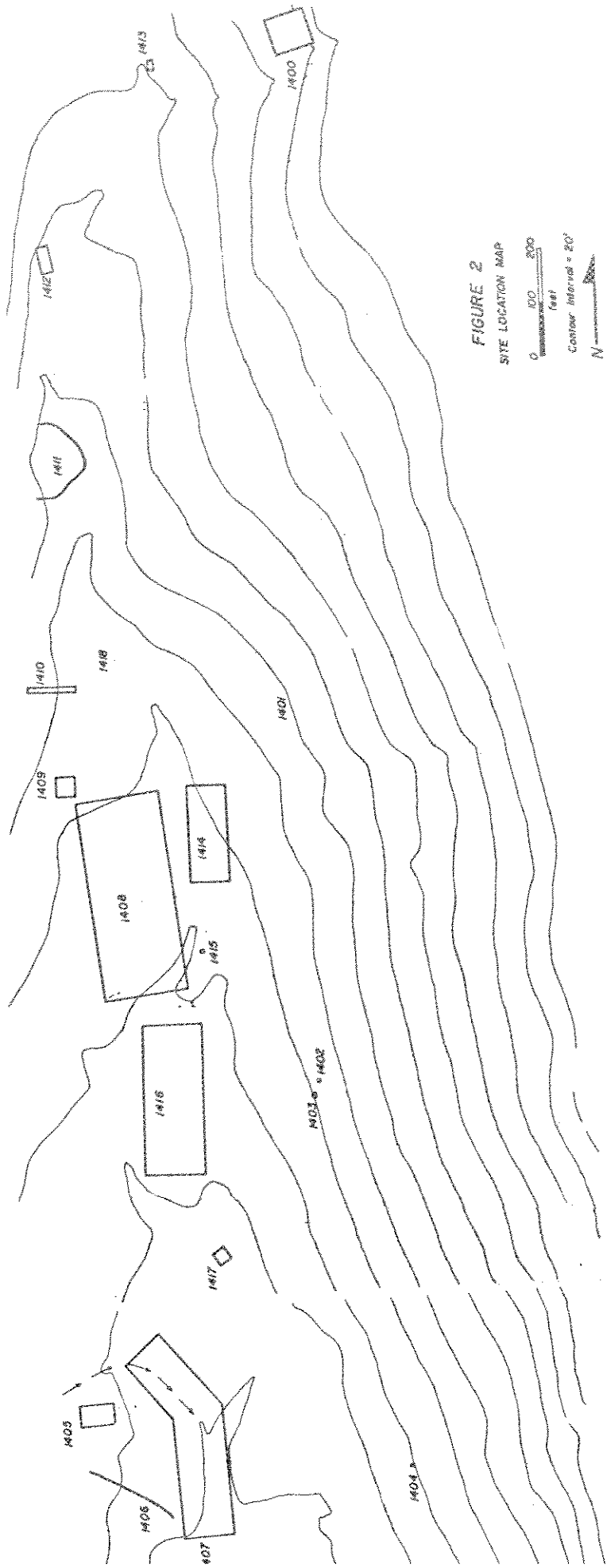


FIGURE 2
SITE LOCATION MAP

0 100 200
feet
Contour Interval = 20'
N

Ms. 120875

ARCHAEOLOGICAL RECONNAISSANCE SURVEY
OF PORTIONS OF KULIOUOU VALLEY
HONOLULU, OAHU ISLAND

by
Aki Sinoto

Prepared for
Kuliouou Valley Associates, Inc.
Honolulu, Hawaii

December 1975

DEPARTMENT OF ANTHROPOLOGY
BERNICE P. BISHOP MUSEUM

INTRODUCTION

BACKGROUND

At the request of Kuliouou Valley Associates, Inc., the Department of Anthropology, Bernice P. Bishop Museum, conducted an archaeological reconnaissance survey of a parcel of land at Kuliouou Valley, Honolulu, Oahu Island. This survey was done in connection with the Kuliouou Valley Associates' preparation of an Environmental Impact Statement for their proposed housing development in the valley.

Fieldwork was conducted on November 20 and December 2, 1975, by a Museum field team composed of Aki Sinoto and Margaret L. K. Luscomb. This report summarizes results of the reconnaissance survey, and contains recommendations and estimates for further archaeological work deemed necessary.

SCOPE OF WORK AND DEFINITION OF PROJECT AREA

The purpose of the reconnaissance survey was to locate any sites or features of possible archaeological significance. A reconnaissance survey is a walk-through survey--extensive rather than intensive--conducted to determine the presence or absence of any archaeological sites within a specified area. A reconnaissance survey (1) permits a preliminary evaluation of the archaeological and/or historic resources within a project area, and (2) facilitates the formulation of realistic recommendations and estimates for any further archaeological work necessitated by the findings. Such further work could include intensive survey--detailed recording of all sites and test excavations of selected sites (Phase I)--and possibly subsequent excavations--intensive salvage and/or research excavations of sites with significant research or interpretive potential (Phase II).

The survey area consists of approximately 66 acres (as shown on the contractor's map), mostly unimproved land below the Conservation District (Tax Map keys 3-8-10-5, -6, -7 and 3-8-11-por. 1). The project area can be separated into two portions with Kuliouou Stream as a natural division: (1) the square portion West of the river and of the access road, comprising an area of roughly 10.5 acres; and (2) the elongate portion, including the

streambed and the lands East of the stream, extending up to the Conservation District boundary and comprising about 55.5 acres. The North limit of the project area is defined by a tributary of the stream that branches to the East; the South limit is the boundary of the existing residential lots.

LOCAL ENVIRONMENT

The project area starts roughly near the middle of the valley; existing subdivisions and residential lots occupy the wider, more level areas closer to the mouth of the valley. Most of the project area is arid and rocky, with steep slopes and a narrow valley floor containing the streambed and floodplain. The stream is usually dry, except during periods of heavy rains, and thus is not well defined in places. Present usage of the area is limited to cattle grazing and horse corrals, and riding trails traverse the eastern slopes. Several bulldozer cuts also occur here at varying levels above the dropoff to the valley floor. The square western portion of the survey area (portion 1) has been extensively bulldozed.

Dominant vegetation in the slope portions of the survey area is *koa haole* (*Leucaena glauca* [L.] Benth.), and *wilelaiki* (*Schinus terebinthifolius* Raddi) in the lower valley floor bordering the stream. A variety of other vegetation is distributed throughout the survey area, including: guava (*Psidium guajava* [L.]), *klu* (*Acacia farnesiana* [L.] Willd.), *kiawe* (*Prosopis pallida* [Humb. and Bonpl. ex Willd.] HBK), *noni* (*Morinda citrifolia* [L.]), lantana (*Lantana camara* L.), and Eucalyptus sp. A few *wiliwili* trees (*Erythrina sandwicensis* Degener) trees grow on the upper slopes.

PREVIOUS SURVEYS IN THE PROJECT AREA

Minimal archaeological information is available on this portion of Kuliouou Valley, and no previous work has been done in this specific area. Most earlier work concentrated near the mouth of the valley and on the slopes of the upper valley where burial caves were known to exist.

McAllister recorded three sites in 1930 that he designated as terrace remains (site 50-OA-A2-4), Kauiliula Heiau (50-OA-A2-5), and Ahukini Heiau (50-OA-A2-6) [McAllister 1930]. From his descriptions, however, it appears

that these sites were all located near the mouth of the valley, and consequently they have been destroyed by development.

In 1950-51, three sites in the area, Kuliouou Shelter (50-OA-A2-1), Makaniolu Shelter (50-OA-A2-2), and Kawekiu Shelter (50-OA-A2-3) were studied intensively. The results of this work were published [Emory and Sinoto 1961]. Here again, however, the sites discussed are all located close to the coast.

The only recent work undertaken in the immediate vicinity of the project area was a reconnaissance survey of a 13-acre triangular parcel adjacent to portion 1 of the present survey. This work was conducted by Bishop Museum in November 1974, at the request of Haines, Jones, Farrell, White, and Gima [Connolly Ms.]. The several remains found during this survey suggest agricultural functions, in addition to two probable habitation sites.

Since the State archaeology laboratory has undertaken the Oahu Site Inventory for the Statewide Historic Site Inventory, additional information regarding sites may be available from the State as well.

SURVEY FINDINGS

The reconnaissance survey revealed that most of the sites occurred within the valley floor, bordering the stream and in the floodplain area. No recordable remains were found on the slopes. On the eastern slopes of the valley the lack of sites is probably due to the unfavorable topography--slopes range in steepness from 11 to 40%, and there are many talus and rubble deposits. On the western side of the valley, near portion 1, the slope is more gradual and favorable for various cultural activities. Here, unfortunately, due to extensive clearing and bulldozing any sites that may have existed have been destroyed.

North of portion 1 the valley narrows and the base of the steep slope (41%+) borders the stream bank. The sites located are distributed within a narrow strip bounded by Koa-3 (survey point) on the South to the northern boundary (see shaded area on map) and probably extend beyond to the head of the valley. These sites appear to be agricultural and consist primarily of

crude terraces, alignments, and walls defining small plots. Two deteriorated structures, possibly a small enclosure and a platform, were also seen. A stacked wall about 60 cm high and 50 cm wide, extending for c. 2,000 ft N/S (parallel to the stream), was also found. Remnant sections of river-bank retaining walls also occurred sporadically through this section. The generally poor state of preservation of these sites can be attributed mostly to stream erosion, flooding, and cattle.

CONCLUSION

DISCUSSION

Because of the preliminary nature of a reconnaissance survey, specific statements cannot be made about the Hawaiian occupation and exploitation of this portion of Kuliouou Valley and its relationships with adjoining coastal and valley areas. The project area, as discussed earlier, has not been previously studied and only cursory inventory of some sites has been done in the valley as a whole.

The marked paucity of structures that could be interpreted as habitation sites tentatively suggests that the primary utilization of this portion of the valley by the Hawaiians was for agriculture. As seen from the recent rains and the resulting flooding, this area was probably not favorable for habitation. Unfortunately, all of the potential data regarding the existing developed portion of the valley has been lost with the destruction of sites. In order to investigate the relationships of the sites in the project area and those nearer the coast [Emory and Sinoto 1961], and to substantiate the probability that this area was agriculturally exploited by people who lived at the mouth of the valley and in coastal areas, further archaeological work is necessary.

EVALUATIONS AND RECOMMENDATIONS

"C Although it is premature to attempt evaluations of significance of the Kuliouou Valley resources at this preliminary stage of investigations, certain statements can be made. Significance is defined in terms of research and/or interpretive potential. Research significance refers to the potential of a

site to yield information of value in understanding culture history, life-ways, and cultural processes at the local, regional, or interisland level. Interpretive significance refers to the potential of a site for public presentation and/or use due to its uniqueness or as a good example of a site type.

In general, individual sites found in the project area are not unique or outstanding examples of their types. Considered as an agricultural complex, however, the sites do have research potential--particularly because archaeological resources in the area are becoming more and more scarce, and potential sources of data are being lost, as the result of on-going development. These sites are subject to deterioration by natural processes, and threatened with imminent disturbance or destruction by development. Further work will allow recovery of valuable data that can be related to data recovered from coastal sites in the valley [Emory and Sinoto 1961]. Thus it is recommended that Phase I Intensive Survey be conducted prior to any construction activity that may disturb the sites. The proposed work would include:

- (1) location and plotting, on a project area base map, of all sites and features present;
- (2) clearing of all sites of vegetation and stream debris, and detailed recording of all sites and features by written descriptions, scaled plan maps and profiles, and photographs;
- (3) surface collection of portable cultural remains--midden, soil samples, and artifacts;
- (4) test excavations of selected sites and features.

It is estimated that a total of 496 man-hours are required to conduct a Phase I Intensive Survey of the scope outlined above. This comprises 256 man-hours of fieldwork and 240 man-hours of analysis and report preparation. Completion of the proposed Phase I Survey would allow informed evaluations of site significance and formulation of recommendations for any further work that might be necessary for maximum recovery of data.

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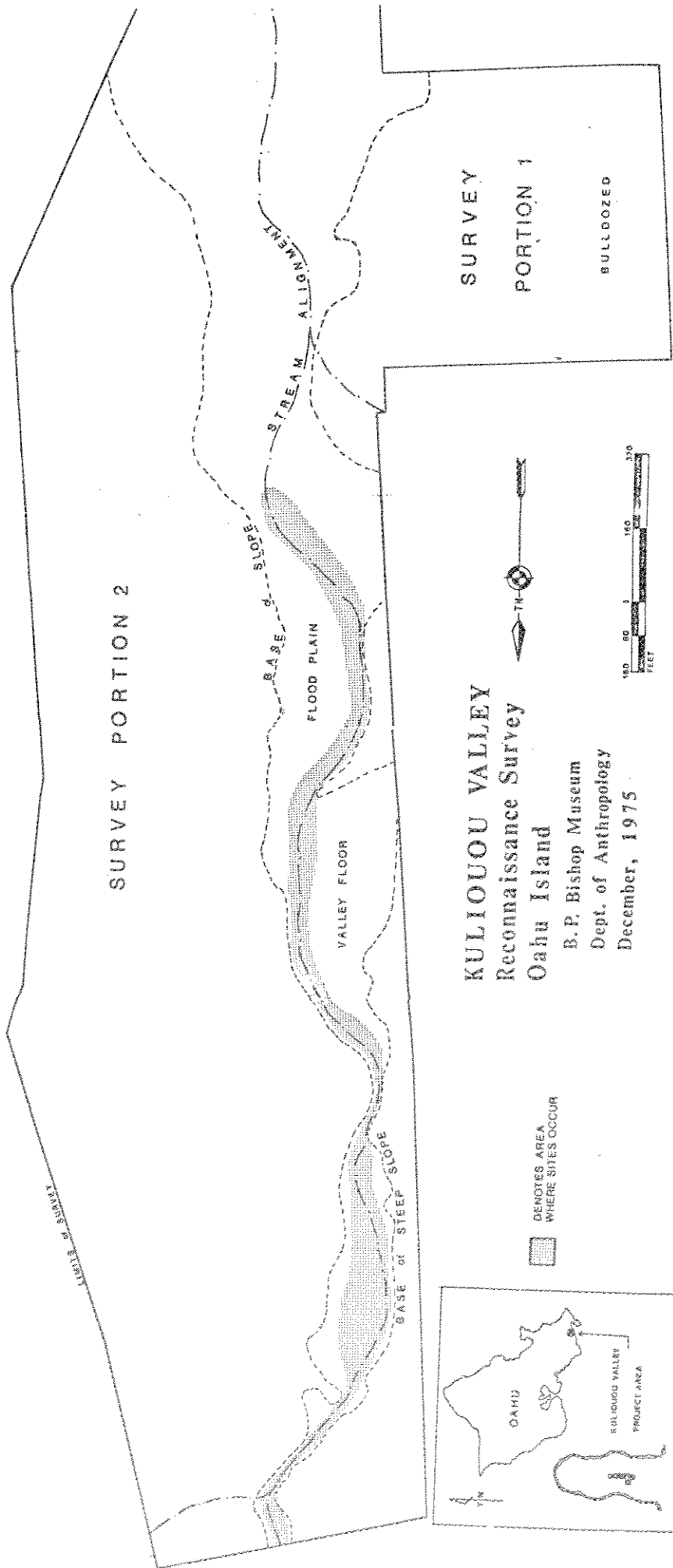
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SURVEY PORTION 2

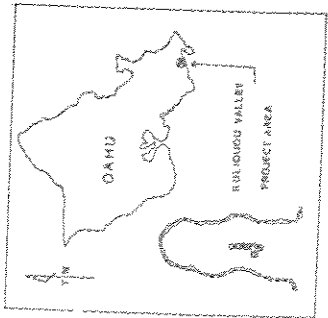
KULOOU VALLEY
 Reconnaissance Survey
 Oahu Island

B. P. Bishop Museum
 Dept. of Anthropology
 December, 1975

SURVEY
 PORTION 1

BULLDOZED


 DENOTES AREA
 WHERE SITES OCCUR



STREAM ALIGNMENT

BASE OF STEEP SLOPE

FLOOD PLAIN

VALLEY FLOOR

BASE OF STEEP SLOPE

BASE OF STEEP SLOPE