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GOVERNOR
STATE OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
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RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

November 23, 2001

To: The Honorable Bruce S. Anderson, Director
Department of Health

Attn: Genevieve Salmonson, Director
Office of Environmental Quality Control

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Keokea Agricultural Lots, Unit 1 Project
Finding Of No Significant Impact (FONSI) And Filing Of
Final Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

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RECEIVED

The State of Hawaii (State), Department of Hawaiian Home Lands (DHHL) has reviewed the Final Environmental Assessment (EA) for the subject project along with comments received on the Draft EA for the subject project during the 30-day public comment period that ended on August 7, 2001.

Consequently, the State DHHL determined that this project will not have significant environmental effects and issued a Finding of No Significant Impact (FONSI). Please publish this FONSI determination for this project in the next issue of the OEQC *The Environmental Notice*.

We have enclosed the following items for your use in this publication notice:

1. One copy of the OEQC Publication Form with project summary (project summary e-mailed to your office and hard copy enclosed); and
2. Four (4) copies of the Final Environmental Assessment.

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The following information, which supports DHHL's FONSI determination is provided:

Identification of Proposing Agency

State of Hawaii, Department of Hawaiian Home Lands

Identification of Accepting Authority

State of Hawaii, Department of Hawaiian Home Lands

Brief Description of Proposed Action

The State Department of Hawaiian Home Lands (DHHL) proposes to develop an agricultural subdivision on Hawaiian homestead lands in Keokea, Maui, Hawaii. Approximately 351 acres of DHHL homestead lands identified by Tax Map Key: 2-2-02:55 will be subdivided. The proposed agricultural subdivision project will consist of 82 total lots. The subdivision site will include 77 agricultural lots averaging 2.0-2.5 acres in size, a large 96-acre reserve lot, a 29-acre historic preserve, and three lots fronting Kula Highway to be used for future community purposes. Upon completion of the project, the smaller subdivided lots will be leased as agricultural homesteads to eligible native Hawaiians. The proposed agricultural subdivision layout will be configured to provide each lot with a significant portion of moderately sloped lands that would be considered farmable based on topography. Other improvements will include paved roadways, drainage, water irrigation, and above-ground utilities.

Determination

A Finding of No Significant Impact (FONSI) determination is warranted for the Keokea Agricultural Lots, Unit 1 Project. The results of the assessments conducted have determined that the agricultural subdivision proposed should not have a significant impact on the surrounding environment.

Reasons Supporting Determination

The reasons supporting this determination are based upon the 13 Significance Criteria listed under Title 11, Chapter 200 (Environmental Impact Statement Rules) of the State Department of Health's Administrative Rules.

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource. The subdivision would not result in the irrevocable commitment to loss or destruction of any natural or cultural resource. Appropriate mitigative and preservation measures will be developed with the State Historic Preservation Division of the Department of Land and Natural Resources and the Maui/Lanai Islands Burial Council to address historic sites present. There should be no destruction or loss of any significant, endangered, or threatened botanical, faunal, geological, or other natural resources since none are known to be present.
2. Curtails the range of beneficial uses of the environment. The project would not curtail the range of beneficial uses of the surrounding environment. This property is owned by DHHL along with other properties in the general surrounding area. This property has been designated for homestead development consistent with County land use plans and policies.
3. Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS. The agricultural subdivision would not conflict with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS. The impact assessment results discussed in the Final EA supports these policies and goals.
4. Substantially affects the economic, or social welfare, cultural practices of the community or State. The project would not have any significant negative impacts on economic factors, the Upcountry community, or its rural character. This project is not expected to adversely impact

traditional native Hawaiian cultural practices on the project site or in the immediate surrounding area.

5. Substantially affects public health. The project is not expected to substantially affect public health since the project would only involve an agricultural subdivision development. Construction of the subdivision infrastructure along with individual lots by lessees would be in conformance with State and County regulations and requirements.
6. Involves substantial secondary impacts, such as population changes or effects on public facilities. This project would not have significant adverse secondary impacts on the social environment or other infrastructure and public facilities. The project would slightly increase the resident population in the Upcountry region; however, many lessees would be existing Maui residents relocating to this area. Based upon prior experiences with other DHHL developments, this project may take well over 10 years to become fully occupied since many lessees would include retirees developing their lots when they retire or relocate from their existing locations. Thus, occupation of this subdivision would occur slowly over time lessening the impact on public facilities. Further, appropriate coordination is being conducted with agencies to address necessary infrastructure improvements.
7. Involves a substantial degradation of environmental quality. The agricultural subdivision would not involve a substantial degradation to the quality of the surrounding environment as discussed in the Final EA.
8. Is individually limited, but cumulatively has considerable effect upon the environment or involves a commitment for larger actions. This project would not have a significant adverse cumulative impact on the environment or involve a commitment for larger actions. The Final EA addressed the potential cumulative impacts associated with this project.

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9. Substantially affects a rare, threatened, or endangered species, or its habitat. There were no known endangered, threatened, or rare botanical resources within the project site; and, the improvements would also not substantially affect such resources that may occur in the general vicinity.
10. Detrimentially affects air or water quality or ambient noise levels. This project should not have a significant detrimental impact on air, water quality, or ambient noise levels in the immediate vicinity of the subdivision site. Impacts associated with these factors would generally be limited to short-term construction activities.
11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters. The project site is not located within an environmentally sensitive area such as those identified.
12. Substantially affects scenic vistas and viewplanes identified in county or state plans or studies. The project would not affect scenic vistas or viewplanes since there are none located on the project site or in the immediate vicinity.
13. Requires substantial energy consumption. The project would not require substantial energy consumption or increased electrical facilities. Appropriate coordination would be conducted with Maui Electric Company, Ltd. to address electrical requirements.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

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Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

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SUMMARY OF IDENTIFIED SITES AND FEATURES - WAIHOULI (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
47	Enclosure	Animal Control	L	L	L	-	-	-
48	Wall	Agriculture	M	L	L	+	+	+
49	Terraces	Agriculture	M	L	L	+	-	+
55	Overhang	Temp. Habitation	M	L	L	+	+	+
57	Upright Slab	Indeterminate	L	L	L	-	-	-
58	Walls	Animal Control	L	L	L	-	-	-
59	Wall	Transportation	L	L	L	-	-	-
60	Wall	Animal Control	L	L	L	-	-	-
65	Enclosure	Habitation/Ag.	M	L	L	+	-	+
67 A B	Complex (2) Enclosure Enclosure	Habitation/Ag.	M	L	L	+	-	+
71	Enclosure	Agriculture	M	L	L	+	-	+
73	Walls	Agriculture	M	L	L	+	-	+
75	Wall	Habitation/Ag.	M	L	L	+	+	+
77	Enclosure	Agriculture	M	L	L	+	-	+
80	Wall	Animal Control	L	L	L	-	-	-
82	Terrace	Habitation/Ag.	M	L	L	+	-	+
83	Enclosure	Habitation/Ag.	M	L	L	+	-	+
88	Wall	Transportation	L	L	L	-	-	-
90	Cave	Burial	H	L/H	H	+	+	+
96	Wall	Agricultural	M	L	L	+	+	+
97	Enclosure	Habitation/Ag.	M	L	L	+	+	+
98	Enclosure	Habitation/Ag.	M	L	L	+	+	+
101	Bridge	Transportation	L	L	L	-	-	-

APPENDIX B

SUMMARY OF IDENTIFIED SITES AND FEATURES — KEOKEA

*Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	#CRM Value Mode Assess.			+Field Work Tasks		
			R	I	C	DR	SC	EX
1 A B	Complex (2) Platform Terrace	Habitation/Ag	M	L	L	+	-	+
2 A B	Complex (2) Enclosure Enclosure	Habitation/Ag	M	L	L	+	-	+
3 A B	Complex (2) Enclosure Enclosure	Burial**/Hab./Ag	M/H	L	L/H	+	-	+
4 A B	Complex (2) Enclosure Enclosure	Habitation/Ag.	M	L	L	+	-	+
5 A B	Complex (2) Platform Enclosure	Temp. Habitation/ Agriculture	M	L	L	+	-	+
6 A B C D	Complex (4) Enclosure Mound Enclosure Enclosure	Burial/Hab./Ag.	M/H	L	L/H	+	-	+

* PHRI temporary site numbers.

Cultural Resource Management - Value Mode Assessment--

Nature: R = scientific research
I = interpretive
C = cultural
Degree: H = high
M = moderate
L = low

+ Field Work Tasks:

DR = detailed recording (scaled drawings, photographs, and written descriptions)
SC = surface collections
EX = test excavations

**Possible functional interpretation

SUMMARY OF IDENTIFIED SITES AND FEATURES — KEOKEA (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
7	Complex (2)	Habitation/Ag.	H	L	L	+	-	+
A	Enclosure							
B	Enclosure							
8	Complex (3)	Habitation/Ag.	M	L	L	+	-	+
A	Enclosure							
B	Enclosure							
C	Enclosure							
9	Complex (3)	Habitation/Ag.	M	L	L	+	-	+
A	Overhang							
B	Enclosure							
C	Enclosure							
10	Complex (7)	Habitation/Ag.	H	L	L	+	-	+
A	Enclosure							
B	Enclosure							
C	Enclosure							
D	Enclosure							
E	Enclosure							
F	Enclosure							
G	Platform							
11	Terrace	Habitation/Ag.	M	L	L	+	-	+
12	Wall	Animal Control	L	L	L	-	-	-
13	Complex (6)	Habitation/Ag.	H	L	L	+	-	+
A	Enclosure							
B	Enclosure							
C	Enclosure							
D	Enclosure							
E	Enclosure							
F	Enclosure							
14	Enclosure	Habitation	M	L	L	+	-	+
16	Complex (3)	Habitation/Ag.	M	L	L	+	-	+
A	Enclosure							
B	Enclosure							
C	Enclosure							
19	Complex (4)	Habitation/Ag.	H	L	L	+	+	+
A	Enclosure							
B	Enclosure							
C	Enclosure							

SUMMARY OF IDENTIFIED SITES AND FEATURES — KEOKEA (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
20 A B C	Complex (3) Enclosure Terrace Enclosure	Habitation/Ag.	M	L	L	+	-	+
21 A B	Complex (2) Enclosure Enclosure	Habitation/Ag.	H	L	L	+	-	+
25 A B C D E F	Complex (6) Enclosure Wall Enclosure Enclosure Enclosure Wall	Habitation/Ag./ Animal Control	H	L	L	+	-	+
26 A B	Complex (2) Enclosure Platform	Habitation/Ag.	M	L	L	+	-	+
27 A B	Complex (2) Overhang Enclosure	Habitation/Ag.	M	M	L	+	-	+
29 A B	Complex (2) Enclosure Enclosure	Habitation/Ag.	H	M	M	+	-	+
30	Heiau	Religious/Heiau	H	H	H	+	-	+
31	Enclosure	Habitation	M	L	L	+	-	+
32	Terrace	Habitation	M	L	L	+	-	+
35 A B	Complex (2) Enclosure Overhang	Habitation/Ag.	H	L	L	+	-	+
36 A B C D E	Complex (5) Enclosure Enclosure Enclosure Enclosure Enclosures	Habitation/Ag.	H	L	L	+	-	+

SUMMARY OF IDENTIFIED SITES AND FEATURES — KEOKEA (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
39	Overhang	Habitation	M	L	L	+	+	+
40 A B	Complex (2) Enclosure Overhang	Habitation	H	M	L	+	-	+
41	Overhang	Temp. Habitation	M	L	L	+	-	+
42	Enclosure	Habitation	H	L	L	+	-	+
44 A B C D	Complex (4) Enclosure Enclosure Enclosure Enclosure	Habitation/Ag.	H	L	L	+	-	+
45	Enclosure	Habitation/Ag.	M	L	L	+	-	+
46 A B C D	Complex (4) Structure Enclosure Enclosure Enclosure	Habitation/Ag.	M	L	L	+	-	+
48 A B C D	Complex (4) Enclosure Enclosure Enclosure Enclosure	Habitation/Ag.	H	H	H	+	-	+
50 A B C	Complex (3) Enclosure Enclosure Enclosure	Habitation/Ag.	M	L	L	+	-	+
51	Enclosure	Habitation/Ag.	M	L	L	+	-	+
52 A B	Complex (2) Enclosure Paved Area	Habitation/Ag.	M	L	L	+	-	+
53 A B	Complex (2) Enclosure Terrace	Habitation/Ag.	M	L	L	+	-	+
54	Enclosure	Habitation/Ag.	M	L	L	+	-	+

SUMMARY OF IDENTIFIED SITES AND FEATURES — KEOKEA (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
55 A B C	Complex (3) Enclosure Overhang Enclosure	Habitation/Ag.	H	L	L	+	-	+
57	Enclosure	Habitation/Ag.	M	L	L	+	-	+
59	Enclosure	Habitation/Ag.	M	L	L	+	-	+
60	Wall	Animal Control	L	L	L	-	-	-
62 A B C	Complex (3) Enclosure Enclosure Enclosure	Relig./Habit. Ag./Burial	H	H	H	+	-	+
63	Wall	Animal Control	L	L	L	-	-	-
64	Enclosure	Habitation/Ag.	M	L	L	+	-	+
65 A B C D E F G	Complex (7) Enclosure Walls Enclosure Enclosure Enclosure Enclosures Enclosure	Habitation/Ag.	H	L	L	+	-	+
69	Enclosure	Water Tank	M	L	L	+	+	-
70	Terrace	Agricultural	M	L	L	+	+	+
71 A B C	Complex (3) Enclosure Enclosure Mound	Burial**/Habit.	M/H	L	L/H	+	-	+
76 A B	Complex (2) Terrace Wall	Habitation/Ag.	M	L	L	+	-	+

SUMMARY OF IDENTIFIED SITES AND FEATURES — KEOKEA (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
78	Complex (6)	Rel.*/Hab./Ag.	H	H	H	+	+	+
A	Terraces							
B	Terrace							
C	Platform							
D	Complex							
E	Enclosure							
F	Enclosure							
79	Enclosure	Agriculture	M	L	L	+	-	+
80	Wall	Animal Control	L	L	L	-	-	-
81	Complex (2)	An. Contr./Ag.	M	L	L	+	-	+
A	Enclosure							
B	Enclosure							
84	Wall	Indeterminate	M	L	L	+	-	+
85	Walls & Terraces	An. Contr./Ag.	M	L	L	+	-	+
87	Complex (2)	Burial	H	L	H	+	-	+
A	Platform							
B	Mound							
89	Terrace	Habitation	M	L	L	+	-	+
90	Enclosure	Habitation	H	L	L	+	-	+
95	Complex (3)	Habit./Ag.	M	L	L	+	-	+
A	Enclosure							
B	Terrace							
C	Wall							
96	Enclosure	Habitation	M	L	L	+	-	+
97	Wall	Agricultural	M	L	L	+	-	+
98	Enclosure	Habitation/Ag.	M	L	L	+	-	+
99	Enclosure	Habitation	M	L	L	+	-	+
100	Wall	Animal/Control	L	L	L	-	-	-

SUMMARY OF IDENTIFIED SITES AND FEATURES — KEOKEA (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
101	Mounds & Wall	An. Control/Ag.	M	L	L	+	-	+
102	Terrace & Wall	Habitation/Ag.	M	L	L	+	-	+
103	Overhang	Habitation/Ag.	M	L	L	+	-	+
105	Enclosure	Habitation/Ag.	H	L	L	+	-	+
106	Stone	Tool Manufac.	M	L	L	+	+	+
107	Overhang	Burial/Ag.	H	L	H	+	+	+
108	Enclosure	Habitation	M	L	L	+	-	+
109	Complex (2) A Overhang B Terrace	Agriculture	M	L	L	+	-	+
110	Wall	Agricultural	M	L	L	+	-	+
111	Complex (3) A Overhang B Terrace C Overhang	Habitation	M	L	L	+	-	+
112	Complex (3) A Overhang B Enclosure C Wall	Habitation/Ag. Animal Control	M	L	L	+	-	+
115	Complex (2) A Enclosure B Enclosure	Habitation	H	H	M	+	-	+
116	Complex (2) A Enclosure B Enclosure	Animal Control	M	L	L	+	-	+
118	Complex (3) A Enclosure B Enclosure C Enclosure	Habitation/Ag. Animal Control	M	L	L	+	-	+

SUMMARY OF IDENTIFIED SITES AND FEATURES — KEOKEA (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
120 A B C	Complex Paved Terrace Lava Tube Enclosure	Habitation/Ag.	M	L	L	+	-	+
124 A B C	Complex (3) Enclosure Overhang Enclosure	Habitation/Ag.	M	L	L	+	-	+
127 A B	Complex (2) Enclosure Overhang	Habitation/Ag.	M	L	L	+	-	+
130	Enclosure	Habitation/Ag.	M	L	L	+	-	+
131 A B C	Complex (3) Overhang Enclosure Enclosure	Habitation/Ag. Animal Control	M	L	L	+	-	+
134	Enclosure	Religious?/ Habitation	H	L	M	+	-	+
135 A B	Complex (2) Lava Tube Wall	Habitation/Ag.	M	L	L	+	-	+
137	Enclosure	Habitation/Ag.	M	L	L	+	-	+
140 A B	Complex (2) Enclosure Enclosure	Habitation/Ag.	M	L	L	+	-	+
142	Enclosure	Habitation/Ag.	H	L	L	+	-	+
143 A B	Complex (2) Enclosure Overhang	Habitation/Ag.	M	L	L	+	-	+
146	Enclosure	Habitation	M	L	L	+	-	+
148 A B C D	Complex (4) Enclosure Enclosure Enclosure Enclosure	Habitation/Ag.	M	L	L	+	-	+

SUMMARY OF IDENTIFIED SITES AND FEATURES — KEOKEA (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
149	Overhang	Habitation	M	L	L	+	-	+
152 A B	Complex (2) Platform Enclosure	Habitation/Ag.	H	L	L	+	-	+
200	Overhang	Habitation	M	L	L	+	-	+
201	Enclosure	Habitation	M	L	L	+	-	+
202	Enclosure	Habitation	M	L	L	+	-	+
203	Enclosure	Habitation/Ag.	H	L	L	+	-	+
204	Enclosure	Habitation	M	L	L	+	-	+
205	Overhang	Habitation	M	L	L	+	-	+
206	Lava Tube Enclosure	Habit.**/Ag.	M	L	L	+	-	+
207	Sink	Burial/Habitation	H	L	L	+	+	+
208	Enclosure	Habitation	M	L	L	+	-	+
209	Enclosure	Agricultural	M	L	L	+	-	+
210	Overhang	Habitation	M	L	L	+	-	+
211	Terrace	Habitation	M	L	L	+	-	+

APPENDIX C

LIMITED HISTORICAL DOCUMENTARY RESEARCH KEOKEA AND WAIHULI SUBDIVISIONS INVENTORY SURVEY by Helen Wong Smith, B.A.

Keokea and Waiohuli Subdivisions are situated in the ahupua'a of Keokea and Waiohuli, Makawao District (Kula), Island of Maui. Makawao can be translated: "Watchful eyes of Wa-o" (timeless or eternity). Sterling (n.d.) notes that "Makawao includes the ancient districts of Hamakualoa and Hamakauapoko..." For this reason, historical citations regarding Hamakauapoko and Hamakualoa are included within this report.

This report includes information obtained from the usual historical sources found in libraries, and information from other sources such as land and tax records, archaeological reports, maps, and various other manuscripts. Much information was obtained from the files of the Maui Historical Society, which houses the personal notes of E. Sterling and I. Ashdown. The information in this report is organized into five sections: Early Historical Accounts, Heiau in the Project Area, Land Commission Award (LCA) Information, Land Use and Tenure Information, and Informant Interviews.

EARLY HISTORICAL ACCOUNTS

Early accounts concerning the Makawao District generally either describe the area or relate early historical events. Areal descriptions usually concern the atmosphere or weather. Ashdown (n.d.) writes, "kula-o-ka-ma'o-ma'o or Land of Mirages, where lost souls wandered until they could find their way to rest." The rain of Makawao is described by Mrs. Miverva Kalama to Sterling (n.d.) in this way: "'uki rain = a soft drizzle (the ua Kama'aina of Makawao) when the kiu rain cloud from Makawao meets the Naulu rain cloud from Kula then the rain comes, the typical Makawao rain."

A passage in Edward G. Beckwith's *Journal of a Tour on Maui*, also speaks of the unusual Makawao rain (Sterling n.d.):

We noticed a peculiar meteorological phenomenon through the whole ride. The trade wind which blows from the ocean across the Northwestern slope of Haleakala, is highly charged with vapor, which is condensed by the cool mountain air, and falls in abundant rains over the region of Makawao. Along the west side of the mountains about half way to the summit, lay a long line of cumulo stratus clouds, and between this and the nimbus there was

but little space. The former lay along side of the mountain, apparently immovable, while the latter would advance and recede, now coming very near and coquetishly scattering its shining rain-drops beneath the very head of immovable cumulus, and now retreating as though afraid of its more dignified companion. While mentioning this latter peculiarity to a gentleman this evening, he remarked that it was this feature of the clouds which gave the place its name - Makawao, Mako=to be afraid, wao=a cloud (HMCS June 5, 1854). [Sterling notes that this is incorrect, that "afraid translates maka'u and ao is cloud. Pukui et al (1974) indicates the literal translation of Makawao is "forest beginning."

The Sterling and Ashdown manuscripts also provide these two descriptions of Makawao. Sterling's description is somewhat poetic; Ashdown's description is curiously intermixed with what may be a legend:

"O native sons of those sections, the ones who watch for the dancing (haa) of the naked ones (olohe) on the plains of Kama'oma'o, where the iwa birds dwell in the ukiuku rain of Makawao..." S. W. Nailili "E noho ana oe e oe choolono iki mai ana" *Ke Au Okoa*, Nov. 6, 1865. *Hamakauapoko and Hamakualoa* (Sterling n.d.).

In the area of Wahine'oma'o (now called the "Baseball Park" above the modern Poli-Poli camp) and nearby Lua-ma-ma-ne, was a structure said to be for bird catching ceremonies because that region was full of birds. The 'Oma'o bird is known as the Hawaiian Thrush, and they were plentiful and provided green feathers. The Woman of 'Omao' dwelt at Mamane and she was called Mamao because she was of such very high rank. She was so sacred that others must keep their distance. A handsome lesser chief fell in love with her beauty and tried to win her. Of course this was kapu. Her heart was heavy with the knowledge that because he came near to her shadow he had to be punished. A high priest conducted ceremonies of purification at the temple there and revived happiness. Today the Mamane trees are stunted and soon the foreign trees such as California Redwood, Norfolk Pines

and others will be replacing the former green verdure (Ashdown 1971:46).

In 1873, Isabella Bird toured the Hawaiian Islands and wrote of her experiences to her sister back home in Edinburgh. These are her impressions of Makawao:

It is very pretty here, and I wish all invalids could revel in the sweet, changeless air. The name signifies "ripe bread-fruit of the gods." The plantation is 2000' above the sea, and is one of the finest on the islands; and owing to the slow maturity of the cane at so great a height, the yield is from 5 to 6 tons an acre. Water is very scarce; all that is used in the boiling-house and elsewhere has been carefully led into concrete tanks for storage, and even the walks in the proprietor's beautiful garden are laid with cement for the same purpose. He has planted many thousand Australian eucalyptus trees on the hillside in the hope of procuring a larger rainfall, so that the neighbourhood has quite an exotic appearance. Below, the coast is black and volcanic-looking jutting into the sea in naked lava promontories, which nature has done nothing to drape (Bird 1974:228).

Early accounts which mention Makawao in relation to early historical events include those by historians Kamakau and Fornander:

When Kekaulike heard that Alapa'i, the ruling chief of Hawaii was at Kohala on his way to war against Maui, he was afraid and fled to Wailuku in his double war canoe named Ke-aka-milo. He sailed with his wives and children...., his officers, war leaders, chiefs, and fighting men, including warriors, spearmen, and counselors. Some went by canoe and some overland, and the fleet landed at Kapa'ahu at the pit of 'Aihako'ko in Kula (old name for Makawao). Here on the shore the chiefs prepared a litter for Kekaulike and bore him upland to Haleki'i in Kukahua (Kamakau 1961:69).

Ke-a-ulu-moku was another celebrated man of Kalaniopu'u's day. His father was the great chief Kau-ua-kahi-akua-nui, son of Lono-maka'i-honua and Kaha-po'ohiwi, but his mother belonged to Naohaku in Kohala. He was celebrated as a composer of war chants, chants of praise, love chants, prophetic chants, and genealogical chants. When he went back to Hawaii with Kalaniopu'u he was homesick for the two Hamakua districts of Maui [Hamakua is within Makawao District] here

he had lived with Kamehameha-nui and Kahekili. His love for the place found expression in a chant he composed, of which the following is an excerpt:

Aloha, Aloha	Affectionate longing, <i>ibid</i>
Aloha wale o'u	Affection for my
maku-a la	(foster) parents,
e o'u makua,	my parents,
Aloha wale o'u	Affection for my
makua	parents
Mai na 'aina	Who belong to
Hamakua,	Hamakua,
He mau 'aina	The two districts of
Hamakua elua,	Hamakua
No'u mua kaikua'ana	Where my elder brothers live.
i naho ai.	
He ala pali na'u he	My hillside trails are theirs
mau ali'i ia	to rule
	(Kamakau 1961:112).

During the fleeing of Kekaulike, Kahekili was carrying on the war on Oahu and suppressing the revolt of the Oahu chiefs, (Kamakau dates this 1785) a serious disturbance on Maui had occurred which gave him much uneasiness. It appears that he had given the charge of his herds of hogs that were running in the Kula district and on the slopes of Haleakala to a petty chief named Kukeawe. This gentleman, not satisfied with whatever he could embezzle from his master's herds, made raids upon the farmers and country people of Kula, Honuaula, Kahikinui, and even as far as Kaupo, robbing them of their hogs, under pretext that they belonged to Kahekili. Indignant at this tyranny and oppression, the country people rose in arms and a civil war commenced. Kukeawe called the military forces left by Kahekili at Wailuku to his assistance; a series of battles were fought, and finally Kukeawe was killed at Kamaole-i-kai, near Palauea, and the revolted farmers remained masters of the situation (Fornander 1969:228).

This uprising of the country people was called the "Battle of the pig-eating Ku-keawe" ('Aipua'a-a-Ku-keawe) (Kamakau 1961:142).

HEIAU IN THE PROJECT AREA

Three heiau are present in Keokea project area—Molohai, Papakea, and Kaumiumimua heiau. Molohai heiau, situated at an elevation of 2,275 feet above sea level, was initially described by Walker (n.d.), who described 26 heiau in the Kula region of which Molohai is the fourth

largest. Walker about 1930 listed Molohai heiau as being 65 by 90 ft and constructed of rough a'a. Walker surmised that the heiau was probably originally L-shaped; however, this could not be determined definitely, as the heiau had deteriorated and portions of it had been rebuilt as a modern wall. According to Walker, the front of the heiau was double terraced, and within it were a large court and a platform, set off by a low wall. In 1973, the Historic Sites office recorded the heiau as including narrow, terraced platform steps along the walls, three stone mounds, an alignment of stones, and a rectangular platform. Due to its size and good condition, Molohai heiau has been placed on the State Register of Historic Places.

Papakea heiau is situated mauka of Molohai at an elevation of 2,300 ft above sea level. Walker (1931) describes the heiau as "an open platform of a'a construction 45'x88'...the front double-terraced to a height of 4'...some coral seen but no pebbles." While surveying the heiau in 1973, a Historic Sites office archaeologist was told by a local informant that a house and cistern once stood on the site. The archaeologist and informant surmised that rocks from the heiau were utilized in constructing the cistern and that Walker's measurement of the heiau excluded the property line of the house. Ashdown (1971:46) cites this heiau as a fishing shrine.

Kaumiumimua heiau, according to M. Riford (1987), is situated makai of Papakea, on a large gully overlooking Ma'alaea Bay. In 1931, Walker commented that the heiau had been much disturbed and that the remains of a platform were present in the northern corner and near the entrance. A survey of the heiau by the Historic Sites office in 1973 indicated that the east and south walls evidence two and possibly three separate construction periods.

Ashdown (1971:46) mentions other heiau in Keokea and Waiohuli—Ho'ola and Ho'oula Ua heiau in Keokea and Kaimupeelua heiau in Waiohuli. Ho'ola heiau (Health temple) is situated just behind the Kula Sanatorium. Ashdown writes, "Ho'oula Ua heiau," a place for praying and offering gifts to bring rain." She also writes, "long before the forest was denuded...near Polipoli Spring area, there was farm where 'awa was cultivated and there stood a temple to Lono." Kaimupeelua heiau is located in the Waiohuli project area. Although the heiau originally measured 17 by 25 meters, much of it has been reduced to rubble by cattle (Historic Sites Register 1973).

Other heiau mentioned by historic writers in the Makawao district include Kailua heiau (Thrum 1909:44), and Pa'ubu, Mahca, Kaumuopahu (or Kaunuopahu), Po'onahochoe and Mana heiau. The latter heiau is now part of a modern cemetery (Ashdown 1971:57).

LAND COMMISSION AWARDS

Although there were many small parcels granted in Keokea and Waiohuli, the Indices states that Keokea was Crown Land from the beginning and that Waiohuli was approved as such in 1890 by Kalakaua. The numerous parcels may be a result of an experiment conducted by the Kamehameha III's administration prior the Greary Mahele concerning trial fee ownership runs. Kuykendall (1968:283) recounts the reasons for such trial fee ownership runs:

It will be remembered that the year 1845, during which the new land law was written and in part enacted, was disturbed by an anti-foreign agitation, accompanied by a rather pointed suggestion that lands be given or sold to the common people and that the legislative committee, in its reply to the petitions of the people, approved the idea of selling land to Hawaiian subjects. This was directly in line with suggestions contained in Dr. Judd's report as minister of the interior, and there were frequent allusions to the subject in the proceedings of the legislature. The agitation among the people probably hastened the decision of the government to make an experimental beginning without waiting for the new law to go into operation. The places selected for the experiment were the Makawao district of Maui and Manoa valley on Oahu.

During the King's tour of Maui in December, 1845, and January 1846, the party visited Makawao and it was announced that the entire district, with the exception of McLane's plantation, was to be offered for sale to the people in fee simple. Rev. J.S. Green, pastor of the Hawaiian church at Makawao, undertook to manage the business of selling the land. In afterwards relating his experience in connection with the project, Green said he called the people together, showed them his instructions from the government, and explained the plan to them.

A few of them purchased at once, others had less confidence that lands thus purchased would be secure, but soon abandoned their scruples, while others still could not for a long time, be persuaded that there was not some catch about it—some design to enrich the chiefs at their expense. But nearly all of these were finally talked out of their suspicions & took up each a small piece of land.

* Letter in Polynesian, July 14, 1849.

Another missionary, Rev. Richard Armstrong, assisted the enterprise by making surveys. The land was sold at \$1 per acre, and nearly a 100 parcels were taken up, most of them ranging from 5 to 10 acres. Altogether about 900 acres were purchased by the people of the district.

In a report by Riford (1987), 11 Land Commission Awards (LCA) either within or bordering the Keokea parcel and eight LCAs within the Waiohuli parcel are listed. The bulk of the parcels is designated as kula land and houselots (1987). Kula land is described by Handy and Handy (1972:510) as "open country, or plain, as distinct from valley...and has often been used as a term to distinguish between dry, or 'kula land' and 'wet-taro land'". As indicated in Kuykendall's account, kula plots were cultivated for personal use, but many tenants were involved in ranching and cash crops. A map of the project area showing LCA locations was obtained from the Tax Map Bureau in Honolulu (Figure A-1; "Portion of Kula, Makawao, Maui TMK 2-2-02"). The map shows nine LCAs within or abutting Keokea and Waiohuli. LCA 8452:19, in the ahupuaa of Koheo 1 and 2, abuts the Waiohuli project area on the northern side.

LAND USE AND TENURE

In their discussion of Hawaiian sweet potato planting techniques, Handy and Handy (1972) mention the Kula area of Maui and describe it as "[w]here potatoes are planted in crumbling lava with humus, as on eastern Maui and in Kona, [in] Hawaii the soil is softened and heaped carelessly in little pockets and patches using favorable spots on slopes...[r]ocky lands in the olden days were walled up all around with the big and small stones of the patch until there was wall (kuaiwi) about 2' high" (Handy and Handy 1972:131).

Handy (1940:161) also mentions Kula in his early work entitled The Hawaiian Planter:

KULA was always an arid region, throughout its long, low seashore vast stony kula lands, and broad uplands. Both on the coast, where fishing was good, and on the lower westward slopes of Haleakala a considerable population existed. So far as I can learn Kula supported no Hawaiian taro, and the fisherman in this section must have depended for vegetable food mainly on poi brought from Waikapu and Wailuku across the plain to supplement their sweet potato staple diet.

Kuykendall (1968:313) writes of the time when Kula crops turned from subsistence crops to commodities:

...Before that time the whalers had created a limited market for fresh vegetables, fresh meat, and fruit; the great increase in the number of whaleships after 1840 caused a corresponding increase in the demand for such products of the soil. In bulk and value, potatoes (sweet and Irish) ranked first in this traffic. In the early days only sweet potatoes had been obtainable at the islands, but after 1830, if not sooner, cultivation of the Irish potato was taken up and during the 1840s and 1850s became of great importance. It was shortly before 1840 that Irish potatoes were first raised in the Kula district, which proved to be so well adapted to them that it soon came to be called the "potato district." Jarves describes the region as it appeared to him in July 1846:

It ranges along the mountain (Haleakala) between 2000 and 5000 feet elevation, for the distance of 12 miles. The forest is but partially cleared, and the seed put into the rich virgin soil. The crop now in the ground is immense. The fields being all in blossom have a fine appearance, spreading as they do, over the broad surface of the mountain.

From this upland region the potatoes were carried down to the shore and taken to Lahaina or were sold directly to ships which called at Kalepolepo. In the spring of 1847 it was estimated that the crop would amount to 20,000 barrels...In 1854, G.D. Gilman estimated that the local Hawaiian market, including whaleships, could be depended on to consume about 20,000 barrels of Irish potatoes.

The influx of gold seekers together with the comparative neglect of agriculture in California created a demand for potatoes and other vegetables, as well as for sugar, molasses, and coffee, which began to be felt strongly in 1847, but the potato "boom" commenced in the fall of 1849. At the beginning of November a correspondent wrote from Maui to the Polynesian:

The call for [potatoes] is loud and pressing, as some vessels bound for California have taken as many as 1,000 barrels each. The price is high, and the probability is that the market can not be supplied this autumn. Kula, however, is full of people. Strangers from Wailuku, Hakamakua, and Lahaina are there

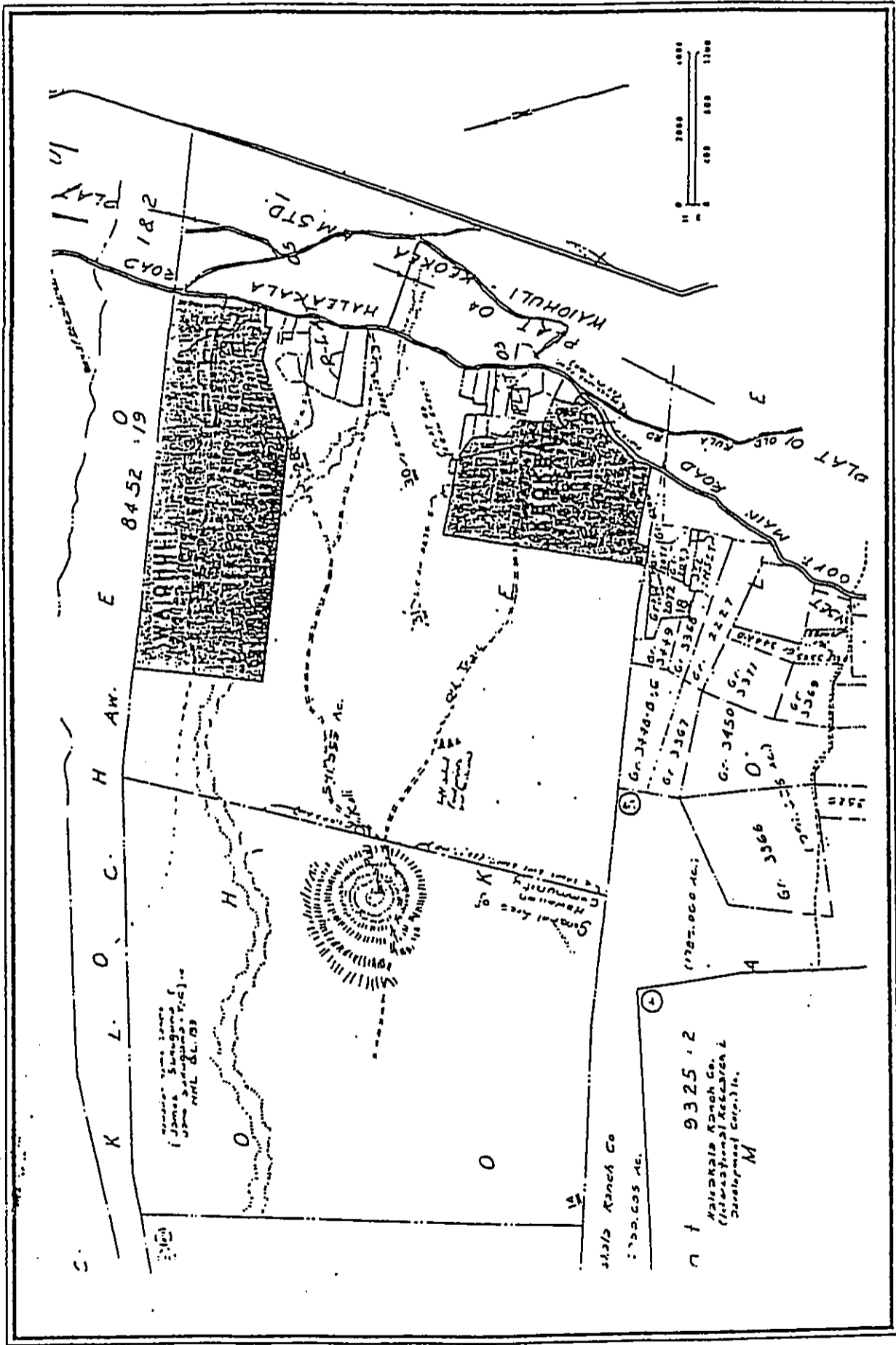


Figure C-1. 1938 MAP SHOWING PROJECT AREA AND LCA LOCATIONS

preparing the ground and planting, so that if the demand from California shall be as urgent next spring as it is now the people will reap a rich harvest...They often repeat the saying of a foreigner, who after visiting the mines of California, came back to Maui quite satisfied, and said to his neighbors at Waikapu, "California is yonder in Kula. There is the gold without the fatigue and sickness of the mining country."

The foreigner's remark caught the fancy of the Hawaiians and they were soon referring to Kula as "Kalifonia" or "Nu Kalifonia" and working with great diligence to extract the wealth from the rich pay dirt on the slopes of Haleakala. To encourage the spirit of enterprise which had been thus awakened among the native people, the privy council voted to have the government lands in Kula surveyed and divided into small lots of from 1 to 10 acres and offered for sale to the natives at a price of \$3/acre (see page 5 of this report) (1968:321).

C. Speakman, in his book entitled MOWEE also mentions the fervor of cash-cropping:

During the gold rush, hundreds of Hawaiians were going into business for themselves on Maui—growing potatoes and hauling them to the port where they were snapped up and shipped to San Francisco. The Maui fields were called Nu Caliponi, or New California; potatoes were gold, and a fortune could be dug out of the ground by one man. The potato boom was short lived, and, when the prices dropped, the Hawaiians lost interest. Perhaps the problem was that Hawaiians did not share the white man's concept of time (1978:116).

The Chinese were among those who took advantage of this agricultural opportunity. During the 1840s, Chinese farmers leased lands in Kula. Their initial success motivated many Chinese to move to that region and lease land for farming. They moved from places such as Makawao, Paia, and Wailuku on Maui, Kohala on the Big Isle, and from Honolulu. Some went to Kula directly from China. The vast majority of Chinese, about 95%, were Hakkas from Kwangtung Province. During the 1840s, most Kula Chinese acquired their farmland by lease or deed from the haole ranchers or Hawaiian homesteaders. Much of this land was owned by the Hawaiian government, which leased it to the ranchers, who in turn subleased it to the Chinese. In some cases, the farmers made their lease payments in farm produce, in lieu of monetary transaction. One family which leased land

from Ulupalakua Ranch paid five bags of corn for every acre of land they farmed (Interview, Willie Fong IN Mark 1975). Although by the mid-1850s, the demand for Kula potatoes had diminished, the Chinese population continued to grow. By between 1880 and 1910 approximately 80 Chinese families had moved to Kula; by 1900 there were some 700 Chinese living there. For a period of 30 to 40 years, Kula supported a thriving community which included Chinese and English schools, Christian churches, a Hung Men society, gambling joints and opium dens, general stores, and dozens of operating farms and cattle ranches (Mark 1975).

In addition to Irish potatoes, the Kula farmers planted corn, beans, onions, Chinese cabbage, round cabbage, sweet potatoes, wheat and other grains, and even cotton. When the Hawaiian market showed no demand for corn, the farmers used the corn to raise pigs, ducks and chickens, and marketed the animals instead. When the corn, potatoes, and other crops were harvested, they were packed and transported on mule teams or wagons to Kahului and Makena harbors, and were then shipped to Honolulu. Those who lived in the southern districts of Keokea and Kamaole usually brought their produce to the Makena landing. Most of Kula's produce, poultry, and beef was sent to two or three markets in Honolulu Chinatown, including Wing Hong Yuen and Sing Loy. The two stores, in turn, supplied Kula's general stores with Chinese dry goods and staples such as rice, flour, sugar, and canned milk (Mark 1975).

Early farming in Kula was adapted to the topography. In planting crops, rather than terracing the land, the farmers followed the natural contour of the land and depended on moist air and rainfall rather than irrigation. Until 1905, there was little water piped into the area, and during droughts—which occurred every several years—the farmers had to pack barrels of water on mules from Polipoli Springs, or from the beach or Olinda, both about 8 miles away (Mark 1975). An article in newspaper The Honolulu Advertiser points out the changes in the topography in Kula and its affect on the water supply:

Before 1850 Kula was supplied with moisture naturally through the existence of a large forest. "That forest was cut down when land was cleared in Kula to open farm plots in 1850. This was in answer to the demand for food in California during the gold rush...by ranchers clearing for pasture." Secondary result of clearing forests was destruction of existing fresh water ponds in Kihei on the Maaloaea (sic) Bay coast below Kula. When forest was cleared, water was free to rush down the mountains carrying soil from Kula and filling with

mud, the ponds for which Kihei was once famous. Meanwhile Kula is dependent on pipe from Waikamoi watershed (Korte 1962 A:15).

In 1905 the Kula Pipeline was built during perhaps the worst drought in Kula history. The water source for the pipeline was discovered in Olinda, northeast of Kula. The contractor who built the pipeline was a prominent Kula resident named Shim Mook, and labor was supplied by the men and women of the area (Mark 1975).

In 1911 the Hawaiian government released a large amount of public land, and it became possible for citizens to purchase property in Kula. The sale of the land was advertised in English and Hawaiian newspapers, but word was somehow not communicated to the Chinese, whose lives these land sales would most affect. According to the Hawaiian Church Chronicle (Oct. 1911:12), the Kula Chinese "were not aware of what was taking place until the land was sold and the Hawaiians came and told them that the property belonged to them. They (Chinese) had relied on the information which they had received that the disposal of the land would not take place for a considerable time." Faced with eviction, the Kula Chinese decided determinately to remain on the land and organize themselves. Ninety-eight young residents signed a petition expressing the desire of the Chinese to be allowed to reside on certain lots their families had farmed for many years. In a letter to the Commissioner of Public Lands dated September 27, 1911, Governor Frear suggested that leases be made to occupants of unsold lots for approximately 10 years, subject to withdrawal for homestead purposes. Then, as the older children of those families reached 18 years of age, they would be able to apply for the lots as homesteads. In October 1911 the Hawaiian Church Chronicle reported that the government had promised to do so under these terms. Chinese who applied for homesteads and were granted them were given three years to improve their lot...after that period, they could apply for a "right of purchase" lease, and then buy the land outright from the government. Before this special arrangement was arrived at, however, a number of Kula farmers saw their land divided into homesteads and leased to others. These farmers, with the loss of their farmland, were forced to move out of Kula and change their livelihoods.

During the 1910s and 1920s many families left Kula for various reasons: severe drought which ruined crops and killed livestock, soil which was reaching depletion level after years of harvesting and tilling, lack of educational opportunities for children, and loss of land due to parceling homesteads. In 1918 another mass exodus occurred—some 40 families left Kula because the land they were leasing was sold to a man named Harold Rice, who intended to use the

land for ranching. In the book Mowee, the author writes regarding the sale of farms to Rice: "The leases to the land had not expired, but the farmers were unaware of their right to challenge the eviction" (Speakman 1978:143). It is some of this land that Rice acquired from the farmers that made up Kaonoulu Ranch, in which the project area resides.

In the early 1970s, 35% of Hawaii's vegetables were grown in Kula, including a large percentage of the state's head lettuce, dry onions, and tomatoes. Much of the remaining land was devoted to livestock breeding by about 20 full and part-time ranchers (Project Measure Work Plan - Lower Kula Irrigation Project, Board of Water Supply, Maui County, Sept. 1971). The cash crops in Kula were no longer corn and potatoes, but a variety of vegetable and flowers produced by some 35 family-operated farms ranging in size from five to 50 acres. As of 1975, the agricultural yield of the irrigated soil was still very high (Mark 1975).

Sugar cultivation has played a major role in Honouaulea and Makawao. In the spring of 1846 there were six establishments on the western slope of Mt. Haleakala manufacturing sugar and molasses (Kukendall 1968:316). Since the general vicinity of the present project area has been used historically for small farms and ranching, Kula sugar cultivation will not be discussed here.

A report on Kula would not be complete without some mention of Kula Sanatorium, founded for the care of tuberculosis sufferers. The sanatorium is located mauka of the project area at an elevation of 3,000 feet (The Honolulu Advertiser 9/20/85 B:3). Land for the sanatorium was requested by Bill Pogue in 1909. Initially the sanatorium consisted of two tent-houses which accommodated 12 patients. The tent-houses, which included kitchen and dining facilities, was financed by the County and Territory and cost \$500.00. The first permanent ward was built by W.E. Foster, former patient and Superintendent. Around 1932, the Hawaiian Homes Commission granted 100 acres to the sanatorium, and in 1937 a new sanatorium was constructed (Jones 1940).

The following general information relevant to Keokea and Waiohuli ahupua'a is from The Maui News:

3-26-04 - P. Cockett has been appointed manager of Waiohuli Cattle Ranch.

4-27-07 - On last Sunday morning, J.P. Inaina was installed pastor of the Keokea Hawaiian church in Kula. A large audience was present. Rev. I. D. Iaea preached the sermon and Rev. M. Lutero gave the right hand of fellowship. The charge to people and pastor was given by Rev. R.B. Dodge. Rev. D.N. Opunui offered the installing prayer.

12-16-32 - Formal approval of the newly acquired land in Keokea which is now being turned into a baseball park for the people of Kula, was given by the Board of Supervisors on Thursday. A resolution requesting the Commissioner of Public Lands to effect the exchange of lands between the territory and the owner was adopted by the Board. Slightly over two acres are involved in the transaction.

INFORMANT INTERVIEWS

On April 20, 1989 the author, accompanied by Mr. Dan Auwai, Department of Hawaiian Homes Lands - Maui Manager, conducted oral history interviews with two former employees of Kaonoulu Ranch—William Poepoe and Henry Kekiwi. William Poepoe was employed by the ranch for some 46 years and retired in 1983. Mr. Poepoe was born on Ulapalakua Ranch and started working for Kaonoulu Ranch at the age of nine, at which age he planted molasses grass (scattering seeds) for the cattle to feed on. By age 11, he was working full-time for Kaonoulu Ranch. Mr. Poepoe said that Harold W. Rice, the founder of the ranch, owned, in addition to lands leased, over 18,000 acres. After Mr. Rice's death, his son, Oskie Rice, took over. Oskie Rick employed 15 full-time ranch hands. Mr. Poepoe said that the cattle raised on the ranch were taken to Makawao for slaughter. In addition to beef cattle, there were also dairy cattle.

Mr. Poepoe also provided additional information on the general Kula area. According to him, near Pu'u Kali (Red Hill) they grew corn, and within the caldera of Pu'u Kali is a fence that the Army erected during WWII for target practice. On the Kamaole-Keokea border there was once a Hawaiian settlement. Mr. Poepoe said there were paved sidewalks and gravesites there. He once took a tombstone from there, until the foreman asked where he got it and pointed out what it was. He then returned it.

Mr. Henry Kekiwi was the last foreman for Kanoulu Ranch (under Rice ownership). He presently lives in the Foreman's house, which the ranch provided along with five other houses for ranch hands. According to Mr. Kekiwi, when he retired after 42 years with the ranch, the ranch had 2,500 head of cattle. Mr. Kekiwi provided general information on the area of the ranch. According to him, stone walls throughout the *ahupua'a* were built in the 1800s. On ranching practices, Mr. Kekiwi said that the cattle would graze in the lower lands near Pu'u Kali during the winter months, then around June, they would be taken *mauka*. Mr. Kekiwi noted that Hawaiian Homes Land wraps around the land of a Mr. George Tanji, who has lived on the land many

years growing cabbages and pigs. Mr. Kekiwi also noted that Rice sold *kuleana* land in the area to a Dupont and that Hawaiians and Chinese would move from Pu'u Kali area to further up Keokea during summer. Mr. Dan Auwai said the name Kaonoulu is derived from Cornwell who originally owned the land. A check with the Hawaii State Archives, however, shows Kaonoulu listed as an *'ili*, so the name is most likely traditional.

Driving down the old Haleakala Road starting at Keokea gate, where the agricultural parcels that Hawaiian Homes is allocating are located, Mr. Kekiwi noted that the *heiau* from second gate left of Haleakala Road had ti leaves growing on its side, which indicates a fresh water supply in the area. He also pointed out many *heiau* in the general vicinity of Molohai and Papakea in Keokea, and in Waiohuli. He was not privy to the names of any of them nor was he aware of any stories about them. Mr. Kekiwi pointed out that when ranching, one is busy looking for cattle, not for *heiau*. Along Haleakala Trail, which was used by Kaonoulu Ranch extensively during its ownership by the Rice family, he pointed out "footprints" imprinted in the lava rock. These footprints are outside the project area, on the way to Pu'u o Kali, also known as Red Hill (see Figure A-1 for location of footprints and locations of other sites mentioned in the interviews). The footprints numbered three, were of various sizes, and were all of the left foot. During an interview with William Poepoe, he said the right sides to the footprints were somewhere on Molokai. Mr. Kekiwi noted that before the ranch, the land was (probably) inhabited by Chinese; the Chinese used the walls but they were not necessarily built by them. Mr. Kekiwi said that the barbed wire fences along the walls were put up by the ranch hands, especially when parts of a wall would fall off, to prevent the cattle from crossing over. When asked by Mr. Auwai about a barbed wire fence that surrounded a small area outside the project area, Mr. Kekiwi said that it was probably put up by *pakalolo* growers and not the ranch hands.

CONCLUSION

During this century, the project area has been used primarily for cattle grazing, hence the many archaeological sites obscured by grasses and lantana. For the purposes of this report, a general overview of agricultural activities was given. If further historical documentary research is conducted for the project area, it is suggested that a check be made for awards given out during the Kingdom of Hawaii and that the following topics be addressed: prehistoric environment and occupation in the area, as evidenced by historical documents; local and regional cultural (including residential sequences).

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APPENDIX C

C-10

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APPENDIX D

WAIHOLI SITE AND FEATURE DESCRIPTIONS

SITE NOS.: STATE: 2344 PHRI: W-1 BPBM:—

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, panini, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 7.8 m long by 10.0 m wide; c. 78 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: This feature is a rectangular enclosure. Facing in places on both the inside and outside of the walls. Upright facing stones are present in the northeast and southwest corners. North wall is an alignment. All walls curve outwards. Walls range in height from 10 to 90 cm. Agricultural features, mounds and crude terraces surround the enclosure.

SITE NOS.: STATE: 2345 PHRI: W-2 BPBM: T-6

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, panini, 'ilima, and grasses

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 8.0 m long by 3.6 m wide; c. 29 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: This is a long, narrow enclosure. The walls show no signs of having been faced. Near the center of the west wall a short wall segment extends westward for 1.5 meters. Scattered mounds, modified outcrops, and crude terraces surround the feature.

SITE NOS.: STATE: 2039 PHRI: W-3 BPBM: T-7

FORMAL TYPE: Terrace

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, panini, 'ilima, kiawe and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 19.6 m long by 10 m wide; c. 196 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: This is a complex, rectangular paved terrace with a 1.0 m high faced wall on the northwest. The west wall extends southward beyond the terrace and retains a lower earthen terrace. The paved surface of the terrace overlies 25 cm thick cultural deposit. Alignments border the south and east sides of the earthen terrace. Agricultural

features; crude terraces, mounds and modified outcrops are scattered around the site.

SITE NOS.: STATE: 2346 PHRI: W-4 BPBM: T-8

FORMAL TYPE: Wall

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, panini, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 78.0 m long by 1.0 m wide; c. 78 sq m

PROBABLE AGE: Historic

FUNCTIONAL INTERPRETATION: Animal Control

DESCRIPTION: This site is part of a complex of historic stone walls all of which are associated with a major east-west drainage. The wall is constructed of stacked boulders and cobbles. It follows the bottom of a narrow drainage. A barbed wire fence begins at the east end of the wall.

SITE NOS.: STATE: 2347 PHRI: W-5 BPBM:—

FORMAL TYPE: Overhang

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, panini, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 3.0 m long by 3.8 m wide; c. 11 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Indeterminate

DESCRIPTION: This overhang was possibly utilized. The evidence for use consists of a single boulder which appears to have been placed on the dripline in the center of the entrance. The interior is 1.0 m high.

SITE NOS.: STATE: 2348 PHRI: W-6 BPBM:—

FORMAL TYPE: Lithic Scatter

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, panini, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 7.3 m long by 2.8 m wide; c. 20 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Lithic Reduction

DESCRIPTION: Basalt flakes are on a small bedrock outcrop. The bedrock has scars on it which suggest that a cobble was smashed against it. There are c. 12 flakes (5-10 cm) and numerous smaller flakes on the bedrock.

SITE NOS.: STATE: 2349 PHRI: W-8 BPBM:—

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, panini, 'ilima, kiawe, and grasses

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APPENDIX D

D-2

CONDITION: Fair
 INTEGRITY: Altered
 DIMENSIONS: 5.5 m long by 8.1 m wide; c. 45 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Semi-rectangular structure with some internal facing on the east wall. The walls of the enclosure are collapsed and have been altered both by cattle and bulldozer cuts on the south and SE sides. A wing wall extends SW 2.8 m from the SW corner. The structure walls are compiled of stacked boulders and cobbles up to 70 cm in height. Mounds and modified outcrops are present south of the site.

SITE NOS.: STATE: 2350 PHRI: W-10 BPBM: —
 FORMAL TYPE: Terrace
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, *kiawe* and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 6.6 m long by 5.3 m wide; c. 35 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Agriculture
 DESCRIPTION: T-shaped terrace; at the SW corner of the terrace is an outcrop. The terrace wall is composed of stacked boulders, cobbles and pebbles. It retains a c. 10 sq m area of soil.

SITE NOS.: STATE: 2040 PHRI: W-11 BPBM: T-5
 FORMAL TYPE: Complex
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 23.0 m long by 18.0 m wide; c. 414 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Burial*/Agriculture
 DESCRIPTION: This complex includes a C-shaped enclosure, a wall, mounds, and a platform. Some mounds are possible burials; the largest (Feature E) is faced on one side. The C-shaped enclosure is unusual in that it opens to the northeast. Rough terraces, small mounds and modified outcrops, all probable agricultural features, surround the site.

FEATURE: A
 FORMAL TYPE: C-shaped enclosure
 TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, *panini*, 'ilima, *kiawe* and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 3.6 m long by 2.4 m wide; c. 9 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: C-shaped enclosure open to the NE. Feature is comprised of stacked cobbles up to 40 cm high. A test pit in this feature produced only a few scattered pieces of charcoal, potentially indicating it is not a habitation feature as it's orientation also suggests. The charcoal produced a calendric age range of AD 1270-1490.

FEATURE: B
 FORMAL TYPE: Mound
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 2.0 m long by 1.2 m wide; c. 2 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Mound is roughly circular and rounded in profile. It is comprised of basalt cobbles and boulders stacked 40 cm high. The feature is more substantial than most of the agricultural mounds in the vicinity.

FEATURE: C
 FORMAL TYPE: Mounds
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, *panini*, *kiawe*
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 8.0 m long by 6.6 m wide; c. 53 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Four small mounds and one associated rubble wall. This portion of the site appears to be agricultural in nature. The mounds are too small for burials, and the wall appears to be a portion of a collapsed terrace situated along the edge of the drainage. The mounds average 6.5 cm in diameter and 40 cm in height.

FEATURE: D
 FORMAL TYPE: Mound
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, *panini*, *kiawe*
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 1.9 m long by 1.9 m wide; c. 4 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: This is a large mound comprised of stacked basalt cobbles and boulders. It is roughly rectangular in plan and rounded in profile. The mound is 60 cm in height. It is more substantial than most of the agricultural mounds in the vicinity.

* Tentative, temporary, or provisional.

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APPENDIX D

D-3

FEATURE: E
 FORMAL TYPE: Platform
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, and grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 3.0 m long by 3.0 m wide; c. 9 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: This feature appears to be a mostly collapsed platform which probably contains a burial. The 90 cm high structure is comprised of stacked boulders and cobbles. A c. 2 m long segment of the exterior facing remains intact along the west side. The remaining sides are collapsed. A small piece of decomposing coral is present on the surface of the feature.

FEATURE: F
 FORMAL TYPE: Mound
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, panini, kiawe
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 1.8 m long by 1.4 m wide; c. 3 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: This is a large mound comprised of stacked basalt cobbles and boulders. It is roughly rectangular in plan and rounded in profile. The mound is 60 cm in height. It is more substantial than most agricultural mounds in the vicinity.

SITE NOS.: STATE: 2351 PHRI: W-12 BPBM: —
 FORMAL TYPE: Terraces
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Panini, lantana and 'ilima
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 7.0 m long by 13.2 m wide; c. 92 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Agriculture
 DESCRIPTION: Three rock-retained terraces arranged in a stepped series. The terraces average 0.4 m in height, 7.0 m long by and 4.6 m wide. Terrace walls incorporate bedrock outcrops. Additional agricultural features, mostly mounds and modified outcrops are present to the southeast.

SITE NOS.: STATE: 2352 PHRI: W-13 BPBM: —
 (Figure D-1)
 FORMAL TYPE: Complex
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, wiliwili, 'ilima, kiawe and grasses
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 25.0 m long by 20.0 m wide; c. 500 sq m

PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Two enclosures; one square and the other trapezoidal. Associated agricultural mounds and terraces surround these features and extend c. 40 m to the northeast.

FEATURE: A (Figure D-1)
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, and grasses
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 8.0 m long by 6.0 m wide; c. 48 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Trapezoidal enclosure; possible wall extension off NW corner. Small terrace at NW corner. Most of the west wall is collapsed. The SE corner is faced externally. The walls average 40 cm in height, are core-filled (filled portion is narrow), and are comprised of stacked boulders and cobbles.

FEATURE: B (Figure D-1)
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 6.1 m long by 6.0 m wide; c. 37 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Square enclosure with core-filled walls. The southwest wall consists of a ridge of bedrock. The walls average 40 cm in height. The wall faces are comprised of stacked basalt cobbles and boulders. The core-fill is comprised of cobbles.

SITE NOS.: STATE: 2353 PHRI: W-14 BPBM: —
 FORMAL TYPE: Complex
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, and grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 42.0 m long by 28.0 m wide; c. 1176 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: This site includes two enclosures, an L-shaped wall, and associated agricultural features.

FEATURE: A
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, and grasses

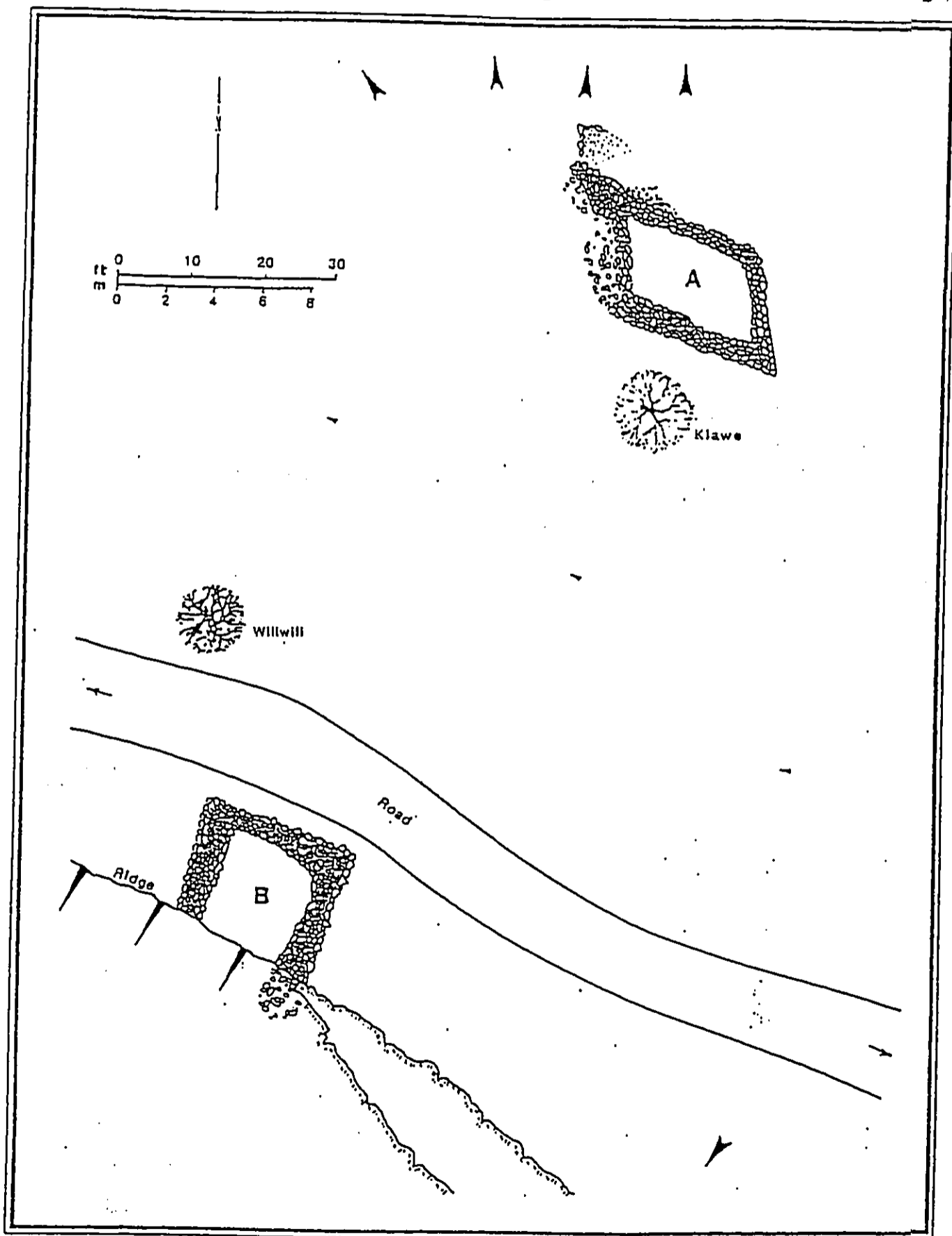


Figure D-1. SITE W-13, FEATURES A AND B.

CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 8.1 m long by 6.0 m wide; c. 49 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure with internal facing on the NE corner. Two large flat slabs located atop walls of structure. Internal wall extends off south wall. The walls range from 20 to 60 cm in height and are comprised of stacked basalt boulders and cobbles.

FEATURE: B
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, and grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 3.0 m long by 2.5 m wide; c. 8 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: C-shaped; very crude. One end of the structure sits on bedrock. Feature is open to the south. It is comprised of basalt boulders and cobbles stacked/piled up to 50 cm in height. Feature probably is agricultural in function.

FEATURE: C
 FORMAL TYPE: Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, and grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 10.0 m long by 9.0 m wide; c. 90 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: L-shaped; west portion of feature consists of an alignment of boulders and cobbles; south wall consists of stacked boulders and cobbles. The walls border a roughly rectangular area of level soil.

SITE NOS.: STATE: 2354 PHRI: W-15 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, and grasses
 CONDITION: Poor
 INTEGRITY: Unaltered
 DIMENSIONS: 5.0 m long by 4.8 m wide; c. 24 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: This is an oval enclosure constructed of large stones (averaging 60 cm in diameter). The inside of the NE wall is faced. Agricultural features, mounds and modified outcrops, are present to the southeast.

SITE NOS.: STATE: 2355 PHRI: W-17 BPBM: —
 FORMAL TYPE: Complex
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 13.0 m long by 9.0 m wide; c. 117 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Consists of a two-chambered enclosure and an oval enclosure; both are small and incorporate bedrock in their construction. Scattered agricultural features surround the site.

FEATURE: A
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, and grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 6.0 m long by 4.0 m wide; c. 24 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Two chambered enclosure; incorporates bedrock on south side. The north wall is faced on both the inside and the outside up to 60 cm in height. Walls are comprised of stacked boulders and cobbles. A cowrie shell fragment is present on the surface inside the feature.

FEATURE: B
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 4.2 m long by 4.2 m wide; c. 18 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Circular enclosure with the walls well faced on the inside. The southern wall is 1.0 m high and the north wall is 0.7 m high. The walls are comprised of stacked basalt boulders and cobbles.

SITE NOS.: STATE: 2356 PHRI: W-18 BPBM: —
 FORMAL TYPE: Complex
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, 'ilima, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 100.0 m long by 80.0 m wide;
 c. 8,000 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture

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APPENDIX D

D-6

DESCRIPTION: This site includes one rectangular enclosure, one irregular enclosure, and numerous agricultural terraces and mounds.

FEATURE: A

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, *panini*, wattle, *kiawe*, and grasses

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 6.3 m long by 5.4 m wide; c. 34 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Medium-sized rectangular enclosure which appears to have a doorway on the northwest corner. The walls are comprised of stacked basalt boulders and cobbles and range from 15 to 50 cm in height.

FEATURE: B

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, *panini*, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 12.0 m long by 11.0 m wide; c. 132 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Complex irregular enclosure. The larger (southern) enclosed area is large (9 x 7.5 cm) and U-shaped. The northern enclosed area consists of an attached C-shape. The larger enclosed area opens to the west portion of the U-shaped area. The walls are comprised of stacked basalt boulders and cobbles. The walls range in height from 30 to 40 cm.

SITE NOS.: STATE: 2357 PHRI: W-20 BPBM: —

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, *panini*, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 7.1 m long by 6.9 m wide; c. 49 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Rectangular enclosure; upslope walls retain a terrace. The west wall consists of an alignment on an outcrop. The walls are comprised of basalt boulders and cobbles stacked up to 70 cm in height. A probable hammerstone is present on the surface. Scattered agricultural features surround the site.

SITE NOS.: STATE: 2358 PHRI: W-21 BPBM: —

(Figure D-2)

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, *panini*, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 9.9 m long by 9.2 m wide; c. 91 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: This is a rectangular enclosure open to the NW which is situated on a partially paved terrace. The walls of the enclosure are faced on both sides. The enclosure is 5 m long by 4.5 wide by 1.2 m high. Both the terrace and enclosure are comprised of stacked basalt cobble and boulders. Scattered agricultural features surround the site.

SITE NOS.: STATE: 2041 PHRI: W-27 BPBM: T-36
(Figures D-3, D-4)

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, *panini*, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 22.0 m long by 12.5 m wide; c. 275 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Religious/
Habitation

DESCRIPTION: May be Kaumcheiwa Heiau. L-shaped enclosure; includes an internal platform or wall segment, paving, and cupboard and step along the inner north wall. The northeast corner is notched. The south wall is paved with flat well-rounded boulders. The walls are well-faced and average 1.2 to 2 m in thickness and 90 cm in height. A test unit excavated in the interior of the enclosure revealed a subsurface cultural deposit containing charcoal, basalt and volcanic glass flakes, coral, marine shell and bone. A radiocarbon sample from the deposit yielded three possible age ranges between AD 1305 and 1617.

SITE NOS.: STATE: 2042 PHRI: W-28 BPBM: —
(Figure D-5)

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, *panini*, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 12.1 m long by 11.1 m wide; c. 134 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Religious*
/Habitation

DESCRIPTION: This is a notched, paved enclosure. The paving lies over a rich cultural (habitation) layer. This feature may be a heiau or high status residence. Formally it resembles site 27. The walls average 2m in thickness and are up to 90 cm in height. The walls are faced on the interior and exterior. The walls are constructed of stacked boulders

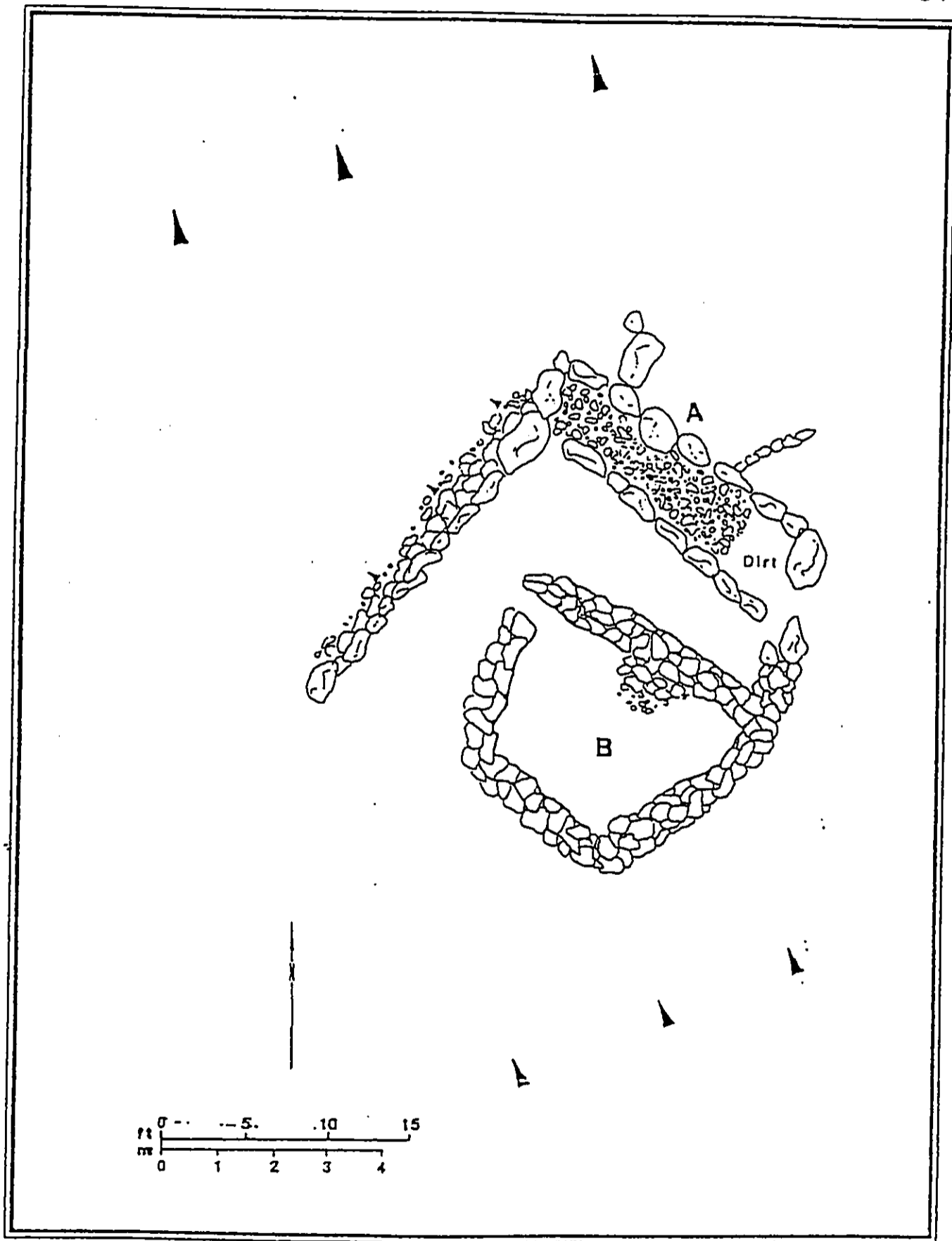


Figure D-2. SITE W-21

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APPENDIX D

D-8

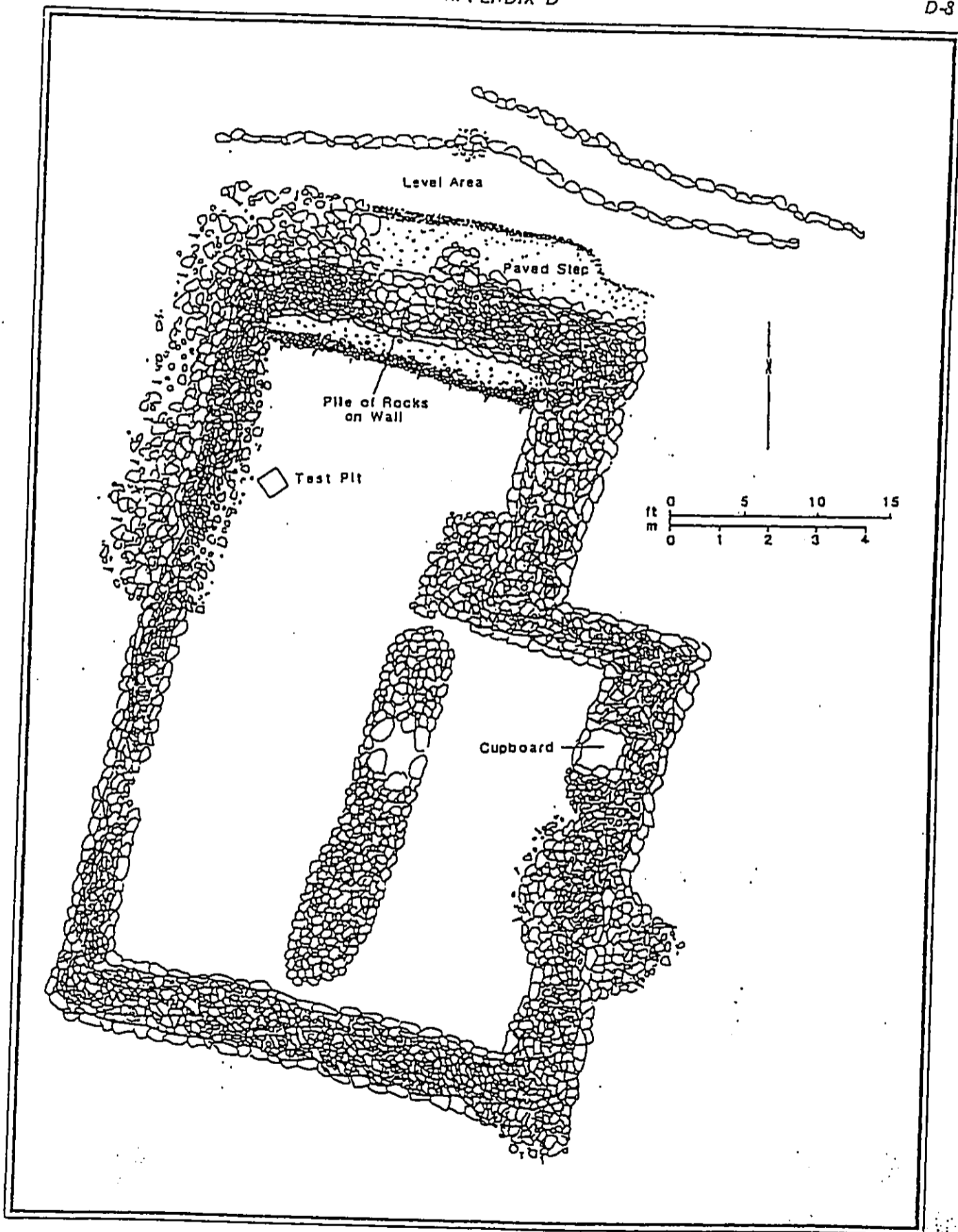
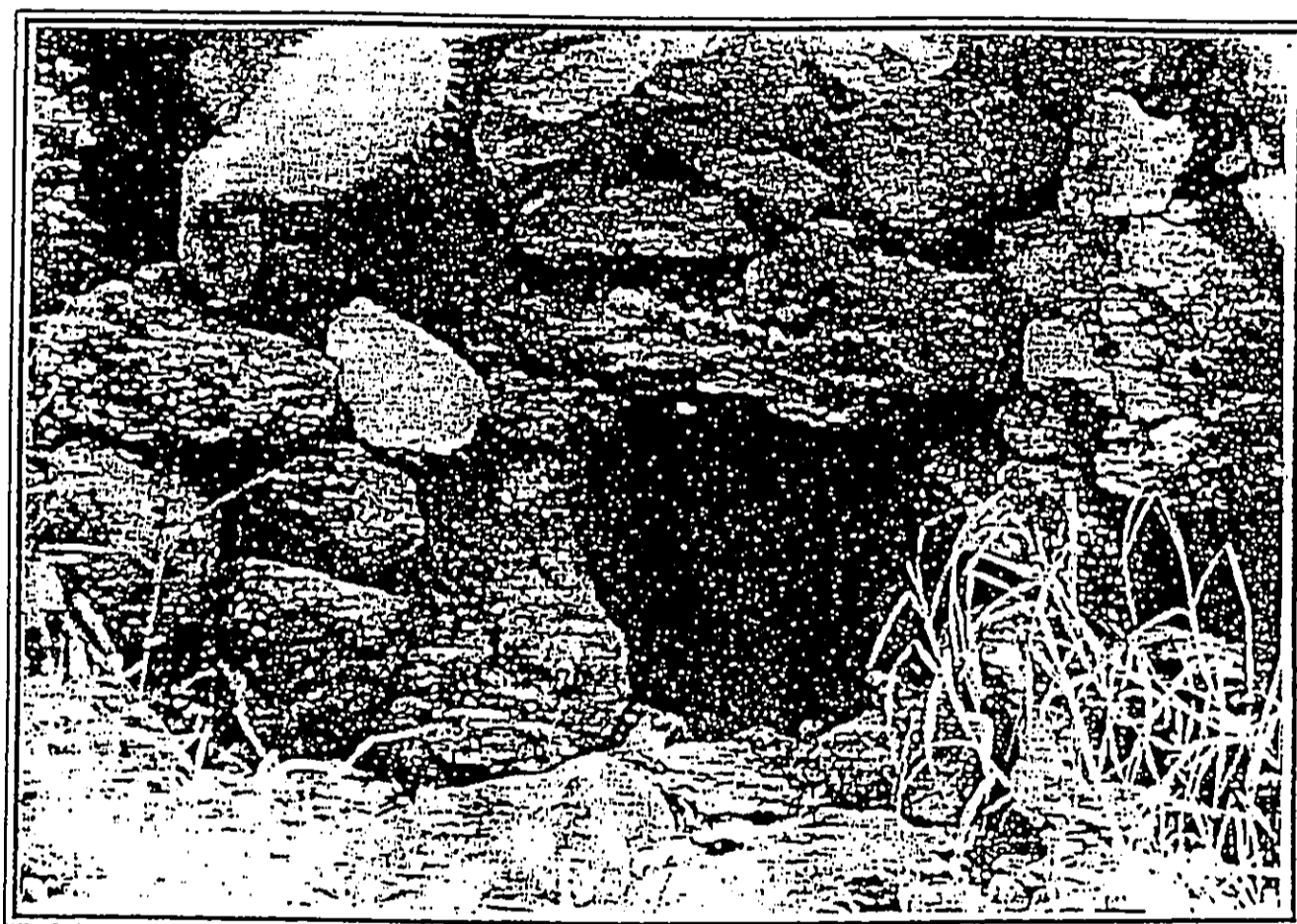


Figure D-3. SITE W-27



*Figure D-4. SITE W-27, CUPBOARD.
VIEW TO EAST-SOUTHEAST
(PHRI Neg. 1143-3)*

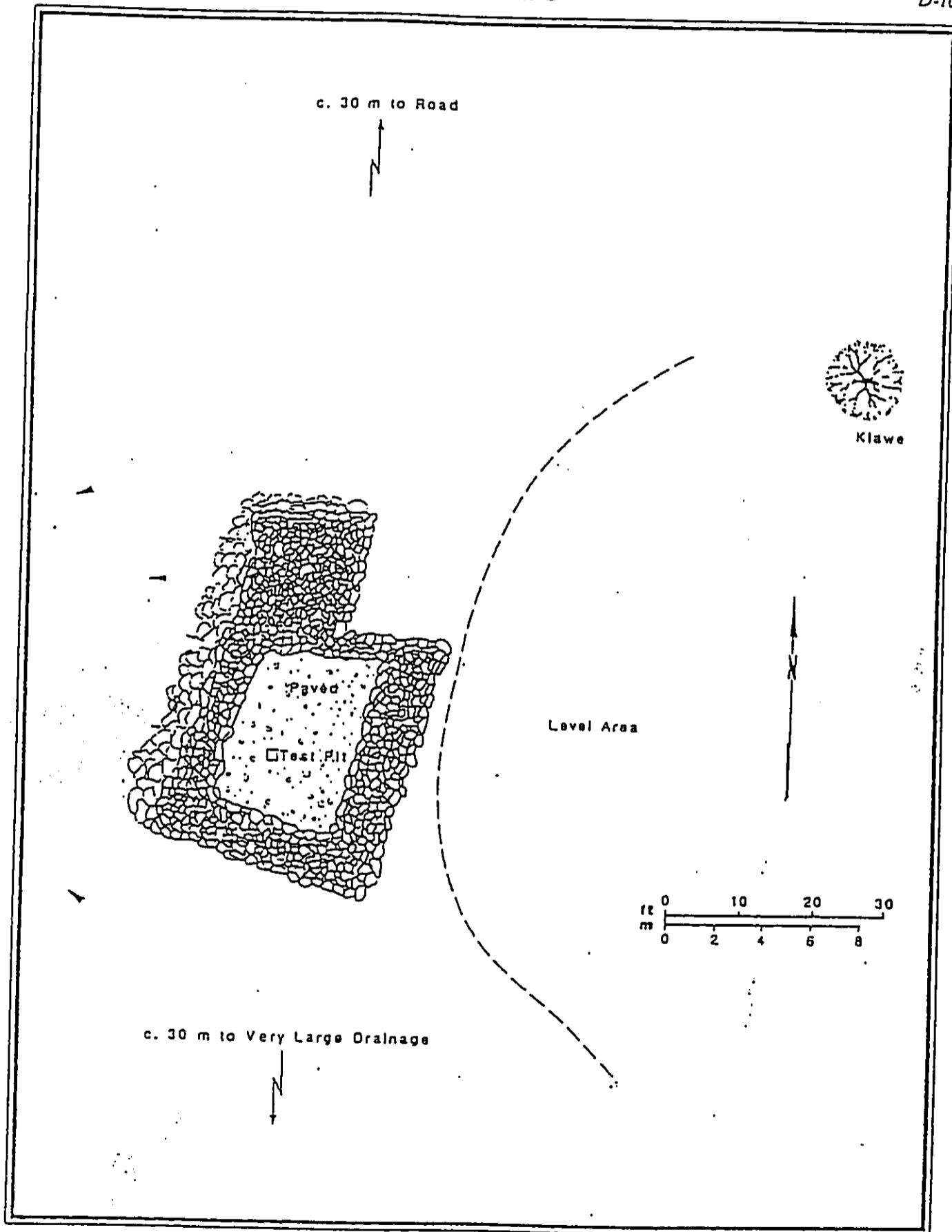


Figure D-5. SITE W-28

and cobbles. A test unit in the interior of the enclosure revealed a subsurface cultural deposit containing coral, basalt and volcanic glass flakes, bone and charcoal. The deposit was capped by a pavement of basalt pebbles and cobbles. A radiocarbon sample obtained from the deposit yielded a age range of AD 1290- 1640.

SITE NOS.: STATE: 2359 PHRI: W-30 BPBM: T-110
 FORMAL TYPE: Alignment
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, *'ilima*, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 23.0 m long by 1.0 m wide; c. 23 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Religious*
 DESCRIPTION: Alignment of uprights and boulders situated on the edge of a basalt outcrop overlooking a gulch and another possible ceremonial site (W-32). Site W-27 lies c. 75.0 m to the southwest. The site's proximity to at least one religious/ceremonial site and its form suggest a possible religious function.

SITE NOS.: STATE: 2360 PHRI: W-31 BPBM: —
 FORMAL TYPE: Overhangs
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, *'ilima*, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 13.0 m long by 3.0 m wide; c. 39 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Two overhangs; includes a bedrock outcrop and a free standing wall. The wall connects with the outcrop c. 5.5 m east of the easternmost overhang and extends west for about 7.0 m. The overhangs are each c. 1.0 m deep by 3.0 m wide by 2.0 m high. Agricultural features surround the site.

SITE NOS.: STATE: 2361 PHRI: W-32 BPBM: —
 (Figure D-6)
 FORMAL TYPE: Upright
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, *'ilima*, and grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 6.2 m long by 6.0 m wide; c. 55 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Religious*
 DESCRIPTION: Natural upright with orifice. The upright is part of an outcrop. The upright projects well above the outcrop and is 2m high measured from the surface of the

rough terrace. The orifice is .15 m in diameter and .55 m deep. Beneath the boulder wall is a crude terrace retained by a single-course of rocks. This unusual, and apparently modified natural upright is interpreted as a possible shrine; however, excavation of the terrace would be necessary to confirm this interpretation.

SITE NOS.: STATE: 2362 PHRI: W-35 BPBM: T-105*
 FORMAL TYPE: Human bone
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle, lantana, and *'ilima*
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 4.8 m long by 4.5 m wide; c. 22 sq m
 PROBABLE AGE: Unknown
 FUNCTIONAL INTERPRETATION: Burial
 DESCRIPTION: A slightly waterworn human skull fragment was discovered in the bottom of a gulch. Anterior portions of the occipital and both parietals were still articulated. The isolated fragment probably originated from an eroded burial situated somewhere upslope.

SITE NOS.: STATE: 2043 PHRI: W-36 BPBM: —
 (Figure D-7)
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, *panini*, *'ilima*, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 15.6 m long by 7.6 m wide; c. 119 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Religious*
 /Habitation
 DESCRIPTION: A complex, paved rectangular enclosure with internal features. In the northeast corner is a slightly elevated paved platform. A fallen upright is present at the interior edge of the platform. One decomposing piece of coral is present near the platform. Overall the feature appears to be divided longitudinally into an upper paved half which has the platform and a lower half which has a soil covered surface. The walls of the feature are well-faced along much of their extent. The walls are comprised of basalt cobbles and boulders stacked up to 1.0 m in height. The walls average 2 m in thickness. A test unit excavated in the lower soil-covered half of the feature revealed a pavement of large flat stones beneath which is a subsurface cultural deposit containing charcoal, coral, basalt flakes and numerous pebbles and cobbles, many of which are waterworn. A radiocarbon sample from the deposit yielded a calendric age range from AD 1397-1482.

SITE NOS.: STATE: 2363 PHRI: W-37 BPBM: T-104*
 FORMAL TYPE: Complex

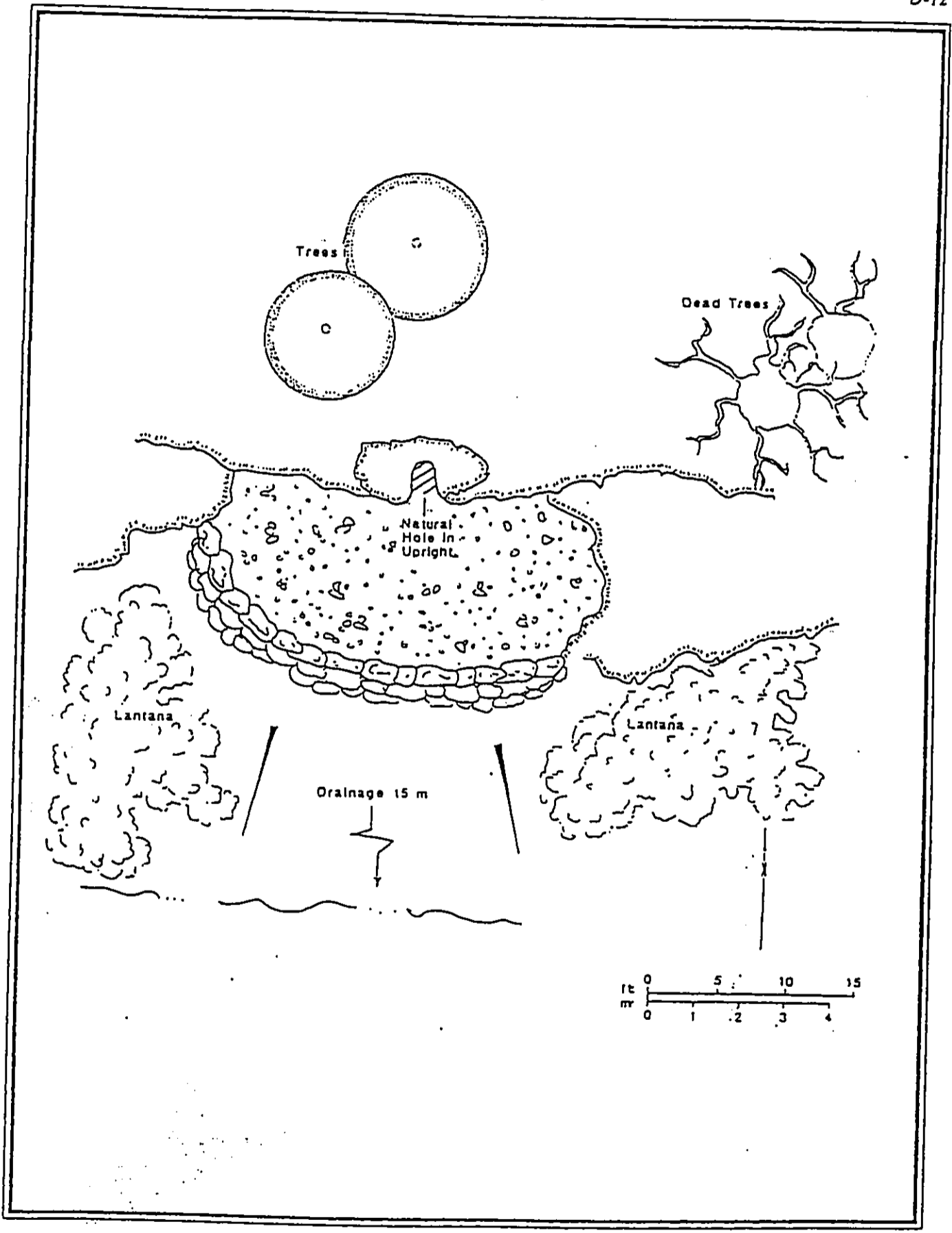


Figure D-6. SITE W-32

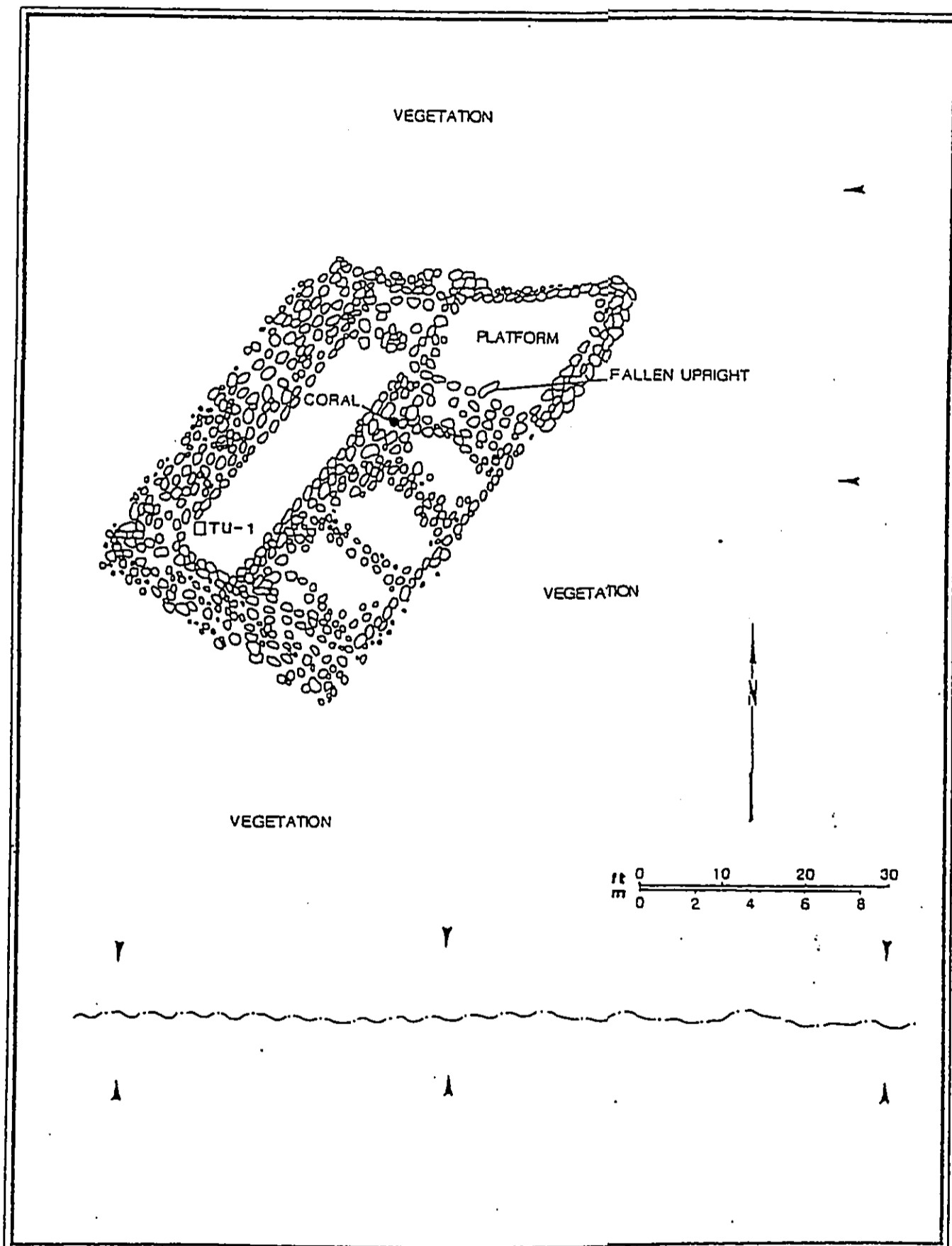


Figure D-7. SITE W-36

TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 5.0 m long by 4.0 m wide; c. 20 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Circular enclosure with some facing on inside of NE wall, and a U-shaped enclosure. Agricultural features surround this site for distances exceeding 100.0 m.

FEATURE: A

FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, and 'ilima
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 5.0 m long by 4.0 m wide; c. 20 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Circular enclosure c. 25 m north of Waiohuli Gulch. Enclosure is thoroughly obscured by lantana and panini. No signs of paving within enclosure. Walls average 75 cm in thickness and 30 cm in height. They are comprised of stacked basalt boulders and cobbles.

FEATURE: B

FORMAL TYPE: U-shaped wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle Forest
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 20.0 m long by 17.0 m wide; c. 340 sq m
 PROBABLE AGE: Unknown
 DESCRIPTION: Discontinuous U-shaped wall faces the south, perpendicular to the slope. The wall consists of one to two courses of large stacked cobbles and boulders.

SITE NOS.: STATE: 2364 PHRI: W-42 BPBM: T-75*

FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle, grasses, 'ilima
 CONDITION: Poor
 INTEGRITY: Unaltered
 DIMENSIONS: 5.5 m long by 5.2 m wide; c. 29 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Oval enclosure and surrounding agricultural terraces. The highest density of terraces is to the east and the south of the enclosure. The enclosure is either poorly constructed or in poor condition. The walls are comprised of stacked basalt cobbles and boulders. Walls average 90 cm in thickness and 20-40 cm in height.

SITE NOS.: STATE: 2044 PHRI: W-45 BPBM: T-72
 (Figure D-8)

FORMAL TYPE: Complex
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, and grasses
 CONDITION: Fair
 INTEGRITY: Altered
 DIMENSIONS: 90.0 m long by 65.0 m wide;
 c. 5,850 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: This complex includes a rectangular enclosure and an oval enclosure amidst extensive agricultural terraces and mounds.

FEATURE: A

FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Panini, Lantana, 'ilima, and grasses
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 12.0 m long by 12.0 m wide; c. 144 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure with an adjoining western terrace. The western edge of the enclosure is defined by a large bedrock outcrop. Walls are comprised of basalt boulders and cobbles stacked to a maximum height of 40 cm.

FEATURE: B

FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, and grasses.
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 8.0 m long by 7.0 m wide; c. 56 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Oval enclosure with high, wide, faced walls. On the inside of the northwest wall there is a step-like feature which averages 1 m in width and is c. 30 cm above the interior surface. The walls of the structure range between 1 and 2 m in thickness and .50 to 1.40 in height. The walls are comprised of stacked boulders and cobbles. A test unit excavated in the interior of the feature revealed a subsurface cultural deposit containing charcoal, marine shell, basalt and volcanic glass flakes and kukui nut shell. A radiocarbon sample from the deposit yielded a calendric age range of AD 1450-1660.

SITE NOS.: STATE: 2365 PHRI: W-46 BPBM: T-71

FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, wattle, 'ilima, and grasses

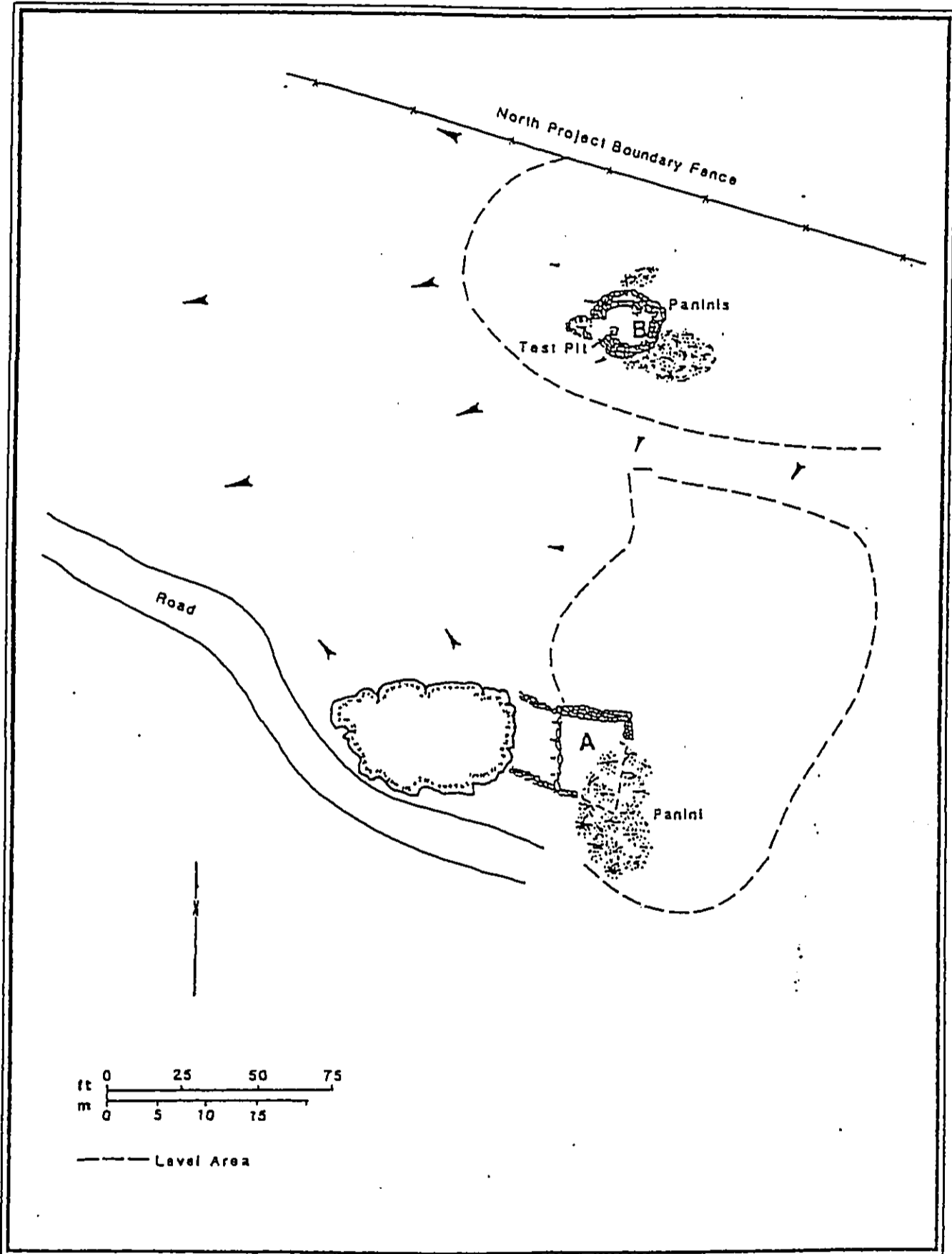


Figure D-8. SITE W-45

CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 14.5 m long by 9.5 m wide; c. 138 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Trapezoidal enclosure surrounded by agricultural features. There is an opening in the northwest corner of the structure. The walls, comprised of stacked basalt boulders and cobble, average 1.0 m in thickness and 50 cm in height.

SITE NOS.: STATE: 2366 PHRI: W-47 BPBM: T-107
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle, 'ilima and grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 39.0 m long by 25.0 m wide; c. 975 sq m
 PROBABLE AGE: Historic*
 FUNCTIONAL INTERPRETATION: Animal Control
 DESCRIPTION: Large rectangular enclosure. Wing walls extend off NE and NW corners. Some facing on the south and north sides and on the east wing wall. Walls are comprised of stacked boulders and cobbles. The walls average 80 cm in thickness and 1.0 m in height.

SITE NOS.: STATE: 2367 PHRI: W-48 BPBM: T-108
 FORMAL TYPE: Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle, 'ilima, and grasses
 CONDITION: Fair
 INTEGRITY: Altered
 DIMENSIONS: 20.0 m long by 38.0 m wide; c. 760 sq m
 PROBABLE AGE: Prehistoric*
 FUNCTIONAL INTERPRETATION: Agriculture
 DESCRIPTION: Large U-shaped wall; western wall retains a terrace. Wall is comprised of stacked basalt boulders and cobbles. Wall ranges in height from 40 to 100 cm.

SITE NOS.: STATE: 2368 PHRI: W-49 BPBM: —
 FORMAL TYPE: Terraces
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle and grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 13.0 m long by 12.0 m wide; c. 156 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Agriculture
 DESCRIPTION: Alignment connecting two parallel agricultural terraces. Agricultural terraces are extensive in this area, extending c. 150.0 m east to the edge of the project area.

SITE NOS.: STATE: 2369 PHRI: W-55 BPBM: —
 FORMAL TYPE: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle, grasses, lantana, and Silky Oak
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 4.0 m long by 3.5 m wide; c. 14 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Temporary
 Habitation*
 DESCRIPTION: Site is an overhang with a wall in front partially blocking the entrance. The enclosed area measures 4.0 m wide by 3.5 m deep 2.0 m high. The wall covers 1.4 m of the entrance. The overhang is filled with historic trash. The wall is composed of stacked basalt boulders.

SITE NOS.: STATE: 2370 PHRI: W-57 BPBM: —
 FORMAL TYPE: Upright slab
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle, lantana, and grasses.
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 0.03 m long by 0.10 m wide; c. 300 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Indeterminate
 DESCRIPTION: Single upright slab with a few possibly associated boulders. Possible remnant of a wall or terrace because evidence of bulldozer disturbance surrounds.

SITE NOS.: STATE: 2371 PHRI: W-58 BPBM: —
 FORMAL TYPE: Walls
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle, 'ilima, and grasses
 CONDITION: Fair
 INTEGRITY: Altered
 DIMENSIONS: 30.0 m long by 1.0 m wide; c. 30 sq m
 PROBABLE AGE: Historic
 FUNCTIONAL INTERPRETATION: Animal Control
 DESCRIPTION: Two wall segments which were probably connected before bulldozing of area. Walls run perpendicular to slope segments comprised of stacked basalt boulders and cobbles averaging 60 cm high. Probable remnant of cattle wall..

SITE NOS.: STATE: 2372 PHRI: W-59 BPBM: T-81
 FORMAL TYPE: Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle, 'ilima, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 24.0 m long by 1.0 m wide; c. 24 sq m
 PROBABLE AGE: Historic
 FUNCTIONAL INTERPRETATION: Transportation

DESCRIPTION: Historic road retaining wall. The wall is in good condition and well-faced. It retains an abandoned road overlooking a drainage.

SITE NOS.: STATE: 2373 PHRI: W-60 BPBM: —
FORMAL TYPE: Wall
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle and grasses
CONDITION: Poor
INTEGRITY: Altered
DIMENSIONS: 25.0 m long by 0.4 m wide; c. 10 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Animal Control
DESCRIPTION: Intermittent wall with some facing on the south side of the east end. The wall runs *mauka-makai* perpendicular to slope. Wall is 25 m long, 40 cm thick, and 1.0 m high. It is constructed of stacked basalt boulders and cobbles. Probably part of some wall represented at site 58.

SITE NOS.: STATE: 2374 PHRI: W-65 BPBM: —
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Silky Oak, wattle, lantana, and grasses
CONDITION: Fair
INTEGRITY: Altered
DIMENSIONS: 26.0 m long by 12.0 m wide; c. 312 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
DESCRIPTION: Semi-rectangular enclosure and terraces. The NE and NW walls of this enclosure consist of modified bedrock. Facing is in the SE interior corner. A 10.0 m long terrace alignment situated just upslope from the structure. Enclosed walls average 75 cm in thickness and 40 cm in height. The enclosure is 8.4 m long and 5.6 m wide.

SITE NOS.: STATE: 2375 PHRI: W-67 BPBM: —
 (Figure D-9)
FORMAL TYPE: Complex
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, *panini*, 'ilima
CONDITION: Good
INTEGRITY: Altered
DIMENSIONS: 18.0 m long by 12.0 m wide; c. 216 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
DESCRIPTION: Consists of one trapezoidal enclosure and two close parallel walls. Walls may represent a collapsed structure or two adjacent terraces. Several agricultural mounds noted in the vicinity.

FEATURE: A
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, *panini*, 'ilima
CONDITION: Good
INTEGRITY: Altered
DIMENSIONS: 12.0 m long by 11.0 m wide; c. 132 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Trapezoidal enclosure. The east wall has been built around bedrock. The south wall is faced with eight upright slabs. There are also upright slabs in the NE and NW corners. A wing wall extends off the southwest corner. The wall averages 40 cm in height and is composed of stacked basalt boulders and cobbles.

FEATURE: B
FORMAL TYPE: Enclosure (?)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, *panini*, 'ilima
CONDITION: Fair
INTEGRITY: Altered
DIMENSIONS: 9.0 m long by 4.0 m wide; c. 36 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Two parallel walls two meters apart extending for c. 7.8 m. Walls are joined at NW end by relatively large rocks. The other end is partially enclosed by larger rocks but they do not completely close off the structure. Formally the walls resemble terraces; however it is likely they represent the disturbed remnants of a smaller enclosed rectangular terrace.

SITE NOS.: STATE: 2376 PHRI: W-71. BPBM: T-101
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, *panini*, wattle, and grasses
CONDITION: Fair
INTEGRITY: Altered
DIMENSIONS: 22.0 m long by 18.0 m wide; c. 396 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DESCRIPTION: Triangular enclosure with associated agricultural features. The structure has a small wall in the eastern end. Agricultural features extend west for c. 120.0 m along the side of a hill. Enclosure walls average 25 cm in height and are comprised of stacked boulders and cobbles.

SITE NOS.: STATE: 2377 PHRI: W-73 BPBM: —
FORMAL TYPE: Walls
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle and grasses
CONDITION: Fair
INTEGRITY: Altered

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APPENDIX D

D-18

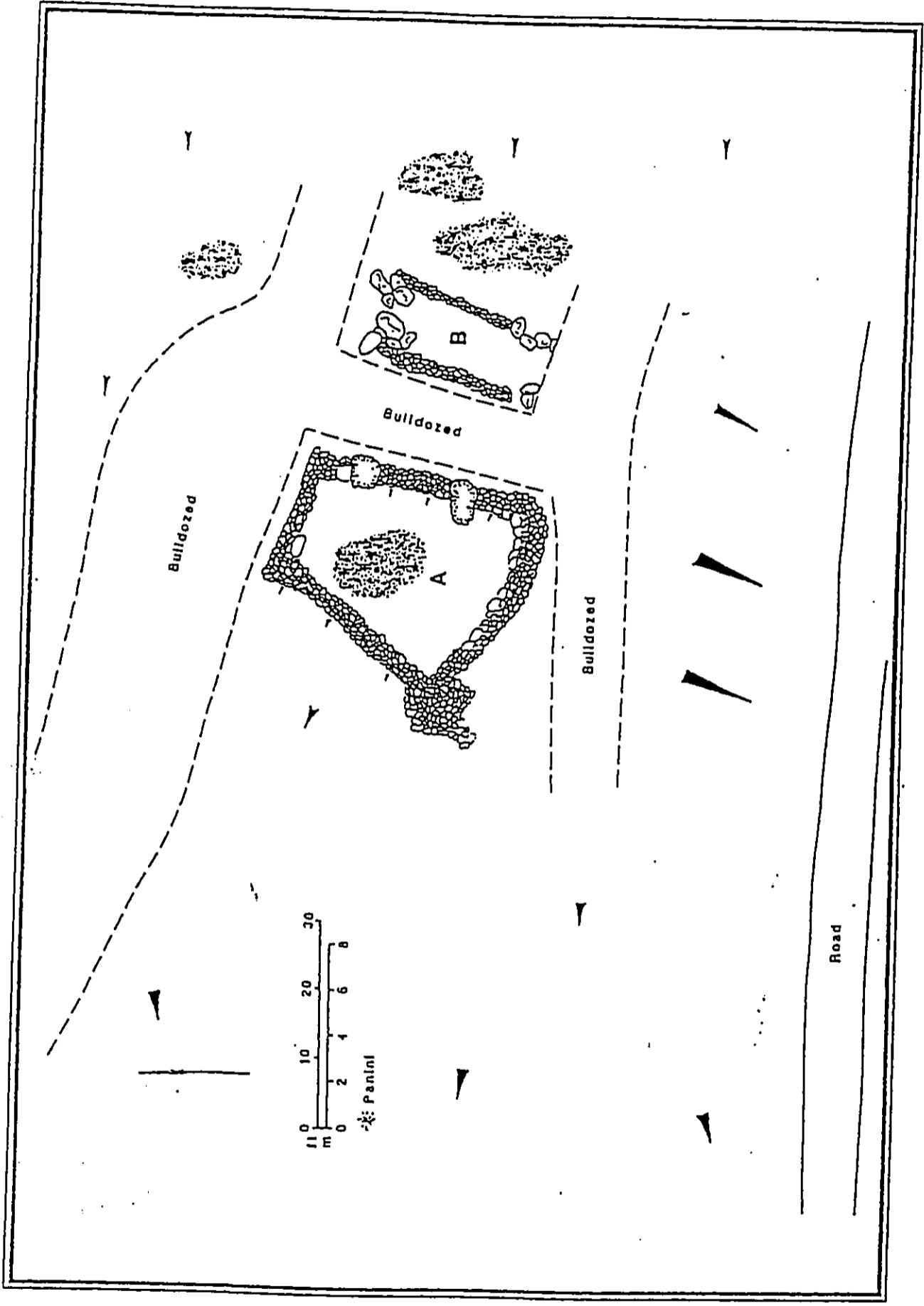


Figure D-9. SITE W-67

DIMENSIONS: 170.0 m long by 75.0 m wide;
c. 12,750 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Agriculture

DESCRIPTION: Terraces and walls. In this area there are two larger terraces and numerous smaller ones. The wall runs perpendicular to the slope. Terraces are retained by either short retaining walls or alignments.

SITE NOS.: STATE: 2378 PHRI: W-75 BPBM: T-87-86
FORMAL TYPE: Wall

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle and grasses

CONDITION: Good

INTEGRITY: Altered

DIMENSIONS: 100.0 m long by 0.5 m wide; c. 50 sq m

PROBABLE AGE: Prehistoric/Historic

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: L-shaped wall, the north-south wall of which retains a terrace. The east-west wall is short and free standing. There are terraces in the area. There is also a water trough made from a cut half-boiler. The L-shaped wall appears to be the disturbed remnant of a rectangular enclosure. The wall has a maximum height of 50 cm and is composed of stacked basalt boulders and cobbles.

SITE NOS.: STATE: 2379 PHRI: W-77 BPBM: —
(*Figures D-10, D-11*)

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle, lantana, koa haole, 'ilima, and grasses

CONDITION: Good

INTEGRITY: Altered

DIMENSIONS: 30.0 m long by 20.0 m wide; c. 600 sq m

PROBABLE AGE: Prehistoric*

FUNCTIONAL INTERPRETATION: Agriculture

DESCRIPTION: Irregular-shaped enclosure; uses a bedrock outcrop. Very low wall on NW side. The enclosure is situated in a swale. Wall is poorly preserved composed of stacked basalt boulders and cobbles. A test unit of this feature did not reveal any cultural remains.

SITE NOS.: STATE: 2380 PHRI: W-80 BPBM: —

FORMAL TYPE: Wall

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle, Silky Oak, lantana, 'ilima, panini, grasses

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 400.0 m long by 1.0 m wide; c. 400 sq m

PROBABLE AGE: Historic

FUNCTIONAL INTERPRETATION: Animal Control
DESCRIPTION: Long wall runs perpendicular to the slope. The wall runs parallel to and close to the south side of a deep ravine and as such may be part of the system of walls at Site W-4. Some segments of the wall are collapsed or have been destroyed by cows and bulldozers.

SITE NOS.: STATE: 2381 PHRI: W-82 BPBM: —
FORMAL TYPE: Terrace

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, panini, 'ilima, and grasses

CONDITION: Fair

INTEGRITY: Altered

DIMENSIONS: 9.3 m long by 5.5 m wide; c. 51 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Possible rectangle habitation terrace in a large area of many scattered agricultural terraces. Consists of a U-shaped alignment of boulders and cobbles, the interior of which is relatively level compared to the adjacent slope.

SITE NOS.: STATE: 2382 PHRI: W-83 BPBM: —
FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, panini, 'ilima, and grasses

CONDITION: Fair

INTEGRITY: Altered

DIMENSIONS: 5.0 m long by 3.5 m wide; c. 18 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Small rectangular enclosure; NW corner faced on interior and exterior; also facing on the interior of the SW corner. Walls have a maximum height of 30 cm and are composed of stacked cobbles and boulders. Agricultural features are present in the vicinity.

SITE NOS.: STATE: 2383 PHRI: W-88 BPBM: —
FORMAL TYPE: Wall

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle and grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 15.0 m long by 1.1 m wide; c. 17 sq m

PROBABLE AGE: Historic

FUNCTIONAL INTERPRETATION: Transportation

DESCRIPTION: Road retaining wall. This wall is in good condition and is faced. The wall holds up a bend in an old road situated on the edge of a drainage. The road is almost certainly the same road that crosses the bridge (Site W-101) just up stream.

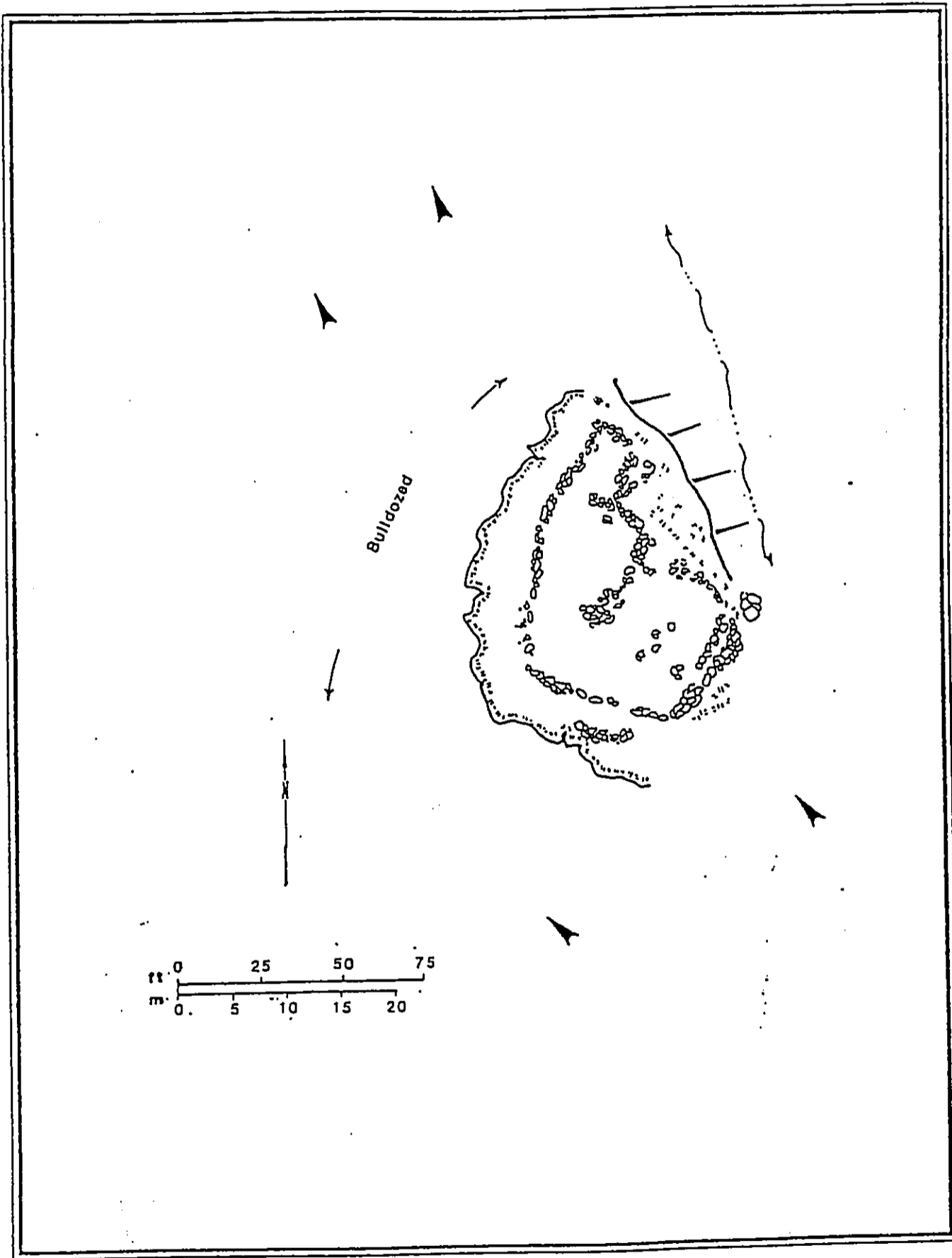
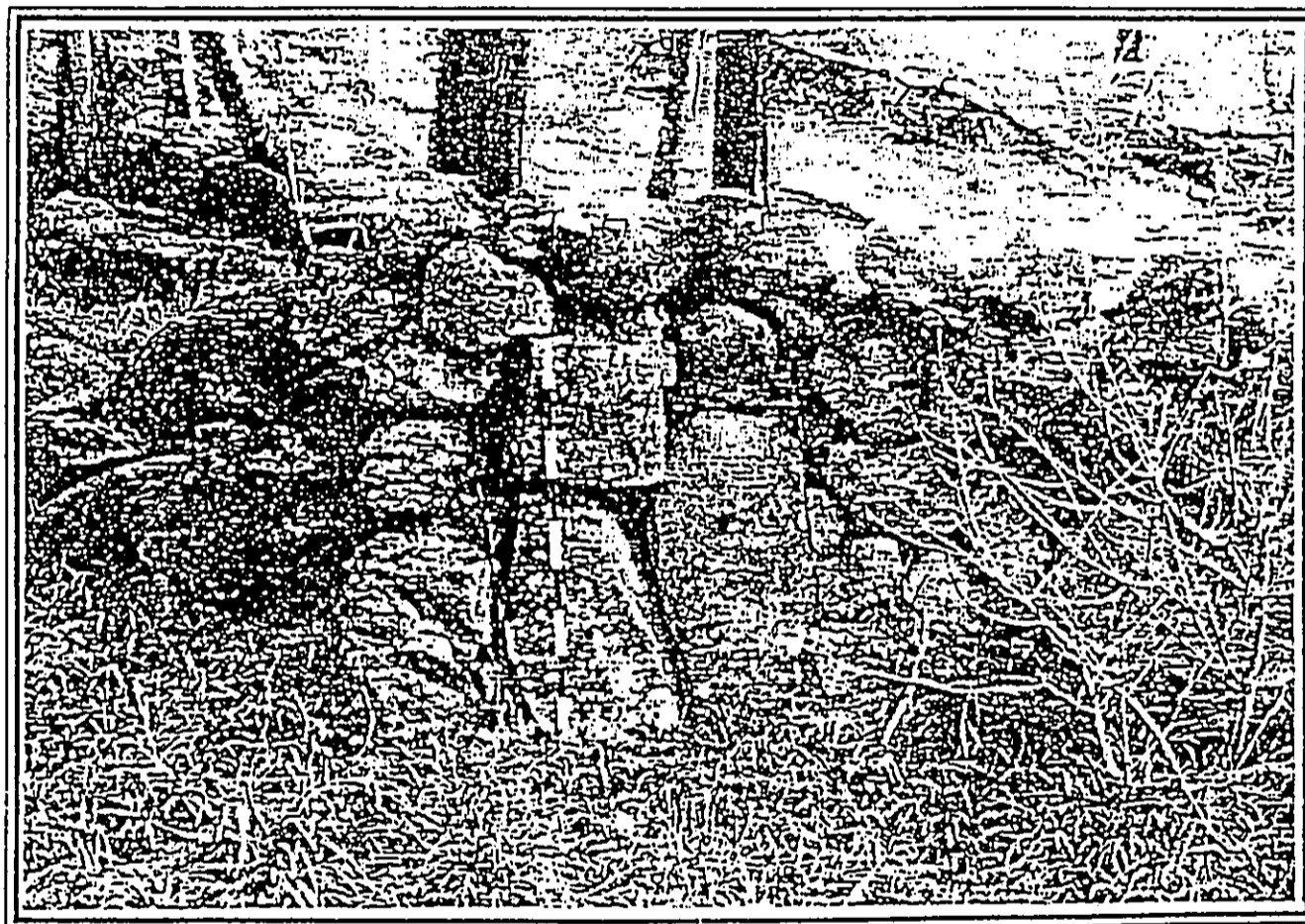


Figure D-10. SITE W-77



*Figure D-11. SITE W-77, WALL WITH UPRIGHTS. View to South.
(PHRI Neg.1143-36)*

SITE NOS.: STATE: 2384 PHRI: W-90 BPBM: —
(Figure D-12)

FORMAL TYPE: Cave
TOPOGRAPHY: Stream-cut basalt cliff
VEGETATION: Wattle, lantana, 'ilima, and grasses
CONDITION: Good
INTEGRITY: Altered
DIMENSIONS: 8.0 m long by 0.8 m wide; c. 6 sq m
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Burial
DESCRIPTION: Small lava tube which extends into the face of a tall cliff face; at least two burials present in tube. The tube extends inward for more than 8.0 m; bends slightly to left. Bones are scattered throughout the tube; a concentration of bones is situated c. 6.0 m from the opening. Entrance to tube is partially walled. Elements present include rib, long bones, possible skull fragment and other post-cranial remains. A glass bead and shell button noted among the bones.

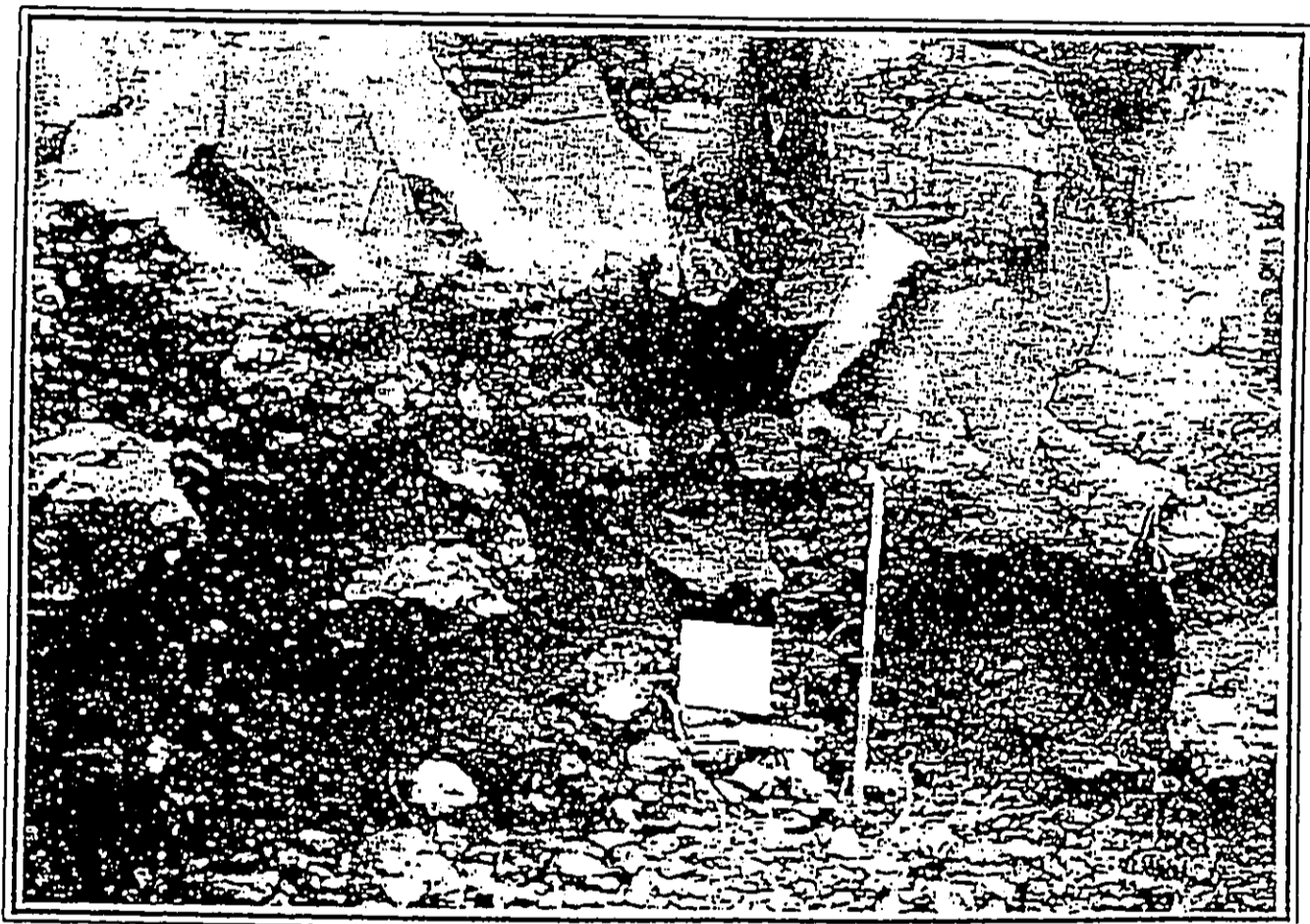
SITE NOS.: STATE: 2385 PHRI: W-96 BPBM: —
FORMAL TYPE: Wall
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, panini, 'ilima, and grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 10.0 m long by 9.2 m wide; c. 92 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DESCRIPTION: U-shaped wall with an internal mound. Site is situated in a large agricultural area. The mound is c. 1.5 m in diameter and 0.5 m high. U-shape opens to the NW. Wall ranges from 35 to 60 cm in height and is comprised of stacked cobbles and boulders. Sub-surface probes indicate that no cultural remains are present in fill, thus probably the feature is agricultural in nature.

SITE NOS.: STATE: 2386 PHRI: W-97 BPBM: —
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, panini, 'ilima, and grasses
CONDITION: Good
INTEGRITY: Unaltered

DIMENSIONS: 12.0 m long by 10.0 m wide; c. 120 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
Agriculture
DESCRIPTION: Rectangular enclosure with short internal wall parallel to the east wall. The walls are very thick (c. 2 m). All walls have large flat boulders on top. There is a 15.0 m long wall extending northeast to the gulch. The 70 cm high enclosed wall is comprised of stacked basalt boulders and cobbles. Agricultural features are present in the vicinity.

SITE NOS.: STATE: 2387 PHRI: W-98
BPBM: T-69-70*
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, panini, 'ilima, and grasses
CONDITION: Fair
INTEGRITY: Altered
DIMENSIONS: 7.7 m long by 5.0 m wide; c. 39 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
Agriculture
DESCRIPTION: Rectangular enclosure with associated agricultural features. The enclosure is higher on the west side to accommodate the slope. Walls are 1-2 m thick and range from 30-60 cm in height. Walls are composed of stacked basalt boulders and cobbles.

SITE NOS.: STATE: 2388 PHRI: W-101 BPBM: —
FORMAL TYPE: Bridge
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle
CONDITION: Poor
INTEGRITY: Unaltered
DIMENSIONS: 9.0 m long by 4.0 m wide; c. 36 sq m
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Transportation
DESCRIPTION: Historic wooden bridge. The bridge is collapsed. The south side still has some of the lower supports in place; "X" braces nailed to supports. Most of the cross members are missing. Supports consist of chemically treated piles.



*Figure D-12. SITE W-90, ENTRANCE TO HISTORIC BURIAL.
VIEW TO SOUTHEAST.
(PHRI Neg.1145-3)*

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E-1

APPENDIX E

KEOKEA SITE AND FEATURE DESCRIPTIONS

SITE NOS.: State: 2046 PHRI: K-1 BPBM: T-15
 FORMAL TYPE: Complex (2 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, wattle, *panini*, and 'ilima
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 80.0 m long by 40.0 m wide;
 c. 3,200.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Platform (Fea. A), terrace (Fea. B), mounds, paved areas, walls, and possible trails. There are a large number of agricultural features in this area including terraces, mounds, and modified outcrops.

FEATURE A: Platform
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, morning glory, 'ilima, *panini*
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 7.0 m long by 7.0 m wide; c. 49.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: An irregular paved platform with two possible bedrock cupboards on the north side. Feature is constructed against a bedrock outcrop. It is constructed of stacked cobbles and boulders. The upper surface is irregularly paved with cobbles. The north half of the feature is partially collapsed.

FEATURE B: Terrace
 TOPOGRAPHY: Dissected alluvial slope
 DIMENSIONS: 5.8 m long by 6.4 m wide; c. 37 sq m
 VEGETATION: Lantana, grasses, morning glory, 'ilima, *panini*
 CONDITION: Fair
 INTEGRITY: Unaltered
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular terrace. The tops of the south and west walls are even with the inside ground surface. The east wall consists of modified bedrock. The terrace wall has a maximum height of 50 cm and is composed of stacked basalt boulders and cobbles.

SITE NOS.: State: 2047 PHRI: K-2 BPBM: T-16
 FORMAL TYPE: Complex (2 Features)
 TOPOGRAPHY: Dissected alluvial slope

VEGETATION: 'ilima, lantana, and grass
 CONDITION: Fair to Good
 INTEGRITY: Altered*
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Site consists of two adjacent enclosures. There are a large number of agricultural features in this area including terraces, mounds, and modified outcrops.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana and grass
 CONDITION: Fair
 INTEGRITY: Altered*
 DIMENSIONS: 12.0 m long by 10.0 m wide;
 c. 120.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure with a 5.0 m by 6.0 m paved platform in the southeast corner and a possible firepit inside. The northwest wall sits on the edge of a drop and consists of an alignment. The walls range from 1.0 to 2.0 m in thickness and average 50 cm in height. The walls are constructed of stacked cobbles and boulders. The south corner of Fea. B abuts the north corner of Fea. A.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: lantana, grass, and 'ilima
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 10.0 m long by 7.0 m wide; c. 70.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Irregular enclosure, the east wall of which consists of a bedrock outcrop. Facing present on both sides of the north and east walls. The south corner abuts the north corner of Fea. A. Walls are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2028 PHRI: K-3 BPBM: T-14
 FORMAL TYPE: Complex (2 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 120.0 m long by 100.0 m wide;
 c. 12,000.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Burial*/
 Habitation/Agriculture

* Tentative, temporary, or provisional

DESCRIPTION: Two rectangular enclosures with wide walls, one with an internal L-shaped wall. Agricultural terraces and mounds surround the enclosure.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: 'ilima, lantana, grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 14.0 m long by 14.0 m wide;
 c. 196.0 sq m

PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with wide walls, especially in the northwest corner. The west and south walls are faced externally and the east wall is faced internally. The walls average 80 cm in height and are comprised of stacked boulders and cobbles. A curved, rock-retained terrace curves southward and then west away from the southeast corner of the enclosure. A test unit excavated in the interior of this feature revealed the presence of a subsurface deposit containing charcoal, marine shell, bone, and basalt flakes. The bone includes two phalanges from a child, potentially indicating an infant burial beneath the floor of the structure. A radiocarbon sample from the deposit yielded a calendric age range of AD 1640-1890.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 9.0 m long by 8.5 m wide; c. 76.5 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with internal dividing wall. The internal wall forms a small room in the northwest corner of the enclosure. There is some interior and exterior facing on the south wall. The walls range between 40 and 60 cm in height and are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2049 PHRI: K-4 BPBM:
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, and 'ilima
CONDITION: Good
INTEGRITY: Altered
DIMENSIONS: 27.0 m long by 10.0 m wide;
 c. 270.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
DESCRIPTION: Complex consists of an irregular enclosure and a rectangular enclosure. Possible firepit

present in Fea. A. Features fit pattern of typical residences situated along the edge of a terraced slope. Numerous agriculture terraces surround the site.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, and 'ilima
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 7.2 m long by 6.0 m wide; c. 43.2 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Irregular nearly C-shaped enclosure. Possible terrace in the north half; possible firepit in the center. Walls range from 100 cm to 10 cm in height and are comprised of stacked basalt boulders and cobbles.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, kiawe, grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 8.5 m long by 7.5 m wide; c. 63.8 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with small room in the southeast corner. A c. 20.0 m long terrace wall extends off the southeast corner of the enclosure. A two track road runs through this terrace. Walls average 30 cm in height and are comprised of stacked boulders and cobbles.

SITE NOS.: State: 2048 PHRI: K-5 BPBM: T-19
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, and grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 75.0 m long by 18.5 m wide;
 c. 1,387.5 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary
 Habitation/Agriculture
DESCRIPTION: Site consists of a C-shape, a platform, a modified outcrop wall, and surrounding terraces. The wall may have diverted water to a large earthen terrace system.

FEATURE A: Platform
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, wattle.
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 5.0 m long by 3.0 m wide; c. 15.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Paved collapsed platform. Given its size and shape (triangular), the platform may have served an

agricultural function; however, testing is necessary to verify function. Feature is c. 30 cm high and is comprised of stacked basalt boulders and cobbles.

FEATURE B: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: lantana, grasses, 'ilima, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 7.0 m long by 6.8 m wide; c. 47.6 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: C-shaped enclosure open to the southwest. Possible midden within enclosure, as the soil inside is darker and finer than the surrounding soil. Position of surrounding features indicates the enclosure may be agricultural.

SITE NOS.: State: 2029 PHRI: K-6 BPBM:
FORMAL TYPE: Complex (4 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 75.0 m long by 60.0 m wide;
 c. 4,500.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Burial/Habitation
 /Agriculture
DESCRIPTION: Complex consists of three enclosures, a mound, and agricultural features.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses, and wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 13.0 m long by 11.8 m wide;
 c. 153.4 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Notched rectangular enclosure with two internal platforms, an internal room, and an external platform. Internal platforms are in the northeast half of the enclosure and are connected by a step. The internal room is in the southwest portion of the enclosure near the notch. A test unit excavated in side the internal room revealed a subsurface cultural deposit containing volcanic glass and basalt flakes, sea urchin remains, coral fragments, marine shell, mammal and fish bone, charcoal, and kukui nut shell. A radiocarbon sample from the deposit yielded two possible calendric age ranges of AD 1470-1680 and AD 1739-1805.

FEATURE B: Mound

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 2.0 m long by 1.0 m wide; c. 2.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular mound surrounded by bedrock outcrops. Facing on southwest side of this feature indicates that it may be a partially collapsed burial platform. The mound has a maximum height of 30cm and is comprised of stacked basalt boulders and cobbles.

FEATURE C: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 7.0 m long by 7.0 m wide; c. 49.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with high well-faced walls, except for the east wall which is mostly collapsed. The enclosure is adjacent to a collapsed lava tube. The enclosure's external wall faces are higher than the internal ones (avr. 85 cm versus avr. 60 cm). Terraced level areas are adjacent to the north and south sides of the enclosure.

FEATURE D: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, wattle
CONDITION: Fair/Poor
INTEGRITY: Unaltered
DIMENSIONS: 5.8 m long by 5.6 m wide; c. 32.5 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: C-shaped enclosure open to the west. The walls look very deflated, though there is no evidence of collapse. Rocks from the wall may have been removed and utilized for the construction of Fea. C.

SITE NOS.: State: 2030 PHRI: K-7 BPBM: T-22
 (Figure E-1)

FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, wiliwili, panini
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 110.0 m long by 70.0 m wide;
 c. 7,700.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
DESCRIPTION: Complex consists of two enclosures, one rectangular and one oval. Surrounding the enclosures are numerous agriculture features.

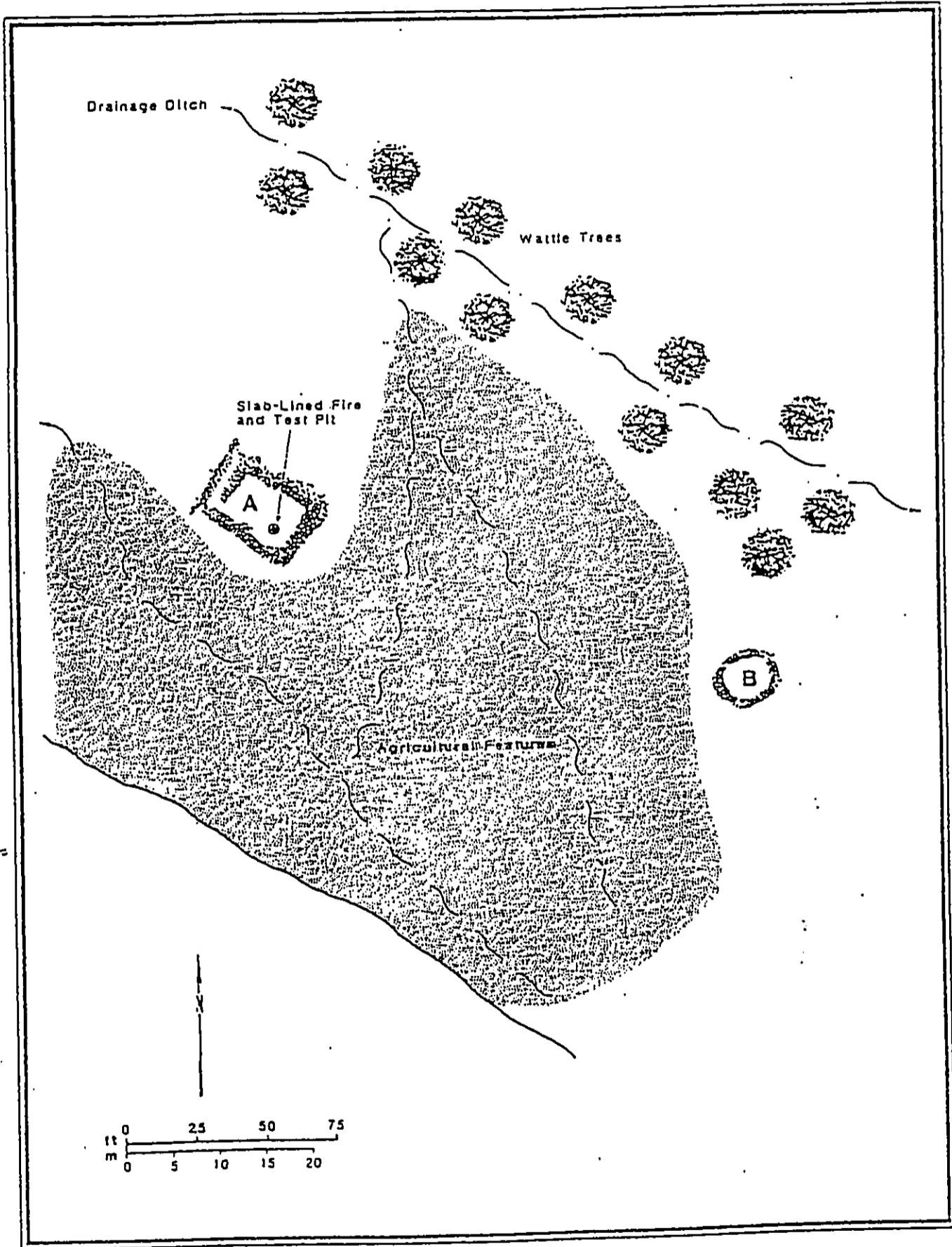


Figure E-1. SITE K-7, FEATURES A AND B.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, wiliwili
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 13.0 m long by 10.0 m wide;
 c. 130.0 sq m

PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure with a terrace attached to the northwest wall. A probable entryway opens onto the terrace near the west corner of the northwest wall. Facing is intermittent along the walls which are 65 cm to 75 cm high and comprised of stacked basalt boulders and cobbles. A slab-lined firepit is centrally located in the eastern half of the structure.

A test unit was excavated which half-sectioned the firepit. The test unit revealed a subsurface cultural deposit containing marine shell, mammal bone, volcanic glass flakes, and charcoal. A radiocarbon sample collected from the deposit yielded three possible calendric age ranges: AD 680-1060, AD 1077-1125, and AD 1135-1157.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 5.5 m long by 5.0 m wide; c. 27.5 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Oval enclosure; walls mostly faced, some collapsed. The south part of the structure lies even with the ground surface. The walls average 80 cm in height and are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2050 PHRI: K-8 BPBM: —
 FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 50.0 m long by 45.0 m wide;
 c. 2,250.00sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture

DESCRIPTION: Complex consists of three rectangular enclosures, two rectangular and one irregular. Many agriculture features are present in the general area.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima
 CONDITION: Good

INTEGRITY: Unaltered
 DIMENSIONS: 20.0 m long by 15.0 m wide;
 c. 300.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Irregular in plan. South wall extends c. 4.0 m beyond the east wall. The southwest portion of the structure has wider walls and the exterior of these walls are collapsed. A short section of the south wall is faced. Maximum wall height is 1.0 m. Walls are comprised of stacked cobbles and boulders. A possible firepit is present in the north central portion of the enclosure.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima
 CONDITION: Fair/Poor
 INTEGRITY: Unaltered
 DIMENSIONS: 13.0 m long by 6.0 m wide; c. 78.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure partially faced on the interior of the northeast corner. The outside of the east wall is partially covered by alluvium. The walls range in height from 30 cm to 40 cm and are comprised of stacked basalt boulders and cobbles.

FEATURE C: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 12.0 m long by 8.0 m wide; c. 96.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure with partial facing on the southeast exterior wall. The feature has been damaged by cattle to the extent that details of construction are difficult to ascertain. Maximum height of walls is 1.0 m and they average 1.5 m in width.

SITE NOS.: State: 2051 PHRI: K-9 BPBM: — T-38
 FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 95.0 m long by 90.0 m wide;
 c. 8,550.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture

DESCRIPTION: Complex consists of two overhangs with associated walls, a rectangular enclosure, and a large irregular enclosure. The irregular enclosure surrounds an area of agricultural features. Both enclosures are attached to the wall of Site K-12.

FEATURE A: Overhang
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, honey suckle.
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 10.0 m long by 5.0 m wide; c. 50.00 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Feature consists of two adjacent overhangs with associated walls on top of an outcrop. The south edge of the outcrop abuts the rock wall of Site K-12. The northern overhang is 3.0 m long, 2.5 m deep, and 1.5 m high. The southern overhang is 1.3 m long, 1.2 m deep, and 1.5 m high. Although no cultural remains noted on the surface of the overhangs their association with Feature B and size indicate possible use as shelters. Testing would be necessary to verify prehistoric use.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, wattle, Christmas-berry
CONDITION: Good
INTEGRITY: Altered
DIMENSIONS: 10.0 m long by 8.0 m wide; c. 80.0 sq m
PROBABLE AGE: Prehistoric/Historic
DESCRIPTION: Rectangular enclosure; paved area adjacent to east wall. The paved area measures c. 8.0 by 4.0 m; its exact dimensions are difficult to determine because dense vegetation covers the feature. The walls have an average width of 80 cm and a maximum height of 80 cm. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE C: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, Christmas-berry
CONDITION: Good
INTEGRITY: Altered
DIMENSIONS: 45.0 m long by 15.0 m wide;
 c. 675.0 sq m
PROBABLE AGE: Historic/Prehistoric*
DESCRIPTION: Very large irregular-shaped enclosure surrounding an area of agricultural features. Feature forms part of the walls of Site K-12 a complex of of historic cattle control walls; however, the presence of a series of terraces and numerous mounds in the interior suggest the enclosure also functioned, potentially prehistorically, as a garden enclosure. The walls range from 1.0 to 1.8 m in height and average 80 cm in thickness. they are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2052 PHRI: K-10 BPBM: —
FORMAL TYPE: Complex (7 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, panini, wattle

CONDITION: Good/Fair
INTEGRITY: Unaltered
DIMENSIONS: 80.0 m long by 60.0 m wide;
 c. 4,800.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
DESCRIPTION: Complex consists of two square enclosures, two oval enclosures, one circular enclosure, one U-shaped enclosure, a platform, and many surrounding agricultural features.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses, panini
CONDITION: Good/Fair
INTEGRITY: Unaltered
DIMENSIONS: 3.6 m long by 3.5 m wide; c. 12.6 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Small square enclosure; most of the walls are faced internally and externally. A probable entryway is present in the western portion of the northeast wall. The walls have a maximum thickness of 70 cm and a maximum height of 1.3 m. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, panini, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 5.7 m long by 3.8 m wide; c. 21.7 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Oval enclosure with high walls. The structure is built into a slope so that the northeast wall is almost at ground level; the wall opposite the northeast wall is very high, 1.5 m. The interior walls of the enclosure are faced, and most of the exterior walls are faced. Walls have a maximum thickness of 1.0 m and are comprised of stacked basalt cobbles and boulders.

FEATURE C: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, panini, wattle
CONDITION: Good/Fair
INTEGRITY: Unaltered
DIMENSIONS: 6.5 m long by 5.0 m wide; c. 32.5 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Oval enclosure; two internal cupboards present in east and south walls. The north wall is the highest and is built into the slope. Internal facing on the southeast and southwest corners. The walls have a maximum thickness of 1.0 m and range from 10 to 30 cm in height. Walls are

comprised of stacked basalt cobbles and boulders and occasionally incorporate bedrock outcrops.

FEATURE D: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, *panini*, wattle

CONDITION: Poor

INTEGRITY: Unaltered

DIMENSIONS: 4.0 m long by 4.0 m wide; c. 16.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Small circular enclosure; some interior facing on the southwest side. Just south of the enclosure, at the foot of Site K-12, is a small natural cupboard in bedrock. Walls average 20 cm in height and 70 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders and occasionally incorporate bedrock outcrops.

FEATURE E: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 4.3 m long by 5.3 m wide; c. 22.8 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Square enclosure; exteriors of the southwest and northeast walls and interiors of northeast, southeast, and northwest walls are faced. Possible cupboard present in north corner. The walls have a maximum thickness of 1.3 m and a maximum height of 80 cm. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE F: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 4.5 m long by 7.6 m wide; c. 34.2 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: U-shaped enclosure open to the northeast. Both sides of southeast and southwest walls are faced. The northwest wall is mostly collapsed. Walls average 20 cm in height and 70 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders and occasionally incorporate bedrock outcrops.

FEATURE G: Platform/pavement

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 5.0 m long by 5.0 m wide; c. 25.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Platform or partially elevated pavement built on and around bedrock. One meter north of the platform is a faced wall which extends north for 4.0 m. The feature has a maximum height of 50 cm and is comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2053 PHRI: K-11 BPBM: — T-39

FORMAL TYPE: Terrace

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, grasses, *panini*, wattle, *koa-haole*

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 6.0 m long by 4.0 m wide; c. 24.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Rectangular terrace; the east side and part of the west wall of the terrace consist of bedrock outcrops. Most of the west and north walls retain and rise slightly above a level area. Walls are unfaced. Many agricultural features in the general area.

SITE NOS.: State: 2054 PHRI: K-12 BPBM: —

FORMAL TYPE: Wall

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, wattle, 'ilima, *wiliwili*

CONDITION: Good/Fair

INTEGRITY: Unaltered

DIMENSIONS: 700.0 m long by 333.0 m wide;
c. 23,3100.0 sq m

PROBABLE AGE: Historic

FUNCTIONAL INTERPRETATION: Animal Control

DESCRIPTION: Site consists of a complex of variable length cattle walls some of which form large enclosures in a collapsed lava tube. The walls extend beyond the project area's southwestern corner. The most prominent wall extends the distance and loops around to return to the project area's west boundary.

SITE NOS.: State: 2055 PHRI: K-13 BPBM: —

FORMAL TYPE: Complex (6 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, cilantro (*Coriandrum sativum* L., 'ilima, wattle, *panini*

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 100.0 m long by 45.0 m wide;
c. 4,500.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Four rectangular enclosures, one D-shaped enclosure, and one oval enclosure. Agriculture features, mounds and terraces, present in the area.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 3.5 m long by 3.0 m wide; c. 10.5 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure; internal cupboard present on east wall; north-south wall extension off the east wall. Some of the inside of the north wall is faced; however, most walls are collapsed. Walls range from 30 cm to 60 cm in height and average 50 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, cilantro
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 6.2 m long by 5.8 m wide; c. 36.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Sub-rectangular enclosure with collapsed walls; no facing or internal features present. Faced terrace nearby. Walls average 60 cm in height and 1.4 m in thickness. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE C: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, and 'ilima
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 5.7 m long by 5.3 m wide; c. 30.2 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure; north and northeast sides of the feature are built on bedrock. The walls are collapsed and the interior is filled with rubble. Walls average 60 cm in height and 1.4 m in thickness. Walls are comprised of stacked basalt cobbles and boulders and occasionally incorporate bedrock outcrops.

FEATURE D: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, panini, wattle, forbs
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 5.0 m long by 5.0 m wide; c. 25.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Oval enclosure with unfaced walls.

Walls average 40 cm in height and 1.2 m in thickness. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE E: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, morning glory, grasses, panini, 'ilima
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 5.6 m long by 4.5 m wide; c. 25.2 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: D-shaped enclosure. North wall formed by an overhang and the remaining walls are comprised of stacked rock. The east wall and portions of the west wall are faced. Walls average 40 cm in height and 80 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE F: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 6.5 m long by 5.5 m wide; c. 35.8 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Sub-rectangular structure with no facing. Walls average 40 cm in height and 1.2 m in thickness. Walls are comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2056 PHRI: K-14 BPBM: —
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, panini, grasses, forbs
CONDITION: Fair
INTEGRITY: Altered
DIMENSIONS: 50.0 m long by 35.0 m wide;
 -c. 1,750.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Complex consists of a U-shaped structure and associated agriculture features. The U-shape opens to southwest. The feature is 6.0 m long, 5.5 m wide, and has a maximum height of 70 cm. The walls average 2.0 m in thickness and appear mostly collapsed. A cattle wall (Site K-12) runs through the site.

SITE NOS.: State: 2057 PHRI: K-16 BPBM: —
FORMAL TYPE: Complex (3 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, honey suckle, wattle, panini
CONDITION: Fair
INTEGRITY: Unaltered

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APPENDIX E

E-9

DIMENSIONS: 85.0 m long by 55.0 m wide;
c. 4,675.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION — Habitation

DESCRIPTION: Complex consists of four habitation enclosures. A cattle wall, which is part of Site K-12, runs through the site. Minor agricultural features surround complex.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, *panini*, Christmas-berry

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 4.0 m long by 3.7 m wide; c. 14.8 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Double enclosure. The eastern enclosure is circular, the walls are collapsed and they incorporate bedrock. The western enclosure is square, and the walls are collapsed. Walls average 80 to 100 cm in height and 100 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE B: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima, Christmas-berry, *panini*

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 6.5 m long by 5.5 m wide; c. 35.8 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Rectangular enclosure; facing present on all of the exterior walls and on the interiors of the south and west walls. The stones used in construction are quite irregular so that the facing is not obvious. A break in the west wall is probably due to cattle, but may represent an entryway. Walls have a maximum height of 85 cm and a maximum thickness of 80 cm.

FEATURE C: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, grasses, *panini*

CONDITION: Poor

INTEGRITY: Unaltered

DIMENSIONS: 8.5 m long by 7.5 m wide; c. 63.8 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Oval enclosure with collapsed walls. Walls average 10 cm in height and 60 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2058 PHRI: K-19 BPBM: —

FORMAL TYPE: Complex (3 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima, wattle

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 60.0 m long by 45.0 m wide;

c. 2,700.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Complex of three habitation structures and numerous agriculture features. Many of the agriculture features are well-defined, are well-constructed, and incorporate bedrock.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima, wattle

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 5.0 m long by 4.2 m wide; c. 21.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Small circular structure with some internal facing. Walls average 50 cm in height and 65 cm in thickness. Walls are comprised of stacked basalt pebbles, cobbles and boulders.

FEATURE B: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, wattle, *panini*

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 4.2 m long by 3.5 m wide; c. 14.7 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Small C-shaped enclosure. No facing observed. Walls average 55 cm in height and 70 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE C: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima, *panini*

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 8.5 m long by 8.0 m wide; c. 68.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Oval enclosure with some facing in the northeast corner. North wall is the highest. Walls average 80 cm in height and 60 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2059 PHRI: K-20 BPBM: —

FORMAL TYPE: Complex (3 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima, wattle,
Christmas-berry
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 50.0 m long by 35.0 m wide;
c. 1,750.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
Agriculture
DESCRIPTION: Complex consists of two enclosures,
one residential terrace, and many surrounding agriculture
terraces.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grass, 'ilima, wattle,
Christmas-berry
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 6.3 m long by 0.0 m wide; c. 0.00 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Square unfaced enclosure; possible step
on the interior of the east wall at a possible entryway. Walls
have a maximum height of 50 cm, and are comprised of
stacked basalt pebbles, cobbles and boulders.

FEATURE B: Terrace
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, wattle, panini
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 6.0 m long by 5.0 m wide; c. 30.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Rectangular level area with walls on
three sides. A wall, or what may be a wall, extends off the
northwest corner of the terrace. Walls average 80 cm in
height and 80 m in thickness. Walls are comprised of
stacked basalt cobbles and boulders and occasionally
incorporate bedrock outcrops.

FEATURE C: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, wattle, grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 2.0 m long by 2.0 m wide; c. 4.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: This is a small circular enclosure. There
is some facing on the walls. A possible entryway is present
in the southeast side. Walls average 70 cm in height and 50
m in thickness. Walls are comprised of stacked basalt
cobbles and boulders.

SITE NOS.: State: 2060 PHRI: K-21 BPBM: —
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses, wattle, panini
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 55.0 m long by 25.0 m wide;
c. 1,375.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
Agriculture
DESCRIPTION: Complex consists of a notched enclosure
and a badly collapsed circular enclosure. Within the notched
enclosure is a small room. Agriculture features present in
general area.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, wattle, panini
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 5.5 m long by 5.5 m wide; c. 30.3 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Circular enclosure bisected by a
modified bedrock wall. The walls are severely collapsed.
Walls average 60 cm in height and 35 m in thickness. Walls
are comprised of stacked basalt cobbles and boulders and
occasionally incorporate bedrock outcrops.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, Christmas-berry,
panini
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 11.0 m long by 10.5 m wide;
c. 115.5 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Notched structure with thick, 2.0+ m
wide walls in the northeast corner and north end of the east
wall. A small internal room, c. 2.5 m by 1.5 m in size,
extends from the north wall. Some facing is evident around
the structure, as well as on the internal room. Walls average
80 cm in height and 1.15 m in thickness. Walls are
comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2061 PHRI: K-25 BPBM: —
FORMAL TYPE: Complex (6 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, wattle, panini
CONDITION: Good
INTEGRITY: Altered

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APPENDIX E

E-11

DIMENSIONS: 120.0 m long by 90.0 m wide;
c. 10,800.0 sq m
PROBABLE AGE: Historic/Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
Agriculture/Animal Control
DESCRIPTION: Complex consists of a circular enclosure, one irregular enclosure, two sub-rectangular enclosures, an L-shaped enclosure, one upslope-downslope wall, and many agriculture features. A series of well-faced, relatively high scallop-shaped terraces which frequently incorporate bedrock outcrops are present on the steeper slopes in the southeast portion of the site.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 4.0 m long by 3.5 m wide; c. 14.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: C-shaped enclosure with partially collapsed unfaced walls. Structure opens to the southwest. Walls average 30 cm in height and 60 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE B: Wall
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, wattle
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 9.4 m long by 5.3 m wide; c. 49.8 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: L-shaped enclosure with some facing on the interior and exterior of the south wall. Feature is open to the southeast. The west wall is entirely collapsed. An area of rubble indicates feature may have once had a north wall. Walls have a maximum height of 1.2 m and average 90 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders. There is a mound very close to the feature and a small C-shaped mound 2.0 m from the northwest corner.

FEATURE C: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, panini
CONDITION: Good/Fair
INTEGRITY: Unaltered
DIMENSIONS: 12.0 m long by 9.0 m wide; c. 108.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Enclosure is irregular in plan view. The southwest wall runs upslope-downslope into Site K-36. Enclosure contains an internal terrace wall in poor condition. Facing is present on the interior of the northeast corner and

parts of the south wall. Walls average 45 cm in height and are comprised of stacked basalt cobbles and boulders.

FEATURE D: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, 'ilima, lantana, wattle, panini
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 20.5 m long by 15.0 m wide;
c. 307.5 sq m

PROBABLE AGE: Prehistoric/Historic
DESCRIPTION: Large rectangular enclosure; the east and west walls form terraces. The north and south walls are free standing. A wing wall extends off the southeast corner for c. 15 m. A long upslope-downslope probable ranch wall extends off the northeast corner, and a terrace extends off the east wall.

FEATURE E: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, panini
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 4.5 m long by 4.0 m wide; c. 18.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with some facing present on the exterior of the northeast corner. Walls average 60 cm in height and are comprised of stacked basalt cobbles and boulders.

FEATURE F: Wall
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 32.0 m long by 0.8 m wide; c. 25.6 sq m
PROBABLE AGE: Historic
DESCRIPTION: Upslope-downslope wall segment. West end of wall falls about 2.0 meters short of connecting with Fea. D. The east end of the wall is broken up into several walls and extends almost to a drainage. Walls average 60 cm in height and are comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2062 PHRI: K-26 BPBM: — T-64
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 40.0 m long by 20.0 m wide;
c. 800.0 sq m
PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Feature A is comprised of two rectangular rooms and a semicircular room. Feature B is a triangular platform. There are agricultural terraces throughout the general area.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 10.0 m long by 7.0 m wide; c. 70.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Three-roomed enclosure consisting of two rectangular enclosures which share a wall with a semicircular enclosure. Rectangular enclosures are situated just uphill from the semicircular enclosure. Wall of the semicircular enclosure is faced. Walls average 30 cm in height and are comprised of stacked basalt cobbles and boulders.

FEATURE B: Platform

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, wiliwili

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 3.5 m long by 5.0 m wide; c. 17.5 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Triangular platform extends out from a gentle slope. The northwest wall is faced. The platform is 30 cm high and comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2063 PHRI: K-27 BPBM: — T-62
(Figure E-2)

FORMAL TYPE: Complex (2 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, wattle, grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 30.0 m long by 30.0 m wide;

c. 900.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Complex consists of a rock shelter with a curved wall in front of it, and a rectangular enclosure which makes extensive use of bedrock. Agriculture features surround the complex.

FEATURE A: Overhang

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, grasses, wattle

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 6.0 m long by 4.0 m wide; c. 24.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Two small chambers are present within the 50 cm high overhang. A wall fronting the overhang forms a semicircular enclosure with the overhang. The wall averages 60 cm in height and is comprised of stacked basalt cobbles and boulders. Off the east wall of the enclosure there is a level area consisting of rubble (possible pavement).

FEATURE B: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, grasses, wattle

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 10.0 m long by 5.8 m wide; c. 58.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: A rectangular enclosure. The north wall consists of the outcrop Feature A cuts into. There is some facing on the south and east walls. A 50 cm high step or bench runs the length of the interior of the east wall and possibly extends a little on the north and south walls. Walls average 60 cm in height and are comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2064 PHRI: K-29 BPBM: — T-63

FORMAL TYPE: Complex (2 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, 'ilima

CONDITION: Good/Fair

INTEGRITY: Unaltered

DIMENSIONS: 50.0 m long by 50.0 m wide;

c. 2,500.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Feature A has walls extending from the northwest and southwest corners. Feature B has a possible platform in the southeast corner and a paved trail in the southwest corner. Agriculture features surround the complex. Some distance from the complex an isolated piece of coral was found. The substantial nature of Feature B and its close proximity to the hejau, Site K-30 suggest it may have functioned as a high status and/or priestly residence.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: lantana, 'ilima, grasses

CONDITION: Good

INTEGRITY: Unaltered



*Figure E-2. SITE K-27, OVERHANG. VIEW TO WEST-NORTHWEST.
(PHRI Neg. 1143-10a)*

DIMENSIONS: 12.0 m long by 10.0 m wide;
c. 120.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with modified bedrock walls extending off the northeast and southeast corners. These walls run upslope, the longest for 15.0 m, the other for 5.0 m. The north wall and the interior of the east wall are faced. Maximum wall height is 1.5 m. Walls are comprised of stacked cobbles and boulders.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 18.0 m long by 13.0 m wide;
c. 234.0 sq m

PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with a possible collapsed platform in the southeast corner. Portions of the north wall are paved with pebbles, especially the eastern half of the north wall. The upper surface of the west wall is nearly flush with the interior of the structure and thus, may have served as a porch. The walls are very substantially constructed being nearly 2.0 m thick and up to 1.2 m high. Intact facing is present along most of the interior and exterior of the structure's walls. A paved walkway is present 0.5 m from the southwest corner of the enclosure; this walkway extends for 5.0 m to the west.

SITE NOS.: State: 2031 PHRI: K-30 BPBM: —
(Figure E-3)

FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, morning glory, castor bean
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 25.0 m long by 24.0 m wide;
c. 600.0 sq m

PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Religious
DESCRIPTION: Molohai Heiau; a large and notched enclosure. Internal features include a long low wall, two mounds (one of which is faced), a triangular platform faced on one side, a square platform in the north corner, a step or bench around most of the inside wall, and a step or bench along outside of the north and west walls. A fragment of coral is present on the step on the inside of the south wall.

A test unit was excavated near the triangular platform which revealed a subsurface cultural deposit containing volcanic glass and basalt flakes, marine shell, mammal bone, and charcoal.

SITE NOS.: State: 2065 PHRI: K-31 BPBM: —T-13
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 10.0 m long, by 9.0 m wide; c. 90.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Sub-rectangular enclosure with very collapsed walls. Agricultural features surround this site. Some facing is present on the inside of the east wall. Possible platform present in the northeast corner. The wall ranges from 20 cm to 55 cm in height and averages 2.5 m in width. The wall is comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2066 PHRI: K-32 BPBM: —
FORMAL TYPE: Terrace
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 6.0 m long by 5.5 m wide; c. 33.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Sub-rectangular terrace with walls on the north, south, and west sides. The walls range from 50 cm to 60 cm in height and average 1.3 m in thickness. Walls are comprised of stacked basalt cobbles and boulders. The east side is defined by a bedrock alignment. A short wall extends off the south corner.

SITE NOS.: State: 2067 PHRI: K-35 BPBM: —
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, wattle, grasses
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 80.0 m long by 65.0 m wide;
c. 5,200.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
Agriculture
DESCRIPTION: Complex consists primarily of a interconnected complex of agricultural terraces with an associated small enclosure and a small overhang.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, grasses
CONDITION: Fair

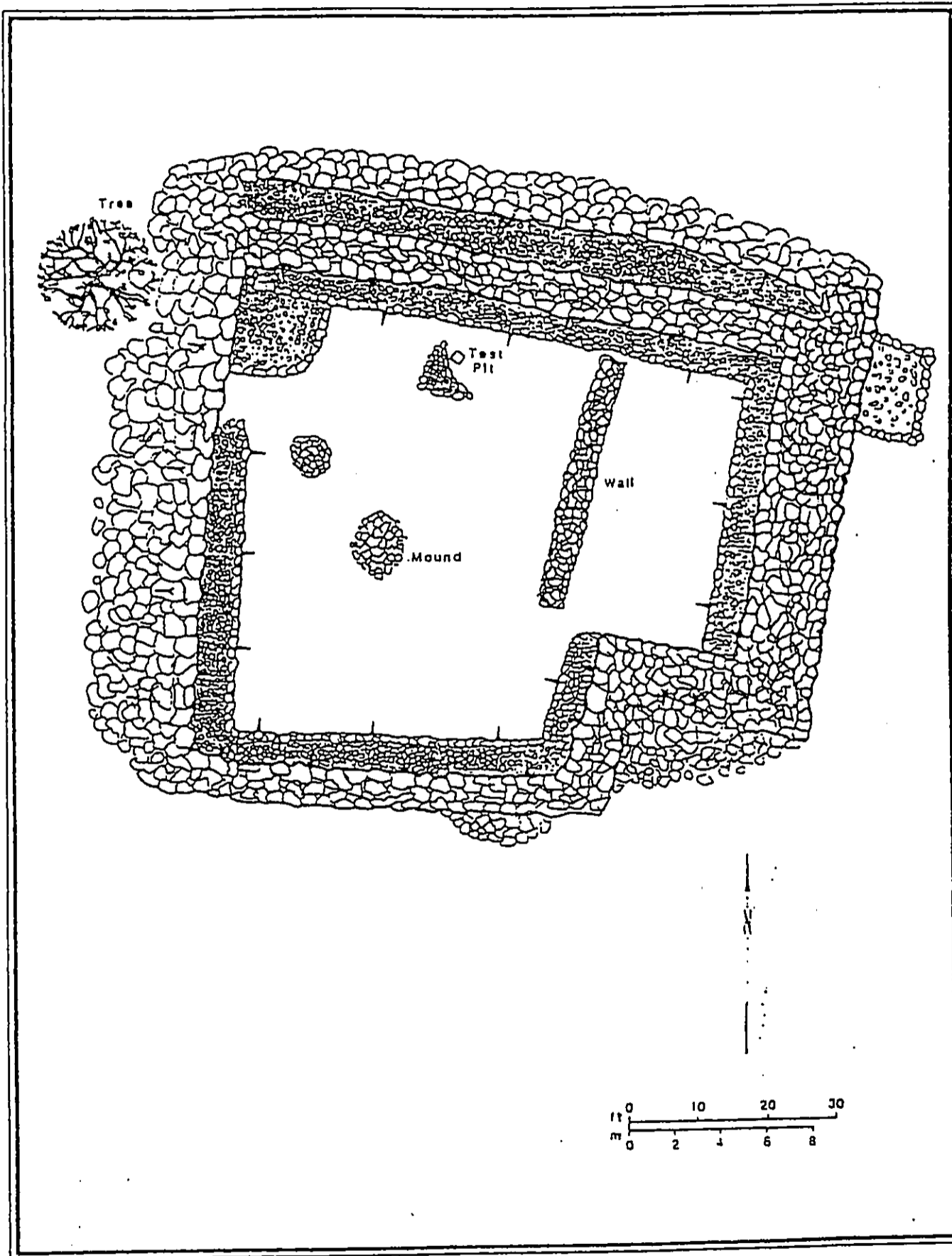


Figure E-3. SITE K-30.

INTEGRITY: Unaltered
DIMENSIONS: 6.5 m long by 5.6 m wide; c. 36.4 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: D-shaped enclosure with two terrace walls curving off the northwest and southeast sides. The walls connect with a larger terrace 5.0 m to the south. Another wall may have once been connected to the east side of the enclosure; this wall is now separated from the enclosure by a cattle trail.

FEATURE B: Overhang
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, 'ilima, grasses, vines
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 4.7 m long by 3.1 m wide; c. 14.6 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Natural partially collapsed lava blister. The 50 cm high blister opening is partially blocked with a cobble wall. The wall is faced on the inside of its northwest end.

SITE NOS.: State: 3032 PHRI: K-36 BPBM: —
FORMAL TYPE: Complex (5 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses, wattle
CONDITION: Excellent
INTEGRITY: Unaltered
DIMENSIONS: 100.0 m long by 90.0 m wide;
 c. 9,000.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
DESCRIPTION: Complex consists of two rectangular enclosures, one trapezoidal enclosure, two attached circular enclosures, one very large rectangular enclosure, and numerous associated agriculture features.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, wattle, Christmas-berry, 'ilima
CONDITION: Very Good
INTEGRITY: Unaltered
DIMENSIONS: 4.8 m long by 3.3 m wide; c. 15.8 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with a cupboard and intact facing on interior of the southwest wall. The feature has very high walls, up to 2.0 m (exterior measurement). The walls average 1.0 m in thickness and are comprised of stacked basalt cobbles and boulders.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, grasses, morning glory
CONDITION: Excellent
INTEGRITY: Unaltered
DIMENSIONS: 5.9 m long by 5.4 m wide; c. 31.9 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: All walls are faced on both sides. A few small areas of the wall are collapsed. The walls average 80 cm in height and average 1.0 m in thickness. Walls are comprised of stacked basalt cobbles and boulders.

FEATURE C: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, Christmas-berry, grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 9.0 m long by 7.5 m wide; c. 67.5 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Sub-trapezoidal enclosure. Inside of west wall is faced. Present on exterior of north wall is a bedrock overhang (3.3 m long by 60 cm deep by 60 cm high). All walls are partially collapsed. The walls have a maximum height of 1.0 m and average 70 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders. Feature is within and attached to Feature E.

FEATURE D: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 65.0 m long by 37.0 m wide;
 c. 2,405.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Feature C is within this very large enclosure; a Feature E is attached to the outside of the enclosure. Terraces are present throughout the enclosure's interior. The enclosure average 75 cm in height and are comprised of stacked basalt cobbles and boulders.

FEATURE E: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, wattle
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 10.0 m long by 5.0 m wide; c. 50.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Double enclosure consisting of two attached, roughly circular enclosures. The walls are very collapsed. North wall is formed by Feature D. Much of the east wall is formed by an outcrop. The walls have a maximum height of 90 cm and average 60 cm in thickness. Walls are comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2068 PHRI: K-39 BPBM: —
 FORMAL TYPE: Overhangs
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, Christmas-berry, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 28.0 m long by 10.0 m wide; c. 280.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Consists of two shelters situated on the same side of a collapsed lava tube. The northern shelter is smaller than the southern one. The northern shelter is approximately 11 m long, 1.0 m to 1.6 m deep, and 40 cm to 60 cm high. The southern shelter is approximately 8 m long, 1.6 m to 4.6 m deep, and 40 cm to 90 cm high. A terrace is fronts the southern shelter extending 5.0 m outside the shelter opening. The terrace has a maximum height of 2.0 m.

SITE NOS.: State: 2069 PHRI: K-40 BPBM: —
 (Figure E-4)
 FORMAL TYPE: Complex (2 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, grasses, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 12.0 m long by 8.0 m wide; c. 96.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Complex consists of a rockshelter situated directly beneath a rectangular enclosure.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 11.0 m long by 8.4 m wide; c. 92.4 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure with a c. 1.0 m-wide bench or step along the east wall. The northwest corner is comprised of bedrock, which extends over the top of Feature B. The west and north walls, and the southeast corner of the enclosure are partially faced. The walls range from 30 to 70 cm in height and are comprised of stacked basalt cobbles and boulders.

FEATURE B: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, grasses
 CONDITION: Good

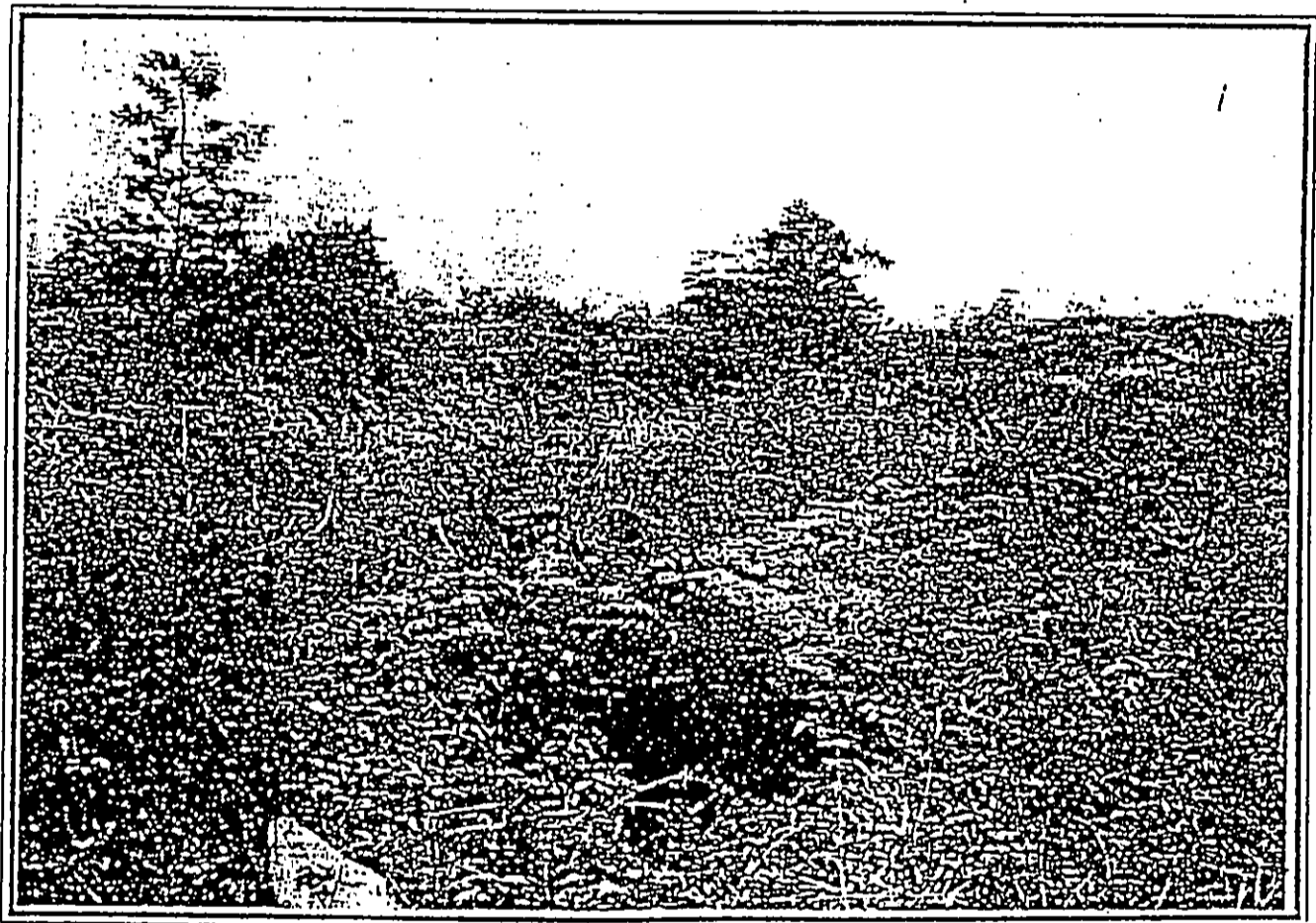
INTEGRITY: Unaltered
 DIMENSIONS: 4.0 m long by 3.6 m wide; c. 14.4 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Natural rock shelter in partially collapsed blister. The shelter is 90 cm high. Two basalt flakes noted at the north end of the shelter.

SITE NOS.: State: 2070 PHRI: K-41 BPBM: —
 FORMAL TYPE: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, grasses, Christmas-berry
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 1.2 m long by 1.0 m wide; c. 1.20 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Temporary Habitation
 DESCRIPTION: Very small rock shelter. Shelter is 60 cm high. Kukui nut fragment found inside.

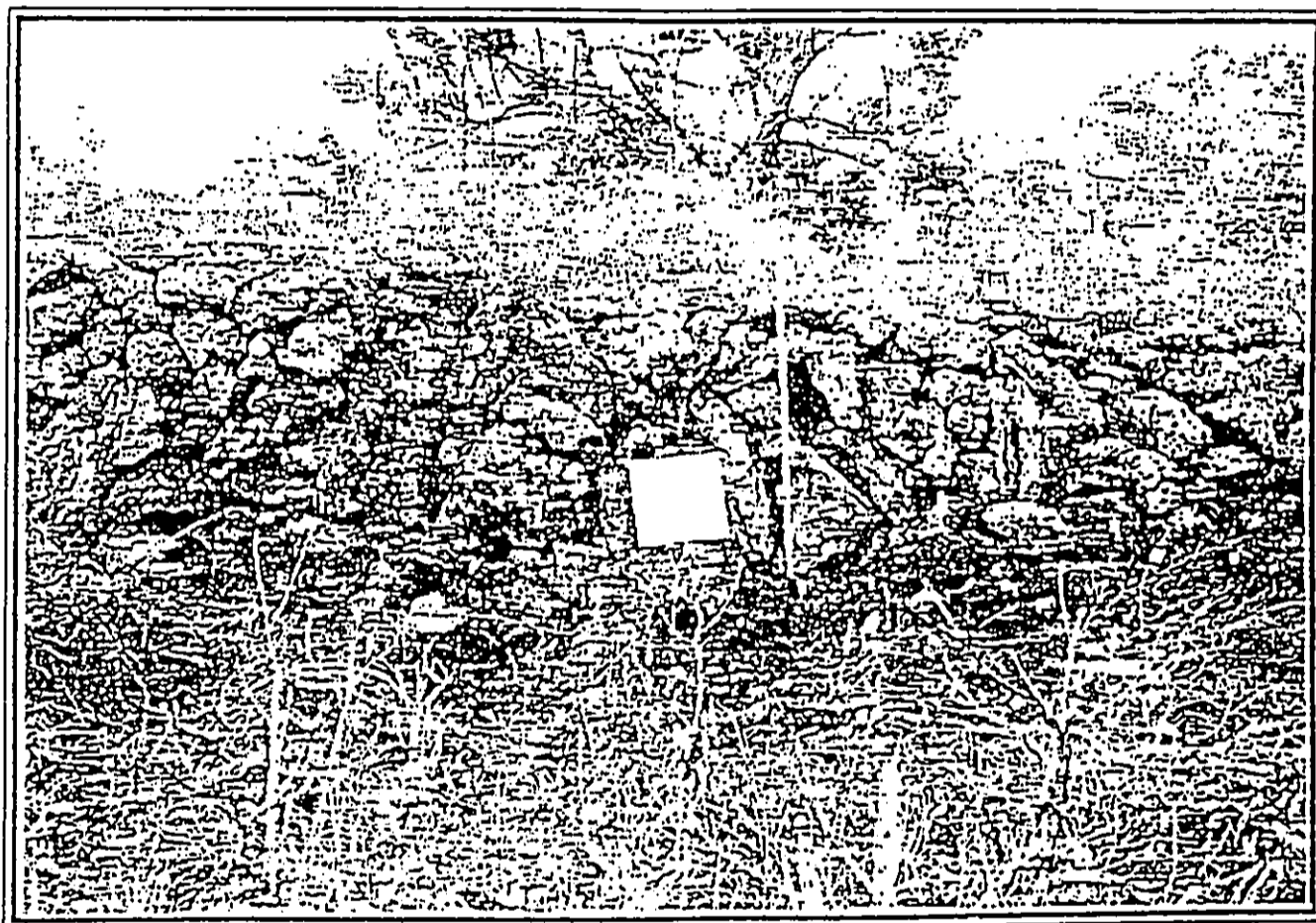
SITE NOS.: State: 2071 PHRI: K-42 BPBM: —
 (Figure E-5)
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, grasses
 CONDITION: Very Good
 INTEGRITY: Unaltered
 DIMENSIONS: 50.0 m long by 18.0 m wide; c. 900.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Rectangular enclosure with core-fill walls. Walls average 90 cm in height. A piece of columnar basalt is present in the east wall. Sixteen meters away from the enclosure is a 26.0 m long wall.

SITE NOS.: State: 2072 PHRI: K-44 BPBM: —
 FORMAL TYPE: Complex (4 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 55.0 m long by 45.0 m wide; c. 2,475.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/Agriculture
 DESCRIPTION: Complex consists of a rectangular structure, an irregular enclosure, two C-shape enclosures, and surrounding agriculture features.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope



*Figure E-4. SITE K-40, OVERHANG. VIEW TO SOUTHEAST.
(PHRI Neg. 1157-10)*



*Figure E-5. SITE K-42, NE WALL OF FEATURE A. VIEW TO SOUTHWEST.
(PHRI Neg.1151-1)*

VEGETATION: Lantana, 'ilima, wattle, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 7.5 m long by 6.0 m wide; c. 45.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular structure with very thick (2-3.0 m) walls. Interior of the east and west walls are faced. North and west walls are somewhat collapsed. The walls range from 50 (interior) to 1.1 m (exterior) in height and are comprised of stacked basalt cobbles and boulders.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 17.0 m long by 13.0 m wide;
 c. 221.0 sq m

PROBABLE AGE: Prehistoric
 DESCRIPTION: Double enclosure consisting of a roughly square and a roughly rectangular enclosure. The walls of the enclosure are very thick, up to 4.0 m thick on the southeast side. The south corner of the enclosure is faced. Near the south corner, on the southwest wall, is an opening. The walls range from 60 cm (interior) to 80 cm (exterior) in height and are comprised of stacked basalt cobbles and boulders occasionally incorporating bedrock outcrops.

FEATURE C: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 9.0 m long by 8.5 m wide; c. 76.5 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Large C-shaped enclosure with walls faced on both sides. A short wall extends off the west corner of the enclosure. The southeast wall of the enclosure is collapsed. The walls average 55 cm in height and are comprised of stacked basalt cobbles and boulders.

FEATURE D: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 3.0 m long by 3.0 m wide; c. 9.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Small C-shaped enclosure open to the north. The back wall of the enclosure is built into an outcrop. On this same outcrop are several small terraces.

SITE NOS.: State: 2073 PHRI: K-45 BPBM: — T-60
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, panini, wattle, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 7.8 m long by 6.5 m wide; c. 50.7 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture

DESCRIPTION: Rectangular enclosure with most of each wall faced. The northeast wall is built partially on bedrock. North of the feature is a long terrace which forms an arc; level areas are present above and below the terrace. The walls average 50 cm in height and are comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2074 PHRI: K-46 BPBM: — T-60
 FORMAL TYPE: Complex (4 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, panini, wattle, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 74.0 m long by 35.0 m wide;
 c. 2590.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture

DESCRIPTION: Complex consists of two rectangular enclosures, one C-shaped enclosure, one D-shaped enclosure, and numerous surrounding agricultural features.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, wattle, 'ilima, grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 6.5 m long by 6.0 m wide; c. 39.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: The northwest side of this rectangular-shaped feature is very collapsed. The northwest side incorporates a bedrock outcrop. Small portions of both sides of the walls are faced. The walls average 50 cm in height and are comprised of stacked basalt cobbles and boulders.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 7.0 m long by 5.5 m wide; c. 38.5 sq m
 PROBABLE AGE: Prehistoric

DESCRIPTION: C-shaped enclosure open to the southwest. The back of the C-shape is comprised of an outcrop. The outside of north wall is faced. A rock alignment runs across the front of the enclosure. The walls are comprised of stacked basalt cobbles and boulders.

FEATURE C: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, wattle, grasses
CONDITION: Good
INTEGRITY: Unaltered

DIMENSIONS: 7.5 m long by 5.5 m wide; c. 41.3 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Rectangular enclosure. Exteriors of all walls except east wall are faced. East wall is totally collapsed. The west wall incorporates some bedrock. The walls are comprised of stacked basalt cobbles and boulders.

FEATURE D: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, wattle
CONDITION: Good
INTEGRITY: Unaltered

DIMENSIONS: 7.0 m long by 5.0 m wide; c. 35.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: D-shaped enclosure comprised of a bedrock outcrop and a wall. The outcrop forms the straight wall and part of the western portion of the D-shape. The walls are comprised of stacked basalt cobbles and boulders.

SITE NOS.: State: 2033 PHRI: K-48 BPBM: T-61-17-58
(Figure E-6)

FORMAL TYPE: Complex (4 Features)

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, 'ilima, Christmas-berry, grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 145.0 m long by 75.0 m wide;

c. 10,875.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Very large complex consisting of a very large enclosure, a double enclosure, a small square enclosure, and an irregular enclosure. An extensive series of large contour terraces is situated along a broad ridge which extends through the central portion of the site.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, wattle, Christmas-berry, grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 67.0 m long by 67.0 m wide;

c. 4,489.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Large irregular-shaped enclosure with substantial walls, several of which incorporate large upright slabs as facing stones. Some of the walls are faced. Walls have a maximum thickness of 2.0 m and are up to 1.5 m in height. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE B: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, vines, grasses
CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 12.0 m long by 10.5 m wide;

c. 126.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Double enclosure in good condition. Lanai or porch present outside of the west wall. Situated just above the northeast corner of the enclosure is a curved paved terrace. Much facing present on interior walls. The walls have a maximum height of 1.1 m and maximum thickness of 2.0 m.

Two test units were excavated in the feature, one in each room. The units revealed a subsurface cultural deposit containing sea urchin remains, mammal and fish bone, a shark tooth, basalt and volcanic glass flakes, and charcoal. A radiocarbon sample collected from the deposit yielded a calendric age range of AD 1518-1591.

FEATURE C: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, Christmas-berry, grasses
CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 17.0 m long by 17.0 m wide;

c. 289.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Generally rectangular in plan view. The north and east walls are very thick, the west wall is thin, and the south wall is single-stacked, single-coursed. Present in the northeast corner is a platform.

FEATURE D: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, grasses, Christmas-berry
CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 9.0 m long by 9.0 m wide; c. 81.0 sq m

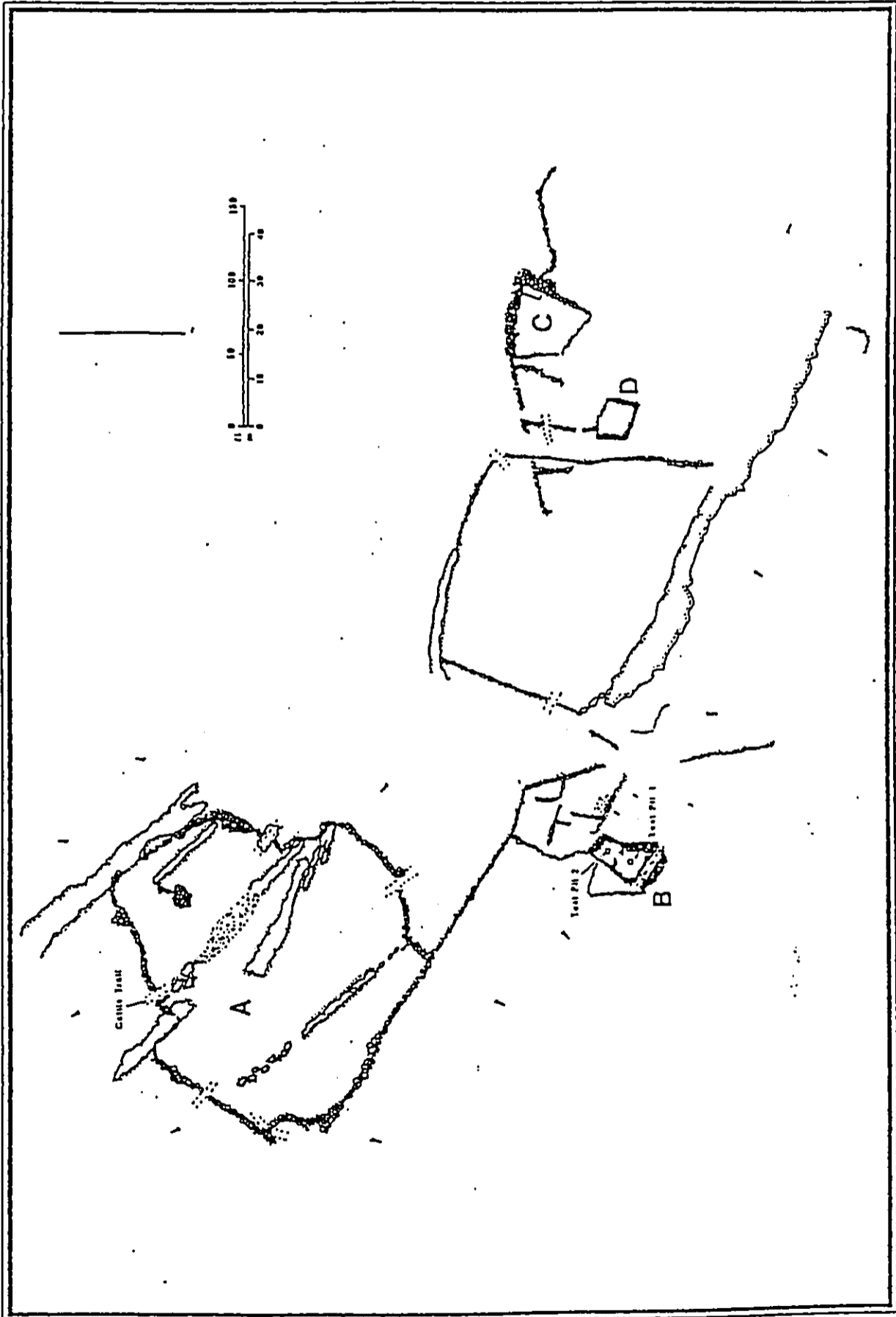


Figure E-6. SITE K-48.

442-050289

APPENDIX E

E-23

PROBABLE AGE: Prehistoric

DESCRIPTION: Feature has very low intact walls. Walls have a maximum thickness of 1.5 m and are up to 30 cm in height. Walls are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2075 PHRI: K-50 BPBM: —

(Figure E-7)

FORMAL TYPE: Complex (3 Features)

TOPOGRAPHY: Steep dissected alluvial slope

VEGETATION: Lantana, wattle, 'ilima, Christmas-berry, grasses

CONDITION: Good

INTEGRITY: Altered

DIMENSIONS: 40.0 m long by 35.0 m wide;
c. 1,400.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Complex features are spread along a steep slope. At the top of the slope is a rectangular enclosure; further down the slope is an oval enclosure, and further down from the oval enclosure is a double enclosure. Numerous agricultural features, primarily terraces, are present in the area.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, Christmas-berry, grasses

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 9.0 m long by 7.8 m wide; c. 70.2 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Rectangular enclosure; parts of the northwest corner and south wall are missing. The north and east walls are mostly bedrock. Walls have a maximum height of 80 cm. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE B: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, Christmas-berry, grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 7.2 m long by 7.0 m wide; c. 50.4 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Oval enclosure with well built and preserved walls. Internal walls are mostly faced. Opening present on northwest side. Walls have a maximum height of 90 cm. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE C: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, wattle, Christmas-berry, grasses

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 12.8 m long by 8.0 m wide; c. 102.4 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Two circular enclosures connected by a short wall. The southern enclosure is built almost entirely within a natural circle of bedrock. The northern enclosure is built on a flat area of bedrock; the southwest wall of the enclosure consists of modified bedrock. Walls have a maximum height of 70 cm. Walls are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2076 PHRI: K-51 BPBM: —

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, wattle, morning glory, panini

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 12.0 m long by 5.5 m wide; c. 66.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Sub-rectangular enclosure with an attached terrace. East wall has some internal facing; the rest of the walls are mostly collapsed. The northwest wall is totally collapsed. Maximum wall height is 42 cm. Walls average 75 cm in thickness and are comprised of stacked basalt cobbles and boulders. Agricultural features surround the feature.

SITE NOS.: State: 2077 PHRI: K-52 BPBM: T-31

FORMAL TYPE: Complex (2 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, wattle, Christmas-berry, panini

CONDITION: Fair/Good

INTEGRITY: Unaltered

DIMENSIONS: 42.0 m long by 35.0 m wide;
c. 1,470.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agriculture

DESCRIPTION: Complex consists of an irregular ovoid enclosure with an adjacent area of possible paving. Agricultural features surround the enclosure.

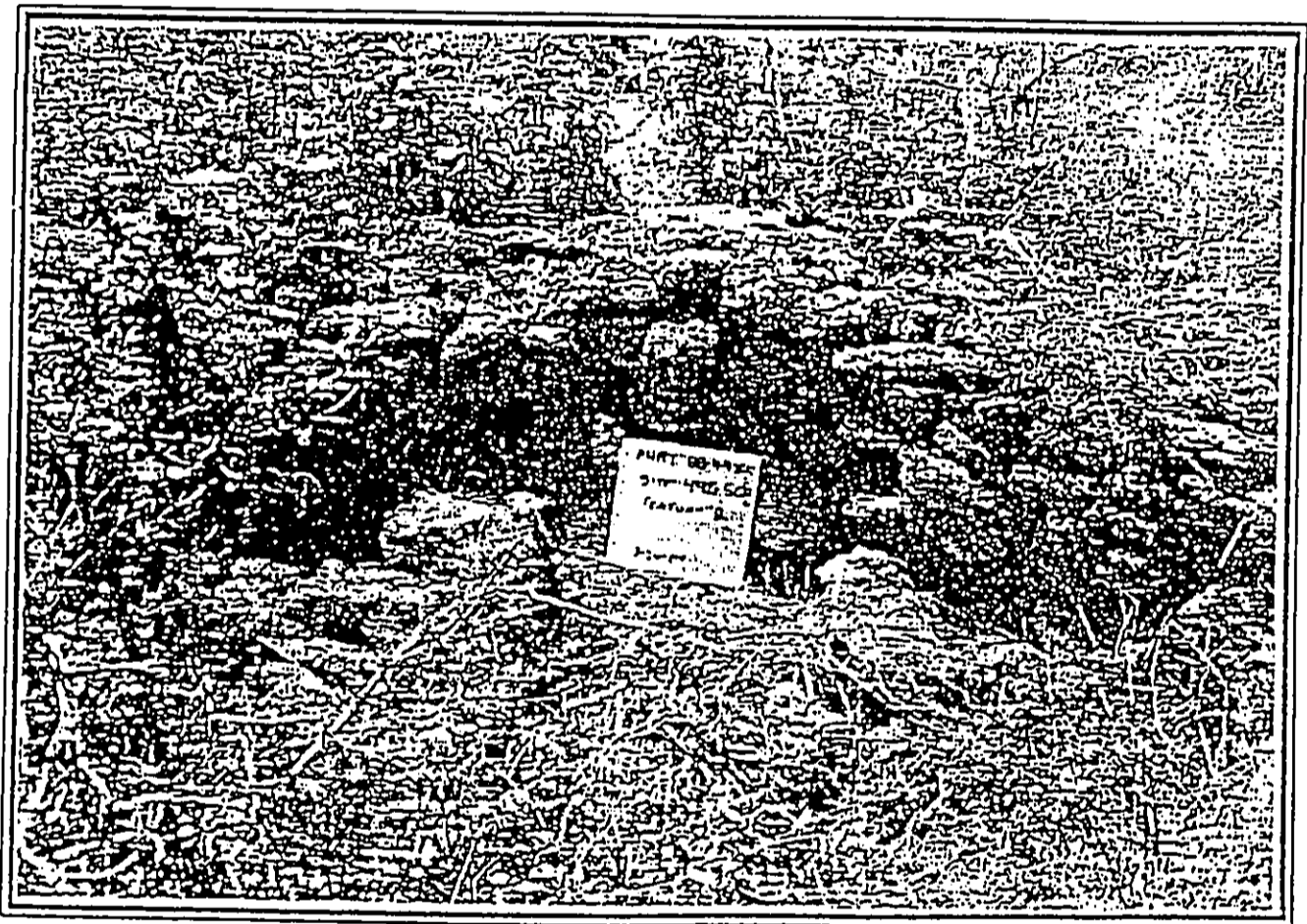


Figure E-7. SITE K-50, FEATURE B. VIEW TO SOUTHEAST.
(PHRI Neg. 1155-6)

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle, lantana, 'ilima, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 24.0 m long by 18.0 m wide;
 c. 432.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Western part of feature is built into a bedrock outcrop. There are two cupboards at the southwest end of the enclosure and a paved area at the south end. The walls of the enclosure have some facing. The walls include sections of multiple stacked and core-fill construction. Maximum wall height is 1.5 m.

FEATURE B: Paved Area
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, wattle, grasses, honey suckle, panini
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 15.0 m long by 15.0 m wide;
 c. 225.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Feature consists of an irregularly-shaped area of paving adjacent to the west wall of the structure.

SITE NOS.: State: 2078 PHRI: K-53 BPBM: —
 FORMAL TYPE: Complex (2 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, wattle, panini
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 42.0 m long by 40.0 m wide;
 c. 1,680.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Complex consists of a group of connected agricultural and habitation features surrounded by a larger area of agricultural features.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, wattle, panini
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 3.0 m long by 1.7 m wide; c. 5.1 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: C-shaped enclosure attached to Feature B. Feature opens to the south. Wall averages 30 cm in height and averages 75 cm in thickness. Wall is constructed of stacked basalt boulders and cobbles. Feature is either a planting windbreak or a temporary habitation structure.

FEATURE B: Terrace
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, panini
 CONDITION: Fair
 INTEGRITY: Altered
 DIMENSIONS: 20.0 m long by 15.0 m wide;
 c. 300.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Raised terrace with three small planting features adjacent to the main wall. Wall averages 1.05 m in height and averages 40 cm in thickness. Wall is constructed of stacked basalt boulders and cobbles.

SITE NOS.: State: 2079 PHRI: K-54 BPBM: T-30
 (Figure E-8)

FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, 'ilima, grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 14.0 m long by 11.0 m wide;
 c. 154.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: The feature is built on bedrock. It consists of an irregular-shaped enclosure with an internal rectangular terrace at the south end. The east wall is basically a terrace. Portions of the northeast wall are faced on the inside. Wall averages 30 m in height and averages 1.5 m in thickness. Wall is constructed of stacked basalt boulders and cobbles occasionally incorporating bedrock outcrops.

SITE NOS.: State: 2080 PHRI: K-55 BPBM: —
 FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, Christmas-berry, grasses
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 41.0 m long by 41.0 m wide;
 c. 1,681.00 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture
 DESCRIPTION: Complex consists of two enclosures and an overhang. Numerous agricultural features surround the site.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, grasses, Christmas-berry

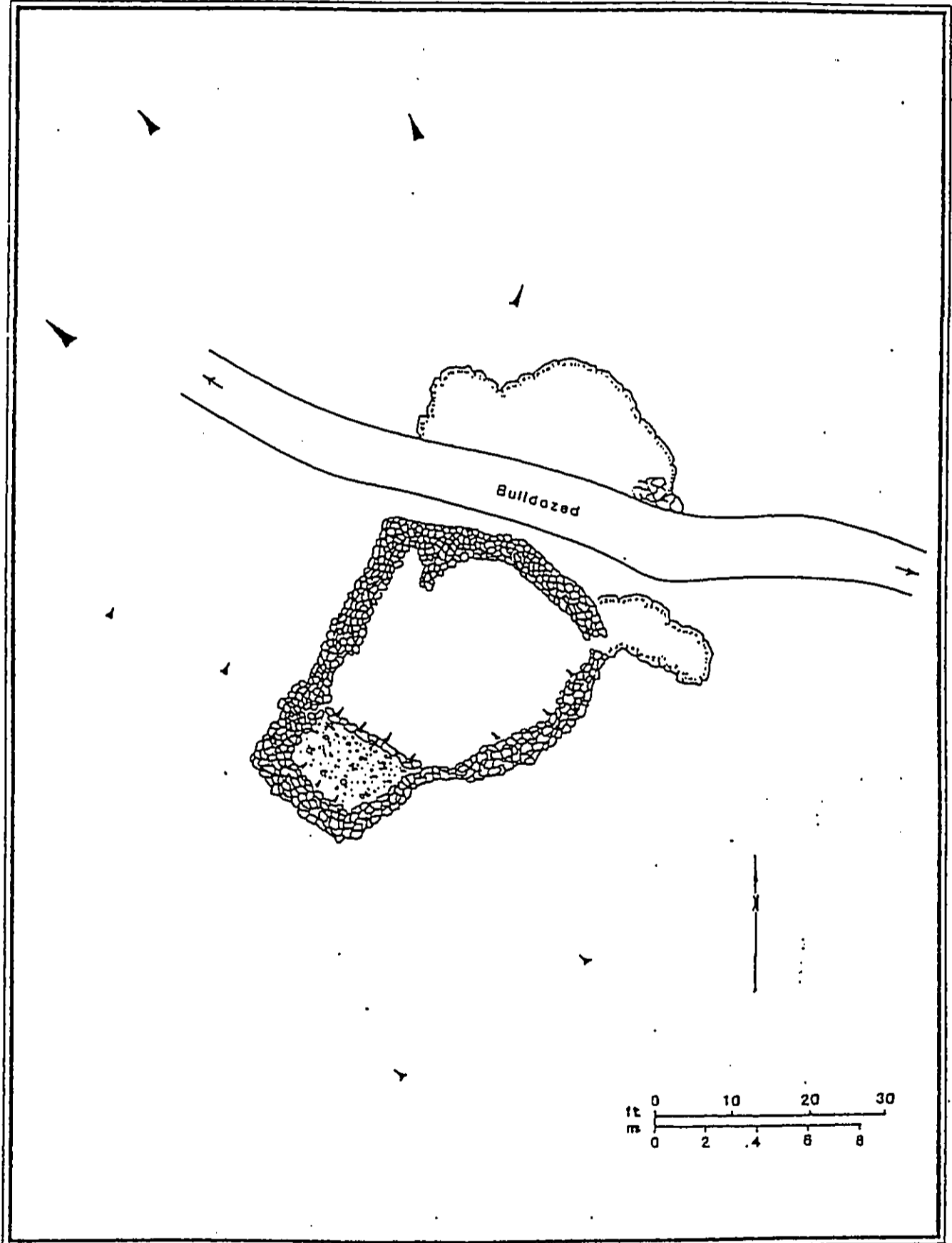


Figure E-8. SITE K-54.

CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 7.0 m long by 5.0 m wide; c. 35.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure with downslope wall also forming a terrace. A smaller enclosure or room is attached to the northeast side of the terrace. The terrace/enclosure walls average 55 cm in height and are comprised of stacked basalt boulders and cobbles.

FEATURE B: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, wattle, Christmas-berry
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 5.0 m long by 3.0 m wide; c. 15.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: A low semicircular wall fronts the overhang. Ceiling of the shelter is 85 cm high.

FEATURE C: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, grasses, Christmas-berry
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 16.0 m long by 7.5 m wide; c. 120.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Feature consists of two small enclosures connected by a wall of bedrock; the bedrock forms the northeast wall of both rooms. The lower room is triangular in plan, and its northwest wall forms a terrace. The upper room is square in plan. An upright slab is present on the wall of bedrock between the two rooms. The walls range from 55 cm to 90 cm in height and are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2081 PHRI: K-57 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, Christmas-berry, wattle, Silky Oak
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 30.0 m long by 24.0 m wide; c. 720.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/Agriculture
 DESCRIPTION: Sub-rectangular enclosure built against an outcrop. The south and southeast walls incorporate bedrock. There is some facing on the enclosure's north corner. The walls average 80 cm in height and are comprised

of stacked basalt boulders and cobbles. Many terraces present upslope and downslope of feature.

SITE NOS.: State: 2082 PHRI: K-59 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, wattle, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 36.0 m long by 28.0 m wide; c. 1,008.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/Agriculture

DESCRIPTION: Rectangular enclosure with short walls extending from the southeast and northeast corners. Interior of southeast wall and the exterior of northwest wall are faced. Part of the southwest wall is collapsed. The walls have a maximum thickness of 1.5 m and a maximum height of 1.1 m. Walls are comprised of stacked basalt boulders and cobbles. The enclosure, excluding the extending walls, measures 11.0 by 5.5 by 0.7 m. Numerous small terraces usually incorporating bedrock outcrops are present to the east of the feature.

SITE NOS.: State: 2083 PHRI: K-60 BPBM: —
 FORMAL TYPE: Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, wattle, 'ilima
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 5.5 m long by 1.1 m wide; c. 6.1 sq m
 PROBABLE AGE: Historic
 FUNCTIONAL INTERPRETATION: Animal Control
 DESCRIPTION: Wall segment is bifaced and core-filled and runs upslope-downslope. Wall averages 50 cm in height and is composed of stacked basalt boulders and cobbles.

SITE NOS.: State: 2084 PHRI: K-62 BPBM: —
 FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle forest
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 45.0 m long by 35.0 m wide; c. 1,575.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Religious/Burial/Habitation/Agriculture
 DESCRIPTION: Complex consists of a rectangular enclosure with an internal probable burial platform, a trapezoidal enclosure with an associated probable shrine/

altar platform, a square enclosure and surrounding agricultural features.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 12.0 m long by 5.5 m wide; c. 66.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with a platform in the southeast end; platform is faced on the northwest and southeast sides. It is 55 cm high, roughly 2.0 m square, and has a relatively level upper surface. Cobble pavement surrounds the platform and on three sides extends to the enclosure walls. Not much of the northwest end of the enclosure remains. The enclosure wall average 1.2 m in thickness and have a maximum height of 50 cm. The walls and platform are comprised of stacked basalt boulders and cobbles.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 8.0 m long by 7.0 m wide; c. 56.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Enclosure's southwest wall is part of a natural volcanic "sill". Facing is present on the interiors of the northeast, west, and southwest walls, and on the exterior of the southwest wall. The walls have a maximum thickness of 1.0 m and maximum height of 1.3. About 2.0 m east of the enclosure is a small platform faced on its northeast side. A large 1.2 m long fallen upright stone is present on the platform. A small cavity, centrally-located in the platform's upper surface, apparently once held the stone upright. Both the enclosure and platform are comprised of stacked basalt boulders and cobbles occasionally incorporating bedrock outcrops. A alignment extends from Feature B to Feature C.

FEATURE C: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 11.0 m long by 10.0 m wide; c. 110.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Large square enclosure with an internal mound or collapsed platform. The northeast and northwest walls of the enclosure consist of alignments; the southeast and southwest walls are wide, up-to 1.0 m in height, and are constructed primarily of boulders. The mound/platform

extends from the middle of the northwest wall of the enclosure.

SITE NOS.: State: 2085 PHRI: K-63 BPBM: —
FORMAL TYPE: Wall
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, wattle, 'ilima, grasses, Christmas-berry
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 15.0 m long by 1.0 m wide; c. 15.0 sq m
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Animal Control
DESCRIPTION: Well-faced and well-built upslope-downslope oriented wall segment. Wall is of multiple-stacked construction, comprised of basalt boulders and cobbles. Wall averages 1.0 m in thickness and 1.1 m in height.

SITE NOS.: State: 2034 PHRI: K-64 BPBM: —
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, wattle, grasses
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 13.0 m long by 11.0 m wide; c. 143.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
DESCRIPTION: Enclosure is attached to a terrace located c. 3.0 m downslope. Most of the area between the enclosure and the terrace is filled with rubble. Interior of the southeast wall of the enclosure is faced. Enclosure has an opening in the northwest wall. The walls range in height from 20 cm to 55 cm and are comprised of stacked basalt boulders and cobbles occasionally incorporating bedrock outcrops. Agricultural features surround the enclosure.

A test unit excavated outside the enclosure near the opening revealed a subsurface cultural deposit containing one basalt flake, sea urchin remains, and charcoal. A radiocarbon sample from the deposit yielded a calendric age range of AD 1420-1660.

SITE NOS.: State: 2086 PHRI: K-65 BPBM: —
FORMAL TYPE: Complex (7 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 215.0 m long by 90.0 m wide; c. 19,350.0 sq m
PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agricultural

DESCRIPTION: Complex consists of enclosures and agricultural features close to each other. Six of the enclosures are habitation features, one is probably a field boundary.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle forest

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 8.2 m long by 6.2 m wide; c. 50.8 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Square enclosure with some facing on the interior of the northwest wall. A small cupboard-like overhang is present west of the southwest corner of the enclosure. Walls have a maximum height of 1.1 m and a maximum thickness of 60 cm. Walls are comprised of stacked basalt boulders and cobbles. A bedrock outcrop is incorporated into the southwest corner.

FEATURE B: Walls

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle forest

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 45.0 m long by 5.0 m wide; c. 225.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Two parallel walls on either side of a collapsed lava tube. The walls begin at the bottom of a short steep slope and extend to top of the slope, where they are joined together by a bedrock outcrop. The northwest wall ends at this point. The southeast wall continues through the site. Walls have a maximum height of 1.5 m and a maximum thickness of 1.0 m. Walls are comprised of stacked basalt boulders and cobbles occasionally incorporating bedrock outcrops.

FEATURE C: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle forest

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 8.0 m long by 6.5 m wide; c. 52.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Square enclosure. The interior of the southwest wall is faced. The other walls are somewhat collapsed. Walls have a maximum height of 90 cm and a maximum thickness of 1.1 m. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE D: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle forest

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 15.0 m long by 14.0 m wide;
c. 210.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Large D-shaped enclosure; the east wall consists of a bedrock outcrop. A few terraces are present within the enclosure. A 3.0 m long wall extends from the northwest portion of the enclosure generally toward the northwest. The northeast side of this wall is faced. Walls have a maximum height of 75 cm and a maximum thickness of 85 cm. Walls are comprised of stacked basalt boulders and cobbles occasionally incorporating bedrock outcrops.

FEATURE E: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle forest

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 5.0 m long by 3.7 m wide; c. 18.5 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Somewhat square in plan view. Part of the interior of the south wall is faced. Walls have a maximum height of 80 cm and a maximum thickness of 80 cm. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE F: Enclosures

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle forest

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 12.0 m long by 7.5 m wide; c. 90.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Large oval enclosure with a slightly smaller enclosure attached to its northeast side. Most of the walls of both enclosures are collapsed. Walls have a maximum height of 65 cm and a maximum thickness of 90 cm. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE G: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle forest

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 8.0 m long by 7.4 m wide; c. 59.2 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Square enclosure; interior and exterior of north corner is faced. The west corner of the feature is collapsed. Walls have a maximum height of 60 cm and an

average thickness of 90 cm. Walls are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2087 PHRI: K-69 BPBM: T-37
(Figure E-9)

FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, panini, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 8.0 m long by 8.0 m wide; c. 64.0 sq m
PROBABLE AGE: Prehistoric/Historic
FUNCTIONAL INTERPRETATION: Water Tank
DESCRIPTION: Square enclosure faced on the southwest, northwest, and part of the northeast sides. The southeast and part of the northeast walls, which are lower than the rest of the structure, are constructed of generally larger stones than those used in the other walls. Within the enclosure are the remains of a wooden platform for a water tank, and metal hoops used to bind boards of tank together.

SITE NOS.: State: 2088 PHRI: K-70 BPBM: T-27

FORMAL TYPE: Terrace
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, wattle, grasses
CONDITION: Fair
INTEGRITY: Altered
DIMENSIONS: 35.0 m long by 12.0 m wide;
c. 420.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agricultural
DESCRIPTION: Terrace extends southward for 10.0 m from a upslope-downslope oriented wall. The junction of the wall and the terrace abuts a basalt outcrop. The south end of the wall curves to create a small terrace measuring 5.0 m in diameter.

SITE NOS.: State: 2089 PHRI: K-71 BPBM: —

FORMAL TYPE: Complex (3 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, panini, wattle, Christmas-berry, grasses
CONDITION: Fair
INTEGRITY: Altered
DIMENSIONS: 60.0 m long by 50.0 m wide;
c. 3,000.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Burial*/Habitation
DESCRIPTION: Complex consists of two enclosures with terraces between them, and connected to them. One enclosure has unusually thick walls and a small interior. Southwest of this feature is a large rubble area which may be natural. Feature C is a possible lava tube burial.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, panini, wattle, grasses
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 9.0 m long by 8.5 m wide; c. 76.5 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Large square enclosure with low, collapsed walls. The north corner of the enclosure rises 1.5 m above the slope the enclosure is on. A terrace wall extends 5.0 m southwest off the southwest corner of the enclosure. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE B: Enclosure

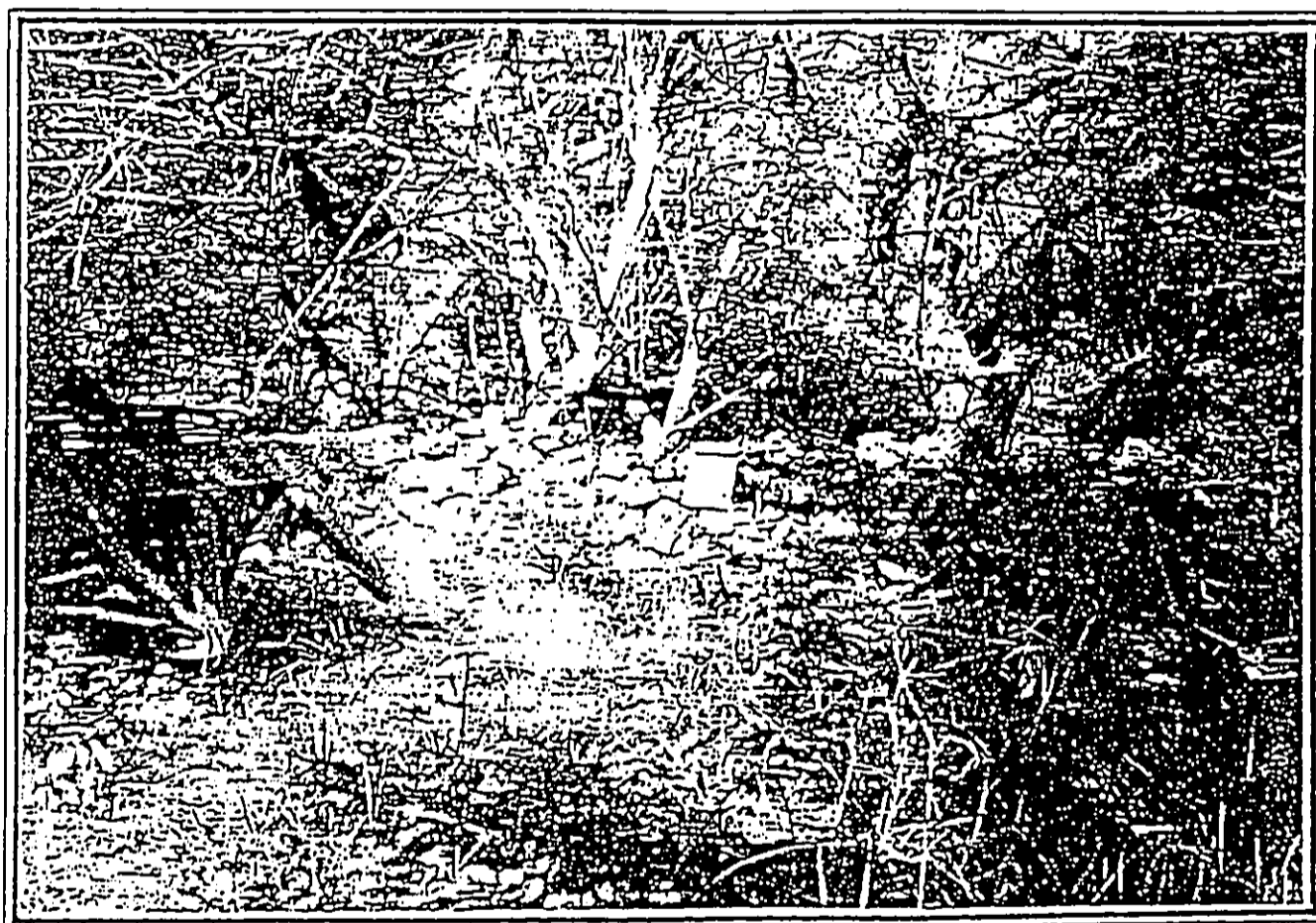
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, Christmas-berry, grasses
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 7.0 m long by 7.0 m wide; c. 49.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Enclosure consists of a square area of paving with a small sunken area in the middle of it. A wall built on the paving forms the southwest and part of the northwest wall of the room. The interior of the sunken area and the wall are faced. Walls average 50 cm in height and are comprised of stacked basalt boulders and cobbles. A terrace runs off the northeast wall.

FEATURE C: Paved Mound

TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses, wattle
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 10.0 m long by 5.0 m wide; c. 50.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Feature consists of a level area of rubble fill with a wall on it. The feature is situated in front of collapsed lava tube. This tube may have an opening plugged up with rubble. Several aligned large upright slabs to the southeast and northwest appear to be remnants of a terrace wall which would have retained the rubble fill.

SITE NOS.: State: 2090 PHRI: K-76 BPBM: —

FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 55.0 m long by 18.0 m wide;
c. 990.0 sq m
PROBABLE AGE: Prehistoric



*Figure E-9. SITE K-69, WALL AND WATERTANK. VIEW TO WEST.
(PHRI Neg#.1151-19).*

FUNCTIONAL INTERPRETATION: Habitation/
Agricultural

DESCRIPTION: Complex consists of a U-shaped terrace with some paving and a free standing upslope-downslope oriented wall segment.

FEATURE A: Terrace

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, 'ilima, wattle, lantana

CONDITION: Fair/Poor

INTEGRITY: Altered

DIMENSIONS: 10.5 m long by 8.0 m wide; c. 84.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: U-shaped terrace with low walls. A small paved area is present in the southeast portion of the feature. Northwest of the terrace is a short terrace. Walls have a maximum height of 45 cm and an average thickness of 1.2 m. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE B: Wall

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, 'ilima, lantana, wattle

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 8.0 m long by 1.1 m wide; c. 8.8 sq m

PROBABLE AGE: Historic/Prehistoric*

DESCRIPTION: Core-filled wall segment oriented upslope-downslope. The wall is faced on both sides and is collapsed in some areas. Wall has a maximum height of 1.1 m and an average thickness of 1.2 m. Wall is comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2091 PHRI: K-78 BPBM: —

FORMAL TYPE: Complex (6 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, wattle,
Christmas-berry

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 115.0 m long by 70.0 m wide;
c. 8,050.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Religious*/
Habitation/Agricultural

DESCRIPTION: Complex consists of two habitation terrace complexes, one stepped and paved platform, one rectangular enclosure, and one area of modified bedrock. Agricultural terraces are present north of the main features.

FEATURE A: Terraces

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, wattle,
Christmas-berry

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 25.0 m long by 10.0 m wide;
c. 250.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Three paved terraces oriented upslope-downslope and connected to each other. Northeast boundary of the terraces consists of a bedrock outcrop. The south and west sides of the terraces are raised above the adjacent slope. The northwest wall of the westernmost terrace is faced. The eastern terrace measures 10 m by 7 m by 20 cm high. The central terrace measures 8.9 m by 6.3 m by 40 cm high. The western terrace measures 8.5 m by 5.3 m by 75 cm high.

FEATURE B: Terrace

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, Christmas-berry,
wattle

CONDITION: Fair

INTEGRITY: Altered

DIMENSIONS: 10.0 m long by 8.0 m wide; c. 80.0 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Probable residential terrace with a small notch in the northwest corner. The inside of the east wall and the outside of the south wall are faced. Interior of terrace has possible paving.

FEATURE C: Platform/terrace

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, wattle, 'ilima,

Christmas-berry

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 12.5 m long by 10.5 m wide; c. 131.3 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Consists of a smaller paved platform built on a larger one. The lower platform forms a paved area which extends out c. 0.8 m beyond the limits of smaller platform. Some facing is present on the west and south sides of the platform.

FEATURE D: Complex

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, wattle,

Christmas-berry

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 32.5 m long by 25.0 m wide;

c. 812.5 sq m

PROBABLE AGE: Prehistoric

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APPENDIX E

E-33

DESCRIPTION: Complex is located on bedrock and is delineated by retaining walls. Modified bedrock outcrops and a possible walkway are present on the north wall. Within the walls are alignments/terraces and areas cleared of stones presumably for planting.

FEATURE E: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, wattle, Christmas-berry

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 9.4 m long by 8.0 m wide; c. 75.2 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Rectangular enclosure; the east and south walls are built into a slope and are higher than the north and west walls. The interior of the east and south walls are faced, as are both sides of the west wall. A possible cupboard is present in the west wall. A possible firepit is present in the interior of the structure. Walls average 1 m in height and 1.2 m in width. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE F: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, grasses, wattle, Christmas-berry

CONDITION: Good

INTEGRITY: Altered

DIMENSIONS: 22.5 m long by 22.5 m wide;
c. 506.3 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Large irregular enclosure with the majority of its walls standing on the edge of a low cliff. The northwest wall consists of a single course of rocks. Wing walls extend off the southeast and southwest corners of the enclosure. Enclosure walls have a maximum height of 1.3 m and an average width of 60 cm. Walls are composed of stacked basalt boulders and cobbles occasionally incorporating bedrock outcrops. Feature appears to be either a agricultural enclosure or corral.

SITE NOS.: State: 2092 PHRI: K-79 BPBM: —

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, wattle, lantana, panini, 'ilima

CONDITION: Fair

INTEGRITY: Altered

DIMENSIONS: 22.0 m long by 20.0 m wide;
c. 440.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Agricultural

DESCRIPTION: Large enclosure irregular in plan view.

The south wall is constructed on a collapsed lava rube. The interior of the north wall is faced. The northeast wall consists of a loose alignment of rocks. Walls have a maximum height of 1.0 m and an average thickness of 60 cm. Walls are comprised of stacked basalt boulders and cobbles. Within the enclosure are several terraces.

SITE NOS.: State: 2093 PHRI: K-80 BPBM: T-46

FORMAL TYPE: Wall

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle forest

CONDITION: Fair

INTEGRITY: Altered

DIMENSIONS: 50.0 m long by 1.5 m wide; c. 75.0 sq m

PROBABLE AGE: Historic

FUNCTIONAL INTERPRETATION: Animal Control

DESCRIPTION: Upslope-downslope oriented wall partly with a fence along it. The wall ranges in height from 30 cm to 90 cm and is comprised of stacked basalt boulders and cobbles. At the north end the wall curves slightly to the west and connects with an outcrop situated above a drainage. Near the upslope portion of the wall is a terrace.

SITE NOS.: State: 2094 PHRI: K-81 BPBM: T-1036

FORMAL TYPE: Complex (2 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Wattle forest

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 80.0 m long by 40.0 m wide;
c. 3,200.0 sq m

PROBABLE AGE: Historic/Prehistoric

FUNCTIONAL INTERPRETATION: Animal control/
Agricultural

DESCRIPTION: Complex consists of a large rectangular enclosure, a small circular enclosure, and numerous agricultural terraces. A wall extends off the southeast corner of the large enclosure.

FEATURE A: Enclosure

TOPOGRAPHY: Steep dissected alluvial slope

VEGETATION: Wattle Forest

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 36.0 m long by 50.0 m wide;
c. 1,800.0 sq m

PROBABLE AGE: Historic

DESCRIPTION: Large rectangular enclosure. The northern two-thirds of the west wall consists of a single course of rocks. Present in the southern half of the enclosure is an outcrop. A wall extends c. 25.0 m northeast off the southeast corner of the enclosure.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 4.0 m long by 3.5 m wide; c. 14.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Small circular enclosure built against a low outcrop. The walls of the enclosure are built with large rocks and are relatively high. The walls are not faced.

SITE NOS.: State: 2095 PHRI: K-84 BPBM: T-55
FORMAL TYPE: Wall
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 4.5 m long by 3.5 m wide; c. 15.8 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Indeterminate
DESCRIPTION: L-shaped wall open to the northeast. The northwest portion of the wall is collapsed. Wall has a maximum height of 1.2 m and is comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2096 PHRI: K-85 BPBM: —
FORMAL TYPE: Wall and terrace complex
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Fair
INTEGRITY: Altered
DIMENSIONS: 80.0 m long by 60.0 m wide;
 c. 4,800.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Animal Control/
 Agricultural
DESCRIPTION: Complex is largely built on and around bedrock. Site consists of an area of rough terraces and a long well-preserved wall segment. The long wall probably connects to a wall at Site K-101.

SITE NOS.: State: 2097 PHRI: K-87 BPBM: T-25
 (Figure E-10)
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 28.0 m long by 8.0 m wide; c. 224.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Burial
DESCRIPTION: The complex consists of a faced mound and a faced platform. Both features are small. The platform

has a small wall around the top; the platform is probably a burial. The mound is a possible burial.

FEATURE A: Platform
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Excellent
INTEGRITY: Unaltered
DIMENSIONS: 3.8 m long by 2.1 m wide; c. 7.9 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: The sides and top of this feature are faced. A wall c. 20 cm high outlines the level upper surface of the platform. Platform has a maximum height of 1.2 m and is comprised of stacked basalt boulders and cobbles.

FEATURE B: Mound/platform
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 2.0 m long by 2.0 m wide; c. 4.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: The east and west sides of the mound are faced; the north and south sides are somewhat collapsed. The feature is built on a L-shaped, rock-retained terrace. The feature has a maximum height of 1 m and is comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2098 PHRI: K-89 BPBM: —
FORMAL TYPE: Terrace
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Wattle forest
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 150.0 m long by 125.0 m wide;
 c. 18,750.0 sq m
PROBABLE AGE: Prehistoric/Historic
FUNCTIONAL INTERPRETATION: Agricultural/
 Habitation/Animal control
DESCRIPTION: Long terrace with a paved area. The terrace connects sides of a collapsed lava tube. Walls are built along the sides of the tube and intersect with the terrace and another large terrace downslope. There are many other small terraces to the north. The terraces appear to be largely agricultural in function, excepting the paved portion which may be a remnant of a habitation feature. For the most part, the walls appear to be ranch-related features. The site roughly resembles the map of Papakea Heiau contained in the SIHP Site Form No. 50-50-10-1036; however, the described location and coral offerings in the form do not match.

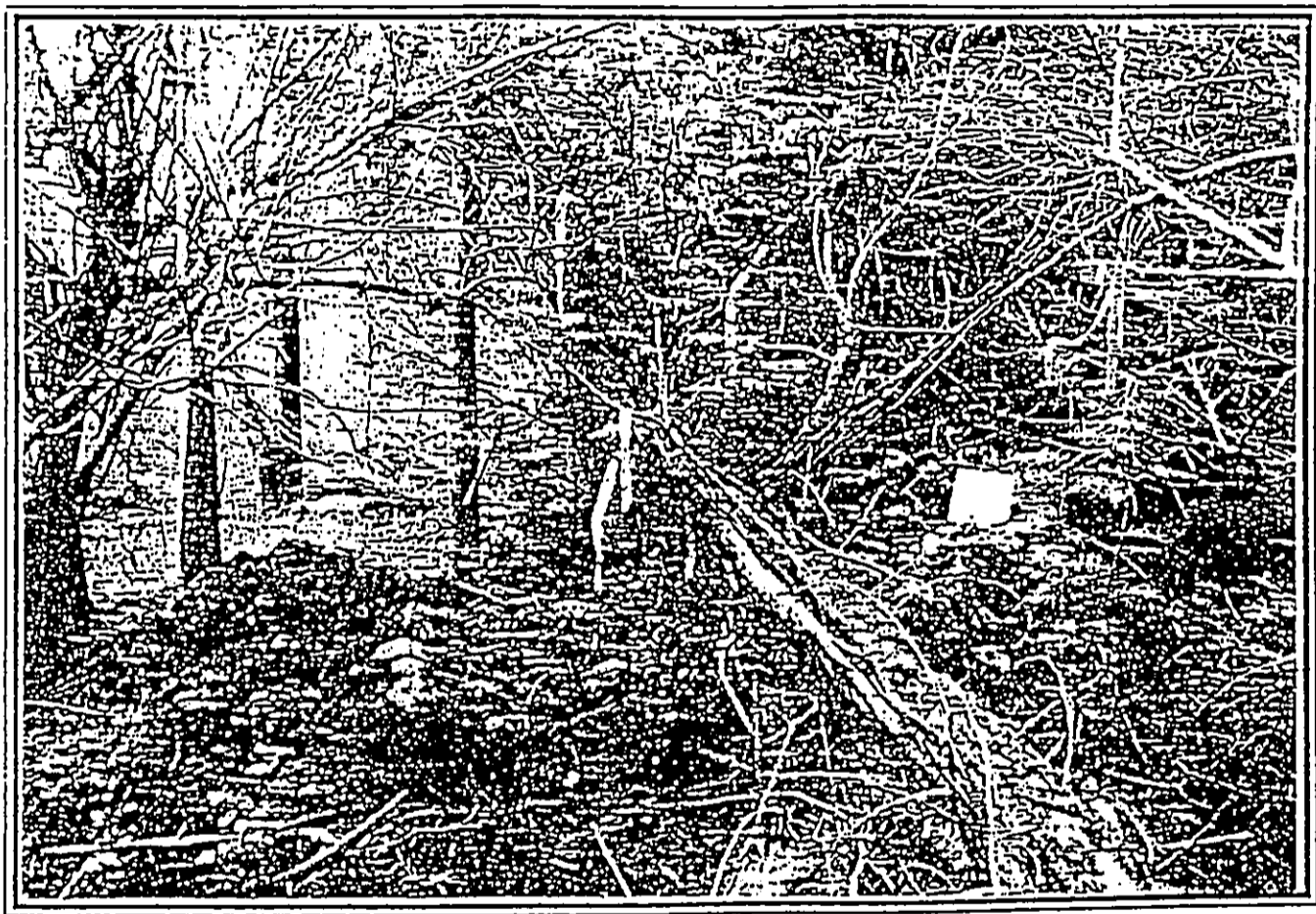


Figure E-10. SITE K-87, BURIAL PLATFORM. VIEW TO NORTHWEST.
(PHRI Neg#.1151-36)

SITE NOS.: State: 2099 PHRI: K-90 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, wattle
 CONDITION: Fair
 INTEGRITY: Altered
 DIMENSIONS: 17.0 m long by 10.0 m wide;
 c. 170.0 sq m

PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Possibly notched enclosure which has been heavily disturbed. The enclosure has no northwest wall. The notch is in the south corner. Adjacent to the northwest side are two paved terraces or lanai. An internal wall subdivides the enclosure interior into upper and lower portions. The walls have a maximum height of 60 cm and are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2300 PHRI: K-95 BPBM: —
 FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, wattle, lantana
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 50.0 m long by 30.0 m wide;
 c. 1,500.0 sq m

PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
 DESCRIPTION: Complex consists of an ovoid enclosure, a partially walled terrace, and a wall segment. There numerous agricultural terraces in the area.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, wattle, lantana
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 7.0 m long by 6.0 m wide; c. 42.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: The west side and portions of the south wall of this enclosure are built into bedrock. The interiors of the east, west, and north walls, and the exterior of the west and north walls are faced. The top of the east wall is even with the ground surface on the exterior, uphill side. Walls have a maximum height of 60 cm. Wall are comprised of stacked basalt boulders and cobbles and incorporate bedrock outcrops.

FEATURE B: Terrace
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, wattle, lantana
 CONDITION: Fair

INTEGRITY: Unaltered
 DIMENSIONS: 9.0 m long by 8.0 m wide; c. 72.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Terrace has east and south walls only; built on bedrock. Feature is eroded and heavily vegetated making it very difficult to determine its exact form and function. Feature may be agricultural in function.

FEATURE C: Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, wattle, lantana
 CONDITION: Fair/Poor
 INTEGRITY: Unaltered
 DIMENSIONS: 4.0 m long by 2.0 m wide; c. 8.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Two course high wall faced on the west side but mostly collapsed. Maximum wall height is 20 cm. Walls are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2301 PHRI: K-96 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, wattle, lantana
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 5.4 m long by 4.5 m wide; c. 24.3 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation*/
 Animal Control
 DESCRIPTION: Circular enclosure with unfaced walls. The southeast wall is built into a small outcrop of rock. Maximum wall height is 40 cm. Walls are comprised of stacked basalt boulders and cobbles. A small drainage is present c. 4.0 m west of the enclosure.

SITE NOS.: State: 2302 PHRI: K-97 BPBM: —
 FORMAL TYPE: Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle forest
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 7.0 m long by 0.6 m wide; c. 4.2 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Agricultural
 DESCRIPTION: Modified bedrock wall c. 0.5 m high (maximum). Feature is probably agricultural. Small agricultural terraces present in the area.

SITE NOS.: State: 2303 PHRI: K-98 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle forest

CONDITION: Fair
 INTEGRITY: Altered*
 DIMENSIONS: 9.5 m long by 8.5 m wide; c. 80.8 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
 DESCRIPTION: Rectangular enclosure with very low walls which look disturbed. There is some facing in the south corner of the enclosure. About 2.0 m southwest of the enclosure are two rock-retained terraces. Walls average 1.5 m in thickness and have a maximum height of 60 cm. Walls are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2304 PHRI: K-99 BPBM: T-3
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle forest
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 7.0 m long by 5.5 m wide; c. 38.5 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Rectangular enclosure with openings in the south corner and northwest side. The southwest wall of the enclosure is built on a small bedrock outcrop. Possible slab-lined firepit in the center of enclosure. Walls have a maximum height of 70 cm and are comprised of stacked basalt boulders and cobbles.

A test unit excavated in the enclosure sectioning the possible firepit did not reveal any subsurface cultural remains indicating the feature is either not a habitation (i.e., an agricultural enclosure) or that the feature was little used.

SITE NOS.: State: 2305 PHRI: K-100 BPBM: —
 FORMAL TYPE: Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle forest
 CONDITION: Poor
 INTEGRITY: Altered
 DIMENSIONS: 21.0 m long by 0.8 m wide; c. 16.8 sq m
 PROBABLE AGE: Historic
 FUNCTIONAL INTERPRETATION: Animal/Control
 DESCRIPTION: Cattle wall roughly faced on both sides. Wall has a maximum height of 60 cm; comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2306 PHRI: K-101 BPBM: T-24
 FORMAL TYPE: Mounds and Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle forest
 CONDITION: Good
 INTEGRITY: Altered

DIMENSIONS: 300.0 m long by 1.0 m wide;
 c. 300.0 sq m
 PROBABLE AGE: Historic/Prehistoric
 FUNCTIONAL INTERPRETATION: Animal Control/
 Agricultural
 DESCRIPTION: Long cattle wall which curves to form a large arc which opens downslope. In the northeast portion of this arc are several probable agricultural mounds. The wall is roughly faced on both sides. Wall has a maximum height of 60 cm; comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2307 PHRI: K-102 BPBM: —
 FORMAL TYPE: Terrace and Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle forest
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 18.0 m long by 6.0 m wide; c. 108.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
 DESCRIPTION: Rectangular terrace built on the top of a knoll. The wall is built across a small steep-sided drainage situated 6.0 m south of the terrace. The south and north walls of the terrace are situated on the edge of the knoll. An alignment extends 4.0 m north from the northwest corner of the terrace.

SITE NOS.: State: 2308 PHRI: K-103 BPBM: T-56
 FORMAL TYPE: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Wattle forest
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 32.0 m long by 22.0 m wide;
 c. 704.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Feature includes large walled area in front of the 80 cm high overhang. The walls of the area run down a steep, short slope (from the cliff to the bottom of the drainage) where the northeast wall runs parallel to the drainage. A level area extends 5.0 m out from the dripline of the overhang.

SITE NOS.: State: 2035 PHRI: K-105 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, wattle, lantana
 CONDITION: Good
 INTEGRITY: Altered

DIMENSIONS: 26.0 m long by 26.0 m wide;
c. 676.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
Agricultural

DESCRIPTION: Rectangular enclosure. Outside of the east wall and portions of the inside of the north and south walls are faced. Walls are collapsed on the north and west sides. In the northeast corner is a possible rock-filled pit. Terraces are present north of the enclosure.

A test unit excavated inside the enclosure revealed a subsurface cultural deposit containing fish and mammal bone, kukui nut shell, and charcoal. A radiocarbon sample from the deposit yielded three possible calendric age ranges of AD 1470-1670, AD 1775-1793, and AD 1947-1953.

SITE NOS.: State: 2310 PHRI: K-106 BPBM: —

FORMAL TYPE: Stone

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 2.0 m long by 2.0 m wide; c. 4.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Tool Manufacturing

DESCRIPTION: Site consists of abraded depressions in several pahoehoe slabs at the bottom of a hill. The slabs range in size from 20 cm to 90 cm in diameter.

SITE NOS.: State: 2311 PHRI: K-107 BPBM: —

FORMAL TYPE: Overhang

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, Christmas-berry, wattle,
koa-haole

CONDITION: Good

INTEGRITY: Altered*

DIMENSIONS: 14.0 m long by 6.0 m wide; c. 84.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Burial/Agricultural

DESCRIPTION: Consists of a burial in a lava blister overhang. The blister is 0.3 m high and c. 4.0 m in diameter. Bones (patella and rib) were observed inside. A wall extends from the opening 9.0 m to the northwest. The entrance may have been plugged at one time, but is now open. Agricultural features surround the site.

SITE NOS.: State: 2312 PHRI: K-108 BPBM: —

FORMAL TYPE: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, wattle

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 6.0 m long by 4.0 m wide; c. 24.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation

DESCRIPTION: C-shaped enclosure open to the northwest; interior of the southeast portion is faced. The southeast wall, which is the highest, abuts a slope. The wall averages 60 cm in thickness and has a maximum height of 90 cm. Wall is comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2313 PHRI: K-109 BPBM: T-49

FORMAL TYPE: Complex (2 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, wattle, panini

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 55.0 m long by 40.0 m wide;

c. 2,200.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Agricultural

DESCRIPTION: The complex consists of a C-shaped terrace, and agricultural features. Several terraces extend from an outcrop. Terraces situated downslope from C-shape.

FEATURE A: Terraces

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, wattle, 'ilima, panini

CONDITION: Good

INTEGRITY: Altered

DIMENSIONS: 3-5 m long by 0.5-1.0 m wide by

0.3-0.5 m high

PROBABLE AGE: Prehistoric

DESCRIPTION: Small terraces scattered across slope.

Most incorporate bedrock outcrops and are roughly constructed. They are opportunistically placed to utilize scattered pockets of soil.

FEATURE B: Terrace

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, grasses, wattle, Christmas-berry

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 3.7 m long by 3.4 m wide; c. 12.6 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: C-shaped terrace, probably agricultural in function. A slightly modified bedrock terrace is present immediately below the feature.

SITE NOS.: State: 2314 PHRI: K-110 BPBM: T-48

FORMAL TYPE: Wall

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, wattle

CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 36.0 m long by 14.0 m wide;
 c. 504.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Agricultural
 DESCRIPTION: Large terrace forms a rough C-shape. Terrace is situated in the bottom and sides of a drainage. A wall extends upslope-downslope from the south end of the terrace and continues downslope.

SITE NOS.: State: 2036 PHRI: K-111 BPBM: —
 FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, Christmas-berry, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 40.0 m long by 20.0 m wide;
 c. 800.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Complex consists of a pair of adjoining overhangs, a paved terrace, and a small overhang with possible walls delineating a level area.

FEATURE A: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, Christmas-berry, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 12.0 m long by 11.0 m wide;
 c. 132.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Two adjoining overhangs with a possible wall in front of the western one. In front of the overhangs is a natural terrace area which extends 4.0 m to the west. Subsurface testing was conducted at the feature.

The test unit excavated near the dripline of the overhang revealed a subsurface cultural deposit containing volcanic glass flakes, marine shell, bone and charcoal. A radiocarbon sample from the deposit yielded a calendric age range of AD 1640-1955.

FEATURE B: Terrace
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, Christmas-berry, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 10.0 m long by 7.5 m wide; c. 75.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: This paved terrace is on a very steep slope and is built to extend the top of the ridge. About 1.5 m of the north wall is faced, and the other 1.5 m of the same wall is collapsed.

FEATURE C: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, Christmas-berry, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 5.0 m long by 4.0 m wide; c. 20.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Overhang alone measures 1.4 m by 0.7 m; a level area fronts it. A possible modified bedrock wall is situated west of the overhang; this wall curves and connects with Feature B and encloses a level area.

SITE NOS.: State: 2315 PHRI: K-112 BPBM: T-43
 FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, panini
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 60.0 m long by 50.0 m wide;
 c. 3,000.0 sq m
 PROBABLE AGE: Prehistoric/Historic
 FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural/Animal Control
 DESCRIPTION: Complex consists of an overhang, an oval enclosure, and a cattle wall. Agricultural features surround the site.

FEATURE A: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, panini
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 2.0 m deep by 1.8 m wide; c. 3.6 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Feature consists of an 1 m high overhang with collapsed bedrock in front. Soil deposit present inside overhang.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, grasses, panini
 CONDITION: Poor
 INTEGRITY: Unaltered
 DIMENSIONS: 5.5 m long by 5.0 m wide; c. 27.5 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Mostly collapsed oval enclosure. All have a maximum height of 30 cm and are comprised of stacked basalt boulders and cobbles. No facing remains and the walls are rounded in cross-section.

FEATURE C: Wall
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, panini

CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 60.0 m long by 0.75 m wide
 PROBABLE AGE: Historic
 DESCRIPTION: Cattle wall which may be connected to the walls of Site K-12. Multiple-stacked wall comprised of stacked basalt boulders and cobbles. Wall is 80 cm high and 75 cm in thickness.

SITE NOS.: State: 2316 PHRI: K-115 BPBM: T-42
 FORMAL TYPE: Complex (2 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, kiawe
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 35.0 m long by 20.0 m wide;
 c. 700.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture

DESCRIPTION: Complex consists of a square enclosure, an enclosure irregular in plan, and agricultural terraces.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, kiawe
 CONDITION: Excellent
 INTEGRITY: Unaltered
 DIMENSIONS: 8.9 m long by 7.9 m wide; c. 70.3 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Square enclosure with a 3.5 m square platform adjacent to the walls in the northeast quadrant of the structure's interior. The level upper surface of the platform is flush with the upper surfaces of the adjacent walls which are also level. Both sides of all walls are well-faced. The south wall is massive, 1.9 m thick. The walls average 80 cm in height and average 1.5 m in thickness. A possible external cupboard is present on the outside of the north wall near the northeast corner. The walls are comprised of stacked basalt boulders and cobbles.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, kiawe
 CONDITION: Poor
 INTEGRITY: Unaltered
 DIMENSIONS: 30.0 m long by 20.0 m wide;
 c. 600.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Enclosure irregular in plan view surrounding a small sink. The walls of the enclosure are poorly constructed and are low. The north wall may have been altered during fence building. The western wall is the

only wall which is easily discernible; the east wall is covered with lantana. The walls have a maximum height of 80 cm and are comprised of stacked basalt boulders and cobbles.

SITE NOS.: State: 2317 PHRI: K-116 BPBM: T-41
 FORMAL TYPE: Complex (2 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, grasses, kiawe
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 75.0 m long by 55.0 m wide;
 c. 4,125.0 sq m
 PROBABLE AGE: Historic
 FUNCTIONAL INTERPRETATION: Animal Control
 DESCRIPTION: Complex consists of two large enclosures, one square and one trapezoidal. Both are probably historic corrals for cattle based on their size, location relative to other similar features, and construction.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, panini
 CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 30.0 m long by 22.0 m wide;
 c. 660.0 sq m
 PROBABLE AGE: Historic
 DESCRIPTION: Large square enclosure with intermittent facing on the walls. Most of the west wall is missing due to bulldozer activity during the building of a fence in the area. A upslope-downslope oriented wall segment extends for c. 5.0 m off the northeast corner. The walls average 75 cm to 80 cm in thickness and have a maximum height of 1.0 m. The walls are of multiple-stacked to core-filled construction and are composed of stacked basalt cobble and boulders.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, panini
 CONDITION: Fair
 INTEGRITY: Altered
 DIMENSIONS: 30.0 m long by 22.0 m wide;
 c. 660.0 sq m
 PROBABLE AGE: Historic
 DESCRIPTION: Large trapezoidal enclosure with only the north and east walls intact. The other walls are linear piles of rubble having been probably destroyed by bulldozer activity. There is a depression in the northwest one-third of the enclosure. The walls average 80 cm in thickness and have a maximum height of 1.3 m. The walls are of multiple-stacked to core-filled construction and are composed of stacked basalt cobble and boulders.

SITE NOS.: State: 2318 PHRI: K-118 BPBM: —
 FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, panini, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 70.0 m long by 40.0 m wide;
 c. 2,800.0 sq m

PROBABLE AGE: Prehistoric/Historic
 FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural/Animal Control

DESCRIPTION: Complex consists of a large square enclosure, a circular enclosure, a sub-rectangular enclosure and associated agricultural features. The large enclosure is probably a historic cattle corral based on it's size, location relative to other similar features, and construction.

FEATURE A: Enclosure

TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, panini, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 35.0 m long by 30.0 m wide;
 c. 1,050.0 sq m

PROBABLE AGE: Prehistoric/Historic
 DESCRIPTION: Large square enclosure. Most of the walls are faced, the west wall, however, is somewhat collapsed. The south wall is in the best condition. A collapsed terrace extends c. 5.0 m from the north corner, then extends 8.0 m to the northeast, then extends eastward and ends 5.0 m from Feature B. The enclosure walls average 70 cm in thickness and have a maximum height of 1.2 m. The walls are of multiple-stacked construction and are composed of stacked basalt cobble and boulders.

FEATURE B: Enclosure

TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, panini, wattle
 CONDITION: Good
 INTEGRITY: Unaltered

DIMENSIONS: 5.0 m long by 4.3 m wide; c. 21.5 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Circular enclosure. The north half of the enclosure is collapsed, and the south half is in very good condition. Walls of the south half are faced on both sides. The enclosure walls average 70 cm in thickness and have a maximum height of 90 cm. The walls are of multiple-stacked construction and are composed of stacked basalt cobble and boulders.

FEATURE C: Enclosure

TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, panini, wattle

CONDITION: Fair

INTEGRITY: Unaltered

DIMENSIONS: 9.0 m long by 4.5 m wide; c. 40.5 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Sub-rectangular enclosure with very collapsed walls. Most of the south half of the east wall is missing.

SITE NOS.: State: 2319 PHRI: K-120 BPBM: T-40

FORMAL TYPE: Complex (3 Features)

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, panini,

morning glory

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 60.0 m long by 25.0 m wide;

c. 1,500.0 sq m

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural

DESCRIPTION: Complex consists of a paved terrace, a small lava tube, and a rectangular enclosure.

FEATURE A: Paved terrace

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Lantana, 'ilima, grasses, panini,

morning glory

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 7.0 m long by 4.5 m wide; c. 31.5 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: Feature consists of an outcrop of cobbles which has been modified into a terrace. A faced retaining wall is present on the southeast downslope side of the platform. The upper surface of the terrace is roughly paved.

FEATURE B: Lava Tube

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, panini,

morning glory

CONDITION: Good

INTEGRITY: Unaltered

DIMENSIONS: 1.8 m long by 0.8 m wide; c. 1.4 sq m

PROBABLE AGE: Prehistoric

DESCRIPTION: A small lava tube open at both ends. Some possible stacking of cobbles at one opening, or the cobbles may represent collapse. Floor of tube has a soil deposit. internal height ranges from 35 cm to 55 cm.

FEATURE C: Enclosure

TOPOGRAPHY: Dissected alluvial slope

VEGETATION: Grasses, lantana, 'ilima, panini,

morning glory

CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 6.2 m long by 3.7 m wide; c. 22.9 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure with all walls faced. There may be an opening in the south corner. Walls have a maximum height of 1.1 m. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

SITE NOS.: State: 2037 PHRI: K-124 BPBM: —
 FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, 'ilima, grasses, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 65.0 m long by 60.0 m wide;
 c. 3,900.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
 DESCRIPTION: Complex consists of an oval enclosure, an overhang wall, a rectangular enclosure, and surrounding agricultural features.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 7.0 m long by 6.0 m wide; c. 42.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: An oval enclosure built into a natural collapsed lava tube depression. Portions of the interiors and exteriors of the walls are faced. The walls range from 60 cm to 80 cm in thickness and range from 1.2 m to 1.4 m in height. The walls are of multiple-stacked construction comprised of basalt boulders and cobbles. Just north of the enclosure is a small lava tube which extends to the northwest for an indeterminable length.

A test unit excavated inside the enclosure revealed a subsurface cultural deposit containing small and medium mammal bone, three basalt flakes, and charcoal. A radiocarbon sample from the deposit yielded a calendric age range of AD 1640-1955.

FEATURE B: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 3.4 m long by 2.5 m wide; c. 8.5 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Overhang with a small curved wall

fronting it. The wall encloses a small area in front of the overhang and both ends of the wall connects to an outcrop equal in height to the wall. A few boulders are present on the outcrop, above the lip of the overhang. The walls have a maximum height of 1.0 m and a maximum thickness of 50 cm. Walls are comprised of stacked basalt boulders and cobbles.

FEATURE C: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, wattle
 CONDITION: Poor
 INTEGRITY: Unaltered
 DIMENSIONS: 8.0 m long by 6.0 m wide; c. 48.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Rectangular enclosure. The walls of the enclosure are quite collapsed making it difficult to determine their exact dimensions. The north wall, being on the side of a swale, is higher than the others. Part of the exterior of the west wall is faced. The walls have a maximum height of 1.0 m and a maximum thickness of 1.0 m. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

SITE NOS.: State: 2320 PHRI: K-127 BPBM: —
 FORMAL TYPE: Complex (2 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, nanini, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 65.0 m long by 35.0 m wide;
 c. 2275.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
 DESCRIPTION: Complex consists of a circular enclosure, a small overhang with an associated wall, and many surrounding agricultural features.

FEATURE A: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, 'ilima, lantana, nanini, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 9.0 m long by 8.2 m wide; c. 73.8 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Circular enclosure; the interior of the south wall and the exterior of the north wall are faced. A possible cupboard is present in the south wall. The walls have a maximum height of 85 cm and a maximum thickness of 1.0 m. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

FEATURE B: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 1.8 m long by 0.4 m wide; c. 0.7 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: A small shallow overhang in a lava blister. A 8.0 m long somewhat informal appearing wall extends north from the overhang. The wall measures 0.5 m wide; c. 0.5 m high. The overhang is 0.7 m high.

SITE NOS.: State: 2038 PHRI: K-130 BPBM: —

FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, panini
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 40.0 m long by 40.0 m wide;
 c. 1,600.0 sq m

PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural

DESCRIPTION: Rectangular enclosure with a small associated overhang containing a pig mandible. Most of the interior walls are faced. The walls have a maximum height of 1.3 m and a maximum thickness of 80 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles. The overhang is 1.4 m high, 1.4 m wide, and 50 cm deep. There are many agricultural features in the area.

A test unit excavated inside the enclosure revealed a subsurface cultural deposit containing small mammal bone, marine shell, three basalt flakes, and charcoal. A radiocarbon sample from the deposit yielded five possible calendric age ranges: AD 1523-1566, AD 1629-1696, AD 1726-1818, AD 1859-1861, and AD 1921-1955.

SITE NOS.: State: 2321 PHRI: K-131 BPBM: —

FORMAL TYPE: Complex (3 Features)
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, morning glory,
 panini

CONDITION: Good
 INTEGRITY: Altered
 DIMENSIONS: 80.0 m long by 50.0 m wide;
 c. 4,000.0 sq m

PROBABLE AGE: Prehistoric/Historic
 FUNCTIONAL INTERPRETATION: Habitation/
 Agriculture/Animal Control

DESCRIPTION: Complex consists of a square enclosure, an oval enclosure, an overhang and a wall, and associated agricultural features. A wall of Site K-12 bisects the site.

FEATURE A: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, morning glory,
 panini
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 3.0 m long by 0.4 m wide; c. 1.2 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Very shallow, 50 cm high overhang with a possible deposit on the floor. A nearby wall is probably not associated with the overhang, as it appears to be a cattle wall. The wall is 50+ m long, 70 cm thick, and 50 cm high. There is also a probable road between this wall and the wall of Site K-12.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, morning glory,
 panini
 CONDITION: Fair/Poor
 INTEGRITY: Unaltered
 DIMENSIONS: 5.0 m long by 5.0 m wide; c. 25.00 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Square enclosure with collapsed walls and rock mounds possibly associated with the enclosure. The walls have a maximum height of 30 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

FEATURE C: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, morning glory,
 panini
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 6.0 m long by 5.0 m wide; c. 30.0 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Circular enclosure with collapsed walls. No facing was present on any of the walls. The walls have a maximum height of 50. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

SITE NOS.: State: 2322 PHRI: K-134 BPBM: —

FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, panini
 CONDITION: Fair-Poor
 INTEGRITY: Altered
 DIMENSIONS: 18.5 m long by 13.2 m wide;
 c. 244.2 sq m

PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Religious*/
 Habitation

DESCRIPTION: Large substantial rectangular enclosure with wide walls and internal features. The east wall is intermittently faced on both sides. There is a possible internal step, or bench along the south half of the east wall. A natural step in the bedrock floor separates the higher north one-quarter of the floor from the lower south three-quarters. The later portion of the interior may have been further subdivided by a wall which is now completely collapsed. A cattle wall has been constructed along the west wall of the feature. Stones from the remaining walls, especially the north and south ones, have been removed to construct the cattle wall. The walls average 70 cm in height and have a maximum thickness of up-to 2.0 m. Walls are comprised of stacked basalt boulders and cobbles. The feature commands a broad view of the surrounding terrain. The enclosure is one of the largest within the project area and probably represents a small *heiau*, a men's house, or high status residence based on its size, construction, and location.

SITE NOS.: State: 2323 PHRI: K-135 BPBM: —
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, panini, morning glory
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 35.0 m long by 15.0 m wide; c. 525.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
DESCRIPTION: Complex consists of an enclosed portion of a collapsed lava tube, and an L-shaped wall within a collapsed lava tube. Along the tube, throughout the site, there are small associated features. A long wall, which may be part of Site K-112 or Site K-12, is situated nearby.

FEATURE A: Lava Tube
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, morning glory, ferns
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 12.0 m long by 12.0 m wide; c. 144.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: An enclosure built within a collapsed lava tube; the northeast and southwest walls have been built on the sides of the tube. The walls have a maximum height of 1.5 m and a maximum thickness of 85 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

FEATURE B: Wall
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, grasses, 'ilima, morning glory, ferns
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 7.0 m long by 6.0 m wide; c. 42.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: L-shaped wall built within a collapsed lava tube. One leg of the L-shape is on the top of the tube and the other crosses the tube. The northeast side of the tube is steep enough to act as a wall—which creates an over all U-shape open to the northwest. The walls have a maximum height of 1.5 m and a maximum thickness of 80 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

SITE NOS.: State: 2324 PHRI: K-137 BPBM: —
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, Christmas-berry
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 4.0 m long by 3.6 m wide; c. 14.4 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
DESCRIPTION: Sub-rectangular enclosure with some facing on the east wall. Northeast side of structure is built into an outcrop. The walls have a maximum height of 70 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles. Agricultural features, mounds, terraces, and modified outcrops, surround site.

SITE NOS.: State: 2325 PHRI: K-140 BPBM: —
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, vines
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 50.0 m long by 40.0 m wide; c. 2,000.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Indeterminate
DESCRIPTION: Complex consists of a large ovoid enclosure, and a C-shaped enclosure. Associated with these features are two small overhangs.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, vines
CONDITION: Good

INTEGRITY: Unaltered
DIMENSIONS: 30.0 m long by 16.0 m wide;
 c. 480.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Large ovoid enclosure situated in a depression/sink. Much of the south wall consists of a small cliff. The other walls are high and are intermittently faced. Wall average 1.0 m in height. Walls are multiple-stacked comprised of basalt cobbles and boulders and frequently incorporate bedrock outcrops. Interior is thickly vegetated possibly indicating feature served as an garden enclosure.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, vines
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 4.8 m long by 3.8 m wide; c. 18.2 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: C-shaped enclosure open to the west. The walls are low and are not faced. The walls have an average height of 20 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

SITE NOS.: State: 2326 PHRI: K-142 BPBM: —
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, vines
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 7.8 m long by 6.0 m wide; c. 46.8 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
DESCRIPTION: Rectangular enclosure with intermittent facing on all sides. Terraces are present north and south of the west wall. The terraces form the edge of a level area which runs to the base of a ridge situated to the east and north. The walls have an average height of 40 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

A test unit excavated in the enclosure sectioning the possible firepit did not reveal any subsurface cultural remains indicating the feature is either not a habitation (i.e., an agricultural enclosure) or that the feature was little used.

SITE NOS.: State: 2327 PHRI: K-143 BPBM: —
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, Christmas-berry,
 panini
CONDITION: Good
INTEGRITY: Unaltered

DIMENSIONS: 50.0 m long by 25.0 m wide;
 c. 1,250.00 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
 Agricultural
DESCRIPTION: Complex consists of an irregular enclosure, an overhang, and surrounding agricultural features.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, Christmas-berry,
 panini
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 8.0 m long by 7.0 m wide; c. 56.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Enclosure is irregular in plan view. Walls are infrequently faced on the north and west sides. In the southwest corner is a possible small platform. In the northwest corner is a low area defined by a terrace connected to the possible platform and north wall. The walls have a maximum height of 80 cm and a maximum thickness of 80 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

FEATURE B: Overhang
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, Christmas-berry,
 panini
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 2.5 m long by 1.5 m wide; c. 3.8 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: A 80 cm overhang with short walls of modified bedrock on either side of the entrance. Present in the vicinity of the overhang are numerous agricultural terraces.

SITE NOS.: State: 2328 PHRI: K-146 BPBM: —
FORMAL TYPE: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, Christmas-berry, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 7.0 m long by 6.0 m wide; c. 42.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: U-shaped enclosure open to the southeast. Northwest side of enclosure is built into a small outcrop. A level area is present on the other side of the outcrop. The walls have a maximum height of 70 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

42-050289

APPENDIX E

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SITE NOS.: State: 2329 PHRI: K-148 BPBM: —
(Figure E-11)

FORMAL TYPE: Complex (5 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, wattle,
Christmas-berry

CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 90.0 m long by 60.0 m wide;
c. 5,400.0 sq m

PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Site consists of three circular enclosures,
one U-shaped enclosure, one rectangular enclosure, and
surrounding agricultural features.

FEATURE A: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, wattle,
Christmas-berry
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 6.5 m long by 6.5 m wide; c. 42.3 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Circular enclosure with low, unfaced
walls. The walls have a maximum height of 25 cm. Walls
are of multiple-stacked construction comprised of basalt
boulders and cobbles.

FEATURE B: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, Christmas-berry,
wattle
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 10.0 m long by 7.5 m wide; c. 75.0 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: U-shaped enclosure open to the
northeast, with associated walls. Small portion of southwest
wall is faced. Present within the enclosure is a small wall
which extends 2.0 m northeast off the enclosure's southwest
wall. The walls have a maximum height of 80 cm. Walls are
of multiple-stacked construction comprised of basalt boulders
and cobbles and occasionally incorporating bedrock outcrops.
Three meters east of the enclosure is what appears to be a
very collapsed U-shape.

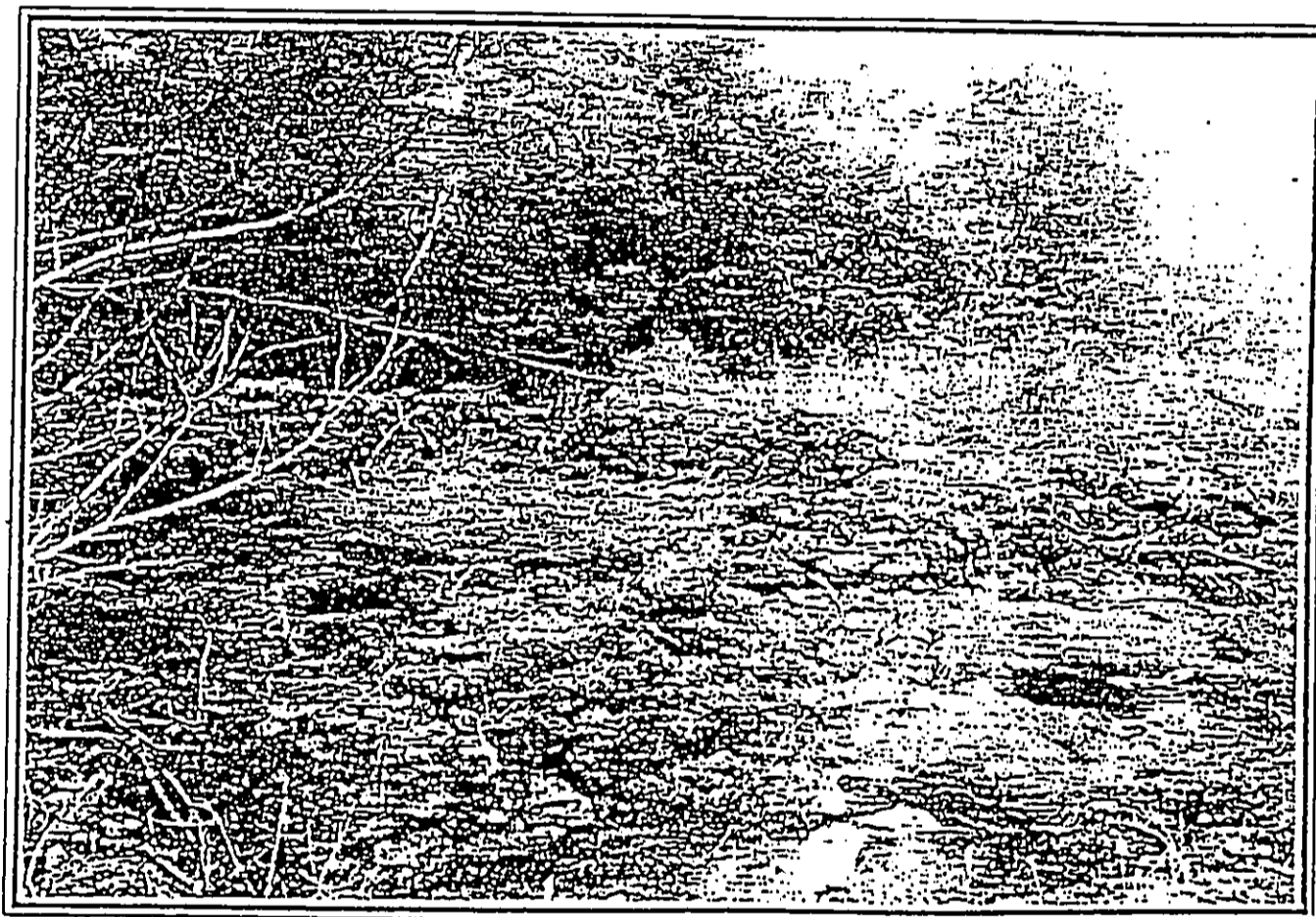
FEATURE C: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, Christmas-berry,
wattle
CONDITION: Fair
INTEGRITY: Unaltered

DIMENSIONS: 7.5 m long by 7.0 m wide; c. 52.5 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Circular enclosure with unfaced walls
quite collapsed. The walls have a maximum height of 35
cm. Walls are of multiple-stacked construction comprised
of basalt boulders and cobbles.

FEATURE D: Enclosure
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, Christmas-berry,
wattle
CONDITION: Poor
INTEGRITY: Unaltered
DIMENSIONS: 5.4 m long by 5.2 m wide; c. 28.1 sq m
PROBABLE AGE: Prehistoric
DESCRIPTION: Rectangular enclosure with very
collapsed walls. The only portions of the enclosure above
ground level are the south wall, the southeast corner, and a
small bit of the east wall. A wall extends c. 4.0 m south from
the southwest corner of the enclosure. The walls have a
maximum height of 30 cm. Walls are of multiple-stacked
construction comprised of basalt boulders and cobbles.

SITE NOS.: State: 2330 PHRI: K-149 BPBM: —
FORMAL TYPE: Overhang
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: lantana, 'ilima, wattle, grasses, panini
CONDITION: Fair
INTEGRITY: Unaltered
DIMENSIONS: 8.0 m long by 3.5 m wide; c. 28.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Overhang is enclosed; it is small and
low, and a wall seals off one-quarter of the entrance.
Fronting the overhang is a fairly level area which is terraced.
The overhang measures 2.9 by 1.1 by 0.5 m.

SITE NOS.: State: 2331 PHRI: K-152 BPBM: —
FORMAL TYPE: Complex (2 Features)
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Lantana, 'ilima, grasses, wattle
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 40.0 m long by 40.0 m wide;
c. 1,600.0 sq m
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/
Agricultural
DESCRIPTION: Complex consists of a double terrace, a
U-shaped enclosure, and surrounding agricultural features.



*Figure E-11. SITE K-148, FEATURE B. VIEW TO SOUTHWEST.
(PHRI Neg.# 1154-20)*

FEATURE A: Double terrace
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, wattle, 'ilima, lantana
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 5.9 m long by 5.8 m wide; c. 34.2 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: Feature consists of two attached paved terraces. The downslope and northwest side of each level area is well faced. The upper terrace surface is 80 cm above the lower one. The southeast corner of each terrace is level with the slope of the hill. The lower terrace is 70 cm high.

FEATURE B: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 5.7 m long by 5.0 m wide; c. 28.5 sq m
 PROBABLE AGE: Prehistoric
 DESCRIPTION: U-shaped enclosure open to the southwest. The walls of the enclosure are faced. The back wall of the U-shape, the northeast side, is collapsed. The walls have a maximum height of 40 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles.

SITE NOS.: State: 2332 PHRI: K-200 BPBM: —
 FORMAL TYPE: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, panini, wattle, Christmas-berry, grasses
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 10.7 m long by 3.0 m wide; c. 32.1 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Site consists of an 1.1 m high overhang with a partially walled entrance. One wall is on the southeast side of the entrance. The wall has a faced corner. The wall on the other side is collapsed. Inside the overhang is a small oval-shaped level terraced area.

SITE NOS.: State: 2333 PHRI: K-201 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 3.3 m long by 2.8 m wide; c. 9.3 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Small square enclosure with collapsed walls. There is a bit of facing on the southwest corner. A

possible entryway is present in the southwest wall. The walls have a maximum height of 30 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles. Five meters south of the enclosure is a wall of Site K-12.

SITE NOS.: State: 2334 PHRI: K-202 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, wattle
 CONDITION: Poor
 INTEGRITY: Unaltered
 DIMENSIONS: 4.0 m long by 3.0 m wide; c. 12.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: A small rectangular enclosure with a modified bedrock terrace extending 10.0 m off the southwest corner. The walls have a maximum height of 70 cm. Walls are of multiple-stacked construction comprised of basalt boulders and cobbles occasionally incorporating bedrock outcrops.

SITE NOS.: State: 2335 PHRI: K-203 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Lantana, grasses, 'ilima, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 45.0 m long by 22.0 m wide; c. 990.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation/Agricultural
 DESCRIPTION: Large irregular-shaped enclosure with two rooms on the southwest side. Probable agricultural features within enclosure including modified outcrops and terraces. The walls have a maximum height of 1.5 m. Walls are of multiple-stacked to core-fill construction. Walls are comprised of basalt boulders and cobbles occasionally incorporating bedrock outcrops.

SITE NOS.: State: 2336 PHRI: K-204 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: grasses, lantana, 'ilima, wattle, Christmas-berry
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 6.2 m long by 5.0 m wide; c. 31.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Circular enclosure with collapsed walls. The interior of the southwest wall is partially faced. Possible

opening present in a section of the west wall. The walls have a maximum height of 55 cm. Walls are of multiple-stacked and are comprised of basalt boulders and cobbles.

SITE NOS.: State: 2337 PHRI: K-205 BPBM: —
 FORMAL TYPE: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, Christmas-berry, panini
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 18.0 m long by 5.0 m wide; c. 90.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Overhang with a terraced area in front of it. Overhang has two deep recesses at either end; recesses differ in elevation and are separated by a collapsed modified bedrock wall. Overhang ceiling ranges from 50 cm to 90 cm in height.

SITE NOS.: State: 2338 PHRI: K-206 BPBM: T-1
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, 'ilima, lantana
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 6.6 m long by 5.5 m wide; c. 36.30 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation*/
 Agricultural
 DESCRIPTION: The northwest and southeast walls of this enclosure are formed by a collapsed lava tube. Possible cupboard present in the middle of the northeast wall. Within the tube, 6.0 m upslope of the enclosure, is a terrace. The walls have a maximum height of 90 cm. Walls are of multiple-stacked and are comprised of basalt boulders and cobbles.

SITE NOS.: State: 2339 PHRI: K-207 BPBM: T-45
 FORMAL TYPE: Sink, Burial
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, Christmas-berry, panini
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 36.0 m long by 5.0 m wide;
 c. 180.00 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Burial/Habitation
 DESCRIPTION: Very deep sink with a small circular alignment in lava tube at the bottom. A lava tube extends to the west. Human bone noted on surface in tube. Sink is filled with trash and dead animals. Areas of charcoal-stain noted on floor of tube.

SITE NOS.: State: 2340 PHRI: K-208 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, Christmas-berry
 CONDITION: Fair
 INTEGRITY: Unaltered
 DIMENSIONS: 5.0 m long by 4.3 m wide; c. 21.5 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Sub-rectangular enclosure built on a bedrock outcrop. Interiors and exteriors of walls are faced. The walls have a maximum height of 90 cm. Walls are of multiple-stacked and are comprised of basalt boulders and cobbles. Many agricultural terraces present northwest of the enclosure.

SITE NOS.: State: 2341 PHRI: K-209 BPBM: —
 FORMAL TYPE: Enclosure
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, morning glory, kiawe
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 30.0 m long by 15.0 m wide;
 c. 450.0 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Indeterminate
 DESCRIPTION: Large oval enclosure encircling a sink. Aside from the east wall, which is built on a slope and which utilizes bedrock, all walls are faced on both sides. The walls have a maximum height of 1.4 m and a maximum thickness of 90 cm. Walls are of multiple-stacked and are comprised of basalt boulders and cobbles. Agricultural terraces surround the enclosure.

SITE NOS.: State: 2342 PHRI: K-210 BPBM: —
 FORMAL TYPE: Overhang
 TOPOGRAPHY: Dissected alluvial slope
 VEGETATION: Grasses, lantana, 'ilima, wattle
 CONDITION: Good
 INTEGRITY: Unaltered
 DIMENSIONS: 4.1 m long by 2.9 m wide; c. 11.9 sq m
 PROBABLE AGE: Prehistoric
 FUNCTIONAL INTERPRETATION: Habitation
 DESCRIPTION: Overhang with irregular enclosure in front. Two sides of the enclosure consist of bedrock; one of the bedrock sides has a small overhang. The interior portion of the northwest wall is faced; all other walls are collapsed. The walls have a maximum height of 90 cm and a maximum thickness of 60 cm. Walls are of multiple-stacked and are comprised of basalt boulders and cobbles.

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APPENDIX E

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SITE NOS.: State: 2343 PHRI: K-211 BPBM: —
FORMAL TYPE: Terrace
TOPOGRAPHY: Dissected alluvial slope
VEGETATION: Grasses, lantana, 'ilima, waule, lilikoi
CONDITION: Good
INTEGRITY: Unaltered
DIMENSIONS: 13.0 m long by 6.5 m wide; c. 84.50 sq m
PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Probable residential terrace with modified bedrock walls present on the south and west sides. The other walls were vaguely defined. Terrace is situated on the end of a ridge. The walls have a maximum height of 80 cm and a maximum thickness of 1.1 m. Walls are of multiple-stacked and are comprised of basalt boulders and cobbles.

APPENDIX F

FULL UTM COORDINATES, ELEVATION AND PROXIMITY TO WATER FOR IDENTIFIED SITES

PHRI TEMP. NUMBER	FULL UTM COORDINATES		ELEVATION (ft. above sea level)	DISTANCE AND DIRECT. TO WATER* (ft.) (approx.)	FULL UTM COORDINATES		ELEVATION (ft. above sea level)	DISTANCE AND DIRECT. TO WATER (ft.) (approx.)
	EASTING	NORTHING			EASTING	NORTHING		
WAIHOHULI								
W-1	774,450	2,296,100	1820	625 (S)	776,250	2,294,650	2780	550 (N)
W-2	774,350	2,295,850	1820	175 (N)	776,200	2,294,600	2760	675 (N)
W-3	774,300	2,295,800	1820	375(N/NNE),450(S)	776,150	2,294,500	2760	1000 (N)
W-4	774,300	2,295,700	1820	175 (SW)	776,250	2,294,550	2820	800 (N)
W-5	774,350	2,295,700	1840	225 (SW)	775,650	2,294,750	2500	1000 (S)
W-6	774,300	2,295,700	1820	150 (S/SW)	775,400	2,294,800	2400	575 (S/SW)
W-8	774,200	2,295,550	1820	550 (SW)	775,400	2,294,950	2340	1000 (S)
W-10	774,500	2,295,750	1880	375 (N), 375 (S)	776,400	2,294,700	2800	75 (N)
W-11	774,600	2,296,000	1900	500 (S)	776,050	2,294,800	2640	225 (N)
W-12	774,600	2,295,900	1900	150 (S)	776,050	2,294,850	2640	125 (N)
W-13	774,500	2,295,250	1960	250 (S)	775,750	2,295,050	2400	225 (N)
W-14	774,500	2,295,400	1940	625 (S), 575 (N)	775,700	2,295,050	2440	325 (N)
W-15	774,700	2,295,500	1980	50 (N)	775,450	2,295,250	2300	100 (N)
W-17	774,700	2,295,650	1940	300 (S)	776,450	2,294,750	2840	100 (S)
W-18	774,850	2,295,850	1980	375 (SW)	775,950	2,295,050	2540	125 (S)
W-20	774,800	2,295,700	1980	125 (N)	774,250	2,295,650	1820	100 (N)
W-21	774,700	2,295,600	1960	275 (S)	774,200	2,295,400	1820	125 (S)
W-27	775,050	2,295,550	2100	300 (N), 300 (S)	775,000	2,295,750	2020	200 (S)
W-28	774,800	2,295,150	2100	375 (SW)	776,500	2,294,750	2860	200 (S)
W-30	775,150	2,295,600	2100	225 (N)				
W-31	775,100	2,295,600	2100	150 (N)				
W-32	775,200	2,295,600	2100	125 (N)				
W-35	774,950	2,294,900	2200	175 (N)	774,150	2,293,450	2220-2260	-
W-36	775,050	2,295,100	2180	875 (W/SW)	774,200	2,293,400	2240	-
W-37	774,950	2,294,950	2200	250 (W/SW)	774,300	2,293,600	2300-2320	-
W-42	776,350	2,295,100	2720	575 (S)	774,300	2,293,350	2280	-
W-45	775,600	2,295,500	2320	275 (S)	774,250	2,293,300	2280-2300	-
W-46	775,500	2,295,550	2280	425 (SW)	774,150	2,293,250	2260-2280	-
W-47	776,650	2,294,950	2860	250 (S)	774,100	2,293,200	2250-2280	-
W-48	776,550	2,294,900	2840	100 (S)	774,050	2,293,150	2260-2280	-
W-49	776,450	2,295,050	2760	500 (S)	773,900	2,292,850	2280-2320	-
W-55	776,250	2,294,500	2820	950 (N)	773,900	2,292,800	2320-2340	-
KEOKEA								
K-1					773,850	2,292,750	2300-2320	-
K-2					773,900	2,292,800	2320-2340	-
K-3					773,850	2,292,750	2300-2320	-
K-4					773,900	2,292,800	2320-2340	-
K-5					773,850	2,292,750	2300-2320	-
K-6					773,900	2,292,800	2320-2340	-
K-7					773,850	2,292,750	2300-2320	-
K-8					773,900	2,292,800	2320-2340	-
K-9					773,850	2,292,750	2300-2320	-
K-10					773,900	2,292,800	2320-2340	-
K-11					773,850	2,292,750	2300-2320	-
K-12					773,900	2,292,800	2320-2340	-

* Water = Intermittent drainage. There are no known water sources in the Keokea parcel.

FULL UTM, COORDINATES, ELEVATION AND PROXIMITY TO WATER FOR IDENTIFIED SITES (cont.)

PHRI TEMP. NUMBER	FULL UTM COORDINATES		ELEVATION (ft. above sea level)	DISTANCE AND DIRECT. TO WATER (ft.) (approx.)	PHRI TEMP. NUMBER	FULL UTM COORDINATES		ELEVATION (ft. above sea level)	DISTANCE AND DIRECT. TO WATER (ft.) (approx.)
	EASTING	NORTHING				EASTING	NORTHING		
K-13	773,800	2,292,650	2320-2360	-	K-64	774,400	2,292,800	2480	-
K-14	773,900	2,292,700	2360	-	K-65	774,400	2,292,600	2540-2600	-
K-16	774,000	2,292,700	2360	-	K-69	774,450	2,292,350	2680	-
K-19	774,100	2,292,900	2340	-	K-70	774,450	2,292,400	2640	-
K-20	774,150	2,292,900	2360	-	K-71	774,500	2,292,550	2580-2600	-
K-21	774,100	2,293,000	2320	-	K-76	774,550	2,292,700	2540-2560	-
K-25	774,200	2,293,100	2320-2380	-	K-78	774,650	2,292,700	2560	-
K-26	774,200	2,293,200	2300	-	K-79	774,650	2,292,850	2560	-
K-27	774,300	2,293,200	2340	-	K-80	774,700	2,292,800	2560	-
K-29	774,250	2,293,250	2300	-	K-81	774,600	2,292,650	2580-2600	-
K-30	774,300	2,293,300	2300	-	K-84	774,500	2,292,400	2660	-
K-31	774,300	2,293,500	2300	-	K-85	774,450	2,292,300	2680	-
K-32	774,400	2,293,450	2320	-	K-87	774,450	2,292,200	2720	-
K-35	774,250	2,293,100	2320-2340	-	K-89	774,400	2,292,150	2700-2720	-
K-36	774,200	2,293,000	2260-2280	-	K-90	774,250	2,292,150	2660	-
K-39	774,000	2,292,600	2340-2420	-	K-95	774,200	2,291,900	2700	-
K-40	774,000	2,292,600	2420	-	K-96	774,450	2,292,100	2740	-
K-41	774,050	2,292,500	2560-2480	-	K-97	774,550	2,292,100	2760	-
K-42	774,250	2,292,800	2440	-	K-98	774,650	2,292,500	2640	-
K-44	774,300	2,292,800	2440-2460	-	K-99	774,700	2,292,650	2600	-
K-45	774,300	2,292,850	2440	-	K-100	774,750	2,292,650	2600-2620	-
K-46	774,300	2,292,900	2420-2440	-	K-101	774,550	2,292,200	2700-2740	-
K-48	774,400	2,293,000	2320-2520	-	K-102	774,600	2,292,100	2780	-
K-50	774,200	2,292,600	2480-2520	-	K-103	774,700	2,292,400	2680-2700	-
K-51	774,100	2,292,400	2540	-	K-105	774,100	2,291,900	2680	-
K-52	774,200	2,292,400	2560	-	K-106	774,100	2,292,050	2620	-
K-53	774,250	2,292,450	2560	-	K-107	774,200	2,292,150	2640	-
K-54	774,200	2,292,500	2540	-	K-108	774,150	2,292,300	2580	-
K-55	774,300	2,292,600	2520	-	K-109	774,100	2,292,200	2580-2600	-
K-57	774,350	2,292,700	2500	-	K-110	774,100	2,292,150	2600	-
K-59	774,350	2,292,750	2480	-	K-111	774,000	2,292,100	2600	-
K-60	774,400	2,292,950	2440	-	K-112	773,400	2,292,200	2360	-
K-62	774,500	2,293,000	2440-2460	-	K-115	773,500	2,292,300	2360	-
K-63	774,500	2,292,800	2480-2500	-	K-116	773,550	2,292,300	2380	-

FULL UTM COORDINATES, ELEVATION AND
PROXIMITY TO WATER FOR IDENTIFIED SITES (cont.)

PIIRI TEMP. NUMBER	FULL UTM COORDINATES		ELEVATION (ft. above sea level)	DISTANCE AND DIRECT. TO WATER (ft.) (approx.)
	EASTING	NORTING		
K-118	773,600	2,292,400	2380	-
K-120	773,700	2,292,450	2380	-
K-124	773,850	2,292,600	2380	-
K-127	773,800	2,292,450	2400	-
K-130	773,600	2,292,200	2400-2420	-
K-131	773,700	2,292,150	2460-2480	-
K-134	773,800	2,292,300	2460	-
K-135	773,800	2,292,350	2440	-
K-137	773,950	2,292,400	2440	-
K-140	773,900	2,292,300	2480-2500	-
K-142	773,800	2,292,250	2480	-
K-143	773,800	2,292,100	2500	-
K-146	773,950	2,292,250	2520	-
K-148	774,050	2,292,350	2520	-
K-149	774,050	2,292,400	2500-2520	-
K-152	774,000	2,292,200	2560	-
K-200	774,300	2,293,100	2360-2380	-
K-201	773,950	2,202,500	2420	-
K-202	774,500	2,293,450	2360	-
K-203	774,150	2,292,800	2400	-
K-204	774,250	2,292,700	2500	-
K-205	773,900	2,292,700	2360	-
K-206	775,000	2,292,400	2800	-
K-207	774,250	2,291,950	2700	-
K-208	774,250	2,292,300	2600	-
K-209	773,500	2,292,150	2380	-
K-210	774,250	2,292,650	2500	-
K-211	774,200	2,292,600	2500	-

APPENDIX E

*State Historic Preservation Division
Correspondences Dated:
September 23, 1998
and
June 15, 2001*

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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DEPUTIES
JANET E. KAWELO
LUNNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhikawa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE
MANAGEMENT
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

FILE

June 15, 2001

Mr. Richard Stook
Project Planner
SSFM International, Inc.
501 Sumner Street, Suite 502
Honolulu, Hawaii 96817

LOG NO: 27692
DOC NO: 0106RC30

Dear Mr. Stook:

**SUBJECT: Update on Historic Preservation Concerns – Keokea Agricultural Lots
(Dept. of Hawaiian Home Lands)
Keokea, Kula, Maui**

This letter follows up on your May 30, 2001 meeting with Dr. Ross Cordy, our Branch Chief for Archaeology, and your fax of June 6, 2001. You had asked us to provide a current update on historic preservation concerns for this project – as our last official letter on this project was dated September 23, 1998 (Log: 22,267; Doc: 9809RC36).

There are numerous significant historic sites in this project area, identified by past archaeological survey work. Commitments have been made to preserve a number of these sites and have the other significant historic sites undergo archaeological data recovery work. Preservation sites include burials that must be protected with limited access, include historic sites that are to be preserved as-is, and others that are to be interpreted for public educational benefits. A number of the sites to be interpreted are to be set aside in a historic preserve – which includes the large Molohai heiau, a number of nearby permanent house sites, and a section of terraced agricultural field ruins (collectively an excellent example of former Hawaiian settlement in Kula – types of sites yet to be set aside for public interpretation on Maui).

Once sites are committed to a form of mitigation, the next step in the historic preservation review process is to develop detailed mitigation plans (scopes of work). For this project, three separate mitigation plans are needed – (1) a burial treatment plan (just for burials), (2) a preservation plan for non-burial sites, and (3) an archaeological data recovery plan. Our office agreed to prepare the preservation plan for non-burial sites and the archaeological data recovery plan. We have also helped establish the protection areas for the burials.

Sites to be Preserved

Table 1 lists the sites which are now committed to preservation – burials and non-burial sites. Some revisions to the 1998 list of non-burial sites were made based on field inspections by our archaeological staff (e.g., a November 23, 1998 inspection headed by Dr. Cordy).

1. The key first step in the preservation of these sites is to establish permanent buffer zones around the sites, which become the permanent borders of the sites. The sites and their buffers are what must be protected and preserved. Our November 1998 work established acceptable buffer zones for non-burial sites and recommended buffers for burial sites. The Maui & Lanai Islands Burial Council reviewed and approved buffer zones for all burial sites on February 8, 1999. Thus, the buffer zones for all these sites have been approved. Our archaeological staff also went out with surveyors from Austin Tsutsumi in early 1999 and marked on the ground all these buffers (for burials and non-burial sites) with flagging tape, and the surveyors marked the buffers with wooden hub stakes. In April 1999, Austin Tsutsumi sent us maps which marked these buffers in relation to lots and roads. It has been a while since the buffers were marked, so we suspect the flagging tape may be gone, but hopefully the stakes are in place. This should be checked.
2. The second step in site preservation is developing interim protection measures during land altering construction. So before the infrastructure (roads, etc.) are constructed, it is vital that these protection measures are in place - for sites in or near the impact areas. Often protection measures include typical 6 foot high, plastic construction fencing which is erected along the site buffer (border) and briefing construction crews about the importance of avoiding sites. Construction should not begin until our office verifies that the protection measures are in place.
3. The final step in site preservation is the development of long-term preservation measures. For burials, a burial treatment plan might specify a hedge or wall along a buffer and other access concerns. The Burial Council was particularly concerned how the lessees will be informed of their responsibilities regarding the burials and who will be charged with making sure that the affected sites continue to be protected. For non-burial sites in this project that are to undergo interpretation, paths and signage and access will be concerns. Again, our office has agreed to prepare a preservation plan for the non-burial sites. Once this plan is finished and acceptable to DHHL and our office, then it needs to be executed and verified as successfully executed by our office.

Because this infra-structure project has taken so long to develop and because people are beginning to live on some of the lots, it is very important to protect these sites. The buffer zone stakes need to be all in place, and we would recommend putting low (cattle-type) fences around some of the sites - for example the historic preserve -- to ensure that accidental damage does not occur. Then whenever construction approaches, higher and more visible plastic fencing can be quickly erected along these fences in construction areas.

Sites Committed to Archaeological Data Recovery

A number of sites were recommended for data recovery. Site 2091 (K-78) underwent extensive data recovery work in 1994, as part of a University of Hawaii at Manoa summer archaeology field school directed by Dr. Michael Kolb (then with our office), so this site no longer needs mitigation. It is still our belief that not all the sites recommended for data recovery will need such work. Only a sample of the many

Mr. Richard Stook
Page 3

agricultural field remains need undergo archaeological work. Of the permanent house sites, many will need brief work, and only a few will need intensive work. Again, our office will prepare a data recovery plan (scope of work) for this project area, itemizing exactly which sites to study and how. (We did a similar scope of work for Phase I in Waiohuli's homesteads.)

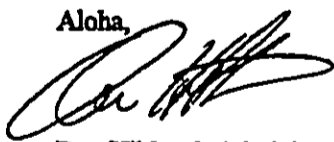
Archaeological data recovery work can be expensive, although we will devise a reasonable and relatively inexpensive scope. But, it is important that DHHL budget funds for this work and the work be done prior to any land alteration. We highly recommend that this work be done for all data recovery sites prior to infrastructure being put in and people occupying their lots. This will eliminate protection concerns, which is important because these sites can be accidentally damaged. If this option is not selected, then interim protection measures will need to be put in place to protect the sites - fencing and briefing of construction crews and beneficiaries receiving lots.

For construction of infrastructure, concerns do exist related to sites slated for data recovery which lie near or in project areas. These sites would need interim protection - fixing buffers, fencing, etc. Or, these sites would need to undergo archaeological data recovery fieldwork - to archaeologically salvage (data recovery) a reasonable amount of their significant information - so they would need no protection during construction. Our office did begin to fix buffers around sites slated for data recovery and work with Austin Tsutsumi to place these on development maps, but this proved to be time consuming and was halted by Austin Tsutsumi. Nonetheless, ca. 30 of these sites have staked buffers.

We would again recommend that a data recovery plan (scope) be developed for a sample of sites across the project area and the fieldwork be successfully executed prior to infrastructure construction and resident occupation of lots. Then all the data recovery sites would no longer need protection, and protection concerns could focus on the much smaller group of very important sites that are slated for permanent preservation.

If you have any concerns, please feel free to contact Ross Cordy of our staff at 692-8025.

Aloha,



Don Hibbard, Administrator
State Historic Preservation Division

Attachment (table)

RC:jca

c: Planning Office, DHHL

Table 1
Historic Sites Committed to Preservation
Keokea Agricultural Lots

State Site #	PHRI Site #	New Lot #	Description of Site
Burials or Possible Burials (Total = 6 sites)*			
2028	K-3	41	Feature A = possible burial w/in habitation site.
2097	K-87	14	Features A & B = possible burials.
2311	K-107	62	Lava blister with verified human bones.
2339	K-207	70	Collapsed lava tube with verified human bones.
2089	K-71	24	Feature C = possible burial (plugged lava tube).
2084	K-62	Preserve (52)	Feature A = possible burial. Feature C might also include a possible burial.
Non-Burial Sites in the Historic Preserve (Large Lot 52)			
1037	K-30	52	Molohai Heiau
2049	K-5	52	Permanent habitation & agriculture
2064	K-29	52	Permanent habitation & agriculture
2063	K-27	52	Permanent habitation & agriculture
2062	K-26	52	Permanent habitation & agriculture
2029	K-6	52	Permanent habitation & agriculture
2092	K-79	52	Agricultural
2084	K-62	52	Habitation w/possible shrine & 2 possible burials
2033	K-48	52	Agricultural terraces down low swale, with one unlabeled house structure
Solitary Non-Burial Sites Outside the Historic Preserve			
2060	K-21	35F	Small religious site (Notched enclosure, 100 sq. m.)
2322	K-134	78	Religious site or permanent house (100 sq.m. or so rectangular enclosure with thick walls).
2316	K-115	68	Permanent habitation (rect. enclosure & sinkhole)
2099^	K-90	62	Papakea Heiau (low enclosure of smaller size)

*The archaeological survey identified a possible burial in site 2091 (K-78), but this feature has since been destroyed, and no longer needs protection.

^Site 1036 was mis-identified in the survey as Papakea Heiau. The heiau is site 2099 (K-90). Thus, 1036 no longer needs preservation.

**2069 (K-40) is now deleted from preservation as not suitable for preservation. 2060 (K-21) is added. Based on November 1998 fieldcheck.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

MICHAEL D. WALSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
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HISTORIC PRESERVATION
DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

September 23, 1998

Richard Stook
Environmental Planner
Will Chee Planning Inc.
HMSA Center
1400 Rycroft Street, Suite 928
Honolulu, Hawaii 96814

LOG NO: 22267 ✓
DOC NO: 9809RC36

Dear Mr. Stook:

**SUBJECT: Updated Status on Mitigation Needs for Keokea DHHL Parcel Once
Surveyed by PHRI
Keokea, Kula, Maui**

As promised, Dr. Ross Cordy, our Branch Chief for Archaeology, has reviewed the PHRI mitigation recommendations for this project. Since the PHRI study was done, our office conducted an extensive survey of large surrounding Waiohuli-Keokea areas for DHHL and recommended preservation of a number of sites in that area. Also, Dr. Kolb, once our director of our DHHL lands survey crew, did additional work in 1994 in this current Keokea project area as part of a University of Hawaii at Manoa archaeological field school which he taught and as part of our office's DHHL work. These projects have affected the PHRI mitigation recommendations somewhat.

The large Waiohuli-Keokea survey which we conducted is located between the current Waiohuli and Keokea planned homesteads and runs far down slope. Preservation recommendations included representative samples of the former settlement landscape. For example, there were permanent habitation sites running down ridges with a larger heiau at the end of the ridge, other types of permanent habitations, samples of agricultural fields. All the recommendations were made with the intent of setting aside historic preserves for the education of DHHL's beneficiaries and the local public -- these preserves illustrating how people resided in these Kula lands in the past. Additionally, the few burials found were recommended for preservation for cultural sensitivity reasons. Religious sites (shrines, and larger heiau) were also incorporated in preservation recommendations -- for interpretive reasons and for cultural concerns. Many other sites were recommended for archaeological data recovery (salvage) prior to land alteration and destruction of the sites, to recover significant information on the past and improve our understanding of history in Kula for the public's benefit.

The Waiohuli Phase I homesteads, surveyed by PHRI and currently under construction, also had religious features and burials set aside for preservation. Other sites there underwent archaeological data recovery to improve knowledge about agricultural practices in this area of Kula and about permanent habitations.

With this perspective, Dr. Cordy looked at this Keokea project to see what sites would be recommended for preservation for interpretive purposes (sites that had not been recommended for preservation in the larger Waiohuli project) and for cultural concerns, and which sites would be recommended for data recovery. He has looked in detail only at the small, numbered lots and roads. He has reviewed the larger lot to the west (downhill) more briefly.

There are 8 historic sites that our office would recommend for preservation in the small numbered lots and the roads (see Table 1). These include 7 sites so recommended in the PHRI report.

1. 5 small features with confirmed or possible burials (K-207, 87, 107, 71, 3). In some cases, these are part of larger sites (usually permanent habitations), but only the burial feature needs preservation. These are clearly culturally significant sites. Again, most are quite small in area.
2. The large agricultural terrace complex (K-48, consisting of terraces descending down a soil-filled swale and some associated habitations) still merits preservation. It is an excellent example of this type of field, and none at this elevation were recommended for preservation in the larger Waiohuli survey our office did for DHHL. Indeed this is one of the best examples in the Kula area that our office has seen. It is an excellent example, thus, for interpretation. Also, site K-48 does contain very important information on the history of Kula. Part of the fieldwork done by Dr. Kolb when with our office included excavations in the upper terraces in lot 24, and evidence for very early occupation and farming and for extinct birds were recovered. This site is large, and it occupies much of Lots 25, 26, 27, and 28, making them unusable for awards -- which DHHL has known for some time. The portion of K-48 in Lot 24 no longer needs preservation or data recovery, since Dr. Kolb did work in that portion in 1994.
3. Site K-62, a permanent habitation with a likely burial feature and a religious feature (marked by an upright stone), also lies adjacent to K-48 in Lot 27. Some work was done by Dr. Kolb at this site, and he found the site to be as PHRI described it. Since this site is immediately adjacent to K-48 and consists of but a few habitation structures and the likely burial feature, we recommend that the entire site be preserved.
4. Site K-14, Papakea heiau. The PHRI report did not recommend preservation of this site. The PHRI study concluded that this site was a habitation site, but their description of this site actually matches that of a religious structure, a notched enclosure of fair size (170 sq. m.). Dr. Kolb's work verified that this is a heiau, matching the description of Papakea heiau. It needs to be preserved.

PHRI's report recommended that all or a portion of site K-78 be preserved. They believed that one structure might be a religious structure. However, this site received intensive study by Dr. Kolb in 1994, and all the structures proved to be habitation related. This site was thoroughly studied, and it no longer needs to be preserved. This frees up Lot 24 for use.

A number of other sites are present within the smaller, numbered lots and roads, and most of these were recommended for archaeological data recovery. Again, site K-78 no longer needs any work (including data recovery), given Dr. Kolb's extensive 1994 work. It is our belief that not all the sites recommended for data recovery will need such work. For example, there are a large number of agricultural fields. A study of general patterns and excavation of only a sample of these fields would be needed. Similarly, there are a number of permanent habitation sites scattered about. Brief work at many of these sites can occur, with only intensive work at a few. When appropriate, our office can prepare an archaeological data recovery plan (scope of work) for this area for DHHL, itemizing exactly which sites to study and how. We did similar scooping for Phase I in Waiohuli's homesteads.

As for the larger parcel to the west of this project area -- where no small numbered lots or roads are shown on the PHRI map -- we tend to agree with most of PHRI's recommendations.

1. They note the presence of the large heiau (Molohai, K-30) and recommend its preservation. They also recommend that nearby K-29 (a habitation site that may have been the residence of higher ranking individuals) and K-6 (a site with habitations, a notched enclosure that may be religious, and a burial) be preserved. We support these recommendations, and we would actually suggest that a fairly large preserve area be located around Molohai heiau and these sites which connects them to the adjacent K-48 agricultural complex. From the map, it appears that sites 26, 27, 29, 6 and 5 and Molohai heiau could be set aside as a unit as a continuation off the end of K-48. What could result is a continuous preserve from site K-48 down to here, with a walking trail and signage. It could be an open area that would be an asset to the homestead's design and planning.
2. They recommend that three scattered sites in the southwest end of the project be preserved -- K-40 (a permanent habitation site), K-134 (a religious site or high ranking residence) and K-115 (a habitation site with an enclosed sinkhole and agricultural features). We certainly agree with K-134 which is quite large. We would have to see K-40 and K-115 before making a determination on them, as other permanent habitations have been recommended for preservation in the larger Waiohuli area, and these sites may no longer need preservation.
3. Site K-21 needs an inspection also, because the description is of a notched enclosure (116 sq. m.), which sounds like a possible religious site. If it does seem to be a religious site, it should be recommended for preservation.
4. As in the area of smaller lots, this larger area contains sites that need data recovery to retrieve important information on Kula's history, before the sites are forever destroyed.

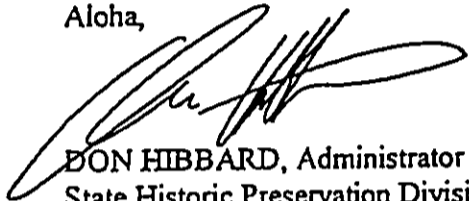
Two final comments. One, ideally State historic site numbers should be used in the future on maps and in documents. For example, K-48 is actually site 2033. The State numbers are the official site numbers; the K- numbers are temporary site numbers. The PHRI study provides the State numbers in

Richard Stook
Page 4

the site description appendix. Two, it is very important to fix the boundaries of the sites to be preserved (with acceptable buffers) as soon as possible. That way it could be verified exactly which lots the sites lie within. PHRI noted that lot boundaries were often not marked, so some sites may or may not overlap into adjacent lots. Also, depending on the plans for construction (will it be phased -- infrastructure first, and then lot alterations later?) and their urgency, will data recovery be phased? If roads are to go in first, then sites near road corridors should be accurately marked, so plans for data recovery can be developed and executed well before land alteration for the roads occurs.

If you have any questions, please feel free to call Ross at 587-0012.

Aloha,



DON HIBBARD, Administrator
State Historic Preservation Division

RC:jen

c: Joe Chu, Planning Office, DHHL

Attachment (table)

Table 1
 Sites Recommended for Preservation
 in
 Small Numbered Lots & Roads, Keokea
 (Not Covering the Large Unnumbered area to the West)

Lot	Sites	
C	K-207 (2339)	Confirmed burial (tube with bones)
5	K-87 (2097)	Possible burials (faced mound and platform)
13(14?)	K-107 (2311)	Confirmed burial (lava blister with bones)
21(22?)	K-71 (2089)	Possible burial feature only (tube with entry blocked).
25-29	K-48 (2033)	Large Agricultural Complex with terraces descending down a swale.
27 (26?)	K-62 (2084)	Permanent habitation site and a feature within it that is a possible burial.
37	K-3 (2048)	Possible burial within permanent habitation feature (Feature A)
<hr style="border-top: 1px dashed black;"/>		
14*	K-90 (1036 & 2099)	Papakea heiau (notched enclosure, 170 sq. m.).

Lots with "?" are those that PHRI said they were not sure which lot the site was within. The first lot number given is that which the map indicates the site is in. The second number in parenthesis with the "?" was given by PHRI as a possible location. The exact locations clearly need clarification.

*Not previously recommended for preservation. This site as described in the PHRI report seemed to be a religious structure, although not so labelled in the report. Dr. Kolb later confirmed that this is a religious structure, matching the description of Papakea heiau. It merits preservation

*Site K-78 (2091) underwent intensive archaeological data recovery as part of a University of Hawaii at Manoa field school directed by Dr. Michael Kolb. It proved not to have a religious feature as described in the survey; all structures were habitation related. Thus, there are no longer any preservation concerns for this site, nor any data recovery concerns.

APPENDIX F

Cultural Impact Assessment

**Cultural Impact Assessment
for
DHHL Keokea Agricultural Lots**

A. Historical and Archaeological Context

An act of 1884 distinguished dry or "kula" lands from wet or taro lands (Pukui and Elbert). Despite its dry climatic conditions, Kula has historically been associated with agricultural use. As early as the 1840's Irish potato was cultivated as a major agricultural crop. In addition to potatoes, Kula farmers planted corn, beans, onions, cabbage, wheat and other grains. By the late 1800's and early 1900's a large Chinese population had settled in Kula, with many turning to farming as a livelihood. While sugar cane cultivation was a significant agricultural element in local history, the Kula area has historically been used for ranching and small scale farming.

The subject area has been an area long-used for human habitation, with historical references dating back to the 1785 "Battle of the pig-eating Ku-keawe" (PHRI). There are 11 Land Commission awards either within or bordering the Keokea parcel. The bulk of the parcels is designated as "kula" lands which were used for cultivation for personal use, as well as for ranching and cash crops.

Numerous archaeological sites found in the project area and surrounding lands is indicative of the area's active use over time. Within the Keokea project area alone, a total of 108 sites have been identified. Functional interpretations of these sites include habitations, agricultural structures, animal control structures, burials, and religious structures. Sites of particular significance recommended for preservation within the project site include the Papakea heiau located in Lot 62; a permanent habitation feature, a large agricultural terrace, and Molahai heiau located in Lot 52; and five (5) possible burial sites located in various areas within the project site.

It is noted that archaeological inventory review has been conducted with appropriate mitigation measures recommended, as coordinated with the State Historic Preservation Division.

B. Previous Informant Interviews

The PHRI study documented interviews conducted in 1989 with William Poepoe and Henry Kekiwi, former employees of the Kaonoulu Ranch (PHRI). Excerpts from PHRI summarize the recollections of both Poepoe and Kekiwi.

William Poepoe

Mr. Poepoe also provided additional information on the general Kula area. According to him, near Pu'u Kali (Red Hill) they grew corn, and within the caldera of Pu'u Kali is a fence that the Army erected during WWII for target practice. On the Kamaole-Keokea border there was once a Hawaiian settlement. Mr. Poepoe said there were paved sidewalks and gravesites there.

Henry Kekiwi

Mr. Kekiwi provided general information on the area of the ranch. According to him, stone walls throughout the ahupua'a were built in the 1800s. On ranching practices, Mr. Kekiwi said that the cattle would graze in the lower lands near Pu'u Kali during the winter months, then around June, they would be taken mauka. Mr. Kekiwi noted that Hawaiian Homes Land wraps around the land of a Mr. George Tanji, who has lived on the land many years growing cabbages and pigs. Mr. Kekiwi also noted that Rice sold kuleana land in the area to a Dupont and that Hawaiians and Chinese would move from Pu'u Kali area to further up Keokea during summer.

Driving down the old Haleakala Road starting at Keokea gate, where the agricultural parcels that Hawaiian Homes is allocating are located, Mr. Kekiwi noted that the heiau from the second gate left of Haleakala Road had ti leaves growing on its side, which indicates a fresh water supply in the area. He also pointed out many heiau in the general vicinity of Molohai and Papakea in Keokea, and in Waiohuli. He was not privy to the names of any of them nor was he aware of any stories about them. Mr. Kekiwi pointed out that when ranching, one is busy looking for cattle, not for heiau. Along Haleakala Trail, which was used by Kaonoulu Ranch extensively during its ownership by the Rice family, he pointed out "footprints" imprinted in the lava rock. These

footprints are outside the project area, on the way to Pu'u o Kali, also known as Red Hill. Mr. Kekiwi noted that before the ranch, the land was (probably) inhabited by Chinese; the Chinese used the walls but they were not necessarily built by them. Mr. Kekiwi said that the barbed wire fences along the walls were put up by the ranch hands, especially when parts of a wall would fall off, to prevent the cattle from crossing over.

C. Project Interviews

In order to obtain additional perspectives on life in the Keokea area and the subject property in particular, additional interviews were conducted with lifelong residents of Keokea. Summaries of conversations held with Mr. and Mrs. Harley Ching and Mr. George Tanji are provided below.

1. Mr. Harley Ching and Mrs. Florence Ching

Mr. and Mrs. Ching are proprietors of the Ching Store, which is located just east of the DHHL property in Keokea. The store, founded by Mr. Ching's father, has been in its present location in Keokea since 1939. Both Mr. Ching and Mrs. Ching were born and raised in Keokea. Mr. Ching is Past President of the Kwok Hing Society and remains active in this Chinese community society which was initially organized in the early 1900's. The Society is responsible for maintaining the Fook On Tong Cemetery in Waiohuli. Annual religious services are still conducted at the Fook On Tong Cemetery.

Both Mr. and Mrs. Ching attended Keokea School. Both recalled the small-scale intimacy of the school during the late 1930's and early 1940's. At that time there were four teachers. Each teacher was assigned two grade levels. Mr. Ching remembered his eighth grade class of eight (8) students, consisting of three (3) girls and five (5) boys. Mrs. Ching recalled her eighth grade graduation being held at the Henry Fong Theater next to the store. (The Henry Fong Theater was a community gathering place where movies were shown.) Mrs. Ching noted that the graduation was one of the more memorable events of her growing up in Keokea.

Mr. Ching worked at the Kula Hospital (formerly known as the Kula Sanitarium). He worked his way up in the hospital's landscape and maintenance section, retiring in 1994 as the maintenance supervisor at the Hospital. Mr. Ching explained the primary function of the hospital was for the treatment of tuberculosis. The elevation of Keokea and its cool air was considered beneficial for patients.

Given its relatively remote location, the hospital was operated as a self-sufficient facility. The hospital operated its own vegetable garden, dairy and piggery. The dairy was located above the main hospital building while the vegetable garden and piggery were located makai on the DHHL property. Mr. Ching recalled receiving milk to take home from the dairy in one gallon milk cans.

In addition, the hospital had its own butcher shop. Beef from Haleakala Ranch was provided to the butcher shop for consumption at the hospital. Employees were permitted to purchase beef from the hospital butcher shop.

Mr. Ching remembered that the DHHL property was leased to Harold Rice for cattle grazing. As a member of the Valley Isle Gun Club, Mr. Ching remembered hunting on lands around the DHHL property.

2. **Mr. George Tanji**

Mr. George Tanji is a second generation farmer in Keokea. His father started farming on lands which abut the subject DHHL property more than 60 years ago. Accordingly, Mr. Tanji grew up in the area immediately adjacent to the proposed Keokea Agricultural Subdivision. Mr. Tanji started full time farming in 1957. He pointed out an area within the subject DHHL property which was referred to as the "100 acres". The "100 acres" abuts his property and consisted of lands leased by the Kula Hospital from the DHHL for various hospital support activities. The "100 acres" contained the hospital vegetable garden which was used to grow vegetables for hospital consumption. Remnants of fence posts and fencing which demarcated the "100 acres" are still visible.

Mr. Tanji noted that beyond the "100 acres", lands were leased to Harold Rice for cattle grazing.

In addition, a piggery, warehouse and slaughterhouse were operated on the "100 acres". He recalled slaughtering occurred every Thursday. The "100 acres" also contained a lemon/lime orchard. As with the piggery and vegetable garden, the products from the orchard were used for hospital consumption.

Mr. Tanji recalled that vegetable cultivation in the garden was done with horse plow. On occasion he helped the vegetable garden staff by bringing down his tractor to help with the plowing. Horses which were used for the gardening operations, grazed on DHHL lands in an area north of and adjacent to Mr. Tanji's farm. Mr. Tanji noted that the "100 acres" was also

used for grazing for dairy cows for the hospital.

The hospital incinerator was also located on the "100 acres". Remnants of the incinerator can still be seen from the access road leading to Mr. Tanji's farm.

To the best of his recollection, Mr. Tanji believes the operations of the "100 acres" ceased sometime in the late 1950's. With the closing of the "100 acres", materials and equipment were auctioned to the public. Mr. Tanji explained that he purchased (via auction) from the "100 acres" a potato shack which was used to store potatoes from the garden.

In viewing the landscape of the "100 acres" today, there is little evidence that this area was once an agricultural area used to support the Kula Hospital.

D. Cultural Perspectives

The historic and archaeological context of the property and surrounding environs, indicates a once active community which utilized the land for agricultural, residential and religious purposes. Past cultural practices associated with the property relate to gathering activities, religious, as well as day-to-day lifestyle activities.

In traditional terms, gathering involved both cultivated and non-cultivated items which allowed residents the opportunity to supplement their daily needs (MacKenzie). Items gathered were used for medicinal, ornamental, practical, aesthetic and ceremonial purposes. The pre-contact subsistence lifestyle however, gradually transitioned to a mercantile and finally an industrial economy which contributed to the decline of traditional gathering practices.

With regard to Native Hawaiian religious concepts, MacKenzie notes that "to Hawaiians, religion was a way of life". "Hawaiian religion also encompassed ceremonies, rites, and a prescribed code of conduct." It is in this context of spiritual commitment that Native Hawaiian burial practices have been defined. Beliefs and customs related to burial practices involved both the physical material of a person (*na iwi* or bones) and the spirit (*'uhane*). *Na iwi*, both highly respected and guarded, are placed in the ground to become a part of the *Haumea* (earth) in perpetuity. Respect for the deceased was also expressed as *ho'omoe pu* ("put to sleep together") where valued objects or articles are buried with the deceased (Pukui, Haertig). It is in the context of these practices and beliefs that burial sites are viewed as guarded and treasured.

E. Assessment of Impacts

Archaeological findings within and around the subject property, indicates past intensive use of the lands for agricultural, residential and religious purposes. Over approximately the past century, the property has been leased out by the DHHL for cattle grazing purposes and for agricultural uses for the Kula Hospital. Given this recent historical use of the property for ranching and agriculture, and as supported by informant observations, Native Hawaiian cultural practices are no longer conducted at the site. The transition to post-contact economies has shifted land use and cultural practices away from one that is subsistence-based to one that is based on large scale agricultural and industrial technology.

Current conditions notwithstanding, archaeological sites which reflect past practices have been documented on the property. Based on reviews conducted by the State Historic Preservation Division, seventeen (17) sites are recommended for preservation. These sites include the burial sites, a large agricultural terrace, a permanent habitation and the Papakea heiau. In the adjacent area, the Molohai heiau, a permanent habitation site, a religious site or high ranking residence and a habitation site with an enclosed sinkhole and agricultural features are recommended for preservation as well.

The proposed action will subdivide the project site to create agricultural lots averaging 2.0 acres to 2.5 acres in size. The use of the land for agricultural/residential purposes to replace the more recent cattle grazing and agricultural use is not inconsistent with the area's past use for similar purposes. Moreover, the recommendations for archaeological mitigation, including site preservation, is intended to recognize the significance of past practices in the context of the subject property's local history. The combination of preservation and related mitigation measures along with a land use pattern reflecting past tradition is deemed to be appropriate in terms of recognizing the cultural practices and beliefs which once took place on the land.

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APPENDIX G

Traffic Impact Analysis Report

TRAFFIC IMPACT ANALYSIS REPORT FOR
KEOKEA AGRICULTURAL LOTS

IN KEOKEA, MAUI, HAWAII

Prepared For
SSFM INTERNATIONAL

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1. INTRODUCTION

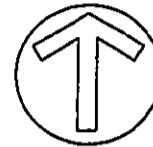
Phillip Rowell and Associates has been retained by SSFM International to prepare a Traffic Impact Analysis Report (TIAR) for the proposed Keokea Agricultural Subdivision in Keokea, Maui, Hawaii. The purpose of this study is to identify the traffic impacts of the proposed project.

This introductory chapter discusses the location of the project, the proposed development, and the study methodology.

Project Location and Description

The proposed project is an agricultural subdivision along the west side of Kula Highway in the Keokea area of Maui. There are two development scenarios that are discussed in more detail later in this report. The development will contain either 77 or 117 lots and an area for community commercial activities such as an open air market for community farmers. The general location in the Keokea area of Maui is shown in Figure 1. A subdivision map is shown in Figure 2.

Access will be via two driveways along the west side of Kula Highway. These locations are also shown in Figure 2. All traffic movements will be allowed at these driveways. No separate left turn storage lanes are planned.



NOT TO SCALE

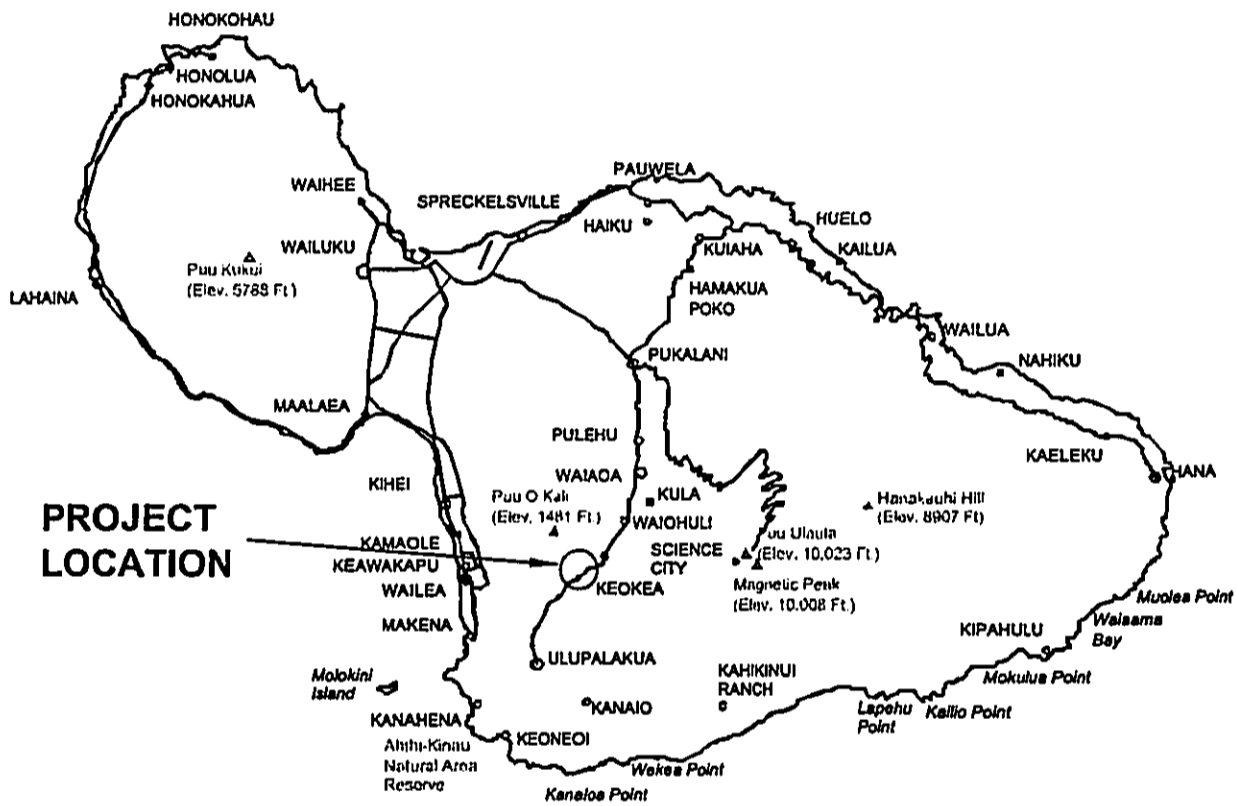
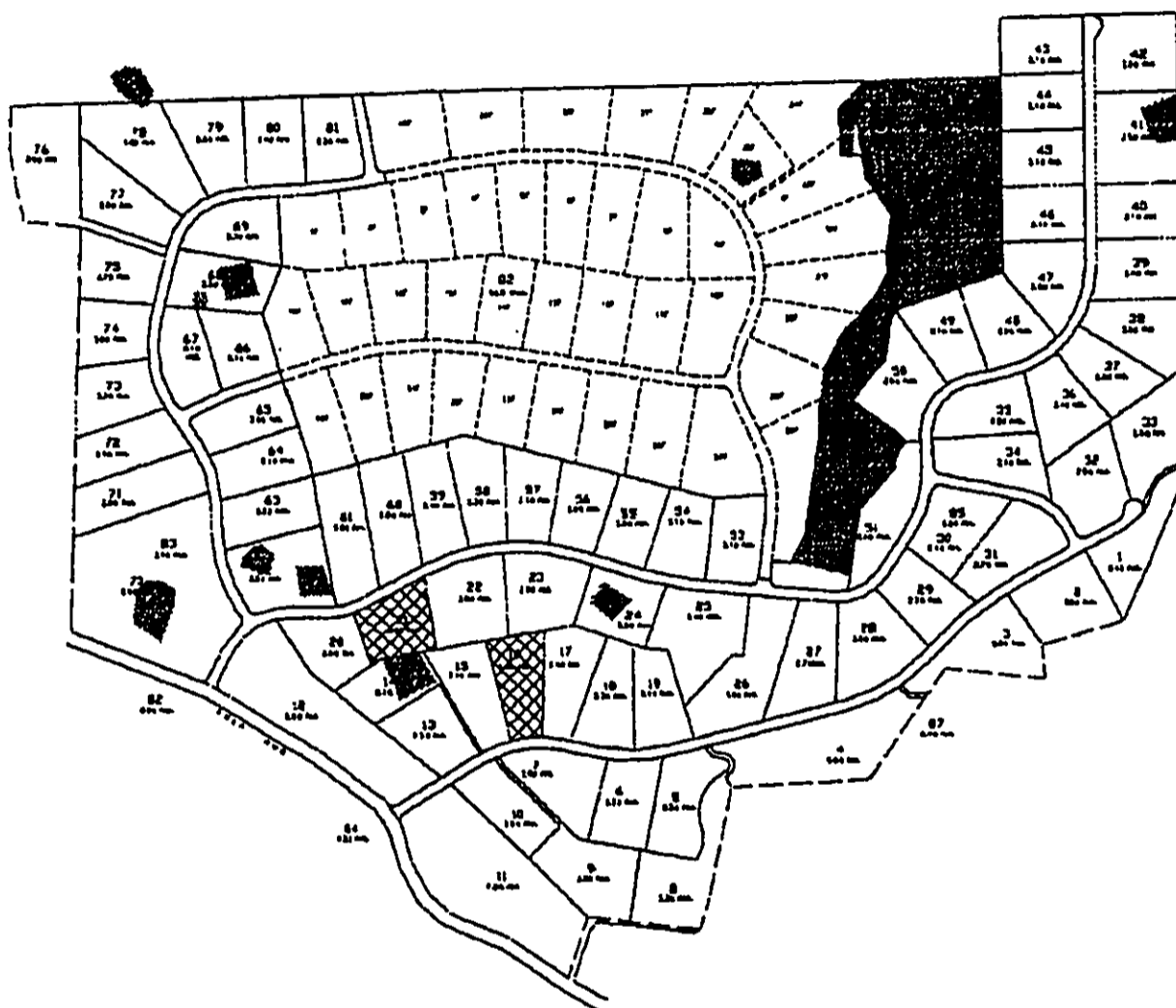


Figure 1

PROJECT LOCATION MAP



Source: SSFM International

Figure 2

SUBDIVISION LOT PLAN

Study Methodology and Order of Presentation

1. *Analysis of Existing Traffic Conditions*

Existing traffic volumes at the study intersections were determined from traffic counts performed for the previous traffic study for this project¹. Traffic volumes, intersection configurations and traffic control information were verified in April, 2001. Other data collected included speed limits and right-of-way controls.

Using the data collected, existing traffic operating conditions in the vicinity of the project were determined. The methodology for unsignalized intersections described in the 2000 *Highway Capacity Manual* (HCM)² was used to determine the level-of-service (LOS) at the study intersections.

Existing traffic conditions, the LOS concept and the results of the LOS analysis for existing conditions are presented in Chapter 2.

2. *Determination of Cumulative Traffic Projections*

The year 2006 was used as the design year. This does not necessarily represent the project completion date. It represents occupancy for purposes of conducting the impact analysis. Cumulative traffic conditions are defined as future traffic conditions without the proposed project. A description of the process used to estimate 2006 cumulative traffic volumes and the resulting cumulative traffic projections is presented in Chapter 3.

3. *Analysis of Project-Related Traffic Impacts*

The next step in the traffic analysis was to estimate the peak-hour traffic that would be generated by the proposed project. This was done using standard trip generation procedures outlined in *Trip Generation*³. The procedure is described in Chapter 4.

These trips were distributed based on the available approach and departure routes. The project-related traffic was then superimposed on 2006 cumulative traffic volumes at the study intersections. The HCM methodology was used again to conduct a LOS analysis for cumulative plus project conditions. The results of this analysis were compared to 2006 cumulative conditions to determine the incremental impacts of this project. The analysis of the project-related impacts and the conclusions of the analyses are presented in Chapter 5.

¹ Pacific Planning and Engineering, Inc., *Traffic Impact Assessment Report for Keokea Agricultural Lots*, Unit 1, August 28, 1998.

² *Highway Capacity Manual*, Institute of Transportation Engineers, Washington, D.C., 2000

³ *Trip Generation*, Institute of Transportation Engineers, Washington, D.C., 1997

2. ANALYSIS OF EXISTING CONDITIONS

This chapter presents the existing traffic conditions on the roadways adjacent to the proposed project. The level-of-service (LOS) concept and the results of the LOS analysis for existing conditions are also presented. The purpose of this analysis is to establish the base conditions for the determination of the impacts of the project which are described in a subsequent chapter.

Description of Existing Streets and Intersection Controls

The following is summary of the major roadways in the study area:

Kula Highway

Kula Highway is a two-lane, two-way highway between Kula and Pukalani. Kula Highway is classified as a minor arterial in the Maui Long Range Transportation Plan. The posted speed limit adjacent to the project is 15 miles per hour (mph). Current peak hour volumes are less than 150 vehicles per hour (vph) for both directions adjacent to the project. This indicates that the total daily traffic volume is approximately 1500 vehicles.

The intersection of Kula Highway with Thompson Road is the closest major intersection. It is located approximately at the north property line of the project. The intersection is unsignalized. Thompson Road provides access to Kula Hospital.

Figure 4 is a schematic of the roadway conditions adjacent to the project. Photographs of the study intersections are presented as Appendix A.

Existing Peak Hour Traffic Volumes

The AM and PM peak hour traffic volumes at the study intersections are shown in Figure 3. The traffic volumes include large trucks, buses and motorcycles. They do not include mopeds or bicycles.



APPROXIMATE
NORTH

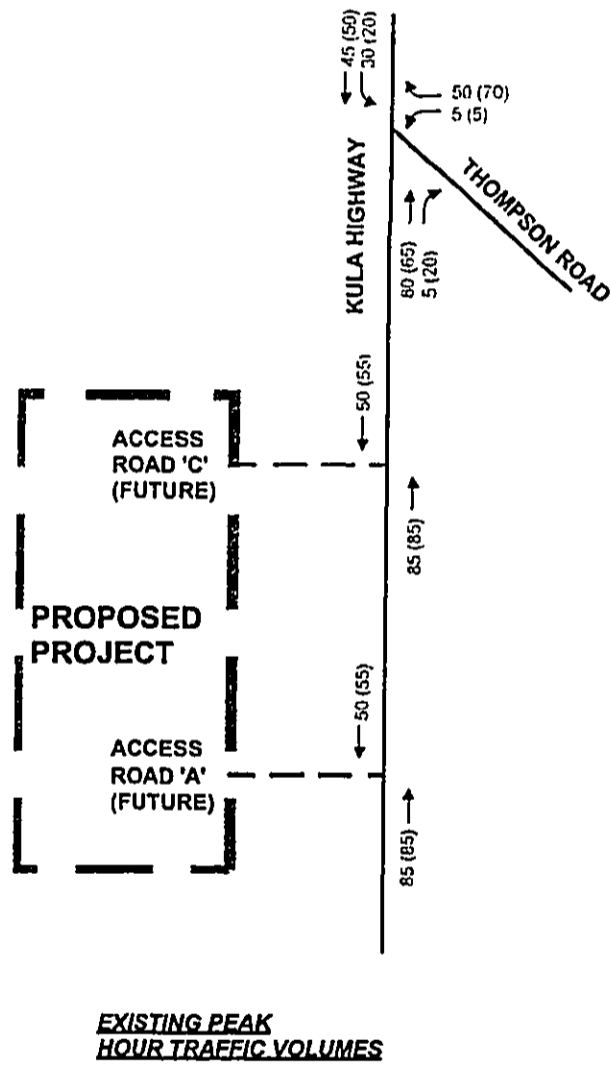
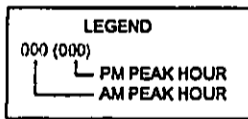
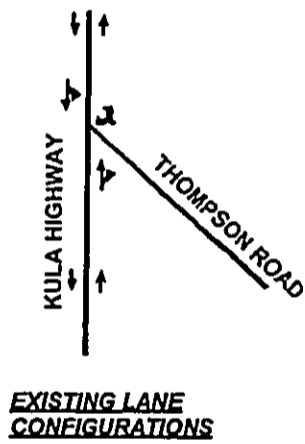


Figure 3

EXISTING (2001) PEAK HOUR TRAFFIC VOLUMES

Level-of-Service Concept

Signalized Intersections

The operations method described in the 1997 Highway Capacity Manual (HCM) was used to analyze the operating efficiency of the signalized intersections adjacent to the study site. This method involves the calculation of a volume-to-capacity (V/C) ratio and average vehicle delay which is related to a level-of-service.

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (LOS) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 1. In general, LOS A represents free-flow conditions with no congestion. LOS F, on the other hand, represents severe congestion with stop-and-go conditions. Level-of-service D is typically considered acceptable for peak hour conditions in urban areas.

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of traffic using the roadway (trucks, buses, etc.) and turning movements.

Table 1 Level-of-Service Definitions for Signalized Intersections⁽¹⁾

Level of Service	Interpretation	Volume-to-Capacity Ratio ⁽²⁾	Stopped Delay (Seconds)
A, B	Uncongested operations; all vehicles clear in a single cycle.	0.000-0.700	<15.0
C	Light congestion; occasional backups on critical approaches	0.701-0.800	15.1-25.0
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801-0.900	25.1-40.0
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901-1.000	40.1-60.0
F	Total breakdown with stop-and-go operation	>1.001	>60.0

Notes:

- (1) Source: Highway Capacity Manual, 1997.
- (2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity.

Unsignalized Intersections

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from A to F. However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is therefore based on delay of each turning movement. Table 2 summarizes the definitions for level-of-service and the corresponding delay.

Table 2 Level-of-Service Definitions for Unsignalized Intersections⁽¹⁾

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	>5
B	Short traffic delays	5.1 to 10.0
C	Average traffic delays	10.1 to 20.0
D	Long traffic delays	20.1 to 30.0
E	Very long traffic delays	30.1 to 45.0
F	See note (2) below	>45.1

Notes:

(1) Source: *Highway Capacity Manual, 1997.*

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

Level-of-Service Analysis of Existing Conditions

The results of the Level-of-Service analysis for the study intersections are shown in Table 3. Shown in the table are the volume-to-capacity ratios, average vehicle delays and the Levels-of-Service. The Level-of-Service worksheets are presented in Appendix B.

Table 3 Existing Levels-of-Service¹

Intersection and Movement	AM Peak Hour			PM Peak Hour		
	V/C	Average Vehicle Delay ²	LOS ³	V/C	Average Vehicle Delay ²	LOS ³
<i>Kula Highway at Thompson Road</i>						
Southbound Left & Thru	0.02	7.4	A	0.03	7.4	A
Westbound Left & Right	0.06	9.0	A	0.08	9.0	A

NOTES:

- (1) See Appendices c for calculations.
- (2) Delay is in seconds per vehicle.
- (3) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.

The level-of-service analysis indicates that the intersection of Kula Highway at Thompson Road operate at Level-of-Service A, which is a high level of service. Delays are minimal and only a small portion of the capacity is used.

3. PROJECTED CUMULATIVE TRAFFIC CONDITIONS

The purpose of this chapter is to discuss the assumptions and data used to estimate 2006 cumulative traffic conditions. Cumulative traffic conditions are defined as future traffic volumes without the proposed project.

Future traffic growth consists of two components. The first is ambient background growth that is a result of regional growth and cannot be attributed to a specific project. The second component is estimated traffic that will be generated by other development projects in the vicinity of the proposed project.

Background Traffic Growth

The *Maui Long Range Transportation Plan*⁴ was used to estimate the background growth rate of traffic along Kula Highway. This plan provided 2020 AM and PM peak hour traffic projections for Kula Highway. These projections are based on anticipated growth in the vicinity and the existing roadway network, meaning no major changes in traffic circulation patterns of the area were anticipated.

The nearest station for which the *Maui Long Range Transportation Plan* provides projections is adjacent to the intersection of Kula Highway at Omaopio Road. The projections were used to calculate the average annual growth rate for the study period. The calculated average annual growth rates ranged from 0 to 1.59% per year, as shown in Table 4. Based on these calculations, an average annual growth rate of 1.6% per year was used for southbound traffic and an average growth rate of 1.25% was used for northbound traffic. These rates were used for the entire period of the *Plan*, which is a 30 year period. This means that all future growth anticipated in the *Maui Long Range Transportation Plan* is included in the background traffic conditions analyzed in this study.

⁴ Kaku Associates, October 1996

Table 4 Calculation of Background Growth Rate Along Kula Highway¹

Year	AM Peak Hour		PM Peak Hour	
	Northbound	Southbound	Northbound	Southbound
1990	574	443	600	864
2020	834	712	849	834
Growth Rate ²	1.25%	1.59%	1.16%	-0.12%

Notes:
 (1) Source: Kaku & Associates, *Maui Long Range Transportation Study*, February 1997, p. 68. Location of projection is adjacent to Omaoplo Road, which is north of the project.
 (2) Average annual compounded growth rate.

Related Projects

The second component in estimating background traffic volumes is traffic resulting from other proposed projects in the vicinity. Related projects are defined as those projects that are under construction or have been approved for construction and would significantly impact traffic in the study area. Related projects may be development projects or roadway improvements.

The only project in the are for which traffic data was available and that would impact traffic conditions adjacent to the project is the Kula Residence Lots. Traffic data was collected from the traffic study for the project.

Traffic generated by the new Kamehameha School was not added to the background traffic estimates because schools draw their traffic from residential communities. Therefore, traffic between the study area and the school would be included in the traffic generation estimates for the proposed project.

2006 Cumulative Traffic Projections

2006 cumulative traffic projections are calculated by expanding existing traffic volumes by the appropriate growth rates and then superimposing traffic generated by related projects. In summary, the assumptions used to estimate the cumulative traffic volumes are:

1. Existing traffic along Kula Highway and Baldwin Avenue was increased by 1.6% per year for southbound traffic and 1.25% per year for northbound traffic. These rates were compounded for 30 years to include all future development anticipated in the *Maui Long Range Transportation Plan*. The southbound and northbound growth factors were 1.60 and 1.45, respectively.
2. Traffic from Kula residence lots was included.
3. No major roadway improvement projects are anticipated for the study period.

The resulting 2006 cumulative peak hour traffic volumes are shown in Figure 4.

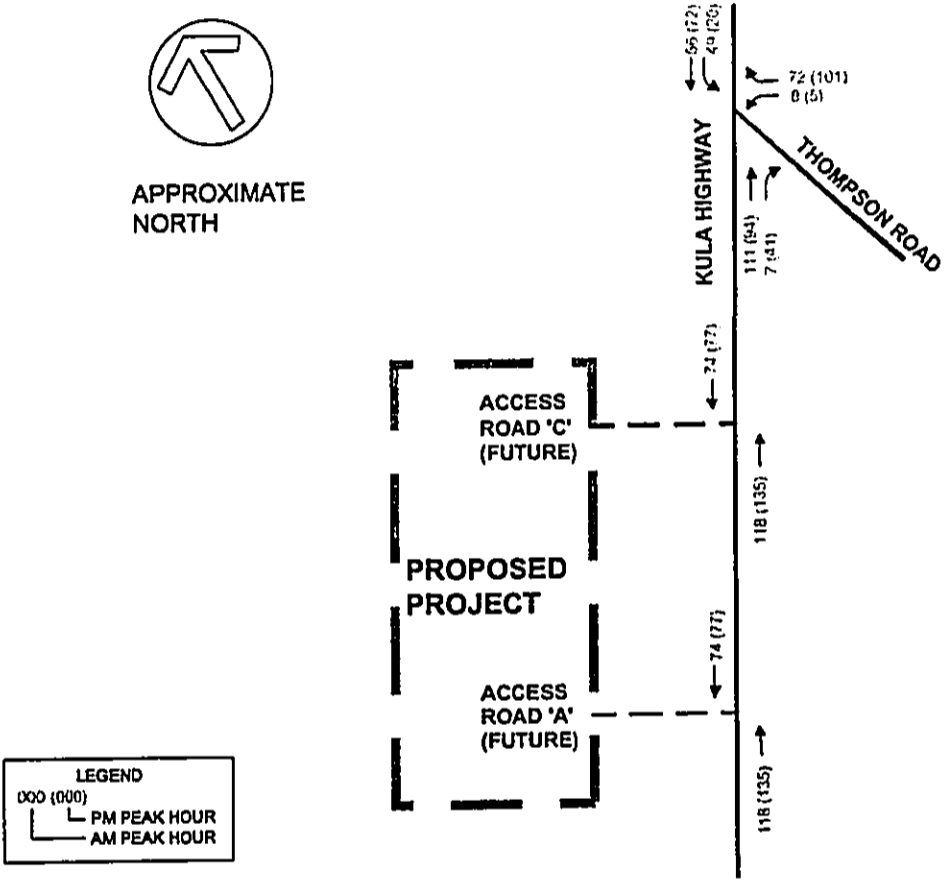


Figure 4

2005 CUMULATIVE (BACKGROUND) PEAK HOUR TRAFFIC VOLUMES

4. PROJECT-RELATED TRAFFIC CONDITIONS

This chapter discusses the methodology used to identify the traffic-related impacts of the proposed project. Generally, the process involves the determination of weekday peak-hour trips that would be generated by the proposed project, distribution and assignment of these trips on the approach and departure routes, and finally, determination of the levels-of-service at affected intersections and driveways subsequent to implementation of the project. This chapter presents the generation, distribution and assignment of project generated traffic and the cumulative plus project traffic projections. The results of the level-of-service analysis of cumulative plus project conditions is presented in the following chapter.

Project Trip Generation

Future traffic volumes generated by a project are typically estimated using the procedures described in the *Trip Generation Handbook*,⁵ published by the Institute of Transportation Engineers. This method uses trip generation rates to estimate the number of trips that a proposed project will generate during the morning and afternoon peak hours.

The proposed project is a 77-unit agricultural residential development. Since the project will consist of single-family detached residential units, trip generation rates for single-family detached housing units were used to estimate the number of trips that the project will generate. Single-family detached housing is defined by the Institute of Transportation Engineers as follows:

⁵ Institute of Transportation Engineers, *Trip Generation Handbook*, Washington, D.C., 1998, p. 7-12

Single-family detached housing includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision.⁶

In addition to the residential lots, there are three additional lots along Kula Highway. The project description suggests that this area may be used as an open air produce market for area farmers. This type of use typically does not contribute significantly to morning or afternoon peak hour traffic. To account for potential use of this area, an additional 100 peak hour trips with a 50-50 directional split have been added to both morning and afternoon peak hour traffic projections for the proposed project. It was further assumed that at least 20% of these trips would be generated by the study project. Therefore, the remaining 40 inbound and 40 outbound trips were included in the trip generation analysis.

The trip rates and the estimated number of AM and PM peak hour trips that the proposed development will generate are shown in Table 5. The trips shown are the peak hourly trips generated by the project, which typically coincide with the peak hour of the adjacent street.

Table 5 Trip Generation Summary of Proposed Project

Time Period	Direction	Residential Lots			Commercial Lots	Total Project Trips
		Rate or Factor	Units	Peak Hour Trips	Trips	
Weekday	Total	9.57	77	737		
AM Peak Hour	Total Trips per Unit	0.77	77	59	80	139
	% Inbound	25%		15	40	55
	% Outbound	75%		44	40	84
PM Peak Hour	Total Trips per Unit	1.02	77	79	80	159
	% Inbound	64%		51	40	91
	% Outbound	36%		28	40	68

In addition to the 77 residential lots, there is a reserve consisting of an additional 40 lots. These lots are intended to replace any of the original lots that can not be used for various reasons. As these lots are shown on the site plan indicating that they *could* be developed in the future, these lots were analyzed as a second scenario. This second scenario consists of 117 (77 + 40) units and is referred to as Plan B. The trip generation calculations for Plan B are shown in Table 6.

⁶ Institute of Transportation Engineers, *Trip Generation*, 1997, p. 262

Table 6 Trip Generation Summary of Proposed Project - Plan B

Time Period	Direction	Residential Lots		Commercial Lots	Total Project Trips	
		Rate or Factor	Units	Peak Hour Trips		Trips
Weekday	Total	9.57	117	1120		
AM Peak Hour	Total Trips per Unit	0.77	117	90	80	170
	% Inbound	25%		23	40	63
	% Outbound	75%		67	40	107
PM Peak Hour	Total Trips per Unit	1.02	117	119	80	199
	% Inbound	64%		76	40	116
	% Outbound	36%		43	40	83

Trip Distribution and Assignments

The project-related trips were distributed along the anticipated approach routes to the project site based on the directional distribution of existing peak hour traffic along Kula Highway. The trip distribution and project related trip assignments are shown in Figure 5.

2006 Cumulative Plus Project Projections

Cumulative plus project traffic conditions are defined as 2006 background traffic conditions plus project related traffic. The incremental difference between cumulative and cumulative plus project is the traffic impact of the project under study.

2006 cumulative plus project traffic volumes with the project were estimated by superimposing the peak hourly traffic generated by the proposed project on the 2006 cumulative peak hour traffic volumes presented in Chapter 3. The traffic projections for 2006 cumulative plus project conditions are shown on Figure 6.

The traffic projection worksheets are presented as Appendix C.

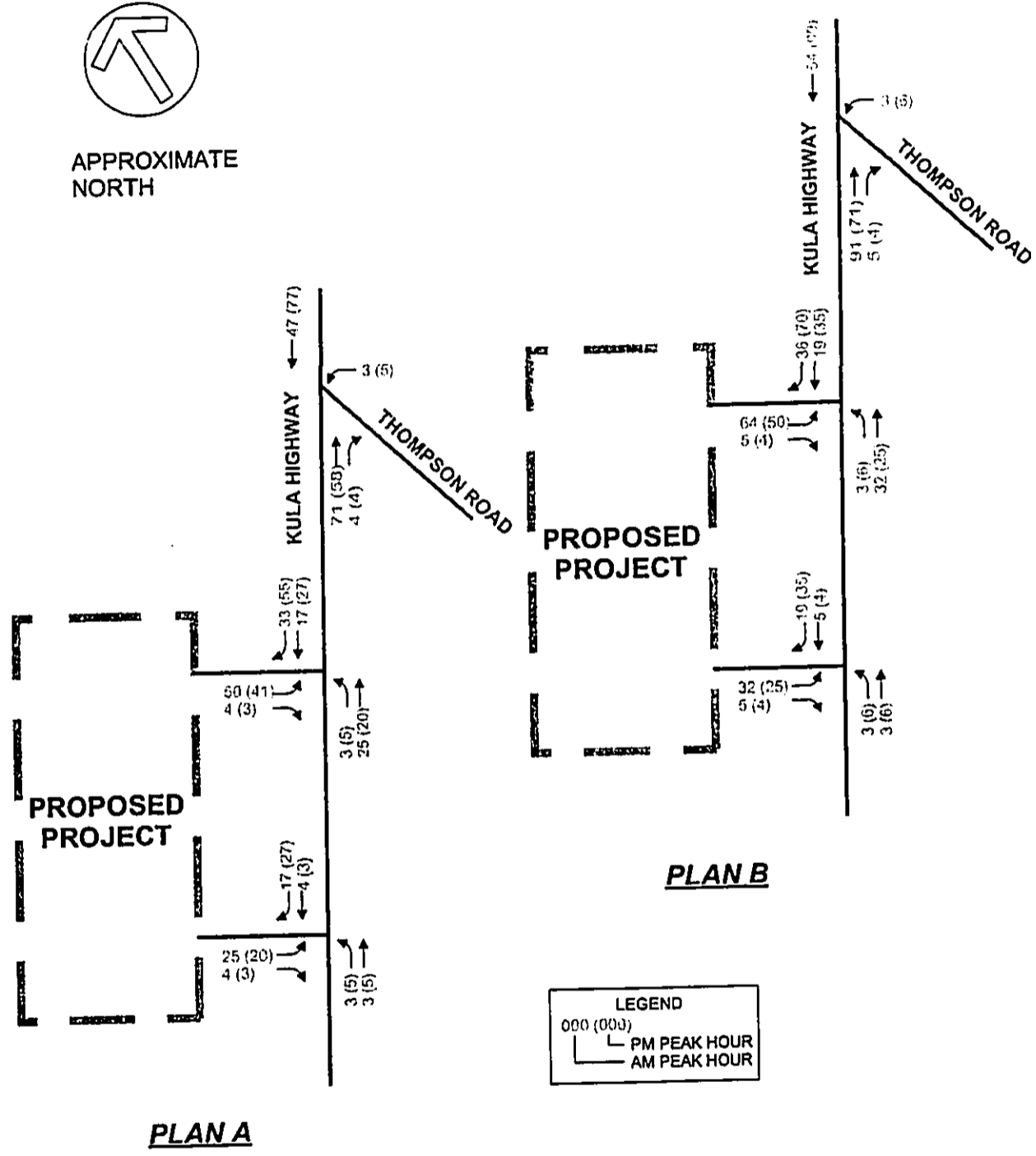


Figure 6
PROJECT TRIP ASSIGNMENTS

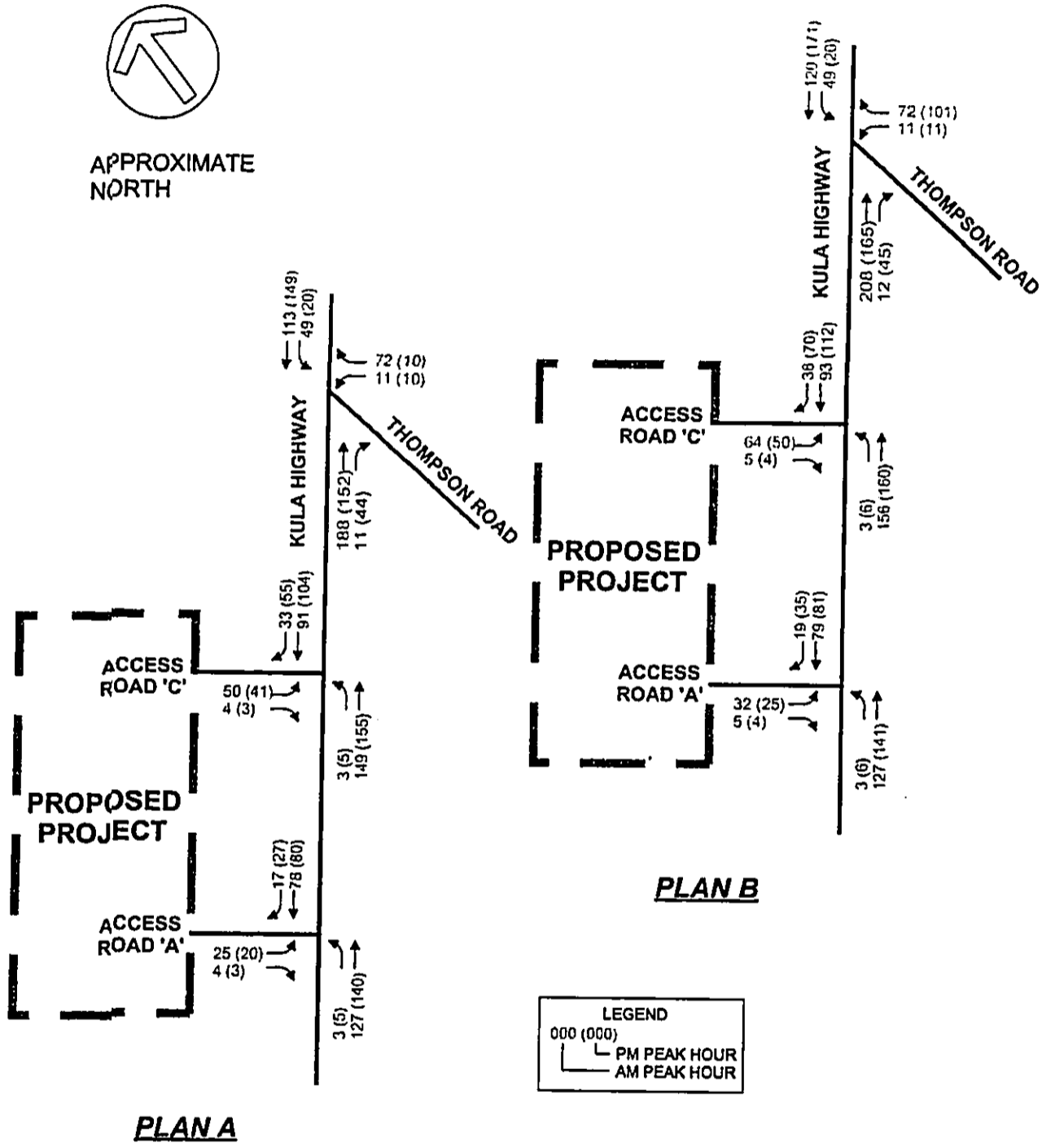


Figure 6
**2006 CUMULATIVE PLUS PROJECT
PEAK HOUR TRAFFIC VOLUMES**

5. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to summarize the results of the level-of-service analysis, which identifies the project-related impacts. In addition, any mitigation measures necessary and feasible are identified and other access, egress and circulation issues are discussed.

Definition of Significant Impacts

Criteria for determining if a project has a significant traffic impact for which mitigation measures must be investigated have been established based on traffic impact study guidelines used in other traffic studies. Generally, the criteria are as follows: if the level-of-service (LOS) without the project is E or F and the volume/capacity (V/C) ratio changes less than 0.020, the project's traffic impacts are considered insignificant. However, if the V/C ratio change is greater than 0.020, then mitigation measures which will reduce the V/C ratio change to less than 0.020 must be identified.

Project Related Traffic Impacts

The traffic impact of the proposed project was assessed by analyzing the changes in traffic volumes and Levels-of-Service. The change in traffic volumes along the roadway links serving the project is summarized in Table 7.

Table 7 Traffic Volume Changes Along Kula Highway

Roadway	Location and Direction		AM Peak Hour				PM Peak Hour			
			Without Project	With Project	Change	Percent Change	Without Project	With Project	Change	Percent Change
Plan A - 77 Residential Units										
Kula Highway	North of Thompson Road	NB	183	260	77	42.08%	195	253	58	29.74%
		SB	115	162	47	40.87%	82	169	87	106.10%
	South of Thompson Road	NB	118	199	81	68.64%	135	196	61	45.19%
		SB	74	124	50	67.57%	77	159	82	106.49%
	Between Access Road 'C' and Access Road 'A'	NB	118	152	34	28.81%	135	160	25	18.52%
		SB	74	95	21	28.38%	77	107	30	38.96%
	South of Access Road 'A'	NB	118	130	12	10.17%	135	145	10	7.41%
		SB	74	82	8	10.81%	77	83	6	7.79%
Plan B - 117 Residential Units										
Kula Highway	North of Thompson Road	NB	183	280	97	53.01%	195	266	71	36.41%
		SB	115	169	54	46.96%	82	191	109	132.93%
	South of Thompson Road	NB	118	220	102	86.44%	135	210	75	55.56%
		SB	74	121	47	63.51%	77	182	105	136.36%
	Between Access Road 'C' and Access Road 'A'	NB	118	159	41	34.75%	135	166	31	22.96%
		SB	74	98	24	32.43%	77	116	39	50.65%
	South of Access Road 'A'	NB	118	130	12	10.17%	135	147	12	8.89%
		SB	74	84	10	13.51%	77	85	8	10.39%

The Level-of-Service analysis was performed using the following assumptions:

1. The existing lane configuration at the intersection of Kula Highway at Thompson Road is unchanged.
2. The driveways for the proposed project are one lane in and one lane out. There are no separate left turn storage lane for left turns into the project from Kula Highway.

The results of the Level-of-Service analysis for 2006 conditions are summarized in Tables 8 and 9. Shown in the table are volume-to-capacity ratios, average vehicle delays, and the Level-of-Service. There are no Level-of-Service results for the "without project" condition because the project driveways do not exist until the project is constructed.

The results of the level-of-service analysis indicate that the intersection of Kula Highway at Thompson Road and the project driveways will operate at level-of-service B or better for either development plan (Plan A or Plan B). Since this is a high level of service no mitigation is required.

Traffic signal warrants were checked to verify that traffic signals are not warranted for the intersection of Kula Highway at Thompson Road or the driveways subsequent to development of the project. The conclusion is that based on estimated 2006 peak hour traffic conditions, traffic signals are not warranted at any of the study intersections.

Table 8 Level-of-Service Analysis for 2006 Peak Hour Conditions - Plan A⁽¹⁾

Intersection and Movement	Cumulative			Cumulative Plus Project			Change	
	V/C	Average Vehicle Delay ²	LOS ⁴	V/C	Average Vehicle Delay ²	LOS ⁴	V/C	Delay
AM PEAK HOUR								
Kula Highway at Thompson Road								
Southbound Left & Thru	0.02	7.4	A	0.04	7.7	A	0.02	0.3
Westbound Left & Right	0.06	9.0	A	0.10	10.0	A	0.04	1.0
Kula Highway at Access Road 'C'								
Northbound Left & Thru				0.00	7.4	A		
Eastbound Left & Right				0.07	10.2	B		
Kula Highway at Access Road 'A'								
Northbound Left & Thru				0.00	7.4	A		
Eastbound Left & Right				0.04	9.7	A		
PM PEAK HOUR								
Kula Highway at Thompson Road								
Southbound Left & Thru	0.03	7.4	A	0.03	7.6	A	0.00	0.2
Westbound Left & Right	0.08	9.0	A	0.13	9.9	A	0.05	0.9
Kula Highway at Access Road 'C'								
Northbound Left & Thru				0.00	7.5	A		
Eastbound Left & Right				0.06	10.4	B		
Kula Highway at Access Road 'A'								
Northbound Left & Thru				0.00	7.4	A		
Eastbound Left & Right				0.03	9.8	A		

NOTES:

- (1) See Appendices D and E for calculations.
- (2) Delay is in seconds per vehicle.
- (3) 95th queue is not calculated for the total intersection.
- (4) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*.

Table 9 Level-of-Service Analysis for 2006 Peak Hour Conditions - Plan B⁽¹⁾

Intersection and Movement	Cumulative			Cumulative Plus Project			Change	
	V/C	Average Vehicle Delay ²	LOS ⁴	V/C	Average Vehicle Delay ²	LOS ⁴	V/C	Delay
AM PEAK HOUR								
Kula Highway at Thompson Road								
Southbound Left & Thru	0.02	7.4	A	0.04	7.7	A	0.02	0.3
Westbound Left & Right	0.06	9.0	A	0.11	10.1	A	0.05	1.1
Kula Highway at Access Road 'C'								
Northbound Left & Thru				0.00	7.5	A		
Eastbound Left & Right				0.09	10.4	B		
Kula Highway at Access Road 'A'								
Northbound Left & Thru				0.00	7.4	A		
Eastbound Left & Right				0.05	9.8	A		
PM PEAK HOUR								
Kula Highway at Thompson Road								
Southbound Left & Thru	0.03	7.4	A	0.03	7.7	A	0.00	0.3
Westbound Left & Right	0.08	9.0	A	0.14	10.1	A	0.06	1.1
Kula Highway at Access Road 'C'								
Northbound Left & Thru				0.00	7.6	A		
Eastbound Left & Right				0.08	10.7	B		
Kula Highway at Access Road 'A'								
Northbound Left & Thru				0.00	7.4	A		
Eastbound Left & Right				0.04	9.9	A		

NOTES:

- (1) See Appendices D and E for calculations.
- (2) Delay is in seconds per vehicle.
- (3) 95th queue is not calculated for the total intersection.
- (4) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*.

Summary and Conclusions

The conclusions of the traffic impact analysis for 2006 cumulative plus project conditions are:

1. Upon completion of the proposed project, the level-of-service at the intersection of Kula Highway at Thompson Road is estimated to be A during the morning or afternoon peak hours. This is the highest level-of-service. Because the future level-of-service with the project is A, no mitigation measures are recommended. Traffic signals are not warranted.
2. The driveways to and from the project will operate at level-of-service B or better with one lane in, one lane out and no separate left turn lanes. This is also a high level-of-service.
3. Based on the field reconnaissance along Kula Highway, sight distances along Kula Highway appear limited. During design, the Civil Engineer locate the driveways to maximize sight distance or make the appropriate changes to the roadway shoulders.
4. Traffic calming measures should be considered for the internal streets due to the horizontal alignment and grades. Measures that should be considered include speed humps, all-way stops and traffic circles.

APPENDIX A
PHOTOGRAPHS OF STUDY INTERSECTIONS



Figure A-1. Looking north along Thompson Road toward Kula Highway.



Figure A-2. Looking north along Kula Highway toward Thompson Road.



Figure A-3 Looking south along Kula Highway toward intersection with Thompson Road.



Figure A-4 Looking north along Kula Highway. Project site is on left side of roadway.



Figure A-5. Looking north along Kula Highway adjacent to project. Note limited sight distance.

APPENDIX B
LEVEL-OF-SERVICE CALCULATIONS FOR EXISTING
CONDITIONS

TWO-WAY STOP CONTROL SUMMARY								
General Information			Site Information					
Analyst	PJR		Intersection	Existing, 1am				
Agency/Co.	Phillip Rowell and Associates		Jurisdiction					
Date Performed	6/8/2001		Analysis Year	Existing				
Analysis Time Period	AM Peak Hour		Project ID	Keokea Agricultural Lots				
East/West Street: Thompson Road			North/South Street: Kula Highway					
Intersection Orientation: North-South			Study Period (hrs): 0.25					
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	0	80 ✓	5 ✓	30 ✓	45 ✓	0		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	0	80	5	30	45	0		
Percent Heavy Vehicles	0	-	-	0	-	-		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	5 ✓	0	50 ✓	0	0	0		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	5	0	50	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (vph)		30		55				
C (m) (vph)		1524		962				
v/c		0.02		0.06				
95% queue length		0.06		0.18				
Control Delay		7.4		9.0				
LOS		A		A				
Approach Delay	-	-		9.0				
Approach LOS	-	-		A				

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	PJR			Intersection	Case 1.1pm		
Agency/Co.	Phillip Rowell and Associates			Jurisdiction			
Date Performed	6/8/2001			Analysis Year	Existing		
Analysis Time Period	PM Peak Hour			Project ID	Keokea Agricultural Lots		
East/West Street: Thompson Road				North/South Street: Kula Highway			
Intersection Orientation: North-South				Study Period (hrs): 0.25			
Vehicle Volumes and Adjustments							
Major Street	Northbound			Southbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume	0	65 ✓	20 ✓	50 ✓	20 ✓	0	
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly Flow Rate, HFR	0	65	20	50	20	0	
Percent Heavy Vehicles	0	-	-	0	-	-	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
Minor Street	Westbound			Eastbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume	5 ✓	0	70 ✓	0	0	0	
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly Flow Rate, HFR	5	0	70	0	0	0	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
Delay, Queue Length, and Level of Service							
Approach	NB	SB	Westbound			Eastbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		LT		LR			
v (vph)		50		75			
C (m) (vph)		1524		974			
v/c		0.03		0.08			
95% queue length		0.10		0.25			
Control Delay		7.4		9.0			
LOS		A		A			
Approach Delay	-	-		9.0			
Approach LOS	-	-		A			

APPENDIX C
TRAFFIC PROJECTION WORKSHEETS

Part 2.1
Trip Assignment Worksheet
 TIAR for Keokea Agricultural Lots
 June 2001

INTERSECTION NO 1
 INTERSECTION OF Kula Highway at Thompson Road

No	Approach & Mvt	Existing		Background Growth		Related Projects Trips		Cumulative Trips		Project Trips		Cumulative Plus Project Trips	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N- RT	0	0	0	0	0	0	0	0	0	0	0	0
2	TH	45	50	20	21	1	1	66	72	47	77	113	149
3	LT	30	20	18	0	1	0	49	20	0	0	49	20
4	E- RT	50	70	22	30	0	1	72	101	0	0	72	101
5	TH	0	0	0	0	0	0	0	0	0	0	0	0
6	LT	5	5	3	0	0	0	8	5	3	5	11	10
7	S- RT	5	20	2	21	0	0	7	41	4	3	11	44
8	TH	80	65	36	27	1	2	117	94	71	58	188	152
9	LT	0	0	0	0	0	0	0	0	0	0	0	0
10	W- RT	0	0	0	0	0	0	0	0	0	0	0	0
11	TH	0	0	0	0	0	0	0	0	0	0	0	0
12	LT	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		215	230	101	99	3	4	319	333	125	143	444	476
Approach Totals													
From North		75	70	38	21	2	1	115	92	47	77	162	169
From East		55	75	25	30	0	1	80	106	3	5	83	111
From South		85	85	38	48	1	2	124	135	75	61	199	196
From West		0	0	0	0	0	0	0	0	0	0	0	0
Total		215	230	101	99	3	4	319	333	125	143	444	476
Departure Totals													
To North		130	135	58	57	1	3	189	185	71	58	260	253
To East		35	40	20	21	1	0	56	61	4	3	60	64
To South		50	55	23	21	1	1	74	77	50	82	124	159
To West		0	0	0	0	0	0	0	0	0	0	0	0
Total		215	230	101	99	3	4	319	333	125	143	444	476
Leg Totals													
North		205	205	98	78	3	4	304	287	118	135	422	422
East		90	115	45	51	1	1	136	167	7	8	143	175
South		135	140	61	69	2	3	198	212	125	143	323	355
West		0	0	0	0	0	0	0	0	0	0	0	0
Total		430	460	202	198	6	8	638	666	250	286	888	952

Part 2.2

Trip Assignment Worksheet

TIAR for Kookea Agricultural Lots

June 2001

INTERSECTION NO 2
 INTERSECTION OF Kula Highway at Drive A

No	Approach & Mvt	Existing		Background Growth		Related Projects Trips		Cumulative Trips		Project Trips		Cumulative Plus Project Trips	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N- RT	0	0	0	0	0	0	0	0	33	55	33	55
2	TH	50	55	23	21	1	1	74	77	17	27	91	104
3	LT	0	0	0	0	0	0	0	0	0	0	0	0
4	E- RT	0	0	0	0	0	0	0	0	0	0	0	0
5	TH	0	0	0	0	0	0	0	0	0	0	0	0
6	LT	0	0	0	0	0	0	0	0	0	0	0	0
7	S- RT	0	0	0	0	0	0	0	0	0	0	0	0
8	TH	85	85	38	48	1	2	124	135	25	20	149	155
9	LT	0	0	0	0	0	0	0	0	3	5	3	5
10	W- RT	0	0	0	0	0	0	0	0	4	3	4	3
11	TH	0	0	0	0	0	0	0	0	0	0	0	0
12	LT	0	0	0	0	0	0	0	0	50	41	50	41
TOTAL		135	140	61	69	2	3	198	212	132	151	330	363
Approach Totals													
From North		50	55	23	21	1	1	74	77	50	82	124	159
From East		0	0	0	0	0	0	0	0	0	0	0	0
From South		85	85	38	48	1	2	124	135	28	25	152	160
From West		0	0	0	0	0	0	0	0	54	44	54	44
Total		135	140	61	69	2	3	198	212	132	151	330	363
Departure Totals													
To North		85	85	38	48	1	2	124	135	75	61	199	196
To East		0	0	0	0	0	0	0	0	0	0	0	0
To South		50	55	23	21	1	1	74	77	21	30	95	107
To West		0	0	0	0	0	0	0	0	38	60	36	60
Total		135	140	61	69	2	3	198	212	132	151	330	363
Leg Totals													
North		135	140	61	69	2	3	198	212	125	143	323	355
East		0	0	0	0	0	0	0	0	0	0	0	0
South		135	140	61	69	2	3	198	212	49	55	247	267
West		0	0	0	0	0	0	0	0	90	104	90	104
Total		270	280	122	138	4	6	396	424	264	302	660	726

Part 23
Trip Assignment Worksheet
 TIAR for Kaeokea Agricultural Lots
 June 2001

INTERSECTION NO 3
 INTERSECTION OF Waimanu Street at Cummins Street

No	Approach & Mvt	Existing		Background Growth		Related Projects Trips		Cumulative Trips		Project Trips		Cumulative Plus Project Trips	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N- RT	0	0	0	0	0	0	0	0	17	27	17	27
2	TH	50	55	23	21	1	1	74	77	4	3	78	80
3	LT	0	0	0	0	0	0	0	0	0	0	0	0
4	E- RT	0	0	0	0	0	0	0	0	0	0	0	0
5	TH	0	0	0	0	0	0	0	0	0	0	0	0
6	LT	0	0	0	0	0	0	0	0	0	0	0	0
7	S- RT	0	0	0	0	0	0	0	0	0	0	0	0
8	TH	85	85	38	48	1	2	124	135	3	5	127	140
9	LT	0	0	0	0	0	0	0	0	3	5	3	5
10	W- RT	0	0	0	0	0	0	0	0	4	3	4	3
11	TH	0	0	0	0	0	0	0	0	0	0	0	0
12	LT	0	0	0	0	0	0	0	0	25	20	25	20
TOTAL		135	140	61	69	2	3	198	212	56	63	254	275
Approach Totals													
From North		50	55	23	21	1	1	74	77	21	30	95	107
From East		0	0	0	0	0	0	0	0	0	0	0	0
From South		85	85	38	48	1	2	124	135	6	10	130	145
From West		0	0	0	0	0	0	0	0	29	23	29	23
Total		135	140	61	69	2	3	198	212	56	63	254	275
Departure Totals													
To North		85	85	38	48	1	2	124	135	28	25	152	160
To East		0	0	0	0	0	0	0	0	0	0	0	0
To South		50	55	23	21	1	1	74	77	8	6	82	83
To West		0	0	0	0	0	0	0	0	20	32	20	32
Total		135	140	61	69	2	3	198	212	56	63	254	275
Leg Totals													
North		135	140	61	69	2	3	198	212	49	55	247	267
East		0	0	0	0	0	0	0	0	0	0	0	0
South		135	140	61	69	2	3	198	212	14	16	212	228
West		0	0	0	0	0	0	0	0	49	55	49	55
Total		270	280	122	138	4	6	396	424	112	126	508	550

APPENDIX D
LEVEL-OF-SERVICE CALCULATIONS FOR
CUMULATIVE CONDITIONS

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case 2.1am			
Agency/Co.	Phillip Rowell and Associates			Jurisdiction				
Date Performed	6/8/2001			Analysis Year	2006 Cumulative			
Analysis Time Period	AM Peak Hour			Project ID	Keokea Agricultural Lots			
East/West Street: Thompson Road				North/South Street: Kula Highway				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	0	111	7	49	66	0		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	0	111	7	49	66	0		
Percent Heavy Vehicles	0	-	-	0	-	-		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	8	0	72	0	0	0		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	8	0	72	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (vph)		49		80				
C (m) (vph)		1483		911				
v/c		0.03		0.09				
95% queue length		0.10		0.29				
Control Delay		7.5		9.3				
LOS		A		A				
Approach Delay	-	-		9.3				
Approach LOS	-	-		A				

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case2.1pm			
Agency/Co.	Phillip Rowell and Associates			Jurisdiction				
Date Performed	6/8/2001			Analysis Year	2006 Cumulative			
Analysis Time Period	PM Peak Hour			Project ID	Keokea Agricultural Lots			
East/West Street: Thompson Road				North/South Street: Kula Highway				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	0	94	41	20	72	0		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	0	94	41	20	72	0		
Percent Heavy Vehicles	0	-	-	0	-	-		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1		0	
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	5	0	101	0	0	0		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	5	0	101	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0		0	
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (vph)		20		106				
C (m) (vph)		1462		933				
v/c		0.01		0.11				
95% queue length		0.04		0.38				
Control Delay		7.5		9.4				
LOS		A		A				
Approach Delay	-	-		9.4				
Approach LOS	-	-		A				

APPENDIX E
LEVEL-OF-SERVICE CALCULATIONS FOR
CUMULATIVE PLUS PROJECT CONDITIONS

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3.1am			
Agency/Co.	Phillip Rowell and Associates			Jurisdiction				
Date Performed	6/8/2001			Analysis Year	2006 Cumulative Plus ProjectA			
Analysis Time Period	AM Peak Hour			Project ID	Keokea Agricultural Lots			
East/West Street: Thompson Road				North/South Street: Kula Highway				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	0	188 ✓	11 ✓	49 ✓	113 ✓	0		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	0	188	11	49	113	0		
Percent Heavy Vehicles	0	-	-	0	-	-		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	11 ✓	0	72 ✓	0	0	0		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	11	0	72	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (vph)		49		83				
C (m) (vph)		1385		804				
v/c		0.04		0.10				
95% queue length		0.11		0.34				
Control Delay		7.7		10.0-				
LOS		A		A				
Approach Delay	-	-		10.0-				
Approach LOS	-	-		A				

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	PJR			Intersection	Case3.1pm		
Agency/Co.	Phillip Rowell and Associates			Jurisdiction			
Date Performed	6/8/2001			Analysis Year	2006 Cumulative Plus Project A		
Analysis Time Period	PM Peak Hour			Project ID	Keokea Agricultural Lots		
East/West Street: Thompson Road				North/South Street: Kula Highway			
Intersection Orientation: North-South				Study Period (hrs): 0.25			
Vehicle Volumes and Adjustments							
Major Street	Northbound			Southbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume	0	152 ✓	44 ✓	20 ✓	149 ✓	0	
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly Flow Rate, HFR	0	152	44	20	149	0	
Percent Heavy Vehicles	0	-	-	0	-	-	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
Minor Street	Westbound			Eastbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume	10 ✓	0	101 ✓	0	0	0	
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly Flow Rate, HFR	10	0	101	0	0	0	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
Delay, Queue Length, and Level of Service							
Approach	NB	SB	Westbound			Eastbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		LT		LR			
v (vph)		20		111			
C (m) (vph)		1389		846			
v/c		0.01		0.13			
95% queue length		0.04		0.45			
Control Delay		7.6		9.9			
LOS		A		A			
Approach Delay	-	-		9.9			
Approach LOS	-	-		A			

TWO-WAY STOP CONTROL SUMMARY								
General Information			Site Information					
Analyst	PJR		Intersection	Case3.2am				
Agency/Co.	Phillip Rowell and Associates		Jurisdiction					
Date Performed	6/10/2001		Analysis Year	2006 Cumulative Plus Project A				
Analysis Time Period	AM Peak Hour		Project ID	Keokea Agricultural Lots				
East/West Street: Drive A			North/South Street: Kula Highway					
Intersection Orientation: North-South			Study Period (hrs): 0.25					
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	3 ✓	149 ✓	0	0	91 ✓	33 ✓		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	3	149	0	0	91	33		
Percent Heavy Vehicles	0	-	-	0	-	-		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	0	0	0	50 ✓	0	4 ✓		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	0	0	0	50	0	4		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (vph)	3						54	
C (m) (vph)	1475						742	
v/c	0.00						0.07	
95% queue length	0.01						0.23	
Control Delay	7.4						10.2	
LOS	A						B	
Approach Delay	-	-					10.2	
Approach LOS	-	-					B	

TWO-WAY STOP CONTROL SUMMARY								
General Information			Site Information					
Analyst	PJR		Intersection	Case3.2pm				
Agency/Co.	Phillip Rowell and Associates		Jurisdiction					
Date Performed	6/10/2001		Analysis Year	2006 Cumulative Plus Project A				
Analysis Time Period	PM Peak Hour		Project ID	Keokea Agricultural Lots				
East/West Street: Drive A			North/South Street: Kula Highway					
Intersection Orientation: North-South			Study Period (hrs): 0.25					
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	5 ✓	155 ✓	0	0	104 ✓	55 ✓		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	5	155	0	0	104	55		
Percent Heavy Vehicles	0	-	-	0	-	-		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	0	0	0	41 ✓	0	3 ✓		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	0	0	0	41	0	3		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (vph)	5						44	
C (m) (vph)	1433						708	
v/c	0.00						0.06	
95% queue length	0.01						0.20	
Control Delay	7.5						10.4	
LOS	A						B	
Approach Delay	-	-					10.4	
Approach LOS	-	-					B	

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3.3am			
Agency/Co.	Phillip Rowell and Associates			Jurisdiction				
Date Performed	6/10/2001			Analysis Year	2006 Cumulative Plus Project A			
Analysis Time Period	AM Peak Hour			Project ID	Keokea Agricultural Lots			
East/West Street: Drive B				North/South Street: Kula Highway				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	3 ✓	127 ✓	0	0	78 ✓	17 ✓		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	3	127	0	0	78	17		
Percent Heavy Vehicles	0	-	-	0	-	-		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	0	0	0	25 ✓	0	4 ✓		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	0	0	0	25	0	4		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (vph)	3					29		
C (m) (vph)	1512					795		
v/c	0.00					0.04		
95% queue length	0.01					0.11		
Control Delay	7.4					9.7		
LOS	A					A		
Approach Delay	-					9.7		
Approach LOS	-					A		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3.3pm			
Agency/Co.	Phillip Rowell and Associates			Jurisdiction				
Date Performed	6/10/2001			Analysis Year	2006 Cumulative Plus Project A			
Analysis Time Period	PM Peak Hour			Project ID	Keokea Agricultural Lots			
East/West Street: Drive B				North/South Street: Kula Highway				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	5 ✓	140 ✓	0	0	80 ✓	27 ✓		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	5	140	0	0	80	27		
Percent Heavy Vehicles	0	-	-	0	-	-		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	0	0	0	20 ✓	0	3 ✓		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR	0	0	0	20	0	3		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (vph)	5					23		
C (m) (vph)	1497					769		
v/c	0.00					0.03		
95% queue length	0.01					0.09		
Control Delay	7.4					9.8		
LOS	A					A		
Approach Delay	-					9.8		
Approach LOS	-					A		

DEC - 8 2001

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2001-12-08-MA-FONS1

FINAL ENVIRONMENTAL ASSESSMENT

FOR

THE DEPARTMENT OF HAWAIIAN HOME LANDS

KEOKEA AGRICULTURAL

LOTS - UNIT 1

KEOKEA, MAUI, HAWAII

NOVEMBER 2001

PREPARED FOR:

**Department of Hawaiian Home Lands
State of Hawaii
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813**

PREPARED BY:



FINAL ENVIRONMENTAL ASSESSMENT

FOR

THE DEPARTMENT OF HAWAIIAN HOME LANDS

KEOKEA AGRICULTURAL
LOTS - UNIT 1

KEOKEA, MAUI, HAWAII

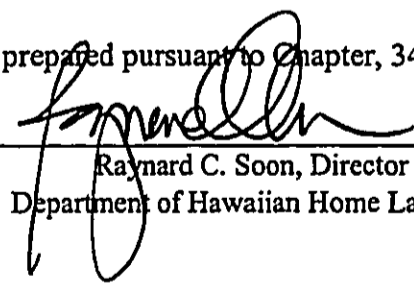
NOVEMBER 2001

PROPOSING AGENCY:

Department of Hawaiian Home Lands
State of Hawaii
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

This environmental document was prepared pursuant to Chapter, 343 Hawaii Revised Statutes

Responsible Official: _____



Raynard C. Soon, Director

Department of Hawaiian Home Lands, State of Hawaii

Date: _____

PREPARED BY:



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CHAPTER 1 INTRODUCTION AND SUMMARY

1.1 PROJECT OVERVIEW

The State of Hawaii, Department of Hawaiian Home Lands (DHHL) is proposing to develop an agricultural subdivision on Hawaiian homestead lands in the Keokea land tract of the Kula district on the Island of Maui. This project is referred to as the Keokea Agricultural Lots, Unit 1 project.

Approximately 351 acres of DHHL homestead lands, identified by Tax Map Key: 2-02-02: 055, will be subdivided and developed as an agricultural subdivision for DHHL beneficiaries. The proposed agricultural subdivision project will consist of 82 total lots. This subdivision site will include 77 agricultural lots averaging 2.0 to 2.5 acres in size, a large 96-acre reserve lot, a 29-acre historic preserve, and three lots fronting Kula Highway to be used for future community purposes. Upon completion of the project, the smaller subdivided lots will be leased as agricultural homesteads to eligible native Hawaiians for one dollar (\$1.00) a year.

In the mid-1980's, as part of the Acceleration of Homestead Awards program, DHHL created 66 agricultural lots on paper for this Keokea project site. These lots were then awarded to DHHL beneficiaries on the condition that DHHL would make the necessary improvements and formally subdivide these lots by 1998. Consequently, development of this property is now ready for implementation resulting in this proposed project.

The proposed agricultural subdivision layout will be configured to provide each lot with a significant portion of moderately sloped lands which would be considered farmable based on topography. Other improvements will include paved roadways, drainage, water irrigation, utilities, and road and waterline improvements along Kula Highway. Table 1.1 provides a summary of pertinent information associated with this project.

1.2 SCOPE AND AUTHORITY

Development of the Keokea Agricultural Lots, Unit 1 project would involve the use of State DHHL lands and funding for infrastructure and other site improvements. As a result, this project triggers environmental review under Chapter 343, Environmental Impact Statements, Hawaii Revised Statutes (HRS). Hence, this project is subject to the environmental documentation procedures prescribed under Chapter 343, HRS and Title 11, Chapter 200 of the State Department of Health's (DOH) Administrative Rules.

Table 1.1 Project Summary Information

Project Name:	Keokea Agricultural Lots – Unit 1
Applicant Identification:	Department of Hawaiian Home Lands State of Hawaii 1099 Alakea Street 20 th Floor Honolulu, Hawaii 96813 Contact: Mr. Larry Lum
Applicant Representative:	SSFM International, Inc. 501 Sumner Street, Suite 502 Honolulu, Hawaii 96817 Contact: Mr. Ronald Sato
Accepting Authority:	Department of Hawaiian Home Lands State of Hawaii 1099 Alakea Street, 20 th Floor Honolulu, Hawaii 96813
Project Description:	The State of Hawaii, Department of Hawaiian Home Lands, proposes to develop an agricultural subdivision on Hawaiian homestead lands in Keokea on the Island of Maui. Approximately 351 acres of DHHL homestead lands located in Keokea will be subdivided for agricultural purposes. The proposed subdivision project will include agricultural lots, a historic preserve, a lot for reserve, and lots for future commercial and community use.
Project Location:	The project site is located in Keokea in the Kula district of the Island of Maui.
Land Ownership:	State of Hawaii, Department of Hawaiian Home Lands
Tax Map Key:	TMK: 2-02-02: 055
State Land Use District:	Agricultural District
Makawao-Pukalani-Kula Community Plan:	DHHL
County Zoning:	Agricultural District
SMA Designation:	Project is not within the Special Management Area

This project represents an Applicant Action being undertaken by DHHL, and a Draft Environmental Assessment (Draft EA) was published in the July 8, 2001 issue of *The Environmental Notice* in conformance with these regulatory requirements. The intent of this document was to ensure that systematic consideration is given to potential impacts of the proposed action upon the natural and man-made environment. Subsequently, this Final

Environmental Assessment (Final EA) was prepared after review of the Draft EA during the 30-day comment period. A Finding of No Significant Impact (FONSI) is consequently being issued by the DHHL for this project.

The State DHHL will serve as the Proposing Agency for this action, thus, this project subsequently involves an Agency Action being undertaken by this department under these environmental regulations. The Accepting Authority for this Environmental Assessment would be the State DHHL as the authorized representative for the Governor of the State of Hawaii.

CHAPTER 2 DESCRIPTION OF PROPOSED ACTION

2.1 PROJECT LOCATION AND VICINITY

The project site is located in Keokea which is a part of the larger Makawao-Pukalani-Kula district of the Island of Maui. This region is commonly referred to as “upcountry” Maui. The project site is located on the southwestern slopes of Haleakala, and is situated adjacent to Kula Highway on its northwest side. The town of Pukalani is located approximately 10 miles to the north of the project site, and the town of Kihei is approximately 4 miles to the west of the project site. Figure 2.1 shows the location of the project site.

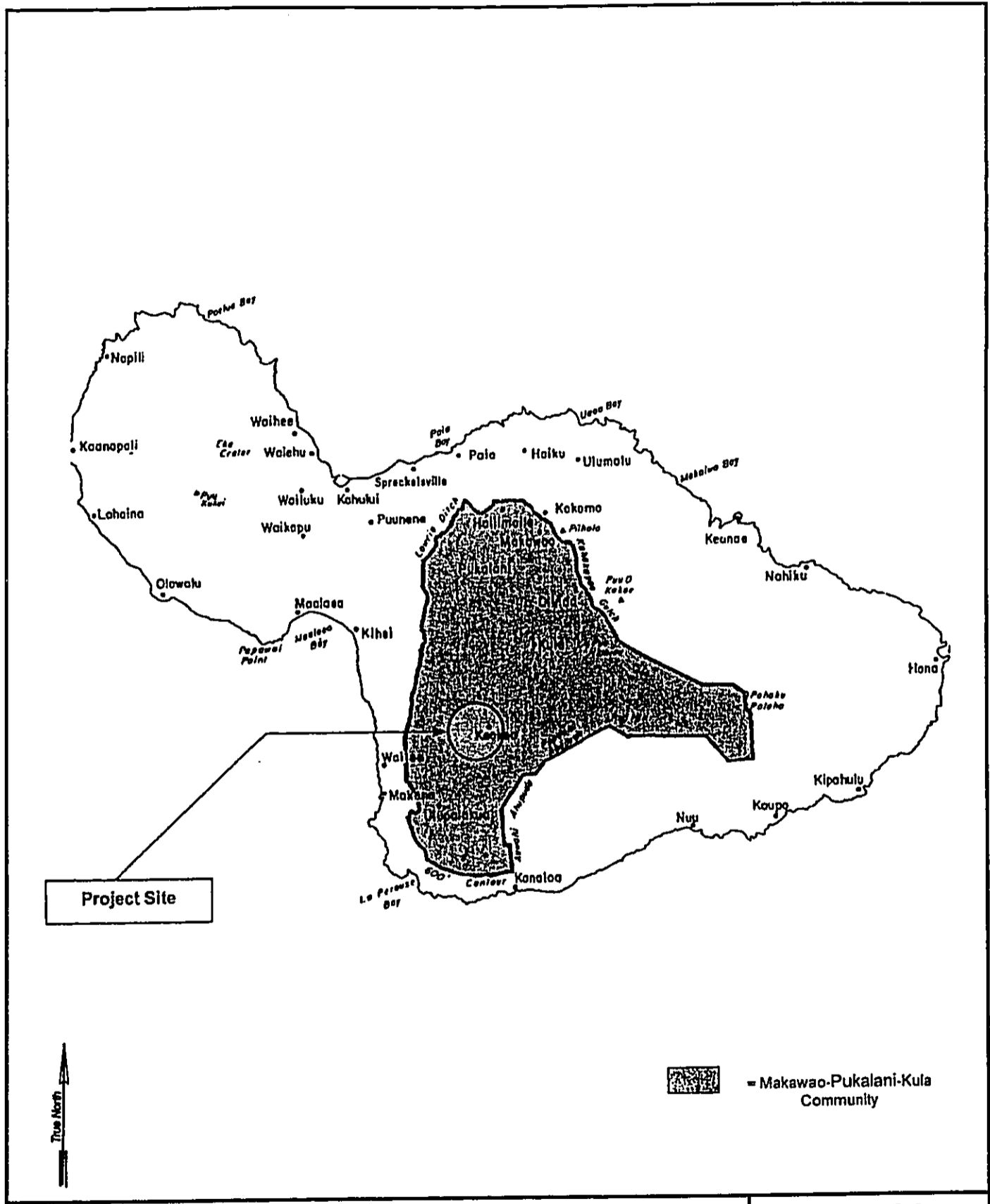
The Keokea area belongs to the Kula region, which in turn is a part of the larger Makawao-Pukalani-Kula community. Figure 2.2 depicts this area comprising “Upcountry” Maui and the location of Keokea in relation to other areas within the Makawao-Pukalani-Kula community. The region’s population is presently concentrated in the two main settlement areas of Makawao and Pukalani which are characterized by a mixture of suburban and rural land uses.

The project’s eastern boundary, which fronts Kula Highway, begins at the Thompson Road intersection and continues southward approximately 1,000 feet along the highway. From its eastern boundary along Kula Highway, the project site extends in a northwesterly direction. The property is bounded on the east by several private residences, and on the south and west by undeveloped lands used for pasture. Figure 2.3 shows the project site and surrounding vicinity.

Land uses in the vicinity of the project site are characterized by low-density rural residential properties, small farms, and lands utilized for agricultural cultivation and ranching activities. There are several small stores and isolated residential lots bordering the eastern boundary of the site. Agricultural zoned properties consisting of pastoral and undeveloped lands border the project site’s west and south sides.

2.2 PROJECT SITE DESCRIPTION

The project site is a 351-acre parcel identified by TMK: 2-02-02: 055. Most of the subject parcel is currently vacant and undeveloped. As already mentioned, most of these lots were awarded in the mid-1980’s to DHHL beneficiaries on the condition that DHHL would make the necessary infrastructure improvements and formally subdivide these lots by 1998. At the present time there are three existing houses on lots 1, 13, and 40 of the project site. These homes were constructed and are occupied by homesteaders who will be assigned to their subject subdivided lots. There is also a lessee residing in a non-conforming structure (tent) on Lot 20, and an unfinished house on Lot 51 built by a lessee who is not yet permanently residing there.



MAKAWAO-PUKALANI-KULA REGION

Figure 2.2

SSPM
INTERNATIONAL

Keokea Agriculture Lots Project
Department of Hawaiian Homelands

Source:
Maui County Planning Department,
1996

In the past, the project site was predominantly used for cattle grazing. The site is characterized by gentle to moderately steep west-facing slopes with elevations ranging from 2,225 to 2,850 feet above mean sea level (AMSL). Soils are well drained and vegetation is dominated by introduced species including, black wattle trees, lantana, prickly pear cactus, and grasses. All lands within the subject parcel are owned by DHHL.

2.3 PROJECT DESCRIPTION

The proposed project will involve the development of an agricultural subdivision generally consisting of agricultural lots and related infrastructure improvements. It should be noted that pursuant to Section 206 of the HHCA and in the Attorney General's legal opinion, Hawaiian homestead lands utilized for the purposes of the Act are exempt from County land use laws.

2.3.1 Agricultural Subdivision

The Keokea agricultural subdivision is comprised of a total of 82 lots subdivided over the entire 351-acre property. The proposed Site Plan of this subdivision is illustrated in Figure 2.4. The various components of this agricultural subdivision are listed below, and each component is described in greater detail.

1. A total of 77 individual agricultural lots to be granted to DHHL beneficiaries.
2. A lot set aside as a historic preserve.
3. Three larger lots planned to serve future community related needs and potential commercial activities or farmers market.
4. A large lot set aside as a reserve area for future use which may be subdivided into 40 additional lots.

Construction activities associated with site preparation will be funded by the Hawaiian Homes Trust Fund, and will include such improvements as roadways, utilities, and other subdivision improvements. At the conclusion of this subdivision work, the 77 individual agricultural lots will be ready for occupancy by awardees. Occupancy can commence after the subdivision and improvements have been accepted by DHHL.

Individual Agricultural Lots

There will be 77 agricultural lots created for lessee use that will average in size from 2.0 to 2.5 acres. Qualified Native Hawaiian beneficiaries have already been awarded the majority (66) of these lots in the mid-1980's as part of DHHL's Acceleration of Homestead Awards program. The selection procedures for remaining lots are established by the Hawaiian Homes Commission administrative rules. Awardees will be able to obtain assistance from DHHL regarding home ownership and homesteading practices. Agricultural use of the land will be required under the lease provisions for these proposed subdivision lots. DHHL requires submission and approval of agricultural plans prior to occupancy and use, and will monitor awardee performance.

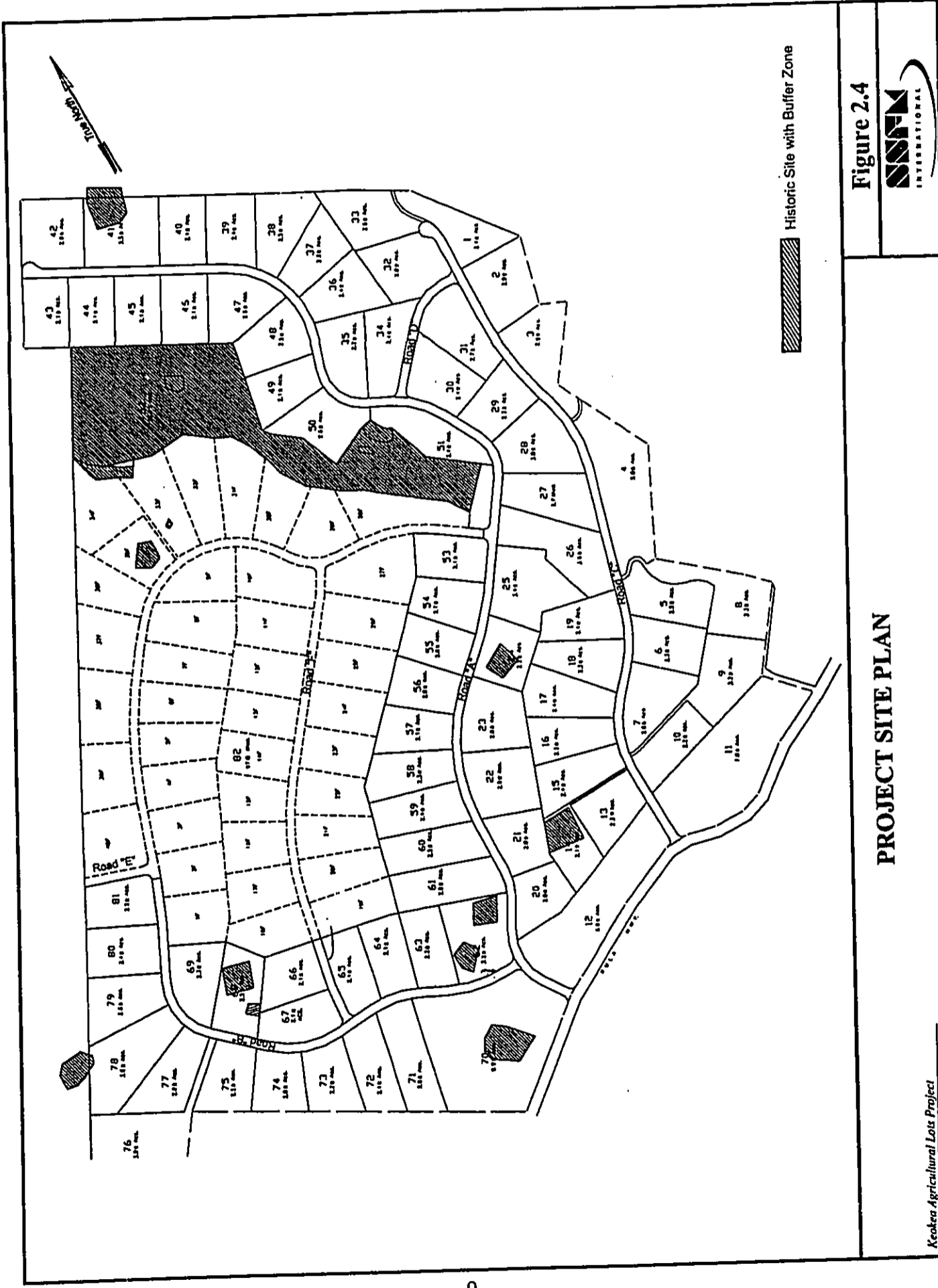


Figure 2.4



PROJECT SITE PLAN

Keokea Agricultural Lots Project
Department of Hawaiian Homelands

The beneficiaries receiving these individual lots are likely to consist of a large number of retirees who have been waiting for their lots. These beneficiaries would likely be comprised of both existing Maui residents, beneficiaries from other islands within the State, and some from outside the State of Hawaii relocating back. It is estimated that about 30 percent of beneficiaries could be current Maui residents. Based upon prior homestead developments, it is anticipated that lessees will gradually develop and move onto their individual lots over many years. Some lessees may relocate to Keokea when they retire or slowly transition over. Thus, full occupancy of this development would occur gradually over time, and may occur over 10 or more years.

Other Agricultural Lots

In addition to the 77 agricultural lots, there will be 5 larger lots within the project site that will remain undeveloped in the immediate future. The first of these five lots is a 20-acre area identified as Lot 52 as shown on the Site Plan that will remain undeveloped. This Lot will be set aside as a historic preserve due to the presence of historic sites. There is the possibility of utilizing this lot as a cultural park for passive recreational use in the future. However, this would be determined by DHHL in consultation with the homestead association.

There will also be three larger lots located along Kula Highway and identified as Lots 11, 12, and 70 on the Site Plan that will encompass areas of 7.8 acres, 6.6 acres, and 9.9, acres respectively. Lots 11, 12, and 70 will be utilized to serve community-related needs and possibly some commercial uses in the future. However, specific intended uses for these lots are still being formulated, and DHHL intends to work closely with the homestead association and local community in the decision-making process. One use being considered is for these three roadside lots to serve as an open market area to provide local farmers with the opportunity to sell their agricultural produce.

Reserve Agricultural Lot

Finally, the remaining lot is a 96-acre property, identified as Lot 82, which comprises much of the center and western section of the project site. As shown on the Site Plan (Figure 2.4), this Lot would be subdivided into 40 additional individual lots. Lands within Lot 82 have not been awarded, and are not scheduled for development in the immediate future. At this time, the intended purpose for Lot 82 is to serve as a "reserve area" or "lot bank" that would provide alternative lots to awardees whose assigned lots are considered unsuitable to accommodate their agricultural needs.

In the event awarded lots are found to be unsuitable for agricultural purposes, one of the 40 alternate lots within Lot 82 would be awarded to the lessee. Some of the initial 77 lots awarded to lessees may be deemed unsuitable for a number of reasons. For example, the presence of archaeological and/or cultural sites or natural hydrologic conditions within a lot may restrict an awardees ability to effectively farm their assigned lot. Although Lot 82 is planned for future use

dependent upon the suitability of the initial 77 lots, this environmental document has included these future lots in the assessment of project-related and cumulative impacts in the event these lots are ever developed and awarded to additional lessees.

2.3.2 Infrastructure Improvements

Roadways

The roadway system for this project will consist of four roads identified as project access roads A, B, C, and D as previously shown on Figure 2.4. These four roads would serve all the lots planned at this time with the exception of Lot 82 (reserve area). Three cul-de-sacs are proposed within the subdivision at the ends of access roads A, B, and C. Access road D would serve as a connecting roadway between roads A and C. Future roads were also shown on the Site Plan to serve Lot 82 in the event that the alternate lots are necessary. These roads would involve the extension of Road B and new Roads E and F.

All proposed access roads will be designed with 50-foot right-of-ways. Right-of-ways within the subdivision will include 31-feet of paved area. Paved areas will consist of 22-foot asphaltic-paved road with 4.5-foot concrete swales adjoining the road on both sides (9 feet total). It should be noted that actual pavement widths may vary slightly depending upon site conditions. In areas where slopes are very steep, provisions will be made to pave the entire right-of-way as a means of minimizing soil erosion.

Materials utilized in the construction of the proposed roadway improvements will include 2-inch asphaltic concrete pavement, crushed rock base course (and subbase course where required), and concrete. Concrete pavement will be utilized for road slopes that exceed the paving limits of asphaltic concrete (approximately 12% slope).

Project access roads A and C will connect with Kula Highway and are the only two points of ingress and egress for the project site from this highway. Based upon the traffic impact analysis conducted for this project, the intersections of these access roads with Kula Highway will operate at acceptable levels-of-service based upon the projected traffic volumes. As a result, no intersection improvements are necessary on Kula Highway to serve this project. However, improvements to the current roadway geometrics at these intersections may need to be provided. Appropriate coordination with the State Department of Transportation will be conducted to determine necessary highway improvements and connection fees.

Wastewater

The proposed project will utilize either cesspools or septic tanks as individual wastewater systems developed by the lessee for each lot. Since the project will exceed the 50-lot limit established by the State Department of Health (DOH), a variance from this standard will be sought in order to allow the project to be developed utilizing individual wastewater systems.

Water Supply

The project's potable water system will be constructed in accordance with standards established by the County DWS. A water master plan has been developed and coordinated with the County DWS to identify necessary system improvements. Water service within the Keokea project is comprised of four service zones of which further details and necessary improvements are discussed in Chapter 5. Water system improvements would consist of both off-site and on-site improvements as specified in the water master plan.

An existing 0.2 million gallon water reservoir was developed along Kula Highway within the nearby DHHL Kula Residence Lots (also referred to as Waiohuli Subdivision) to serve that particular development. This "Kula" water reservoir was also planned and designed to serve up to 77 lots within the Keokea Agricultural Lots project. A new off-site 12-inch water line will be constructed within Kula Highway to transport water from this existing reservoir to the upper service zone of the Keokea project. On-site improvements within the Keokea subdivision would consist of a new 0.2 million gallon water reservoir to service the lower service zones along with both 8- and 12-inch water lines within the subdivision access roads.

A separate irrigation system is also planned to supply Keokea lessees with non-potable water for agricultural activities conducted on individual lots. This non-potable water system will be designed and installed as a future separate "dry-line" irrigation system. This system is referred to as a "dry line" because it will not be immediately connected to its proposed water source. The irrigation line will remain "dry" until such time that a proposed transmission line is connected to it. The Upper Kula System would be the water source intended to serve this irrigation system (refer to Chapter 5), and the State Department of Agriculture will be overseeing the design, installation, and connection of the water line to the subdivision's irrigation system.

Drainage

There will be no curbs or gutters within the subdivision. However, drainlines, manholes, and paved swales with inlet grates (in lieu of catch basins) will be provided within the proposed roadway right-of-way. Additionally, drainage culverts, with inlet and outlet structures, will be provided under certain sections of the roadway to efficiently convey drainage flows through the project site. Diversion ditches would also be incorporated in the subdivision's design to reduce cross-lot runoff.

Electrical and Telephone Services

Overhead and/or underground facilities will be installed to provide electrical services to the project site. Electrical service will be provided by Maui Electric Company, Ltd. Telephone services will be provided by Sandwich Isles Communications, Inc. (SIC). SIC will install a telephone cable system using underground conduits. In addition to the underground conduits, SIC will install a microwave dish which will function as an emergency backup system to primary

communication cables. The microwave dish will be approximately 6 to 8 inches in diameter and installed on a 30-foot high monopole (SIC, 1999).

2.3.3 Environmental Characteristics

The project will result in some short-term construction-related impacts which will require appropriate mitigation measures as described further in chapter 4. These impacts include short-term fugitive dust emissions and noise generated from construction activities. The project is not anticipated to create any significant, long-term, adverse environmental effects.

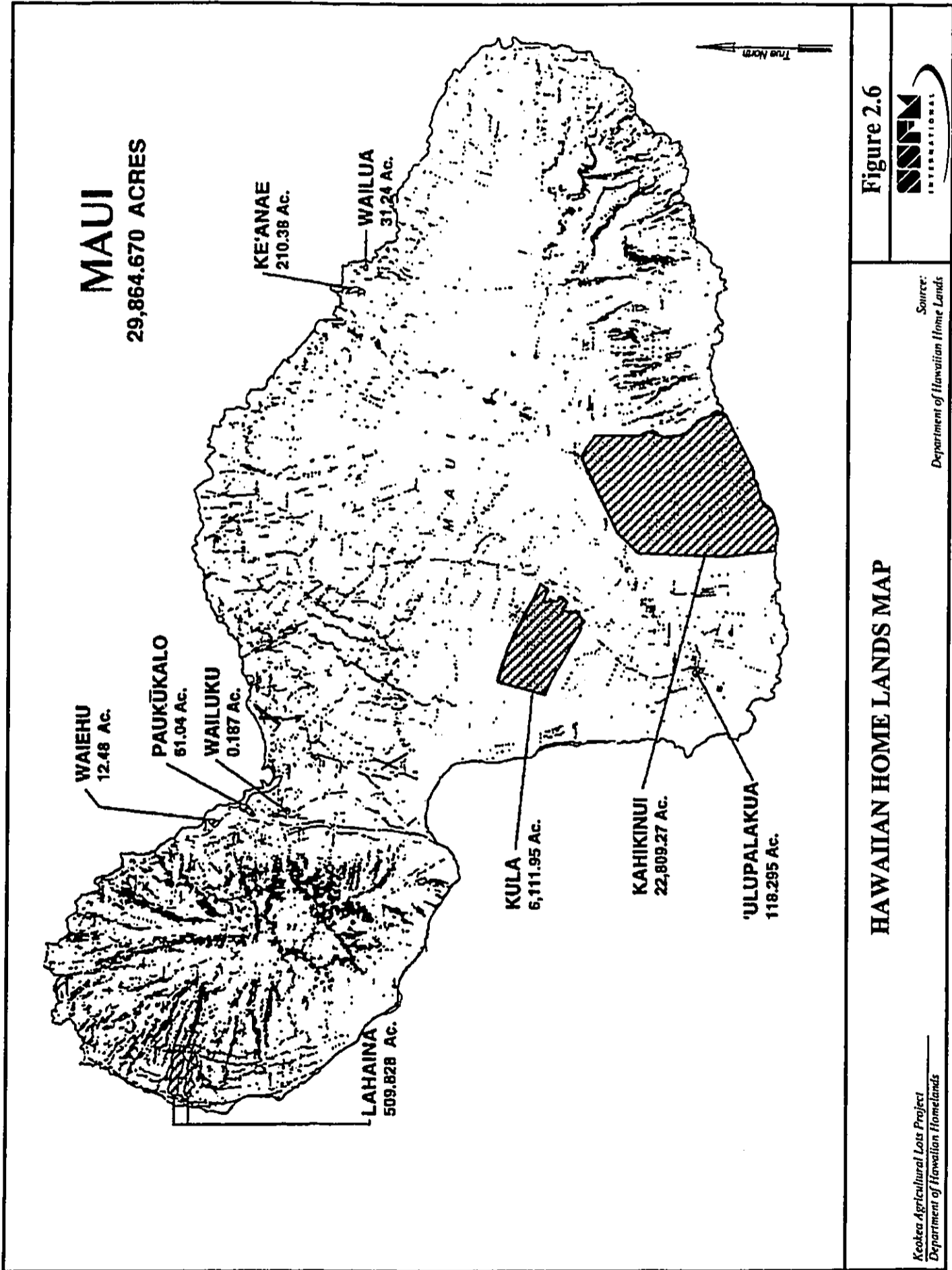
The development of the proposed project would involve the commitment of fuel, labor, funding, material resources and land. The commitment of land for the proposed subdivision improvements will preclude other land-use options for the site. This commitment of land resources fulfills the mandate of the Hawaiian Homes Commission Act and is consistent with existing and future land uses in and around the project area.

2.4 PROJECT NEED AND OBJECTIVES

In 1898, approximately 1.76 million acres of land belonging to the Crown and Government of the Kingdom of Hawaii were surrendered, or ceded, to the United States government during the American annexation of the islands. These "ceded" lands were to be held in trust by the federal government for the Hawaiian people. The passage of the Hawaiian Homes Commission Act (HHCA) of 1921 affirmed the relationship between the federal government, as trustee of the ceded lands, and native Hawaiians as beneficiaries of these lands. The passage of HHCA set aside 203,500 acres of ceded lands as Hawaiian homelands for homesteading by native Hawaiians.

As of June 30, 2000, only 42,034 acres of Hawaiian Home Lands statewide were in homestead use. Presently, 18 percent of eligible Native Hawaiians, or fewer than 6,600 families, actually reside, farm, or ranch on these homestead lands. There are over 30,000 applications for homestead awards. As of June 30, 2000, there were 6,061 applications for homestead lands on the Island of Maui. Of this total, 323 applicants were for pastoral awards, 2,905 for agricultural lands, and 2,833 are waiting for residential lots (DHHL 2000).

There are a total of 30,962 acres of available Hawaiian homestead lands on Maui. The Kula tract accounts for 6,112 acres of this total, and is second only to the Kahikinui tract which has a total area of 22,809 acres. Only a small fraction of these lands on Maui has been or is in the process of being developed. The Paukukalo subdivision has been fully developed and is occupied. The Waiehu subdivision is being developed and nearing completion. Subdivision improvements at the Waiohuli residential lots in Kula are completed, and construction of residential units began during the latter part of 1999. Additionally, there are proposed plans to develop approximately 2,400 acres in Kahikinui for 20-acre Kuleana Homestead Lots. This distribution of Hawaiian Homestead lands on the Island of Maui is illustrated in Figure 2.6.



Consequently, there is a need to develop more homestead lands on the Island of Maui to serve applicants. This project would specifically address this demand for available homestead or agricultural lots to provide Native Hawaiians with agricultural homesteading opportunities on the Island of Maui.

In the mid-1980's, as part of the Acceleration of Homestead Awards program, DHHL created 66 agricultural lots on paper for this Keokea project site. These lots were then awarded to DHHL beneficiaries on the condition that DHHL would make the necessary improvements and formally subdivide these lots by 1998. Therefore, pursuant to Section 204 of the HHCA, the proposed project helps fulfill DHHL's legal mandate to serve the beneficiaries of the Hawaiian Home Lands trust by developing and delivering its lands.

2.5 DEVELOPMENT SCHEDULE AND CONSTRUCTION COST ESTIMATES

After completion of this environmental review process, design work for the proposed subdivision will be completed, and construction plans processed for construction of the subdivision's infrastructure and establishment of lots.

The preliminary construction costs for the proposed project is estimated to be approximately \$10.2 million. These construction improvements will be funded by the Hawaiian Homes Trust Fund. Construction would involve providing all infrastructure and utilities serving this project, and establishing the individual lots to be leased to beneficiaries. Construction activities are anticipated to begin in early 2002 (February/March) and be completed by the middle of 2003 (May/June). Lessees will be responsible for development of their individual lots which could occur over many years (10+ years) based upon other DHHL non-turnkey type developments.

2.6 PERMITS AND APPROVALS REQUIRED

A listing of possible required discretionary land use approvals and ministerial permits for this project is provided below:

Permit/Approval	Administering Agency
National Pollution Discharge Elimination System (NPDES)	State Department of Health
Erosion and Dust Control Plan	Maui County Department of Public Works and Waste Management
Variance – Wastewater System	State Department of Health
Grading Permit	Maui County Department of Public Works and Waste Management
Building Permit	Maui County Department of Public Works and Waste Management
Subdivision Plan Approval	Maui County Planning Department

CHAPTER 3 PHYSICAL AND BIOLOGICAL ENVIRONMENT

This chapter discusses the existing physical and biological environment in the general area of the proposed subdivision, and the probable impacts resulting from the implementation of the project. Mitigation measures, if necessary, are also discussed.

3.1 CLIMATE

The Hawaiian Islands are in a sub-tropical zone where the climate is generally mild throughout the year with small seasonal variations in temperature. In general, Hawaii only recognizes two seasons per year with a mean annual temperature of approximately 76 degrees Fahrenheit. Annual temperatures range from 81 degrees Fahrenheit during the summer months of August and September to 72 degrees Fahrenheit during the cooler months of January and February (Juvik, S., 1998).

Maui is cooled by the northeast tradewinds throughout most of the year. These winds are constant during the spring and summer months. Kona weather conditions, ranging from strong southerly winds with heavy rains, to calm, humid, or rainy weather, are common during the winter months.

Kula's climate is typical of most upland areas in Hawaii, with climatic conditions varying according to altitude and wind direction. In contrast to lowland areas, which are generally characterized by arid to semi-tropical climates, the Kula region is characterized by more temperate conditions with temperatures ranging from the low 50's during the winter months, to the mid-80's during the summer months. The region is relatively dry with rainfall measuring from 20 to 30 inches annually (MEDB, 1994).

3.2 GEOLOGY AND TOPOGRAPHY

The site is characterized by gentle to moderately steep west-facing slopes at an average of 10 to 15 percent, and elevations range from 2,225 to 2,850 feet above mean sea level.

The topography of the project site is characterized by moderately sloping lands, which vary depending on their soil substrate. The soil types specific to the site are the Kula cobbly loam, 12 to 20 percent slopes (KxaD), and Kamaole very stony silt loam, 3 to 15 percent slopes (KGKC). Kula cobbly loam and Kamaole are well-drained soils developed in volcanic ash. For Kula cobbly loam soils, permeability is moderately rapid, runoff is medium, and erosion hazard is moderate. For Kamaole very stony silt loam, permeability is moderate, runoff is slow to medium, and the erosion hazard is slight to moderate (USDA, 1972). Site topography is shown in Figure 3.1.

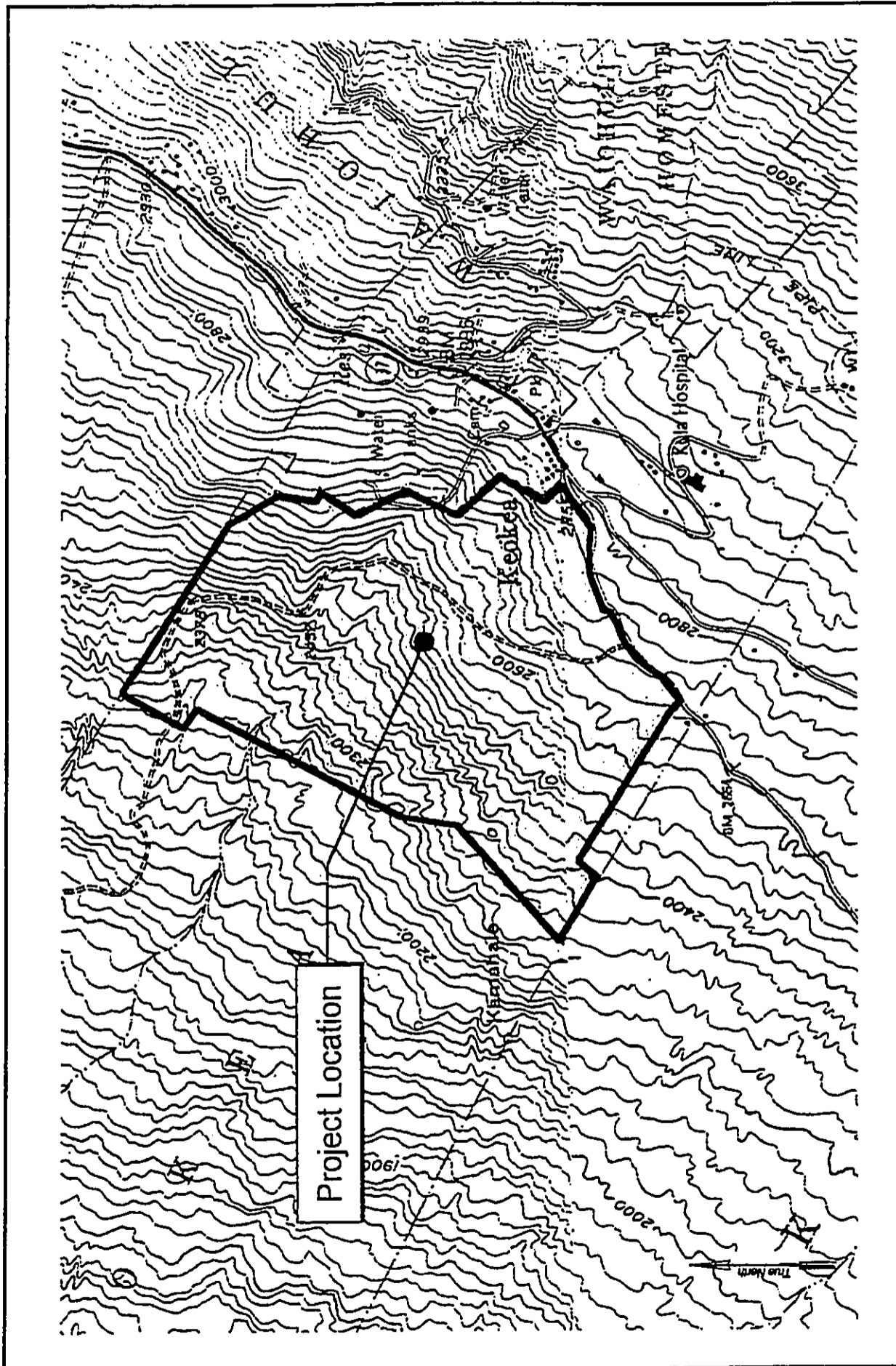


Figure 3.1



PROJECT SITE TOPOGRAPHY

Keokea Agricultural Lots Project
Department of Hawaiian Homelands

The proposed project will involve only minimal clearing, grubbing, and grading of road areas, and other areas required for roadfills, drainage, etc. As previously stated, the site is characterized by gentle to moderately steep slopes at an average of 10 to 15 percent. The proposed agricultural subdivision layout will be configured to provide each lot with a significant portion of moderately sloped lands which would be considered farmable based on the existing topography. In general, the finished contours of the subdivision lots will follow existing grades to minimize earthwork costs and maintain existing drainage patterns. Therefore, it is not anticipated that the proposed project will adversely impact the site topography or geology.

3.3 SOILS AND HYDROLOGY

As indicated in the *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai* (USDA, 1972), the land type in the project area consist of soils belonging to the Puu Pa-Kula-Pane association. The Puu Pa-Kula-Pane soil association is found on the intermediate and high uplands, and consists of deep, gently sloping to steep, well-drained soils that have a medium or moderately textured subsoil. This association is used for orchards, pastures, truck crops, and wildlife habitat. Figure 3.2 shows soils associations for the Island of Maui.

The State Department of Agriculture has established three categories of Agricultural Lands of Importance to the State of Hawaii (ALISH). "Prime" agricultural lands have the soil quality, growing season, and moisture supply needed to produce sustained high crop yields economically when treated and managed according to modern farming methods. "Unique" agricultural lands possess a combination of soil quality, location, growing season, and moisture supply currently used to produce sustained, high yields of a specific crop when treated and managed according to modern farming methods. "Other" important agricultural lands include those which have not been rated "prime" or "unique" (Department of Agriculture, 1977). The majority of the lands underlying the project site fall within the "other" important agricultural lands category. A smaller area located in the northwestern portion of the project site is categorized as "prime" agricultural land. Figure 3.3 shows ALISH designations for agricultural lands within the project site and its surroundings.

As previously indicated in Section 3.2, the substrate underlying the project site is well drained with runoff ranging from slow to medium and erosion hazards form slight to moderate. There are no surface streams located within the project site. However, an un-named gulch located west of the project site extends slightly into the project area crossing its western boundary. Surface runoff and drainage for the project site are addressed in further detail in Section 5.3 of this report.

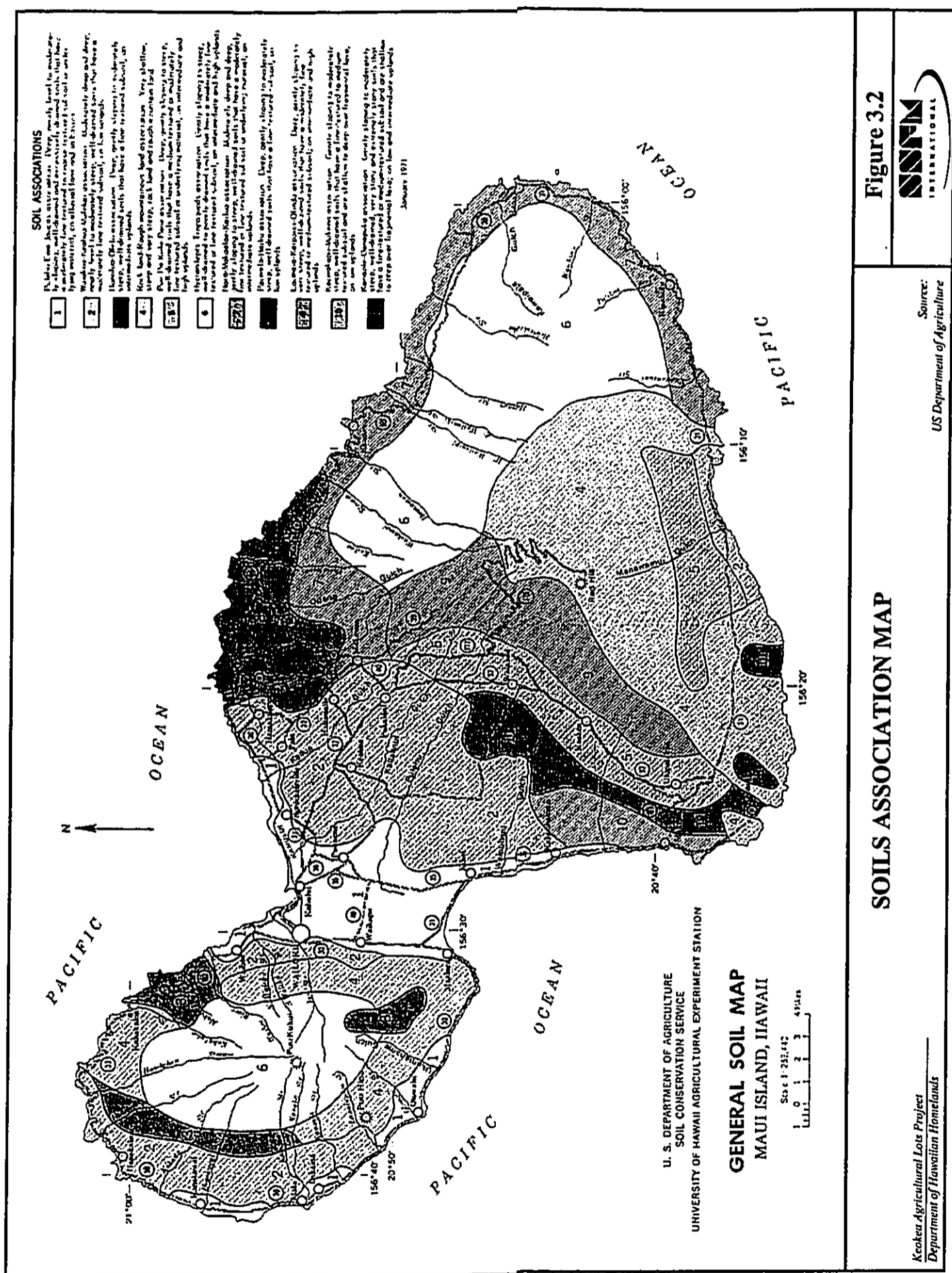


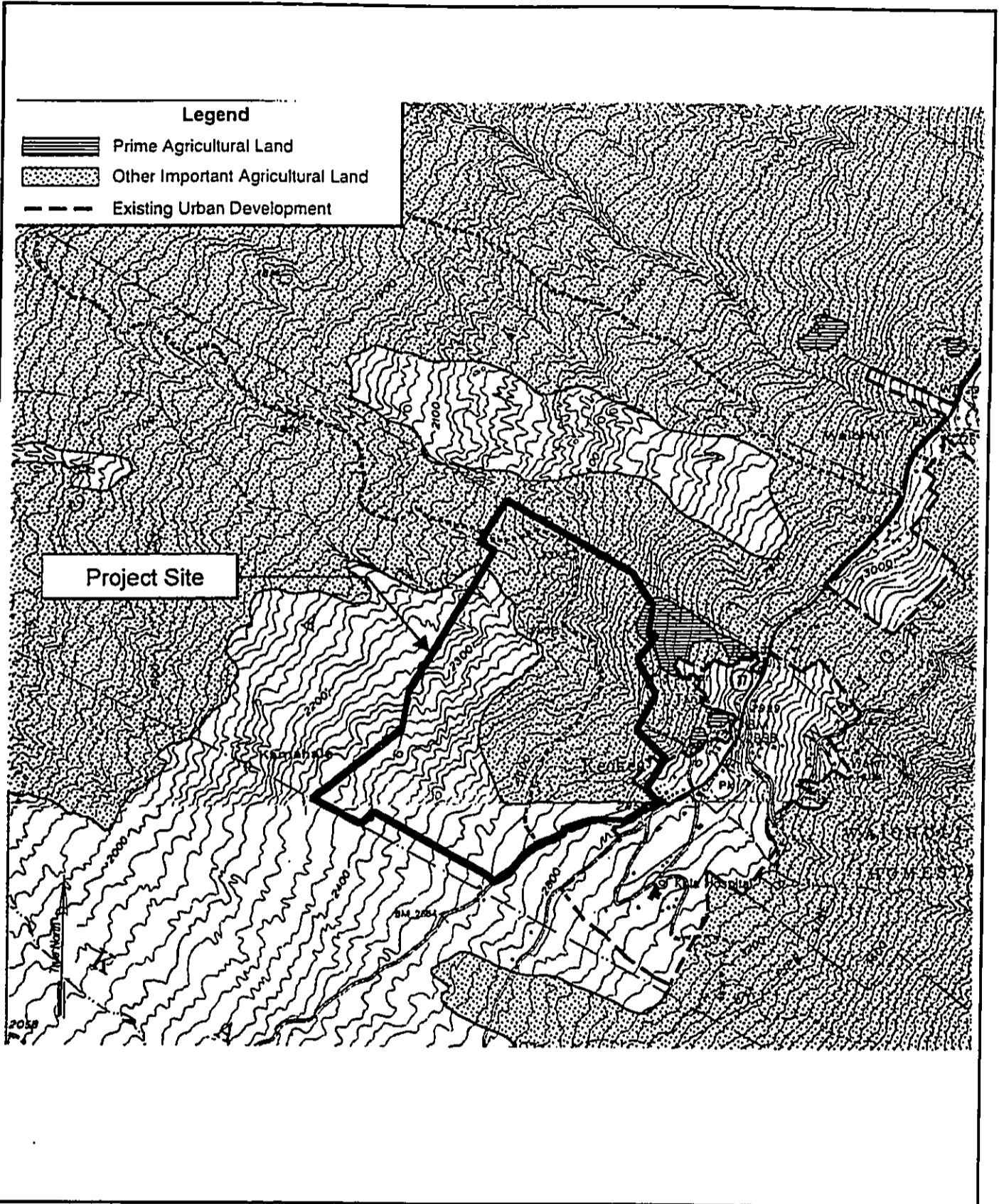
Figure 3.2



Source: US Department of Agriculture

SOILS ASSOCIATION MAP

Keokey Agricultural Lots Project
 Department of Hawaiian Homelands



AGRICULTURAL LANDS OF IMPORTANCE

*Keokea Agriculture Lots Project
Department of Hawaiian Homelands*

Source:
State Department of Agriculture,
1997

Figure 3.3



Development of this subdivision along with off-site water main along Kula Highway are not expected to have a significant impact on the existing topography or the physical character of the immediate area. Grubbing and grading activities for the project would be designed to minimize creating significant cuts or fills of the property. Excavation activities for the water main would be within the existing highway and not change the highway's topography. To minimize potential short-term erosion impacts during construction activities, various erosion control measures and best management practices are available for implementation. Necessary measures would be developed during the design of this project, and would comply with the County's Erosion and Sedimentation Control regulations.

A Grading Plan for the property along with design plans for the off-site water main will be developed and submitted to pertinent County agencies for their review and approval. Development of individual lots will be the responsibility of each individual lessee, however, provisions will be incorporated to have them implement Best Management Practices. Furthermore, lessees will be required to obtain applicable building, grubbing and grading, or farm permits from the County as a condition of their leases. These permits will require lessees to comply with County soil erosion and sedimentation control regulations. Thus, such grading activities are not expected to significantly alter the existing condition of the site or adversely impact surrounding areas.

Erosion control measures to minimize effects during construction may include: use of temporary sprinklers in non-active construction areas; stationing water trucks on the site during construction to provide immediate sprinkling in active construction areas; use of temporary berms and cut-off ditches; use of temporary silt fencing and screens; thorough watering of graded areas after construction activity has ceased for the day and on weekends; or sodding or planting slopes immediately after grading work has been completed. The actual measures will be included in an erosion control plan submitted to the County for ministerial approval.

Other Short-Term Construction Impacts

Other typical short-term impacts usually associated with construction related activities may include fugitive dust emissions, construction noise from equipment, and traffic disturbances from construction vehicles occurring along the road. Fugitive dust emissions and construction noise are not expected to cause much disturbance or annoyance to surrounding properties.

Although these potential short-term effects should have minimal impacts, other possible mitigative measures would be considered for implementation during the project's design. Such measures would be determined during the project's design and preparation of construction plans. Measures being considered could include: the use of wind breaks or watering to reduce dust, and planting slopes immediately after grading work has been completed, and other measures developed as part of the Grading Plan. The measures actually developed would be designed to

make construction activities comply with pertinent Administrative Rules of the State Department of Health such as Title 11: Chapter 46 (Community Noise Control), and Chapter 60 (Air Pollution Control).

3.4 BOTANICAL RESOURCES

A botanical field survey of the project site was conducted in August 1998 and a supplemental botanical report was prepared in May 2001. The botanical survey and supplemental report can be found in Appendix B. The primary objectives of the survey were to provide a general description and inventory of the vegetation on-site, to search for threatened and endangered plants as well as species of concern, and to identify areas of potential environmental problems or concerns and to propose appropriate mitigation measures.

The Keokea site is comprised of two vegetation types, black wattle forest and scrub vegetation. The site is dominated by alien plant species. Only 14 percent of the species identified at the site are native to the Hawaiian Islands.

The black wattle forest vegetation type dominates the eastern half of the site and is characterized by dense stands of black wattle (*Acacia mearnsii*) trees approximately 50 to 60 feet in height. Scattered throughout the black wattle forest are open, grassy meadows of Kikuyu grass (*Pennisetum clandestinum*). These areas were bulldozed in the past and are characterized by more or less uniformly deep soils containing few stones.

The stands of black wattle forest bordering Kula Highway are not as dense and are scattered with large shrubs and small trees of Christmas berry (*Schinus terebinthifolius*) and *Bocconia frutescens*. Also present are localized patches of various grasses including Bermuda grass (*Cynodon dactylon*), meadow ricegrass (*Ehrharta stipoides*), buffel grass (*Cenchrus ciliaris*), and Guinea grass (*Panicum maximum*).

The northwestern portion of the black wattle forest contains several small gullies, which support large patches of airplant (*Kalanchoe pinnata*) interspersed among thickets of lantana shrubs (*Lantana camara*).

Scrub vegetation is found on the western half of the site and is characterized by low thickets of lantana (ranging from 3 to 6 feet in height) interspersed among grassy patches. Grasses are found in low lying swale areas and consist of various grass species including Kikuyu grass, Bermuda grass, buffel grass, Natal redtop (*Melinis repens*), and molasses grass (*Melinis minutiflora*).

Scattered through the scrub are a few trees and large shrubs. The tree and shrub cover comprises only 20 to 30 percent of this vegetation type and consists of scattered small stands of individuals of black wattle, Christmas berry, *Bocconia* spp., Koa haole (*Leucaena leucocephala*), panini (*Opuntia ficus-indica*), and Chinaberry.

In the southwestern portion of the site, there are several *Cottoneaster pannosa* shrubs up to 12 feet in height. This large shrub is an introduced ornamental, which has escaped cultivation and is naturalizing on the site and adjacent areas. Scattered throughout the scrub vegetation are lichen-covered ridges and knolls which support a number of native plant species.

Probable Impacts

In summary, the vegetation within the project site is dominated by introduced or alien plant species such as black wattle, Kikuyu grass, and lantana. A total of 124 plant species were inventoried during the field survey. Of these, 104 (84%) are introduced species; two (2%) are originally of Polynesian introduction; and 18 (14%) are native species. The majority of the native species were found on the lichen-covered 'a'a ridges and knolls scattered through the scrub vegetation in the western portion of the project site (Char & Associates 1998).

The survey determined that there are no known threatened or endangered species nor any species of concern within the project site. In addition, construction of the off-site water main within Kula Highway should not impact endangered plant species since the line would be constructed within the existing roadway. As such, the proposed action will not have a significant negative impact on the botanical resources, and there are no botanical reasons to impose any restrictions, conditions, or impediments to the proposed development.

3.5 FAUNA AND AVIFAUNA

A field survey of avifauna and feral mammals was conducted within the project by Phillip Bruner in September 1998 and is included with this report in Appendix C. The objectives of the field survey were to 1) document the bird and mammal species which occur on the project site, 2) provide baseline data on the relative abundance of each species, 3) note the presence of any native fauna which could potentially occur on the site, and 4) determine the presence of special or unique resources that if lost or altered may adversely impact native fauna.

The project site area and much of the surrounding region have been significantly altered by introduced vegetation and past ranching activities. These alterations have resulted in the development of large areas of second growth forest/ranch land which give the Upcountry region its rural character.

Animal life in the proposed subdivision vicinity similarly reflects the rural character of the region. Avifauna typically found within Upcountry's rural area include some native bird species but are mainly comprised of introduced or alien species. Bird species commonly found in the project area include, the common myna (*Acridotheres tristis*), house sparrow (*Passer domesticus*), cardinal (*Cardinalis cardinalis*), house finch (*Carpodacus mexicanus*), and several species of dove.

As previously mentioned, the majority of birds present at the project site are introduced. Of all the bird species observed during the avifaunal survey, 88% were non-native species. The only endemic and/or indigenous native birds recorded during the survey were the Common Amakihi (*Hemignathus virens*) and the Pacific Golden-Plover (*Pluvialis fulva*). The Common Amakihi is endemic and is the most abundant and widespread of the native landbirds. The Pacific Golden-Plover is a migratory shorebird commonly seen along existing ranch roads and in other open habitats on the project site. Neither the Common Amakihi nor the Pacific Golden-Plover are listed as threatened or endangered species.

The Short-eared Owl or "Pueo" (*Asio flammeus sandichensis*) is known to forage in agricultural fields and pastures and is frequently seen in the Kula and the Upcountry region. However, no Pueo were observed during the survey, and it is not listed as an endangered species on the Island of Maui. There are no rare, threatened, or endangered species on the project site, and there are no anticipated adverse impacts to existing fauna within the project vicinity. Construction of the off-site water main within Kula Highway should similarly not adversely impact important faunal species since the water main would be constructed within the existing paved highway.

Mammals found within the subdivision and surrounding vicinity are primarily common introduced species such as feral pigs (*Sus scrofa*), axis deer (*Axis axis*), mongoose, (*Herpestes* spp.) cats (*Felix catus*), and dogs (*Canis familiaris*). There were no endangered or threatened mammals recorded during the survey. Mammals found within the project site are primarily introduced species common to the area such as cats, Axis Deer, feral pigs, and Indian Mongoose.

On the island of Maui, the Hawaiian Hoary bat (*Lasirus cinereus semotus*) has been reported in a wide variety of habitats including native forest, alpine habitat, agricultural lands and ranchlands. Little is known about the life history and ecology of the Hawaiian Hoary bat, and the occurrence and abundance of the species on Maui has not been extensively studied. Some scientific studies suggest that the bats occur on Maui only as "migrants" from the Big Island, and others suggest that there may be a resident population on Maui (Bruner 1998).

There were no Hawaiian Hoary bats observed on the project site, and none of the mammals which were observed are listed as rare, threatened, or endangered species. As a result, the project should not have a significant adverse impact on mammals or negatively impact critical habitat. Construction of the off-site water main within Kula Highway should also not impact endangered mammal species since the line would be constructed within the existing roadway.

3.6 AIR QUALITY

The air quality in the Keokea region is considered good. The presence of almost constant northwesterly tradewinds and the fact that there are no point sources of airborne emissions result in high air quality at the project site and the immediate vicinity. Most of the existing airborne pollutants are attributed primarily to vehicle-generated exhaust from the region's roadways.

Other sources of airborne pollutants include fugitive dust and equipment emissions generated by agricultural machinery and activities. Additionally, smoke from sugarcane harvesting operations occurring in the Central Maui plain also contribute to airborne pollutants in the project area. However, these sources are considered intermittent and the generated particulates are quickly dispersed by the prevailing tradewinds.

Construction-related site work for the subdivision along with the off-site water main will be the most disruptive short-term activity on the environment. Site work involving clearing, grading, and grubbing operations will generate a persistent source of fugitive dust particle emissions. This fugitive dust will result in short-term adverse impacts to the air quality at the project site and adjacent areas.

The substrate underlying the project site is composed primarily of volcanic ash which does not retain water for long periods making it more susceptible to become airborne when disturbed. The physical characteristics of the substrate in conjunction with the almost constant northwesterly tradewinds create conditions which could potentially result in intensified dispersal of fugitive dust. Therefore, stringent dust control measures would be practiced to mitigate potential adverse impacts to air quality. Mitigation measures considered may include but would not be limited to the following:

- All roadway shoulders and other open areas outside of the roadways shall be stabilized with mulching and/or a water-based crusting agent.
- Roadways shall be continuously watered to control dust from construction traffic.
- Dust generated from equipment movements in the open areas shall be mitigated with truck or hose water spray for each piece of equipment.
- Course rock aprons and/or a soil-cement type polymer shall be installed at the entrances to Kula Highway to mitigate the dispersal of both dust and mud beyond the project boundaries.
- If necessary, special dust screens will be installed in the windows of adjacent residential homes and commercial establishments.
- The paving or planting of bare earth areas will be implemented as soon as practicable.

All pollution control measures will comply with applicable Air Pollution Control Regulations administered through the State Department of Health. Therefore, in addition to the proposed mitigation measures a dust control plan would be prepared, if required, to have the contractor minimize fugitive dust emissions in complying with these regulations.

3.7 NOISE QUALITY

Noise levels in the project site area are characteristic of its rural surroundings and are considered relatively low. Ambient noise levels in the vicinity of the project site are attributed to conditions (such as wind and wildlife), traffic along the Kula Highway, and agricultural activities involving the intermittent operation of equipment, such as tractors, sprayers, and trucks.

Construction-related noise, will be an unavoidable short-term and temporary impact upon the surrounding environment. Several noise sensitive areas, primarily residential properties, are situated north-northeast of the project site. Construction-related noise will be audible at different locations within the project site, and the levels of noise volume, frequency, and duration will vary. Noise characteristics will depend on the particular construction phase, duration of the phase, and types of equipment used. Noise is expected to be most pronounced during the early construction stages when heavy equipment is utilized for site clearing operations and infrastructure installation. Vehicles such as bulldozers, dump trucks, front-end loaders, material-transport trucks, and water tankers will be a primary source of noise throughout the project area when travelling along the region's roadways.

Stringent noise control measures will be implemented to mitigate potential adverse impacts to the surrounding area. Mitigation measures may include but not be limited to the following:

- Production equipment and personnel will work during daytime hours only (approximately 7:00 am to 5:00 pm).
- Water deliveries will be limited to the hours of 7:00 am to 8:00 pm.
- Water truck (on-site operations) will begin early in the day (approx. 6:00 am and run one-half hour past production operations end (approx. 5:30 pm).
- If construction operations require that crews work on Saturdays, notification will be given to adjacent homeowners prior to commencement of the work.
- Equipment mufflers or other noise attenuating equipment may be necessary if noise levels are determined to be excessive.
- Proper equipment and vehicle maintenance will be required to keep noise levels at a minimum.

Construction-related noise is not expected to exceed maximum permissible noise levels allowable to the property line limits. However, should such noise levels occur a permit would be obtained from the State Department of Health to allow these activities. This permit would include restrictions to adequately mitigate potential noise impacts resulting from short-term construction activities. All identified restrictions would be followed by the contractor.

3.8 VISUAL RESOURCES

Situated on the slopes of Haleakala, Kula provides expansive scenic vistas of the Central Maui isthmus, offshore islands, and the West Maui Mountains. There are several clearings throughout the project site which provide views of central Maui, and the northern and southern shorelines of the island. Mauka of the site, Haleakala is clearly visible, while makai of the site, the West Maui Mountains are visible.

The project site is vacant and undeveloped and is overgrown with vegetation dominated by introduced species including, black wattle trees, lantana, prickly pear cactus, and grasses. The surrounding area is typical of the rural-agricultural mix of the region consisting of small low-density rural communities interspersed with scenic expanses of pastoral, and farmlands

The Kula region includes a diverse range of scenic vistas and open expanses which typify the rural character of the region. The project site is situated at higher elevations ranging from 2,225 to 2,850 feet AMSL. This high elevation will maintain the views of the Central Maui plain and coastline presently available from the project site. The proposed subdivision is not part of a scenic corridor and will not adversely impact the visual resources of the surrounding area. In addition, construction of the off-site waterline will not impact visual resources or views since it would be located underground within the existing highway.

3.9 NATURAL HAZARDS

This section addresses those natural hazards applicable to the project. Of the potential natural hazards, earthquakes, hurricane, and tsunami and flooding hazards are addressed. There are no other known potential urban-related hazards applicable to the project such as airport clear zones, nuisances, or other site safety issues associated with the proposed subdivision.

3.9.1 Earthquake Hazards

Although difficult to predict, an earthquake of sufficient magnitude causing structural or other property damage may occur in the future. However, except for the island of Hawaii, the Hawaiian Islands are not situated in a highly seismic area subject to numerous earthquakes (Macdonald et al. 1983). Most of the earthquakes that have occurred were volcanic earthquakes causing little or no damage.

Earthquakes in the Hawaiian Islands are primarily associated with volcanic eruptions resulting from the inflation or shrinkage of magma reservoirs beneath which shift segments of the volcano (Macdonald et al. 1983). Maui is periodically subject to episodes of seismic activity of varying intensity. Earthquakes cannot be predicted with any degree of certainty or avoided, and an earthquake of sufficient magnitude (greater than 5 on the Richter Scale) may cause some damage to existing and future developments.

Although the possibility of earthquakes occurring on Maui are not considered to be high, potential damage to the proposed subdivision may occur from an earthquake of sufficient magnitude. However, damages to these facilities will be minimized since the design of the subdivisions infrastructure would meet or possibly exceed the minimum design requirements specified under State and County design standards. Thus, the risk of potential damage to this project will not be more than other existing land uses or infrastructure facilities on the island of Maui.

3.9.2 Hurricane Hazards

The three major elements of a hurricane making it hazardous are: 1) strong winds and gusts, 2) large waves and storm surge, and 3) heavy rainfall. A hazard mitigation report prepared by the Federal Emergency Management Agency after Hurricane Iniki in 1992 determined that nine hurricanes approached within 300 nautical miles (about one day's travel time) of the Hawaiian Island's coastlines between 1970 and 1992. Most hurricanes affecting the islands have focused on Kauai. Based upon a tracking of hurricanes since 1950, there appears to be no geographical or meteorological reasons why hurricanes miss the other islands but tend to steer toward Kauai (FEMA 1993).

Major hurricanes that have affected the Hawaiian Islands include Nina (November 30, 1957), Dot (August 6, 1959), Iwa (November 23, 1982), Estelle (July 23, 1986), and Iniki (September 11, 1992). All of these except Estelle have been most severe on Kauai. Iniki, which was a Class 5 hurricane, was the most powerful of these. Estimated maximum sustained winds over land were 140 mph with gusts to 175 mph, making Iniki the most powerful hurricane to strike the Hawaiian Islands in recent history.

A hurricane of significant strength and high winds passing close to the island could cause damages to existing buildings and structures on Maui. However, the potential for damages from a hurricane to the proposed subdivision should be minimal. The density of above ground structures will be limited since it will be designed with large amounts of open space for agricultural purposes. In addition, the proposed project is not situated in a coastal area and not susceptible to hurricane-related storm surge.

3.9.3 Flood Hazards

As designated by the Federal Emergency Management Agency Flood Insurance Rate Map for the island of Maui, the proposed project is located within Zone C. Lands within Zone C flood designations are considered areas of minimal flooding. As such there are no associated flood maps available for the project area.

CHAPTER 4 SOCIAL, ECONOMIC, AND CULTURAL ENVIRONMENT

This chapter discusses the existing social, economic, and cultural environment in the general area of the proposed subdivision, and the probable impacts resulting from the implementation of the project. Mitigative measures, if necessary, are also discussed.

4.1 ECONOMIC AND FISCAL CONDITIONS

Maui's economy has long been dependent upon the agriculture and tourism industries. The cultivation of pineapple and sugarcane and growth of tourism have been vital components in maintaining the stability of Maui's economy.

The Kula region with its fertile volcanic soils is heavily dependent upon agriculture as well. The region has become famous for producing a variety of high-quality produce and flowers which are exported to both domestic and international markets. Land uses in the vicinity of the project site are characterized by low-density rural residential properties, small farms, and lands utilized for agricultural cultivation and ranching activities. Agricultural and ranching activities have long been the driving forces behind the local economy in the Kula region.

On a short-term basis, the proposed project will support construction and construction-related employment. The projected preliminary construction budget for the subdivision project is estimated to be approximately \$10.2 million. As a result, the construction of this project would create numerous construction jobs over the construction period. Construction of the project would also generate additional personal income for construction workers. Personal income is defined as the wages paid to the direct construction workers or operational employees associated with a development.

Direct construction jobs created would typically consist of on-site laborers, tradesmen, equipment operators, supervisors, etc. Engineering jobs associated with the design and construction management work would typically consist of surveyors, design engineers, and administrative staff. It is anticipated that local residents employed within the engineering and construction fields would likely fill these project-related jobs.

State tax revenues would be generated as a result of the expenditure of money for the project's construction. Revenues generated would consist primarily of general excise taxes (GET) on development costs and construction materials, along with corporate income tax. In addition, GET taxes on indirect and induced income spent stimulated by the spending of direct income would also contribute new revenues to the State.

Once fully developed and occupied, the subdivision's residents are anticipated to contribute to the long-term support of both the local and regional economies through their cultivation and sale of agricultural products. For these reasons, the proposed project is anticipated to have only beneficial impacts on the socio-economic conditions of the area.

4.2 EXISTING LAND USE

The project site is located in the Kula region of Maui which is less densely populated and characterized by a mixture of rural and agricultural land uses. The region's fertile volcanic soils provide prime lands for agricultural activities. Only 150 acres of these fertile volcanic soils are required to produce more than 2 million pounds of the world-famous "Kula (or Maui) Onion" (Kepler, A.K., 1988). While centered around the onion, Kula also produces a variety of high-quality vegetables and flowers, which are exported to both domestic and international markets.

Land uses in the vicinity of the project site are characterized by low-density rural residential properties, small farms, and lands utilized for agricultural cultivation and ranching activities.

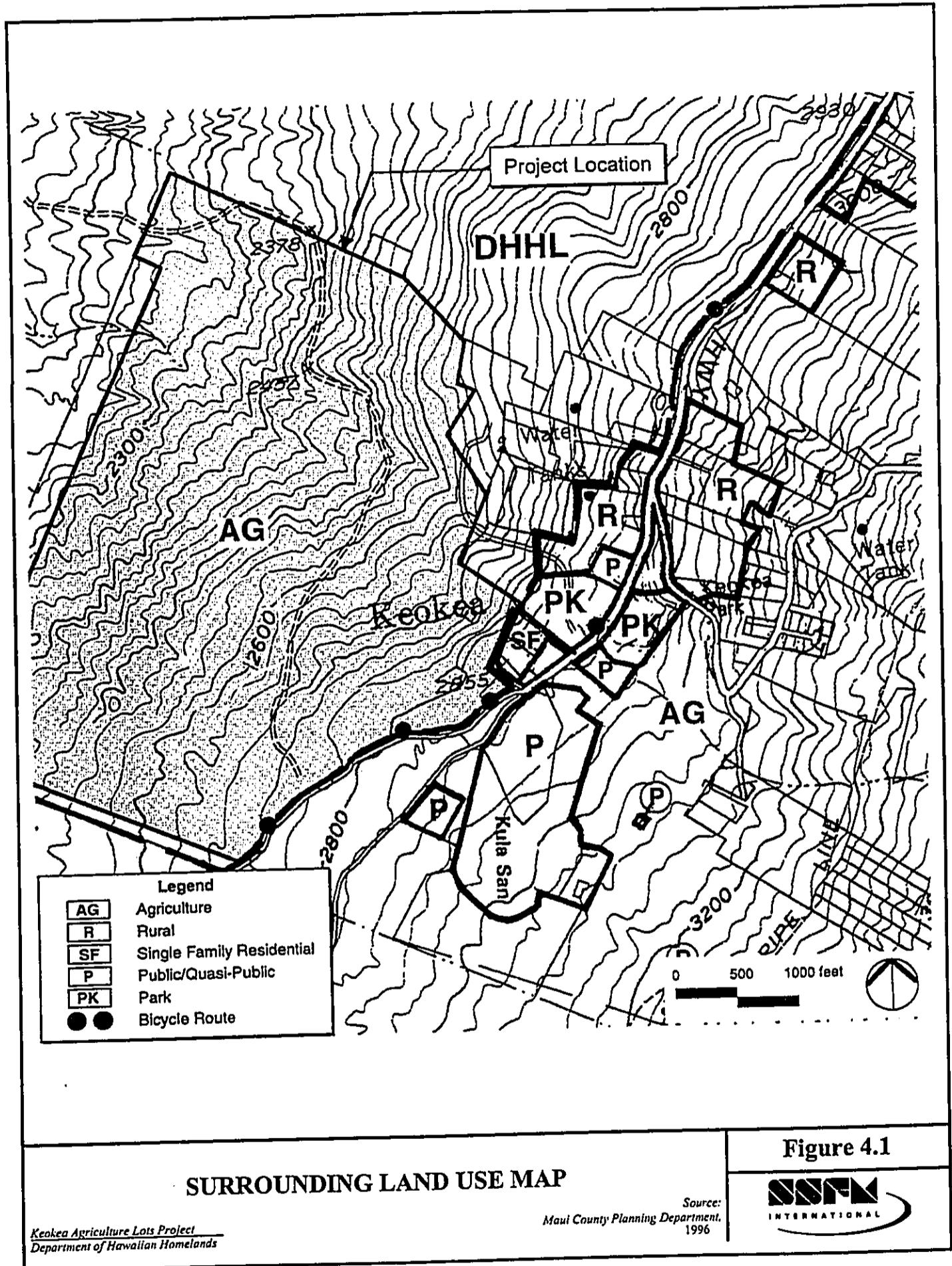
There are several solitary residential units bordering the eastern boundary of the site and agricultural zoned properties consisting of pastoral and undeveloped lands which border the project site's west and south sides.

As previously stated in Section 2.2, the project site is situated on predominantly vacant and undeveloped land, which was predominantly used for cattle grazing activities in the past. In addition to cattle grazing, the former Kula Sanatorium operated an incinerator unit which was formerly located in the southern portion of Lot 9. The incinerator was a relatively small unit used for the burning of hospital refuse. The Kula Sanatorium ceased incineration operations and closed the facility sometime in the late 1950's or early 1960's (K.H., 1998).

The land underlying the project site has been designated "Agricultural" by the State Land Use Commission (SLUC) and "DHHL" under the Makawao-Pukalani-Kula Community Plan. In addition to agricultural land use designations, the immediate site vicinity includes rural, park, single-family residential, and public/quasi-public designated lands. Surrounding land use designations are shown in Figure 4.1.

The County zoning designation for the parcel was previously categorized as "Interim" but has recently been changed to the Agricultural District. It should be noted that DHHL is exempt from County zoning rules and regulations.

The proposed subdivision will establish a low-density agricultural community on currently vacant lands. The proposed project will result in changes to land use density. However, the overall rural and agricultural character of the project will not be inconsistent with surrounding land uses.



Medical wastes may have been destroyed at the former Kula Sanatorium incinerator site in Lot 9. However, potential contamination of the soils at the former site in Lot 9 is unlikely as a result of the small volume of wastes incinerated and the many years which have passed since the incinerator was operational. If deemed necessary, future environmental investigations and remediation efforts will be undertaken at Lot 9 prior to occupancy or an alternate lot would be provided.

4.3 SOCIAL CONDITIONS

Community Character

The project site is part of the Makawao-Pukalani-Kula Community Plan region which includes a diverse range of physical and socio-economic environments. The region's temperate climate, fertile soil, and sweeping views have resulted in steady growth over the past few years. The project site is situated along the southwestern flank of Haleakala in an area which is generally characterized by low-density rural residential properties, small farms, and lands engaged in agricultural cultivation and ranching activities.

The Makawao-Pukalani-Kula region is generally considered to be a rural and agricultural community. Agricultural activities in the Kula region include both large-scale farming and ranching operations, and small-scale, family-run farmlots. The proposed agricultural subdivision and off-site improvements are anticipated to maintain and contribute to the existing rural, agricultural character of the Keokea area. Upon its completion, the subdivision will add to the social and agricultural diversity of the Makawao-Pukalani-Kula region.

This project should not have a significant indirect adverse impact on the character of this Upcountry region. Development of this DHHL property to serve beneficiaries has been planned for and is supported by the Makawao-Pukalani-Kula Community Plan (County 1996). A discussion of the project's consistency with this Community Plan is provided in later chapters of this document. Many residents residing in Keokea would involve existing Maui residents relocating from other areas of the island. Other residents relocating from outside the Island of Maui would be native Hawaiian beneficiaries of which a large percentage of the population is already present in this Upcountry region.

Population

Maui is the fastest growing county in the state of Hawaii. The population of Maui County has exhibited rapid growth over the past fifteen years with the 1995 population of 111,200 reflecting a 55.3 percent increase over the July 1980 population of 71,600. Growth in the County is expected to continue, with resident population projections for the years 2000 and 2010, estimated to be 123,900 and 145,200, respectively (Maui Economic Development Board, 1994).

As a whole, the population of Maui County has exhibited extremely rapid growth over the past 15 years. During this time period, the resident population of the Makawao-Pukalani-Kula region has grown rapidly as well. The 1990 resident population of the Makawao-Pukalani-Kula region was approximately 18,923. Regional projections for the years 2000 and 2010 reflect population estimates of 21,760 and 24,613, respectively. Compared to 1990, these estimates reflect increases of approximately 15 percent and 30 percent for the years 2000 and 2010, respectively (Munekiyo & Arakawa, Inc., 1996).

Assuming 3 to 4 persons per household and a total of 77 new households once fully developed and occupied, the proposed subdivision may contribute between 231 and 308 residents to the region's population. Including the future 40 lots associated with reserve Lot 82, this region may have an additional resident population of between 351 and 468 persons. However, this increase in resident population is not anticipated to have a significant adverse impact on the County's resident population or character of this Upcountry area. Lessees are permitted to only have a single residence on each lot.

The majority of beneficiaries receiving these individual lots are likely to consist of retirees who have been long waiting for their lots. These beneficiaries would likely be comprised of both existing Maui residents, beneficiaries from other islands within the State, and some from outside the State of Hawaii relocating here. Consequently, the actual resident population may be lower than that indicated since households may have two or possibly only one person residing there.

In addition, development of individual lots is likely to occur slowly over 10 or more years based upon DHHL's experiences with other non-turnkey type developments. As a result, the increase in residents would be spread out over many years and lots are gradually developed. This would reduce the impact of large sharp changes in the resident population of this region. It is estimated that about 30 percent or more of beneficiaries could be current Maui residents. Thus, this development would involve a relocation of existing residents from other areas of the island to Keokea that would lessen the actual potential increase in the County's resident population.

Based upon prior non-turnkey type homestead developments, it is anticipated that lessees will gradually develop and move onto their individual lots over many years. Some lessees may relocate to Keokea when they retire or slowly transition over. Thus, full occupancy of this development would occur gradually over time, and may occur over 10 or more years. Therefore, this project is not anticipated to adversely impact the demographics or character of the region.

4.4 ARCHAEOLOGICAL AND CULTURAL RESOURCES

The Keokea area and the Makawao-Pukalani-Kula region as a whole is rich in Hawaiian culture and history. Early Hawaiian settlement is evident from the large numbers of archaeological sites in the region, and there are numerous recorded and unrecorded Heiau, stone

walls, building platforms, and petroglyphs which provide evidence of intensive habitation and land use well before the arrival of Captain Cook to the Hawaiian Islands in 1778 (Maui County Planning Department, 1996).

4.4.1 Archaeological Research

An archaeological inventory survey of the DHHL's Keokea and Waiohuli sites was conducted by Paul H. Rosendahl, Inc. (PHRI) in 1989 and is attached as Appendix D. The inventory survey encompassed the entire 351 acre Keokea project area, and included aerial reconnaissance as well as variable-intensity pedestrian surveys. A total of 159 sites were identified during the survey, 108 of which were located in the Keokea project area. Of these 108 sites, the PHRI survey recommended a total of 14 sites for preservation.

State Historic Preservation Division (SHPD) was consulted to confirm the significance assessments of the 108 sites identified by PHRI's archaeological inventory survey. SHPD indicated that since the time the PHRI study was completed, SHPD researchers had conducted extensive surveys of large areas in the Keokea area for DHHL. These surveys include a 1994 survey of areas within the proposed project site and subsequent site inspection on November 23, 1998. Results of the additional archaeological research of the project site were summarized in two letter-reports prepared by SHPD on September 23, 1998 and June 15, 2001. These correspondences updated the status of archaeological and historic resources and are included in Appendix E.

The subsequent SHPD studies have somewhat affected the mitigation recommendations set forth in the 1989 PHRI survey, and a detailed discussion of the archaeological resources within the project is provided below.

The PHRI study identified a total of 108 sites within the project area. Of these 108 sites, a total of 14 sites were recommended for preservation. These 14 sites were 2028, 2029, 2031, 2033, 2064, 2069, 2084, 2089, 2091, 2097, 2311, 2316, 2322, and 2339.

In summary, PHRI assessed ninety-four (94) of the 108 sites as significant solely for information content. Eighty-nine (89) of the 94 sites were recommended for further data collection, while five (5) required no further work. Recommendations for the remaining 14 sites were as follows: Four (4) sites were assessed as significant for information content and as culturally significant. Three (3) sites were assessed for further data collection and preservation with interpretive development. Another three (3) sites were assessed as significant for information and cultural value and were recommended for further data collection and preservation as is. Three (3) other sites were recommended for further data collection and provisionally recommended for preservation as is. The remaining site was recommended for preservation "as is".

SHPD recommends a total of 18 sites for preservation. However, the sites recommended by SHPD differ somewhat from those recommended by PHRI. Based upon additional archaeological work, SHPD finds that Sites 2091 and 2069 no longer required preservation, but does recommend several additional sites for preservation (See Appendix E).

The sites recommended for preservation by SHPD are varied and include burial features, habitation sites, religious sites, and a large agricultural complex. Archaeological sites to be preserved are summarized in Table 4.1 and their locations within the proposed subdivision are shown in Figure 4.2.

**Table 4.1
Archaeological Sites to be Preserved**

State I.D. No.	PHRI I.D. No.	Subdivision Lot No.	Resource Description
2028	K-3	41	Burial or Possible Burial
2029	K-6	52	Permanent Habitation and Agriculture
2033	K-48	52	Agricultural Terrace and Unlabeled House Structure
2049	K-5	52	Permanent Habitation and Agriculture
2060	K-21	35F	Small Religious Site
2062	K-26	52	Permanent Habitation and Agriculture
2063	K-27	52	Permanent Habitation and Agriculture
2064	K-29	52	Permanent Habitation and Agriculture
2084	K-62	52	Habitation, Possible Shrine and/or Possible Burial
2089	K-71	24	Burial or Possible Burial
2092	K-79	52	Agricultural Complex
2097	K-87	14	Burial or Possible Burial
2099	K-90	62	Papakea Heiau
2311	K-107	62	Burial or Possible Burial
2316	K-115	78	Habitation/Agriculture Features w/Terraces
2322	K-134	68	Religious Site or Permanent House
2339	K-207	70	Burial or Possible Burial
1037	K-30	52	Molohai Heiau

Of the 18 sites recommended for preservation, eight (8) are located within Lot 52. Lot 52 is a large 29-acre lot that will remain undeveloped and function as a permanent Historic and Cultural Preserve within the subdivision. Final design plans for the proposed historic preserve have not yet been developed. One possible concept for the historic preserve could be the development of a walking trail that would include signage identifying historic and cultural artifacts. Such an option would be an asset by establishing a large open area within the subdivision that provides recreational and educational opportunities to future residents.

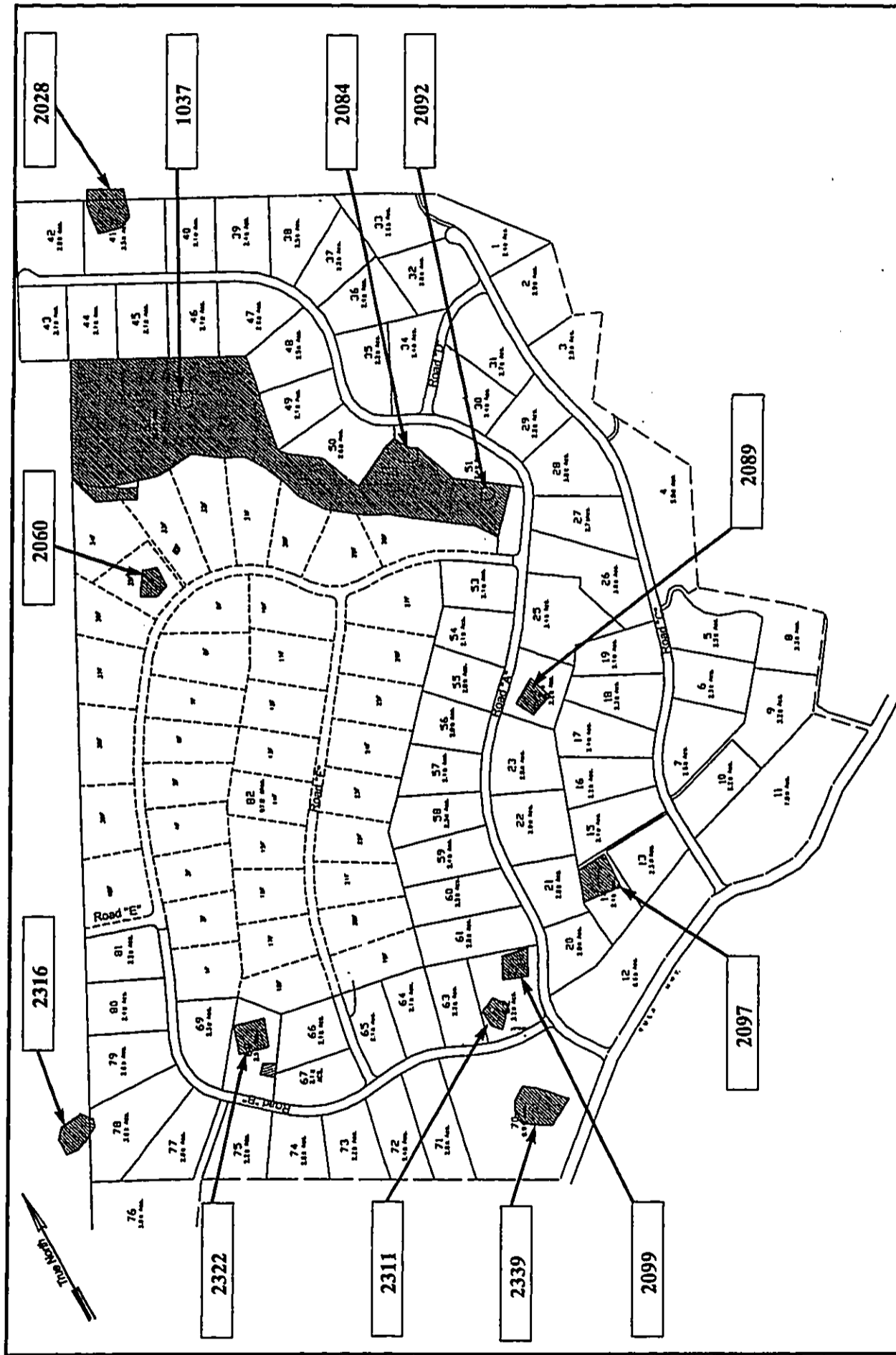


Figure 4.2



ARCHAEOLOGICAL SITES AND BUFFER ZONES

Keokea Agricultural Lots Project
Department of Hawaiian Homelands

Proposed Mitigative Measures

The project site includes both numerous and diverse significant historic sites which include burials that must be protected with limited access, historic sites that are to be preserved as-is, and other sites that are to be interpreted for public educational benefits. Mitigation measures recommended by SHPD consist of the development of three separate mitigation plans. The mitigation strategy for the project site will include the following plans:

1. A Burial Treatment Plan
2. A Preservation Plan for Non-Burial Sites
3. An Archaeological Data Recovery Plan

SHPD has agreed to prepare the Preservation and Data Recovery Plans for the site and has also assisted in establishing the protection areas for the burials. SHPD has established buffer zones for all sites committed to preservation and Figure 4.2 shows the established buffer zones for these sites. It should be noted that the buffer zone for Site 2028 was enlarged at the request of the Maui Island Burial Council. As a result, the buffer zone for Site 2028 extends beyond the northern border of the project site. In general, the preservation plan will consist of the following elements:

- Establishing permanent buffer zones around sites to be preserved (Buffer zones for non-burial sites have already been established and buffer zones for burial sites have been recommended).
- Development of interim protection measures during land altering construction activities. In general protection measures would consist of 6-foot high, plastic construction fencing which would be erected along the site buffer (border) and briefing of construction crews by the site archaeologist. Additionally, construction would not begin until SHPD verifies that appropriate protection measures are in place.
- Development of long-term preservation measures. For burial sites, a burial treatment plan would be developed. This plan would address how burials would be protected and how access to sites would be controlled. The burial treatment plan would also establish how burials will continue to be protected over time. Non-burial sites paths, signage, and access issues will be addressed with regard to long-term preservation efforts.

Additional temporary mitigation measures may also be implemented to protect historic sites from damage prior to the start of construction activities. It is recommended by SHPD that low (cattle-type) fencing be installed around some of the sites (for example Lot 52 the historic preserve) to ensure that accidental damage to the sites is prevented.

In addition to the sites that require preservation, there are numerous sites that will require data recovery work. As mentioned earlier SHPD will be preparing the Data Recovery Plan for the project site. Data recovery of historic sites will either be accomplished prior to the start of or during construction activities. The latter would require the establishment of interim protection measures such as fencing and briefing of construction crews and beneficiaries receiving lots. Once data recovery efforts have been completed these sites will no longer need to be preserved.

Upon completion, the mitigation plans will identify appropriate protection measures for all *historic sites and burials during construction activities and after completion of the subdivision*. Additionally, SHPD will have the authority to inspect and approve all implemented protection measures prior to any land altering construction activities.

Close coordination efforts with the SHPD will continue to ensure that appropriate protection and preservation measures are developed. Mitigation and preservation measures established by SHPD will be incorporated into all future construction plans. Additionally, future lot owners will be notified of the presence of archaeological sites on their lots that have not yet undergone data recovery or the presence of archaeological sites on their lots designated for preservation. Mitigation and preservation concerns will also be explained to the awardees.

In the event human burials are inadvertently unearthed during construction activities, all work in the vicinity of the burial shall cease, and SHPD and the Maui/Lanai Islands Burial Council shall be immediately notified. Upon implementation of the SHPD's recommendations, it was determined that the proposed project should have "no adverse affect" on the significant historic sites.

4.4.2 Cultural Impact Assessment

A cultural impact assessment was conducted in May 2001 to research traditional cultural resources and practices within the project site and surrounding area. The study involved a literature search and oral interviews with life-long residents of Keokea and is included as Appendix F. The information presented in this section is taken in large part from the cultural impact assessment. This section summarizes the assessments findings and potential impacts to cultural resources or practices.

Historical Background

The cultural impact assessment revealed the rich and diverse history associated with the Kula and Keokea areas. The "Kula" lands (or dry lands) of this area of Maui have historically been associated with agricultural use. As early as the 1840's Irish potato was cultivated as a major agricultural crop. In addition to potatoes, Kula farmers planted corn, beans, onions, cabbage, wheat and other grains. By the late 1800's and early 1900's a large Chinese population had settled in Kula, with many turning to farming as a livelihood. While sugar cane cultivation

was a significant agricultural element in local history, the Kula area has historically been used for ranching and small-scale farming.

The subject area has been an area long-used for human habitation, with historical references dating back to the 1785 “Battle of the pig-eating Ku-keawe” (PHRI, 1989). There are 11 Land Commission awards either within or bordering the Keokea parcel. The bulk of the parcels is designated as “kula” lands which were used for cultivation for personal use, as well as for ranching and cash crops (Munekiyo, 2001).

Cultural Perspectives

The historic and archaeological context of the property and surrounding environs, indicates a once active community which utilized the land for agricultural, residential and religious purposes. Past cultural practices associated with the property relate to gathering activities, religious, as well as day-to-day lifestyle activities.

In traditional terms, gathering involved both cultivated and non-cultivated items which allowed residents the opportunity to supplement their daily needs (MacKenzie). Items gathered were used for medicinal, ornamental, practical, aesthetic and ceremonial purposes. The pre-contact subsistence lifestyle however, gradually transitioned to a mercantile and finally an industrial economy which contributed to the decline of traditional gathering practices.

With regard to Native Hawaiian religious concepts, MacKenzie notes that “to Hawaiians, religion was a way of life”. “Hawaiian religion also encompassed ceremonies, rites, and a prescribed code of conduct.” It is in this context of spiritual commitment that Native Hawaiian burial practices have been defined. Beliefs and customs related to burial practices involved both the physical material of a person (na iwi or bones) and the spirit (‘uhane). Na iwi, both highly respected and guarded, are placed in the ground to become a part of the Haumea (earth) in perpetuity. Respect for the deceased was also expressed as ho’omoe pu (“put to sleep together”) where valued objects or articles are buried with the deceased. It is in the context of these practices and beliefs that burial sites are viewed as guarded and treasured (Munekiyo, 2001).

Assessment of Impacts

Archaeological findings within and around the subject property, indicates past intensive use of the lands for agricultural, residential and religious purposes. Over approximately the past century, the property has been leased out by the DHHL for cattle grazing purposes and for agricultural uses for the Kula Hospital. Given this recent historical use of the property for ranching and agriculture, and as supported by informant observations, Native Hawaiian cultural practices are no longer conducted at the site. The transition to post-contact economies has shifted land use and cultural practices away from one that is subsistence-based to one that is based on large-scale agricultural and industrial technology.

Current conditions notwithstanding, archaeological sites which reflect past practices have been documented on the property. Based on reviews conducted by the SHPD, seventeen (17) sites are recommended for preservation. These sites include the burial sites, a large agricultural terrace, a permanent habitation and the Papakea heiau. In the adjacent area, the Molohai heiau, a permanent habitation site, a religious site or high ranking residence and a habitation site with an enclosed sinkhole and agricultural features are recommended for preservation as well.

The proposed action will subdivide the project site to create agricultural lots averaging 2.0 acres to 2.5 acres in size. The use of the land for agricultural/residential purposes to replace the more recent cattle grazing and agricultural use is not inconsistent with the area's past use for similar purposes. Moreover, the recommendations for archaeological mitigation, including site preservation, is intended to recognize the significance of past practices in the context of the subject property's local history. The combination of preservation and related mitigation measures along with a land use pattern reflecting past tradition is deemed to be appropriate in terms of recognizing the cultural practices and beliefs which once took place on the land (Munekiyo, 2001).

4.5 SECONDARY AND CUMULATIVE IMPACTS

Secondary Impacts

Secondary impacts, or indirect effects, are effects which are caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable. Such effects may include growth inducing impacts and other effects related to changes in land use patterns, population density or growth rate, and related effects on air, water, and other natural systems.

The Keokea agricultural subdivision would involve some secondary impacts due to inevitable changes in the resident population associated with this Upcountry region. Related to this resident population change would be corresponding effects on public facilities such as children attending schools, demand for park facilities, and additional demands on infrastructure systems. The off-site water main with Kula Highway is not expected to generate secondary impacts since it is intended to directly serve the Keokea development.

These indirect effects resulting from the Keokea project were appropriately addressed under the various sections of this document covering public facilities and infrastructure systems. As discussed in these various sections, the additional demands created are not expected to have a significant impact on these public facilities and infrastructure systems. Necessary infrastructure improvements would be implemented and coordinated with the appropriate agency.

Impacts associated with the social environment and community's character were also previously addressed. As discussed, this Keokea agricultural subdivision is not expected to result in a significant increase of new residents migrating to the Island of Maui because many of

the lots (about 30%) are intended to serve existing DHHL beneficiaries on the island waiting for homestead lots. Consequently, many of the new residents living in Keokea would likely involve the relocation of existing residents from other areas of the island. Other residents would be those from other islands within the State of Hawaii and beneficiaries outside the State relocating back here. Furthermore, the majority of beneficiaries are anticipated to consist of retirees.

The relocation of existing island residents (DHHL beneficiaries) to Keokea would indirectly result in slightly lower demands on public facilities (schools, parks, etc.) and infrastructure (water demand, sewer generation, etc.) services from other parts of the island. Although difficult to predict what areas of the island beneficiaries would be relocating from, it is expected that this movement should result in only slightly lower demands being generated from the various areas of the island.

Cumulative Impacts

Cumulative impacts are impacts on the environment that result from the incremental impact of a project when added to past, present, and reasonably foreseeable future actions. The DHHL Waiohuli residential subdivision located less than a mile northeast of the project site may generate some cumulative impacts which are addressed.

The infrastructure and creation of lots for this Waiohuli subdivision is completed, and is expected to begin leasing lots to beneficiaries before the end of this year. This development involves the establishment of 386 residential lots for DHHL beneficiaries, and an environmental assessment was completed for it in 1996 (Munekiyo & Arakawa, Inc. 1996). Consequently, development of these residential lots would occur within the timeframe where construction of the Keokea infrastructure occurs. In addition, development of residential and agricultural lots from both projects would occur somewhat concurrently over many years.

The cumulative effects of short-term construction activities occurring for both the Keokea project area and Waiohuli residential lots are not expected to be significant. Construction of the infrastructure for the Waiohuli subdivision has already been completed. Thus, remaining activities will involve construction of individual homes by lessees likely to occur slowly over several years (likely 10+ years based upon DHHL experience with other non-turnkey type developments). These activities would not involve large scale construction activities or disturbances.

Construction of infrastructure improvements for Keokea would be limited to the project site and other off-site improvements occurring over the next one to two years. These activities would be short-term, and contractors would incorporate appropriate Best Management Practices to minimize impacts and comply with all pertinent State and County requirements. Thus, the cumulative effects of both these activities should not be significant or adverse to the community and environment.

Other potential cumulative impacts from development of both Waiohuli and Keokea would involve effects on infrastructure facilities and public facilities. The impacts of these developments have been addressed under the appropriate sections of this document. The cumulative impacts of these developments are not expected to be significant. Necessary infrastructure improvements would be provided and coordinated with pertinent agencies.

A water master plan was developed and coordinated with the County which included both the Waiohuli and Keokea developments. Other off-site water system improvements would be developed for the future lots (reserve and community/commercial lots) planned within Keokea. A traffic study was conducted that included both developments, and determined that off-site improvements for Kula Highway were not required. Improvements to address geometric conditions at Keokea will be coordinated with the State Department of Transportation.

Regarding public facilities, a 16-acre lot within Waiohuli is planned to serve as a future park. This property is more than required to meet the County's park dedication requirements for both Waiohuli and Keokea even though such requirements are not applicable to State agency initiated developments. Effects on school facilities were also addressed, and adding the Keokea project should not be significant given that the majority of lessees are expected to be retirees. In addition, development of individual lots would occur over many years reducing the impacts associated with sudden increases in student enrollments.

CHAPTER 5 INFRASTRUCTURE AND PUBLIC FACILITIES

This chapter addresses the project's probable effect on existing infrastructure and public facilities in the project vicinity by the proposed subdivision.

5.1 WATER FACILITIES

Water service to the Makawao-Pukalani-Kula region is provided by the Maui County Department of Water Supply (DWS). The region is supplied primarily by surface water sources, and distribution is handled by the Makawao and Kula systems.

The Kula system consists of an upper and lower system, with the upper system located at the 4,000-foot elevation and the lower at the 3,000-foot elevation. The upper system collects water from Haipuaena, Puohakamoa, and Waiakamoi Streams, while the lower system diverts water from the Haipuaena, Puokakamoa, Waiakamo, and Honomanu Streams.

Major storage reservoirs supporting the Upper Kula System include the upper Waiakamoi dam/reservoir, the lower Waiakamoi concrete dam, the Waiakamoi and Olinda tanks, and the Kahakapao Reservoir. These facilities provide the Upper Kula System with an additional 140 million gallon storage capacity. Additionally, during periods of drought, the Kula system is also supplemented by water pumped from the Makawao system (Munekiyo & Arakawa, Inc., 1996).

The existing water system that would serve the Keokea project site consists of a 200,000 gallon water reservoir situated along Kula Highway on a lot in the Waiohuli subdivision. This water reservoir is intended to serve both the Waiohuli subdivision and Keokea project. The County DWS has committed a total of 500,000 gallons per day toward both this Waiohuli subdivision and Keokea agricultural subdivision from their Lower Kula Water Treatment Plant at Piihola by entering into and executing a "Water Credits Agreement," dated December 9, 1997, with DHHL (R.T. Tanaka Engineers 1996).

Probable Impacts And System Improvements

The Keokea project would involve the development of agricultural lots for lessees and subsequently generate increased demand for potable water for domestic service. A water master plan was developed for this project to estimate increased demands and determine necessary water system improvements. The project was estimated to generate a total of 118,200 gallons per day based upon the projected demands shown below for the entire development:

Agricultural Lots (77 lots)	46,200	gallons (domestic use only)
Future Commercial / Community Lots (3 lots)	48,000	gallons (assumed 33% of lot usable due to slope)
Future Reserve Lot (Lot 82 – 40 future lots)	24,000	gallons
Historic Preserve Lot (Lot 52)	<u>0</u>	gallons
Total Projected Demand	118,200	gallons

A water master plan was developed in 1996 and approved by the County DWS for the Waiohuli subdivision and the Keokea agricultural subdivision (R.T. Tanaka Engineers 1996). Pursuant to this water master plan, 500,000 gallons of water were committed by the County DWS for these developments. The Water Credit Agreement (December 9, 1997) between the County DWS and DHHL calls for allocating potable water for 77 lots for the Keokea project corresponding with the initial development plan phase. This allocation will be solely for domestic use only. DHHL will continue to work with the County DWS to address obtaining water allocation for the future lots planned as part of this Keokea project.

Water system improvements for this project are identified in a Keokea water master plan developed. Under this master plan, the Keokea site is divided into four service zones ranging from upper service Zones 1 and 2 closer to Kula Highway, and lower service Zones 3 and 4 situated at lower elevations. Water from the “Kula” water reservoir located in the Waiohuli development would be used to service the 77 lots. As a result, an off-site 12-inch water main will be constructed within Kula Highway from this reservoir to the Keokea development.

On-site improvements within the Keokea subdivision would consist of a new 0.2 million gallon water reservoir to service lower Zones 3 and 4 along with both 8- and 12-inch water lines and accessories within the subdivision access roads. The preferred location being considered for the on-site reservoir is on Lot 21. However, the final location of this reservoir would be determined during more detailed design work. Upper service Zones 1 and 2 would be serviced from water lines branching off from the 12-inch water line along Kula Highway. Figure 5.1 shows both the off-site and on-site potable water system improvements planned as part of this project to provide lessees with domestic water service. The potable water system serving the Keokea subdivision will be constructed in accordance to DWS standards.

A separate irrigation system is also planned to supply Keokea lessees with non-potable water for agricultural activities conducted on individual lots. This non-potable water system will be designed and installed as a future separate “dry-line” irrigation system. This system is referred to as a “dry line” because it will not be immediately connected to its proposed water source. The irrigation line will remain “dry” until such time that a proposed transmission line is connected to it. The Upper Kula System would be the water source intended to serve this irrigation system, and the State Department of Agriculture will be overseeing the design, installation, and connection of the water line to the subdivision’s irrigation system.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

Agricultural Lots (77 lots)	46,200	gallons (domestic use only)
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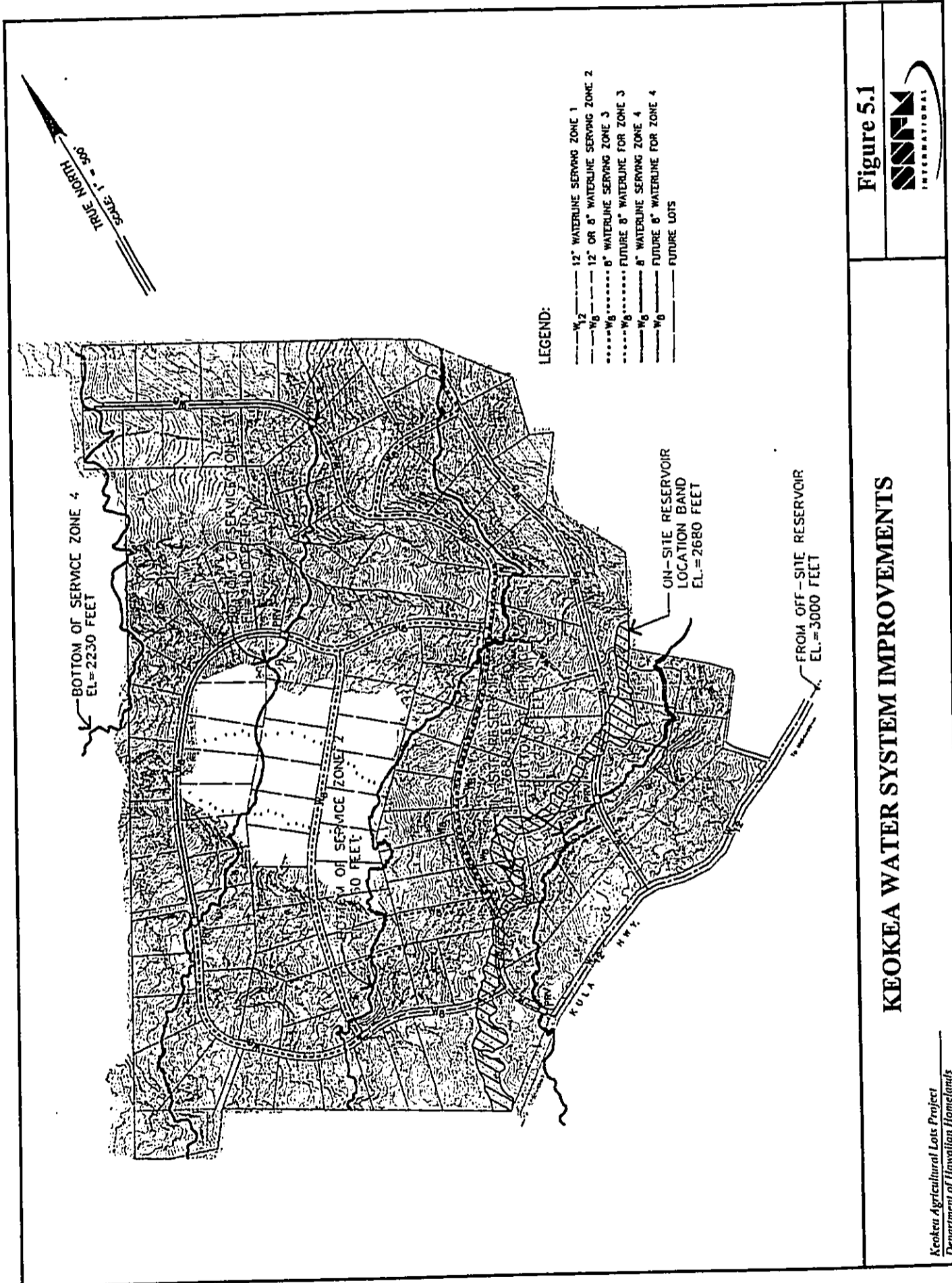


Figure 5.1



Based upon the projected demands and coordination efforts being conducted between DHHL and County DWS, this Keokea project is not expected to have a significant adverse impact on the County's existing water system. DHHL will be funding its share of necessary water system improvements to serve this Keokea development, and appropriately coordinate such efforts with County DWS. The development of future lots (reserve Lot 82) along with the three larger lots fronting Kula Highway would be dependent upon obtaining necessary allocations from the County DWS.

5.2 WASTEWATER FACILITIES

The Makawao-Pukalani-Kula region is currently not serviced by a County wastewater treatment system. A portion of Pukalani is serviced by a private wastewater treatment system, however, the remainder of this Upcountry area consists of individual wastewater systems comprised of cesspools or septic tanks (Munekiyo & Arakawa, Inc., 1996).

The State Department of Health (DOH) has established critical wastewater disposal areas throughout the State where the use of cesspools are severely restricted or prohibited. These critical wastewater disposal areas are designated by advisory committees established for each county (DOH 1991). The Keokea project site is situated within an area designated as a non-critical wastewater disposal area by the County of Maui, Wastewater Advisory Committee.

The State DOH regulations governing the utilization of cesspools were amended in 1991 restricting further cesspool use throughout the State. However, specific areas on various islands were exempted from these rule amendments due to negligible potential for groundwater contamination. On the island of Maui, only one area has been designated as exempt from State DOH restrictions on cesspool development and use. This exempted area occupies a large area of land on the southwestern slopes of Haleakala which includes the Keokea project site. As a result, the utilization of cesspools within the Keokea project site is permitted¹

Individual lots developed by lessees as part of this Keokea project would utilize individual wastewater systems consisting of either septic tanks or cesspools due to the absence of a County wastewater system serving this region. These individual wastewater systems are not expected to have a significant impact on groundwater resources or the surrounding environment.

The project site and surrounding areas were designated as a non-critical wastewater disposal area permitting these types of wastewater systems. This designation considered various factors to protect groundwater resources such as the water table, soil and rock formation, and terrain. Furthermore, as a condition of their lease agreements, each lessee's individual wastewater system would need to be designed by a licensed engineer, and plans submitted to the

¹ Telephone conversation with Department of Health Wastewater Branch staff
Harold Yee, June, 2001.

DOH for their review and approval. Systems would be designed to meet requirements prescribed under the DOH's Administrative Rules regulating wastewater systems (Title 11, Chapter 62).

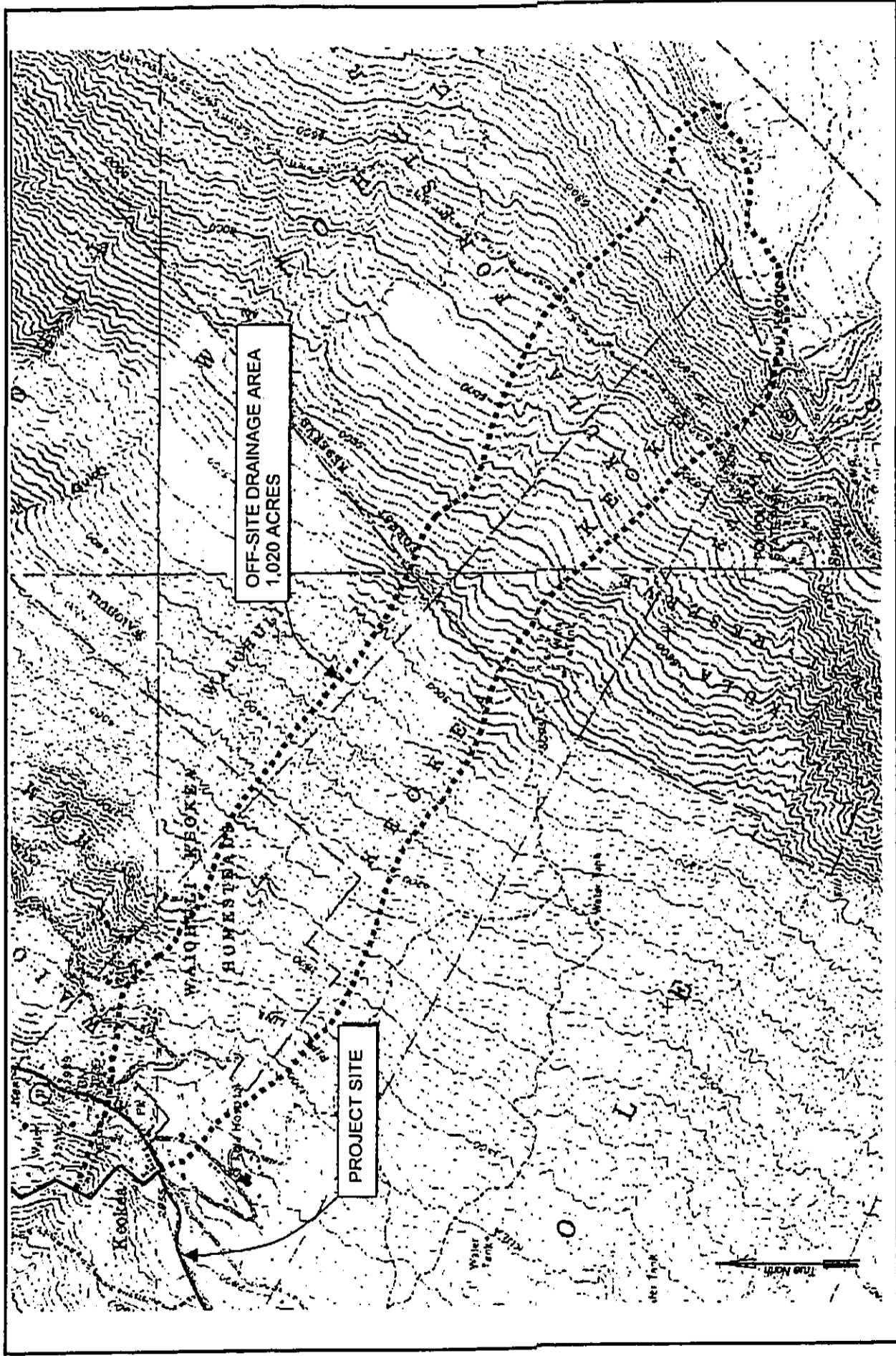
5.3 DRAINAGE FACILITIES

Most of the developed and agricultural areas in the Kula region are located between the 1,500 to 3,000-foot elevations. This Upcountry region can be characterized as having broad, rolling ridge tops, deep, precipitous gulches, and slopes increase along ridges as the terrain ascends in elevation. There are many gulches that separate the region's arable lands into smaller areas, making the Upcountry area well suited for smaller-scale agricultural operations.

There are no surface streams located within the project site to which storm runoff directly discharges. Runoff sheet-flows in a northwesterly direction across the project site where it eventually enters an un-named gulch located west of the project site. Runoff entering this off-site gulch continues downstream where it is ultimately discharged into the ocean in the area approximately one mile south of Laie. The eastern terminus of this un-named gulch extends into the project site. Coordination efforts with the U.S. Army Corps of Engineers previously determined that there were no jurisdictional waters within the project site, and subsequently no Department of the Army Permit is required. A copy of a letter confirming this is included in Appendix A.

An off-site drainage basin approximately 1,020 acres in size drains toward the project site from an easterly direction. Figure 5.2 shows the location of this off-site drainage basin in relation to the project site. Off-site flows would enter the project site at its eastern boundary and run in a northwesterly direction across the site. Figure 5.3 illustrates the approximate flow of surface runoff through the project site. Preliminary peak off-site runoff quantities were determined for 10-year, 50-year, and 100-year storm events and are summarized in Table 5.1 below.

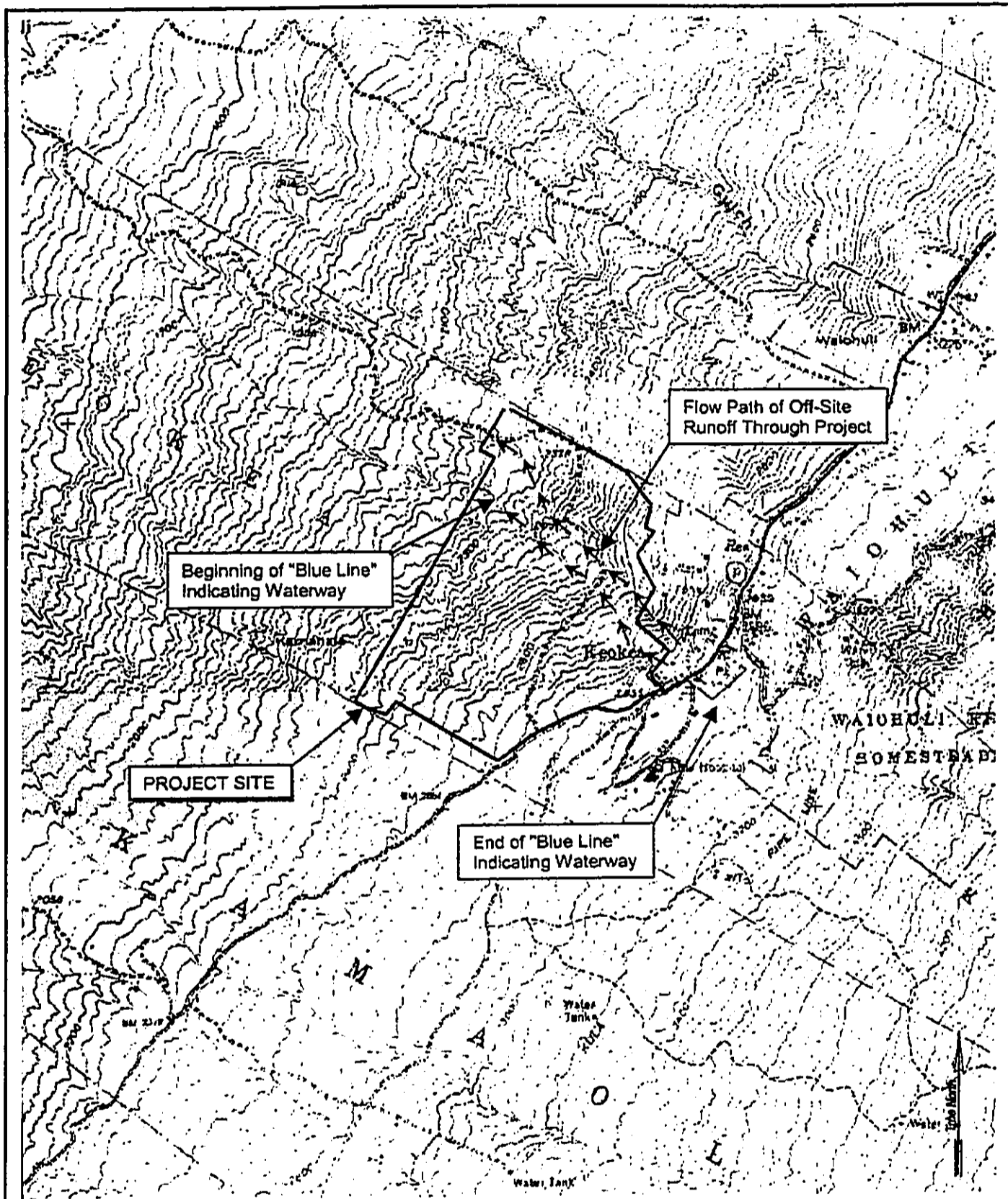
Table 5.1 - Off-Site Runoff Quantities			
Storm Frequency (in years)	10	50	100
Rainfall (inches in a 24-hour period)	7.8	11.0	12.5
Surface Runoff (inches)	2.65	5.00	6.20
Peak Discharge (cubic feet per second)	844	1779	2271



OFF-SITE DRAINAGE AREA MAP

Keokea Agricultural Lots Project
Department of Hawaiian Homelands

Figure 5.2
SSNN
INTERNATIONAL



KEOKEA AGRICULTURE LOTS RUNOFF FLOW

*Keokea Agriculture Lots Project
Department of Hawaiian Homelands*

Figure 5.3

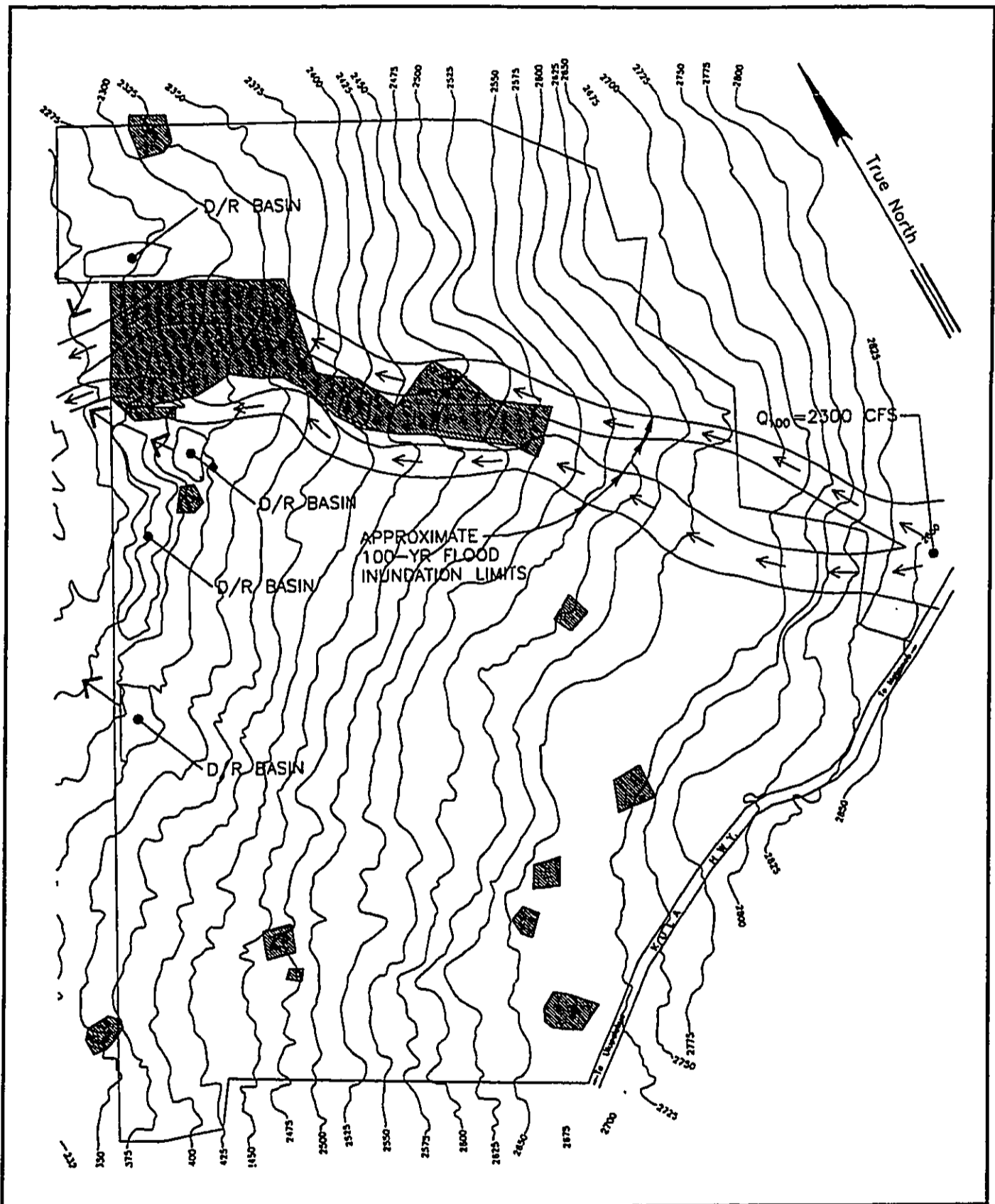


As shown in Table 5.1, the 100-year storm flow is greater than 2,200 cubic feet per second. Due to the large off-site drainage area and flow path of water across the project site, the County requires the designation of 100-year flood inundation limits through the project site. Figure 5.4 shows the approximate locations of the inundation limits and proposed detention/retention basins. All proposed lots that occur within the 100-year flood inundation limit will be designed to incorporate appropriate drainage reserve measures. The primary components of proposed drainage improvements would consist of the following:

- A roadway collection system consisting of shoulder swales, grated drain inlets, and drainlines with inlets spaced to confine design flows to the roadway shoulder swales.
- Drainlines that will function to take collected flows to detention/retention basins or directly into drainage ways.
- Drainage culverts with inlet and outlet structures in areas where roads cross major drainageways.
- Grassed swales for “flat” sections of roads with flow velocities of five feet per second or less.
- Concrete swales for “steep” sections of roads with flow velocities greater than five feet per second.
- Detention/retention basins located at lower elevations within the site (Figure 5.3).
- Spillway and overflow structures from detention/retention basins into existing drainageways.
- Diversion ditches would be provided to reduce cross-lot runoff.

During the construction phase of the project, potential short-term impacts from erosion could occur as a result of on-site storm water drainage patterns. To minimize potential adverse impacts resulting from construction-related activities, the following erosion and sedimentation control measures listed below would be considered for implementation.

- Minimize the time of construction activities
- Retain existing ground cover as long as possible during construction activities
- Establish drainage control features early in the construction process
- Use of temporary area sprinklers in non-active construction areas where ground cover has been removed.
- Where needed utilize temporary berms, cut-off ditches, or silt screen fencing to control soil erosion.
- Utilization of on-site water tankers for immediate sprinkling in active construction areas on an as-needed basis.
- Application of water to graded areas after construction activity has ceased for the day and on weekends and holidays.



FLOOD INUNDATION LIMITS

Figure 5.4

*Keokea Agriculture Lots Project
Department of Hawaiian Homelands*



- Sodding and planting of all cut and fill slopes immediately after grading work has been completed.
- Upon completion of finish grading, cover all exposed areas with grass or an appropriate cover material.
- Implementation of appropriate measures to prevent sediment-laden runoff from leaving the project site.

To further minimize impacts, Best Management Practices would be considered for inclusion into the subdivision design plans. Such practices would be implemented by the contractor to minimize erosion and other impacts. Additionally, appropriate coordination would also be conducted with pertinent agencies during the normal construction plan review process to address applicable regulations and other requirements to address concerns during the project's design.

After project completion, proper drainage of on-site storm water runoff will be achieved by the construction of drainlines and paved and grass swales with inlet grates within the proposed roadway right-of-way. Additionally, drainage culverts, with inlet and outlet structures, will be provided under certain sections of the roadway to efficiently convey drainage flows through the project site.

No adverse impacts are anticipated as a result of drainage as both temporary and permanent erosion and sedimentation control measures would be implemented. Compliance with erosion control measures specified in the regulations of County, State, and Federal agencies will be adhered to during construction activities.

5.4 SOLID WASTE FACILITIES

Residential waste collection services are provided by the County of Maui on a weekly basis. Residential solid waste disposal is also provided on a weekly basis by the County's Department of Public Works and Waste Management (DPWWM), Solid Waste Division.

Since the closure of the County's Makani Sanitary Landfill in Makawao in June 1992, all solid waste generated in the Upcountry region is transported to the Central Maui Landfill off Pulehu Road. The Central Maui Landfill accommodates approximately 146,000 tons of waste annually. Of this amount approximately 23,360 tons are contributed by the Makawao-Pukalani-Kula region (Munekiyo & Arakawa, Inc., 1996).

The Central Maui Landfill is relatively close to the project area located approximately eight miles northwest of the site. Other than the Hana Landfill, the Central Maui Landfill is the only disposal site on the island of Maui that accepts County-hauled residential waste, commercially-hauled commercial waste, and self-hauled waste.

The existing waste collection services in the Kula area are adequate to accommodate solid waste generated by the agricultural lots proposed for this subdivision. Therefore, it is not anticipated that the proposed project will result in adverse impacts to solid waste collection services of the area.

5.5 TRANSPORTATION FACILITIES

A Traffic Impact Analysis Report (TIAR) was prepared in June 2001 by Philip Rowell and Associates and is included as Appendix G. The purpose of the TIAR was to identify and assess future impacts of the proposed project on the local roadway system. TIAR study methodology consisted of conducting an analysis of existing traffic conditions, determination of cumulative traffic projections, the analysis of project-related traffic impacts.

The TIAR analyzed three intersections along Kula Highway in the vicinity of the project site which could potentially be impacted by the proposed project. These intersections are:

- Kula Highway at Thompson Road
- Kula Highway at the proposed Project Access Road "A"
- Kula Highway at the proposed Project Access Road "C"

The qualitative measure used to describe operational conditions within a traffic stream is the "Level-of-Service" (LOS). In determining LOS, factors such as speed, delay safety, driver comfort, traffic interruptions, vehicle density, and freedom to maneuver are considered. LOS "A", "B", and "C" are considered satisfactory levels of service. LOS "D" is generally considered a "desirable minimum" operating level of service, while LOS "E" and LOS "F" are considered undesirable and unacceptable conditions, respectively.

Existing Traffic Conditions

The upcountry region of Maui is accessed via a network of arterial, collector, and rural roadways. However, the primary roads connecting the Upcountry region with central and eastern Maui are Haleakala and Makawao Highways. Makawao Highway extends southward from Hana Highway, and Haleakala Highway extends eastward from Kahului into the upcountry region. At the Pukalani Bypass and Kula Highway intersection, Haleakala Highway functions as a two-lane roadway and continues up the mountain to Haleakala Crater.

Kula Highway is a two-lane roadway, which extends from Pukalani to Ulupalakua and is the primary north-south arterial serving the Upcountry region's rural communities. Kula Highway is located directly adjacent to the project site and runs along its eastern boundary. The posted speed limit adjacent to the project site is 15 miles per hour. Due to its rural setting, traffic congestion on Kula Highway in the project area is very uncommon. Delays are minimal and only a small portion of the roadway capacity is used.

In general, existing traffic conditions traffic in the project vicinity is considered to be very good. Traffic conditions along Kula Highway in the project vicinity operate at a Level-of-Service "A". Level-of Service "A" is characterized by free flowing traffic where individual users are virtually unaffected by the presence of others in the traffic stream. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Intersections were analyzed during the morning and afternoon peak traffic hours with respect to existing conditions. Under existing conditions, all three intersections operate at a LOS "A" during both the AM and PM peak hours.

Probable Impacts

Cumulative traffic conditions are defined as future traffic conditions without the proposed project. The TIAR incorporated projected future traffic volumes generated by the DHHL Kula Residential Lots (Waiohuli development) being developed two miles north of the project site. In determining the cumulative traffic conditions, the year 2006 was used as the design year. It should be noted that the design year does not represent the project completion date, but rather provides a date of occupancy for purposes of conducting the impact analysis.

Project-related traffic was determined by estimating peak hour traffic that would be generated by the proposed project. The project-related traffic was then superimposed on 2006 cumulative traffic volumes to establish future traffic conditions with the proposed project.

Project-related impacts were assessed by analyzing the changes in traffic volumes and Levels-of-Service. The proposed project is anticipated to result in a relatively small amount of traffic, generating approximately 139 and 159 trips during the AM and PM peak hours, respectively. The results of the level-of-service analysis indicate that the intersection of Kula Highway at Thompson Road and the project driveways will operate at level-of-service B or better (Rowell, 2001).

In addition to changes in traffic volume and Level-of-Service, signal warrants were checked to verify that traffic signals are not warranted for the intersection of Kula Highway at Thompson Road or the access driveways subsequent to development of the project. The TIAR concluded that based on estimated 2006 peak hour traffic conditions, traffic signals are not warranted at any of the study intersections (Rowell, 2001). Therefore, the proposed project will not have any significant adverse impacts on circulation and traffic in the area.

Coordination with the State Department of Transportation (DOT) will be conducted during the project's design to address connection fees to Kula Highway for access road and possible improvements to existing roadway geometrics. Such improvements addressing highway geometrics may include providing right-turn deceleration lanes. However, actual improvements necessary will be developed during the design phase in consultation with the State DOT.

5.6 ELECTRICAL AND COMMUNICATION FACILITIES

There are no electrical or telephone facilities on the project site. Electricity and telephone service in the surrounding area is currently provided by existing overhead facilities. Sandwich Isles Communications, Inc. maintains a telephone office building on Kula Highway situated approximately two miles from the project site.

Overhead lines and/or underground conduits for electrical, street lighting, and cable television services will be provided by the respective utility companies. Telephone services will be provided through underground facilities within the project site, and will be connected by an underground conduit to the nearby Sandwich Isle Communications telephone office building on Kula Highway. The proposed project is not anticipated to adversely impact electrical and telephone services in the Upcountry region.

5.7 EDUCATIONAL FACILITIES

The Keokea project site is situated within the King Kekaulike Complex of the State of Hawaii Department of Education (DOE) school system. This complex consists of five elementary schools, Samuel Enoka Kalama Intermediate School, and King Kekaulike High School. The elementary schools in the Makawao to Kula region include Makawao, Pukalani, and Kula Elementary Schools (DOE 2001).

Existing Educational Facilities

Kula Elementary School serves students in Kindergarten to 5th grade from Kanaio to Omaopio which includes the project site. Student enrollments have slowly decreased from 522 to 466 students over the past three years (1998 to 2000). Student enrollments indicate a fair amount of students in transition from this school because only 465 (1998) to 444 (2000) students were enrolled for the entire school year. Classrooms were rated as adequate in terms of school space, and regular instruction teachers averaged 17.5 students (DOE 2001b).

Kalama Intermediate School provides educational services for students in grades 6th to 8th. Student enrollments slowly decreased from about 1,300 to 1,120 students over the past three years (1998 to 2000). This school serves a total of five elementary schools in this Upcountry region, and is a well-designed facility with a well-kept campus and buildings. Classrooms were rated as adequate in terms of school space, and regular instruction teachers averaged 16.4 students (DOE 2001d).

King Kekaulike High School serves students in grades 9 to 12, and had student enrollments slowly increasing from about 1,030 to 1,400 students over the past three years (1998 to 2000). The 1998-99 school year was the first year that all four grades (9-12) were being accommodated at King Kekaulike High School. The school is designed to accommodate 1,650 students. Classrooms were rated as marginally adequate in terms of school space, and regular instruction teachers averaged 19.1 students (DOE 2001a).

The new Kamehameha Schools Campus in Pukalani will provide instruction for students from grades Kindergarten to 12. Currently, the school has an enrollment of 176 students and provides instruction to grade levels K to 7 only. The campus is currently undergoing expansion, and instruction for Grade 8 will begin next year (2001 and 2002). An enrollment of 832 students is anticipated for the 2003-2004 school year, and by the year 2005–2006 the maximum enrollment of 2,096 students is projected to be attained for grades K–12 (KSBE, 2001). The Makawao-Pukalani-Kula region is also served by privately operated facilities such as Haleakala School (Grades K to 8) and Seabury Hall (Grades 6 to 12).

Probable Impact On Educational Facilities

The State Department of Education – Statistics Office, estimated that the proposed Keokea project will increase the student population in the area by a total of 50 students. They estimated that an additional 26 elementary-level (K-5), 11 intermediate-level (6-8), and 13 high school-level (9-12) students may be generated as a result of the proposed development². When accounting for the possibility of 40 additional future lots associated with reserve Lot 82, student populations may increase to a total of 77 students. This would include 40 elementary-level, 17 intermediate-level, and 20 high school-level students.

The actual number of students generated by this project may be quite lower since the majority of lessees developing these lots are likely to be retirees. Thus, these lessees should probably not have younger children needing to enroll in surrounding schools. It is also possible that some of these lots would be developed solely for agricultural use by lessees which would further reduce the projected number of children arising from this project. The purpose of this project is to provide an agricultural subdivision allowing for agricultural uses. As a result, the student population projection provided by the State DOE may be more conservative (higher), but represents a reasonable estimate from which impacts are addressed.

Elementary students generated by the Keokea project would likely attend Kula Elementary School since it is the area's "home" school. However, some students may obtain district exemptions to attend other elementary schools on the island or private schools such as the Kamehameha Schools Campus. The elementary-aged students projected are not expected to have a significant impact on Kula Elementary School staff or facilities. Enrollments at this school have steadily decreased (89 students) from 555 students in the Fall of 1996 to 466 in 2000. Thus, these additional students should not have a significant impact on this school. Furthermore, development of these individual lots would occur slowly over many years which would further reduce the impact of adding these new students to this school.

² Telephone conversation with Department of Education employees, Keith Kameoka and Dr. Thomas Saka, October 1998.

Similarly, the other four elementary schools in this complex have generally had steadily decreasing enrollments. Notably nearby Makawao and Pukulani Elementary Schools decreased from 709 to 620, and 578 to 493 from 1996 to 2000, respectively. These declining elementary school enrollments have contributed to the declining enrollments at Kalama Intermediate School. Thus, the intermediate school students projected by the Keokea project should not have a significant impact on this intermediate school's facilities or staff. This school's enrollment decreased by 180 students over the past few years and coupled with decreasing enrollment at the feeding elementary schools should be able to accommodate the projected students especially when lessees are expected to slowly move into their lots.

King Kekaulike High School serves students moving up from Kalama Intermediate School. Thus, the projected additional high school students generated by the project should not have a significant impact on this high school's facilities or staff. As mentioned, this school is designed to accommodate about 1,650 students and had a Fall 2000 enrollment of about 1,400 students³. Given the declining enrollments at the elementary and schools and intermediate school, enrollments at this high school should similarly taper off. With Keokea's individual agricultural lots anticipated to be developed slowly over possibly 10 or more years, the impact from these lots is expected to be minor since new students enrolling would be spread out over several years.

The Waiohuli development was projected to generate an additional 140 total students (Munekiyo & Arakawa, Inc. 1996). However, these projections coupled with that which may arise from the Keokea project is not expected to have a significant impact on educational facilities serving this region. As mentioned previously, development of individual lots by lessees is expected to occur slowly over many years possibly 10 to as much as 20 years based upon DHHL's experience with other developments. As a result, additional students generated by these developments would likely occur slowly over several years dependent upon how quickly lessees develop their lots and move in.

The impact on school facilities would thus be gradual spread over several years and not involve a sudden increase of all projected students enrolling within a school year. Furthermore, new students added to the school system may already graduate from high school, or progressively move onto higher levels (ex. intermediate to high school) before additional students enroll from lessees moving in 5 or more years later. Therefore, the cumulative impact on school facilities are not expected to be significant. To minimize impacts on school staff, appropriate coordination would be conducted with the State DOE on the progress of this development. This coordination would assist DOE with their facilities and program planning.

³ Telephone conversation with Department of Education employee, Helen Fukunaga, June, 2001.

5.8 MEDICAL FACILITIES

Maui Memorial Hospital, the only major medical facility on the island, is approximately 21 miles to the northeast of the project site. This facility is a fully operational state facility which provides general and acute emergency care.

Kula General Hospital is situated approximately 1,000 feet southeast of the project site. Kula General Hospital is a State-owned geriatric facility which provides long-term care to the elderly. The facility has a total of 110 beds of which 99 beds are for long-term care, 9 beds are for the developmentally disabled, and 2 beds are for acute care. The facility has an outpatient clinic with a medical staff of two physicians, and a registered nurse. At the present time the hospital does not provide emergency services. However, plans are currently being considered to expand hospital services to include emergency care (K.H., 1998).

In addition to these two hospital facilities, there are several medical and dental care facilities located throughout Makawao and Pukalani to serve Upcountry residents. The general region from Omaopio Road to Ulupalakua is serviced 12 hours a day by a locally based ambulance service. Beyond these hours, ambulance service is provided by the Makawao ambulance or nearest available unit from other hospitals.

Overall, the existing medical facilities adequately serve the Kula region. In addition to existing medical facilities, Kula Hospital is in the process of upgrading its facilities in response to the expected population growth in the area. The existing and future medical facilities in the Kula area will be well equipped to accommodate the additional residents associated with the Keokea project.

5.9 POLICE AND FIRE PROTECTION

The Maui Police Department (MPD) is responsible for preserving the public peace, preventing crime, and protecting life and property. On the island of Maui, the MPD's Uniformed Services Bureau includes uniformed patrol services in the patrol districts of Wailuku, Lahaina, and Hana. The Makawao-Pukalani-Kula community was formerly serviced by the Wailuku Station, which is situated approximately 21 miles northwest of the project site.

Today, a new Community Police Officer office that became operational in 1996 is available for use by beat officers to service the Kula community. This Community Police Officer office is situated within the Kula Community Center on Kula Highway and is located approximately 9 miles northeast of the project site.

Four patrol officers, per eight-hour shifts, provide police services for the Makawao-Pukalani-Kula beats. These four officers are assigned to Haiku and Paia as well, and their beats overlap making them responsible for responding to emergency situations involving the Upcountry region as a whole. The Makawao-Pukalani-Kula beat also includes a single community police officer permanently assigned to the area. (MPD 1998).

Fire prevention, protection, and suppression services are provided by the Maui Fire Department's (MFD) Kula Fire Station. The Kula Fire Station is located approximately 5 miles northeast of the project site, and is staffed by one officer, one driver, and three firefighters per 8-hour shift.

The Makawao and Paia fire stations provide additional firefighting support for the Kula region, and are situated approximately 10 and 16 miles north of the project site, respectively. The Makawao and Paia stations are each staffed with five men. The Kahului fire station also supports the area in situations where additional man-power is need. The Kahului station is staffed by 10 men and includes a rescue company in addition to their fire unit (MFD 2001).

Existing police and fire protection services are adequate to serve the Kula area. The addition of the Community Police Officer office and fire house in the Kula area have increased fire and police capabilities to better serve the Keokea and surrounding area. Concerns expressed by these departments with regard to subdivision developments are typically associated with traffic impacts, water supply, and fire protection requirements. Fire hydrants will be serviced by the proposed on-site reservoir and will be installed at 500-foot intervals in accordance with county standards for agricultural lots.

5.10 RECREATIONAL FACILITIES

There are a few State recreational facilities in the district which are situated at the higher elevations of Haleakala. These include Polipoli State Park and Haleakala National Park which provide camping, hiking, and sight-seeing activities for both residents and visitors.

County recreational facilities in this Kula district consist of five neighborhood parks and three district parks that total about 75 acres in size. The district parks include the Eddie Tam Memorial Center, Pukalani Park and Community Center, and the recently completed Kula Recreational Center. Neighborhood parks in the district include Haliimaile Park, Kula Community Center, Waiakoa Gym, Harold Rice Memorial Park, and Keokea Ball Park.

Dedicated in 1994, the Kula Recreational Center is located a few miles away from the project site and is anticipated to accommodate the current and immediate future need for recreational facilities in the Kula district. This 10.3-acre facility serves as the region's only district park and includes multi-purpose ball fields, picnic sites, a fitness area with exercise stations, a comfort station, and parking areas (Munekiyo & Arakawa, Inc 1996).

Various recreational facilities in this area also include four tennis courts, nine sports fields, three sports courts, five community centers and three gyms (Munekiyo & Arakawa, Inc 1996). Public schools in this district also have limited recreational fields and facilities that are available to serve residents in the area. Completion of the King Kekaulike High School has also added more recreational facilities to this area to support high school athletics consisting of fields, gym, and a stadium (DOE, 2000a).

Probable Impact And Mitigative Measures

Based upon the County's subdivision regulations, subdivision developments typically provide a dedication of 500 square feet for park and playground space for each lot developed. Using this standard, the proposed 77 lots would require a park dedication of 38,500 square feet or less than 1 acre. Even if the future additional 40 lots were included, the total 117 lots created (77 plus 40) would only require 1.34 acres for park dedication area.

However, under the County's subdivision codes (§18.16.320), it states that subdivisions by State agencies are exempt from these parks and playground dedication requirements. Consequently, the Keokea agricultural lot project being developed by the DHHL would be exempt from these dedication requirements.

Nevertheless, the DHHL is providing a 16-acre parcel for future park development within their nearby Waiohuli development. The park dedication requirement for that project of 386 lots would only amount to 4.43 acres. Thus, this future park would be more than adequate to address both the Keokea project requirements along with the Kula Residential Lot development.

This region's expansive geographic area and widely dispersed population centers limit the availability of recreational services due to the travel inconvenience involved to access larger park and recreational facilities. Development and maintenance costs also affect the establishment of new park facilities or the expansion of existing ones. Thus, the development of larger more centralized facilities should be considered (Munekiyo & Arakawa, Inc 1996).

Development of this 16-acre lot would expand the range of recreational facilities serving these communities and surrounding areas. Consequently, this Keokea project should not have a significant adverse impact on parks and recreational facilities serving this region. Appropriate consultation with these homestead associations along with the County would be conducted to address development of this 16-acre park site.

Other options being considered are designating one of the future 40 lots (1F to 40F) associated with Lot 82 as a future park within the Keokea subdivision. Another option is designating one of the parcels along Kula Highway for a future park. A third option is developing Lot 52 as a cultural park for passive recreational use that includes preservation efforts for historic sites. However, the future development of these lots for park use would be dependent upon the wishes of the Keokea Homestead community association. Appropriate coordination will be conducted at the appropriate time between the DHHL and community association along with the County concerning development of park facilities for this project.

CHAPTER 6 CONSISTENCY WITH PLANS AND POLICIES

The proposed project fulfills DHHL's legal mandate by developing and delivering its lands to serve the beneficiaries of the Hawaiian Home Lands Trust. As previously mentioned, the project is not subject to County land use laws pursuant to Section 206 of the Hawaiian Homes Commission Act. This chapter discusses the project's consistency with pertinent land use objectives and policies associated with State Land Use District regulations, the Maui County General Plan, and the Makawao-Pukalani-Kula Community Plan.

6.1 STATE LAND USE DISTRICT

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission (LUC), establishes four major land use districts in which all lands in the state are categorized. These districts are designated "Urban", "Rural", "Agricultural", and "Conservation". The project site is within the "Agricultural District" based upon review of the LUC's land use district boundary maps.

The proposed action involves the subdivision of the subject parcel into a total of 82 lots of which 77 agricultural lots would be provided for lessees to develop homes and conduct small scale agricultural activities. Reserve Lot 82 also includes the use of 40 future additional lots. Although DHHL properties are not subject to this State land use district regulations, the land use and activities planned for this project are in general conformance to the permitted uses under this Agricultural District land use classification. These 77 lots and future lots planned will average approximately 2.0 – 2.5 acres in size or larger which is consistent with the Maui County Code Chapter 19.30, "Agricultural District", which states that "minimum lot areas shall be two acres".

6.2 MAUI COUNTY GENERAL PLAN

The Maui County General Plan sets forth broad objectives and policies designed to guide the long-range development of the County. As stated in the Maui County Charter, "The purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and development of the County and the social, economic and environmental effects of such development and set forth the desired sequence, patterns, and characteristics of future development."

The proposed action is consistent with the following General Plan Objectives and Policies:

Objective: To preserve for present and future generations existing geographic, cultural, and traditional community lifestyles by limiting and managing growth through environmentally sensitive and effective use of land in

accordance with the individual character of the various communities and regions of the County.

Policies:

- a. *Provide and maintain a range of land use districts sufficient to meet the social, physical, environmental, and economic needs of the community.*

Objective: *To maximize the use and yield of productive agricultural land throughout the County.*

Policies:

- a. *Preserve scenic vistas and natural features.*

Objective: *To maximize the use and yield of productive agricultural land throughout the County.*

Policies:

- a. *Ensure the availability of land that is well suited for agricultural production; and*
- b. *Provide incentives to help the small farmer maintain a viable farm operation.*

The open space character of the proposed subdivision is consistent with the unique individual character of the rural Kula Region. The proposed subdivision is an opportunity to subdivide undeveloped, fallow agricultural lands, formerly used primarily for cattle grazing, and make it available to Native Hawaiians by providing them with small-scale agricultural homesteading opportunities. The Keokea Agricultural Subdivision consisting of two-acre minimum lots is consistent with State and County land use controls, and contributes to the open space character of the Kula Region.

6.3 MAKAWAO-PUKALANI-KULA COMMUNITY PLAN

The Makawao-Pukalani-Kula Community Plan is one of nine community plans for the County. This plan reflects current and anticipated conditions in the Makawao-Pukalani-Kula region, and advances planning goals, objectives, policies, and implementation considerations to guide decision-making in the region through the year 2010 (County 1996). Under the Land Use Maps for this Community Plan, the project site is designated "DHHL." This section discusses the project's conformance and consistency with pertinent goals, objectives, and policies from this Community Plan.

A. Economic Activity

1. *Goal: A stable and diverse economic environment which supports a level of community prosperity in order to provide social services and environmental amenities and which respects the region's rural and agricultural lifestyle, open space and natural resources.*
2. *Objectives and Policies:*
 - a. *Provide for the preservation and enhancement of agricultural lands and operations, emphasizing the importance of promoting diversified agriculture to the region's economic base and lifestyle.*
 - b. *Recognize the rural, open space character of the Upcountry region as an economic asset of the island.*
 - c. *Preserve agriculture by actively promoting locally grown agricultural products.*
 - d. *Develop a stable and balanced employment base which will provide opportunities for increasing the standard of living for all of the region's residents.*

The Keokea project is consistent with these objectives because it will support the enhancement of agricultural lands and promotion of diversified agriculture. The project is an agricultural subdivision providing large lots to allow lessees the opportunity to pursue small scale diversified agricultural activities on their lots. As discussed in Chapter 2, some lots located along Kula Highway may be used for community activities such as an open market area where lessees can market their products. This project recognizes the rural open space character of this region and provides opportunities to promote locally grown products. Thus, the construction of this agricultural subdivision along with individual lots would create short-term construction jobs supporting the County's economic employment base. Potential diversified agricultural activities initiated by lessees would also contribute to the County's economy.

B. Land Use

1. *Goal: The maintenance and enhancement of Upcountry's unique and diverse rural land use character with sensitivity to existing land use patterns, natural resource values, and economic and social needs of the region's residents.*
2. *Objectives and Policies:*
 - a. *Recognize the value of open space, including agricultural lands and view planes to preserve the region's rural character.*

- b. *Establish land use patterns which recognize the "Right to Farm," in order to minimize conflicts between existing agricultural operations and urban-related activities.*
- c. *Encourage new residential developments in areas which are contiguous extensions of, or infills within the established residential pattern, and which do not adversely affect agricultural uses.*
- d. *Make available agricultural lands for those who wish to farm.*
- e. *Establish water resource availability as a major criteria in establishing land uses.*

The Keokea project is consistent with these objectives because it recognizes the right to farm principle by providing lessees with the opportunity to conduct agricultural activities on their lots. This development recognizes the value of open space and agricultural lands which is reflective in the project's design, and is consistent with the region's rural character. The project site is on property that is an extension of existing urbanized areas along Kula Highway, and is implementing development of this DHHL property. The availability of water resources has been allocated by the County DWS for this project, and DHHL will continue to work with this department along with other agencies to address future water needs and improvements.

C. Environment

1. *Goal: Protection of Upcountry's natural resources and environment as a means of preserving and enhancing the region's unique beauty, serenity, ecology, and productivity, in order that future generations may enjoy and appreciate an environment of equal or higher quality.*
2. *Objectives and Policies:*
 - a. *Recognize and protect rare, endangered and unique biological resources in the region.*
 - b. *Preserve the existing visual, noise, odor and air quality characteristics found in agricultural/rural neighborhoods of the Makawao-Pukulani-Kula region.*

This project would not adversely effect rare, endangered, or unique biological resources in the region as discussed in previous chapters. This development would also not significantly impact existing visual, noise, odor, or air quality characteristics found in the neighborhoods of this region.

D. Cultural Resources

1. *Goal: The identification, preservation and where appropriate, restoration and promotion of cultural resources and practices which reflect the rich and diverse heritage found in the Upcountry region.*
2. *Objectives and Policies:*
 - a. *Recognize the importance of historically and archaeologically sensitive sites, both known and undiscovered, and encourage their preservation and protection.*
 - b. *Maintain the integrity of Upcountry's cultural and historical resources through implementation of a controlled access program to designated sites.*

This project would not adversely effect significant historic or archaeological sites present within the property. An archaeological inventory survey has been completed for this project and has been coordinated with the SHPD to address appropriate mitigation measures and preservation efforts. SHPD is also assisting in the preparation of data recovery and preservation plans for many of the sites, and a large lot (Lot 52) has already been established as a preserve area within the project. Therefore, the integrity of these sites would be preserved through implementation of the preservation plan developed. Thus, this project is consistent with these objectives.

E. Department of Hawaiian Home Lands

1. *Goal: The immediate implementation of programs and settlement of Native Hawaiians on lands of the Department of Hawaiian Home Lands that diversifies and enriches the Upcountry community.*
2. *Objectives and Policies:*
 - a. *Encourage and support planning and implementation of Department of Hawaiian Home Lands projects that benefit native Hawaiians, that include a variety of land uses in order to form a complete community, and that are in harmony with the goals and objectives of the Makawao-Pukalani-Kula Community Plan.*
 - b. *Recognize and support the allocation of water resources for Department of Hawaiian Home Lands projects, consistent with applicable State and Federal laws.*
 - c. *Coordinate and integrate the development of Department of Hawaiian Home Lands' projects with surrounding Upcountry communities.*

- d. *Recognize the Department of Hawaiian Home Lands' Waiohuli-Keokea region as a potential agricultural and affordable housing community and the eventuality of a Hawaiian sovereign entity.*

This project is consistent with these objectives because it directly implements development of DHHL properties benefiting native Hawaiians. The project would support establishment of a complete community in harmony with the goals and objectives of this Community Plan. DHHL is working with the County DWS in addressing the allocation of water resources to serve this project. Coordination with other surrounding communities concerning this project has been and would continue to be conducted with DHHL to keep everyone informed. Finally, the Keokea property is being developed as an agricultural subdivision recognizing its potential for agricultural activities by lessees.

F. *Physical Infrastructure*

1. *Goal: The timely and environmentally sensitive development and maintenance of infrastructure systems which protect and enhance the safety and health of Upcountry's residents and visitors, including the provision of domestic water, utility and waste disposal services, and effective transportation systems which meet the needs of residents and visitors while maintaining the region's rural character.*

Transportation

Objectives and Policies:

- a. *Ensure the safe and convenient movement of people and goods by providing maintained roadways having adequate carrying capacities.*
- b. *Support the planning of new roadways provided that there would be minimal impact to the Upcountry lifestyle and character.*

This project is consistent with these transportation objectives because necessary roadway improvements would be provided as part of this development. These roadway improvements would be coordinated with the State Department of Transportation and County DPWWM, and would provide for the safe and convenient movement of people and goods. Roadway improvements would have minimal impact to the Upcountry lifestyle and character since it would only involve access roadways within the project site and highway geometric improvements near access road intersections.

Water

Objectives and Policies:

- a. *Prioritize the allocation of water as new resources and system improvements become available as follows: a) for maintenance and expansion of diversified agricultural pursuits and for the Department of Hawaiian Homes projects; and then b) for other uses including development of new housing, commercial and public/quasi-public uses.*
- b. *The Department of Water Supply shall expand water supply and distribution systems, including catchment systems, in accordance with the directions set forth in the Makawao-Pukalani-Kula Community Plan.*
- c. *Recognize and support the immediate allocation of water resources for Department of Hawaiian Home Lands projects and agriculture.*
- d. *Support the development of separate domestic and irrigation water systems.*

Implementing Actions:

- a. *Increase the deliverable capacity of the lower Kula line to 7.5 mgd and extend the line to Keokea to serve Department of Hawaiian Home Lands projects.*

This project is consistent with these water objectives since water resources and system improvements planned would serve this DHHL development. A non-potable water resource is also planned to be developed in consultation with the State Department of Agriculture to provide lessees with opportunities to pursue agricultural activities on their lots. Improvements thus reflect the development of both domestic and irrigation water systems consistent with these objectives. Water system improvements being coordinated with the County DWS are generally consistent with these objectives and implementing actions identified.

Drainage

Objectives and Policies:

- a. *Respect and preserve natural drainageways as part of good land development practices and recognize their value as open space corridors.*
- b. *Implement comprehensive drainage improvements and maintenance procedures to ensure that the overall system will meet public safety and welfare needs of the region's residents.*
- c. *Support the Soil and Water Conservation Districts in their efforts to implement soil erosion and drainage control management programs.*

This project would include drainage improvements on the project site which are being developed in coordination with the County DPWWM. Such improvements recognize the value of natural drainageways as open space corridors. Drainage improvements would be designed to meet public safety and welfare needs of the region's residents. Drainage plans developed would be submitted to the County for their review and approval. Best management practices would also be incorporated in the design of infrastructure improvements to minimize soil erosion and provide for proper drainage control practices during construction.

G. Housing

1. *Goal: Housing opportunities for the residents of Makawao-Pukalani-Kula, to include all income and age groups, which are affordable, safe, and environmentally and culturally compatible.*
2. *Objectives and Policies:*
 - a. *Provide increased opportunities for affordable housing through:*
 - *Coordinated government assistance programs including the Department of Hawaiian Home Lands.*
 - b. *To establish an efficient settlement pattern, discourage a dispersed pattern of development, thereby reducing public service, infrastructure and maintenance costs.*

This project would be consistent with these housing objectives because it will provide additional housing opportunities for lessees as part of DHHL's program. This agricultural subdivision has incorporated an efficient settlement pattern to serve lessees minimizing unnecessary infrastructure costs and preventing a dispersed pattern of development.

6.4 COUNTY ZONING

The County Zoning district classification for the subject parcel was previously "Interim" before being changed recently to the "Agricultural District". As previously indicated, DHHL is not subject to County land use rules and regulations such as zoning. However, it is anticipated that individual lots developed by lessees will be in accordance to County zoning district standards. These lots presently conform to the minimum lot size of 2.0 acres under the County's zoning district standards.

CHAPTER 7 ALTERNATIVES TO THE PROPOSED ACTION

No action was the only alternative considered to the proposed action. The no action alternative would mean the existing conditions at the project site would remain unchanged. Existing vacant land area would remain underutilized and undeveloped. Non-development would also require the expenditure of State resources to prevent the parcel from vegetative overgrowth, and continued use as a site for trash dumping.

Most importantly, the no action alternative would prevent the 2,700 native Hawaiian people on the DHHL Maui waiting list the opportunity to acquire a new agricultural lot to improve their quality of life and contribute to the agricultural-based economy of the Kula region.

The no action alternative has been rejected from further consideration because it would fail to address the growing demand for developed homestead lots for Native Hawaiians by providing them with agricultural homesteading opportunities, and it would not fulfill DHHL's legal mandate to serve the beneficiaries of the Hawaiian Home Lands trust by developing and delivering its lands.

CHAPTER 8 AGENCY AND PUBLIC CONSULTATION

Consultation with various government agencies and the community has been conducted on this project to obtain their comments associated with the project. These consultation efforts included pre-assessment consultation efforts and the distribution of the Draft EA for this project to various agencies, community organizations, and area residents for their review. These consultation efforts conducted are discussed in this Chapter, and copies of comments received are included in Appendix A of this document.

8.1 PRE-ASSESSMENT CONSULTATION

As part of the environmental assessment process, pre-assessment consultation efforts with various State and County government agencies and community organizations were conducted to obtain their comments and concerns associated with the proposed subdivision. Consultation letters providing project information were originally sent to these parties for review and comments in November 1998. The proposed project has essentially remained the same since that time, therefore, subsequent consultation efforts were considered unnecessary, and the Draft EA process was initiated.

A listing of agencies and organizations to which early consultation letters were sent is provided below. Those providing written response are identified with a “»” symbol. Copies of written comments received are included in Appendix A.

Federal Agencies

- » Fish and Wildlife Service, Department of the Interior
- »⁴ U.S. Army Engineer Division, Department of the Army
- » U.S. Department of Agriculture – Natural Resources Conservation Service

State of Hawaii Agencies

- Department of Forestry and Wildlife
- » Department of Health
- » Department of Transportation Highways Division – Maui District Office
- Department of Land and Natural Resources, Historic Preservation Division
- » State Office of Planning
- » Office of Hawaiian Affairs

⁴ A letter from the Department of Army concerning the applicability of a Department of Army Permit was received after the filing and publication of the Draft EA.

Maui County Agencies

- Department of Water Supply
- » Department of Public Works and Waste Management
- » Department of Parks and Recreation
- » Department of Planning
- » Department of Fire Control
- » Maui County Police Department
- Maui Electric Company

8.2 DRAFT EA COMMENTS

The Draft EA for this project was published in the July 8, 2001 issue of the State Office of Environmental Quality Control's *The Environmental Notice* initiating a 30-day public comment period which ended on August 7, 2001. Copies of this Draft EA were distributed to the following parties for review and comments. Those parties which submitted comments are indicated by a "»" next to them. Comment letters received from these parties along with corresponding response letters are included in Appendix A.

Federal Agencies

- Fish and Wildlife Service, Department of the Interior
- U.S. Army Engineer Division, Department of the Army
- » U.S. Department of Agriculture, Natural Resources Conservation Service

State of Hawaii Agencies

- » Department of Accounting and General Services
- Department of Agriculture
- Office of Planning, Dept. of Business, Economic Development & Tourism
- » Department of Health
- » Department of Health, Office of Environmental Quality Control
- Department of Land and Natural Resources
- Department of Transportation, Maui District Office
- » Office of Hawaiian Affairs
- » Department of Education
- » Department of Land and Natural Resources, Historic Preservation Division
- Department of Land and Natural Resources, Maui/Lanai Islands Burial Council
- » Department of Transportation

Maui County Agencies

- » Department of Parks and Recreation
- » Department of Public Works and Waste Management
- » Department of Planning

- » Department of Water Supply
- » Maui Fire Department
- » Maui Police Department

Utilities And Community Organizations

- » Maui Electric Company
- Keokea Homes Farmers Association
- » Kula Community Association
- Waiohuli Homesteaders, Inc.

CHAPTER 9 FINDINGS AND DETERMINATION

To determine whether a proposed action may have a significant effect on the environment, the Approving Agency needs to consider every phase of the action, the expected primary and secondary consequences, cumulative effect, and the short- and long-term effects. The Approving Agency's review and evaluation of the proposed action's effect on the environment would result in a determination whether: 1) the action would have a significant effect on the environment, and an Environmental Impact Statement Preparation Notice should be issued, or 2) the action would not have a significant effect warranting a Finding Of No Significant Impact (FONSI).

This chapter discusses the results of the assessment conducted for the proposed Keokea agricultural subdivision in relation to the 13 Significance Criteria prescribed under the State Department of Health's Administrative Rules Title 11, Chapter 200. The purpose of this assessment was to consider the "significance" of potential environmental effects which includes the sum of effects on the quality of the environment along with the overall and cumulative effects. The resulting findings are discussed below for each criteria.

9.1 PRELIMINARY FINDINGS

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

The proposed project would not result in the irrevocable commitment to loss or destruction of any natural or cultural resource. As discussed in Chapter 4, the project would not negatively impact any natural or cultural resources of significance or concern.

The project should not result in the destruction or loss of any significant, endangered, or threatened botanical, faunal, geological, or other natural resources. Design and construction of the subdivision and associated infrastructure would be in conformance with both State and County design standards and requirements. Furthermore, appropriate coordination with applicable agencies would also be conducted during the design phase to allow for the review and approval of construction plans.

In terms of archaeological and cultural resources, close coordination with the SHPD has been initiated and will continue throughout the project's design and construction to ensure significant historic and cultural resources are not destroyed.

2. *Curtails the range of beneficial uses of the environment.*

The proposed project would not curtail the range of beneficial uses of the surrounding environment. The project site is presently vacant and undeveloped. Without the

proposed action, the existing vacant land areas would remain underutilized and undeveloped. The proposed subdivision would enhance the beneficial uses of the environment in that it would provide the potential for the productive agricultural use of presently unused lands. Additionally the proposed project would not curtail cultural or traditional activities or adversely impact native, threatened, or endangered species or their habitats.

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

The activities proposed under this project would not conflict with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS. This Draft EA addressed the probable environmental impacts associated with the project of which most would be primarily associated with short-term construction activities. The improvements are not expected to have a significant impact on natural resources or the surrounding environment. Consequently, the project would be consistent in conserving natural resources in the area, and enhancing the quality of life for DHHL beneficiaries by providing homestead opportunities.

4. *Substantially affects the economic, or social welfare, cultural practices of the community or State.⁵*

As discussed in this document, the project would not have any significant negative impacts on economic factors. This project would provide an economic benefit by creating short-term construction related jobs and correspondingly increased tax revenue which would have a positive affect on the overall economy of the County and State.

As discussed in this document, the project is also not expected to substantially affect the social welfare of residents in the surrounding area. The project would have no impact on the existing character of neighborhoods or communities in which the subdivision would be located.

5. *Substantially affects public health.*

The proposed project will be designed and installed in accordance with State and County design standards and other regulatory requirements which take into consideration public safety and health. Consequently, the project is not expected to constitute a public health or safety hazard. The only public health related concerns would involve short-term air, noise, and traffic impacts during construction activities.

⁵ This significance criteria was modified to reflect the recent change to Chapter 343, HRS approved by the Governor as Act 50 on April 26, 2000. This Act added "cultural practices" as part of the factors considered in determining the significance of an effect.

Potential impacts due to such construction activities will be minimized or brought to negligible levels by use of appropriate mitigation measures described in this document along with compliance with agency regulations.

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

The proposed subdivision will result in an increase in the area population. However, associated population increases would be negligible since lots within the proposed subdivision are low-density lots designed for agricultural purposes. Chapter 5 addressed potential impacts of the proposed project on infrastructure and public facilities in the project area. The results of this assessment and studies performed determined that the project would not substantially impact population or public facilities of the surrounding area.

7. *Involves a substantial degradation of environmental quality.*

The proposed subdivision would not involve a substantial degradation to the quality of the surrounding environment. Chapter 3 of this document discussed the probable impact of several environmental factors associated with the project. The results of this assessment and studies performed determined that the project would not substantially impact or degrade the environmental quality of the immediate environment.

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

The result of the assessment conducted and discussed in this document has determined that this project is not expected to have a considerable impact on the environment. Improvements would be limited to the proposed subdivision area.

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

As discussed in Chapter 3, the biological resources within the project area are dominated by alien plant and animal species. There are no known threatened or endangered species nor any species of concern within the project site. As such the proposed project will not have any adverse impacts on threatened or endangered species or their habitat.

10. *Detrimentially affects air or water quality or ambient noise levels.*

The proposed subdivision would not have detrimental affects on water quality or ambient noise levels in the surrounding environment. Chapter 3 of this document discussed the probable impact of the proposed project on the air and noise quality. The results of this assessment determined that the project would not substantially impact these environmental attributes.

11. *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.*

The proposed project is situated on the relatively arid southwestern slopes of Haleakala. The project location is not located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters and would therefore have no adverse impacts upon such areas.

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

As described in Chapter 3, the Kula region includes a diverse range of scenic vistas and open expanses which typify the rural character of the region. The project site is situated at higher elevations which maintain the views of the Central Maui plain and coastline presently available from the project site. The proposed subdivision is not part of a scenic corridor and will not adversely impact the visual resources of the surrounding area.

13. *Requires substantial energy consumption.*

Since the project site is presently vacant, undeveloped land the proposed project would require installation of electrical facilities to provide energy to future residents. However, the intended agricultural use of the lands would limit the number of residential units within the subdivision. The low-density development would require minimal amounts of energy and is not anticipated to adversely impact electrical services in the Upcountry region.

9.2 DETERMINATION

A Finding of No Significant Impact (FONSI) determination should be warranted for the Keokea Agricultural Lots – Unit I project based upon the information provided in this Final EA document. The results of the assessments conducted along with technical studies performed have determined that the project should not have a significant impact on the surrounding environment. The findings supporting this determination are based upon the previous discussion of the project's affect on the environment in relation to the 13 Significance Criteria.

CHAPTER 10 REFERENCES

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APPENDICES

APPENDIX A

Agency And Public Consultation

APPENDIX A-1

Pre-Assessment Consultation Comments



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

In Reply Refer To: DH

OCT - 1 1998

Richard Stook
Wil Chee Planning, Inc.
HMSA Center
1400 Rycroft St., Suite 928
Honolulu, HI 96814

Re: Keokea Agricultural Lots, Unit I, Kula, Maui, Hawaii

Dear Mr. Stook;

The U.S. Fish and Wildlife Service (Service) has reviewed your letter requesting information on species within the Keokea area (TMK: 2-2-02: 55) that are either federally listed as endangered or threatened or are proposed for listing. The project sponsor is the Department of Hawaiian Home Lands (DHHL). The proposed project is to subdivide a 342-acre lot into 71 two-acre lots and three larger lots. You have requested that the Service provide any biological information that we may have to assist you in preparing a draft Environmental Assessment (EA). The Service offers the following comments for your consideration.

Based on our review of information contained in our files, including maps prepared by the Hawaii Heritage Program of The Nature Conservancy, there are no federally endangered, threatened, or candidate species directly within the proposed project site. However, federally endangered and candidate species, as well as sensitive native habitats, occur adjacent to the proposed project site. Endangered Hawaiian hoary bats (*Lasiurus cinereus semotus*), which have been recorded in adjacent areas, are likely to utilize the proposed project site. Endangered (E), candidate (C), and species of concern (SOC) plants, which have been recorded in adjacent areas, include but are not limited to: *Abutilon menziesii* (E), *Acacia koaia* (SOC), *Canavalia pubescens* (C), *Geranium arboreum* (E), and *Hibiscus brakenridgei* (E). The Service recommends that the biological surveys to be performed at the proposed project site be conducted by qualified biologists and that the results of those surveys be included in the draft EA.

Keokea Agricultural Lots, Unit I
Kula, Maui, Hawaii

Also, we recommend the draft EA address potential project-related impacts to these species and their habitats.

The Service encourages the early review of proposed projects and we appreciate the opportunity to provide early input on this proposal. We hope this information is of use to you in the completion of the draft EA and look forward to receiving a copy of the draft EA when it is completed. If you have questions regarding our comments, please contact Fish and Wildlife Biologist David Hopper by phone at (808) 541-3441 or by facsimile transmission at (808) 541-3470.

Sincerely,



Robert P. Smith
Pacific Islands Manager

cc: Maui DOFAW



United States
Department of
Agriculture

Natural
Resources
Conservation
Service

210 Ima Kala St.
Suite 209
Wailuku, HI
96793-2100

Our People... Our Islands... In Harmony

September 14, 1998

Mr. Richard Stook
Wil Chee - Planning, Inc.
1400 Rycroft Street, Suite 928
Honolulu, Hawaii 96814

Dear Mr. Stook,

Subject: Pre-Assessment DHHL Ag Lots; TMK: 2-2-02: 55

There are two specific concerns relating to this project.

1. The land is sloping, rocky, loamy and erosive. Since the subdivision will be broken into 2 to 2.5 acre lots, conservation practices will be very important. However, it is highly recommended that conservation practices be planned and implemented for the total subdivision versus individual farmlots. Thus, it is important the Department of Hawaiian Home Lands pay for the construction of engineering structures while making the lessee responsible for operation and maintenance. Should each lessee be responsible for conservation practices, the cost will probably prohibit the lessees from constructing them. There probably will be practices such as diversions, terraces, grassed waterways, windbreaks etc. which will run through several lots.

2. Where will the water come to irrigate these farmlots?

Thank you for the opportunity to comment.

Sincerely,

Neal S. Fujiwara

Neal S. Fujiwara
District Conservationist

BENJAMIN J. CAYETANO
GOVERNOR



LAWRENCE MIKE
DIRECTOR OF HEALTH

ALFRED M. ARENSDORF, M.D.
District Health Officer

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, MAUI, HAWAII 96793

September 23, 1998

Richard Stook
Environmental Planner
Wil Chee Planning, Inc.
HMSA Center
1400 Rycroft Street, Ste. 928
Honolulu, Hawaii 96814

Dear Mr. Stook:

Subject: Keokea Agricultural Lots
Pre-Assessment, Draft Environmental Assessment
TMK: (2) 2-2-02: 55

Thank you for the opportunity to provide comments on the proposed Department of Hawaiian Homelands Keokea Agricultural Lots project. We have the following comments:

1. The project is located in an area not serviced by a municipal sewer system. The type of wastewater disposal system(s) must meet the requirements of Hawaii Administrative Rules (HAR), Chapter 62, "Wastewater Systems". The approval of the Wastewater Branch of the Department of Health is required.
2. The noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in HAR, Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained prior to the commencement of work.
3. The applicant is required by HAR, Chapter 11-26, "Vector Control" to determine whether rodents are present at the site and to eradicate these rodents prior to clearing the lot. Should this action be necessary, the applicant is also required to notify the Department by submitting Form VC-12 to this office.

Mr. Richard Stook
Page 2
September 23, 1998

Should you have any questions, please call me at 984-8230.

Sincerely,



HERBERT S. MATSUBAYASHI
District Environmental Health Program Chief

c: Art Bauckham

BENJAMIN J. CAYETANO
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MAUI DISTRICT
650 PALAPALA DRIVE
KAHULUI, HAWAII 96732

KAZU HAYASHI
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAII
GLENN M. OKIMOTO

IN REPLY REFER TO:

HWY-M 2.334-98

September 30, 1998

Mr. Richard Stook
Environmental Planner
Wil Chee - Planning, Inc.
1400 Rycroft Street, Suite #928
Honolulu, Hawaii 96814

Dear Mr. Stook:

SUBJECT: KEOKEA AGRICULTURAL LOTS - UNIT I DRAFT ENVIRONMENTAL
ASSESSMENT, PRE-ASSESSMENT CONSULTATION REQUEST
I.D. NO. ME-98-66

Thank you for the opportunity to provide preliminary comments in the preparation of the Draft Environmental Assessment for the referenced project. We have the following comments to offer:

1. A Traffic Impact Analysis Report (TIAR) is required in anticipation of the potential traffic volumes and, subsequently, required improvements to Kula Highway;
2. All improvements to Kula Highway shall be constructed to State Highway's standards;
3. A Permit to Perform Work Upon State Highways is required for all work proposed within State's right-of-way; and
4. All plans and reports relating to this project shall be submitted to our office for review and approval.

If you have any questions or concerns, please call Paul M. Chung at 873-3535.

Very truly yours


ROBERT O. STAROT
District Engineer, Maui

PMC:dmf

PHONE (808) 594-1888

FAX (808) 594-1865



STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813

October 1, 1998

Mr. Richard Stook, Environmental Planner
Wil Chee - Planning, Inc.
1400 Rycroft Street, Suite #928
Honolulu, Hawaii 96814

PC NO. (98)5

RE: Pre-Assessment Consultation Request for the Department of Hawaiian Homelands-
Keokea Agricultural Lots - Unit I Draft Environmental Assessment, Keokea, Maui
(TMK: 2-2-02:55)

Richard:
Dear Mr. Stook:


Thank you for including the Office of Hawaiian Affairs in the pre-assessment consultations for the Department of Hawaiian Homelands' Keokea Agricultural Lots project. DHHL is proposing to subdivide approximately 209 acres into seventy 2.0 - 2.5 acre lots and three larger lots. Improvements will include paved roadways, drainage, irrigation, and wastewater systems, above-ground utilities and improvements to Kula Highway. The Office of Hawaiian Affairs has the following suggestions.

- (1) That the area be surveyed by an expert in flora to ascertain whether endangered, threatened, rare or traditionally gathered plant species exist on the project.
- (2) That an archaeological survey/inventory be conducted by a reputable archaeological consultant which includes an assessment of the likelihood of subsurface resources.
- (3) Consultation with the Maui Island Burial Council.
- (4) Because the property is undeveloped there should be an assessment of traditional or cultural gathering practices that may exist within the project area.

Mr. Richard Stook, Environmental Planner
Wil Chee - Planning, Inc.
October 1, 1998
Page two

If you have any questions please contact Colin Kippen, Acting Land and Natural Resources
Division Officer at 594-1938.

Sincerely,



Colin Kippen
Acting Land and Natural Resources Division Officer

cc: Board of Trustees



LINDA LINGLE
MAYOR

OUR REFERENCE
RN:at
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411



THOMAS M. PHILLIPS
CHIEF OF POLICE
CHARLES H.P. HALL
DEPUTY CHIEF OF POLICE

September 18, 1998

Mr. Richard Stook
Environmental Planner
Wil Chee-Planning, Inc.
HMSA Center
1400 Rycroft Street, Suite #928
Honolulu, Hawaii 96814

Dear Mr. Stook:

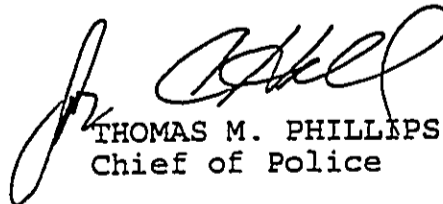
SUBJECT: Pre-Assessment Consultation Request for the Department of Hawaiian Homelands-Keokea Agricultural Lots-Unit I Draft Environmental Assessment. Keokea, Maui (TMK:2-2-02:55)

Thank you for your letter of September 4, 1998 requesting concerns or issues regarding the above subject.

After reviewing the proposal, we find that the entrances to this project from Kula Highway need to be addressed; however, I understand that deceleration and turn-pocket lanes at the two entrances of this development will be installed. This should minimize traffic impact and address our concern.

Thank you for giving us the opportunity to comment on the proposed project.

Very truly yours,


THOMAS M. PHILLIPS
Chief of Police

LINDA LINGLE
MAYOR



RONALD P. DAVIS
CHIEF

HENRY A. LINDO, SR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 243-7561

September 9, 1998

Mr. Richard Stook, Environmental Planner
Wil Chee-Planning, Inc.
HMSA Center
1400 Rycroft Street, Suite # 928
Honolulu, HI 96814

RE: Unit I Draft Environmental Assessment, Keokea, Maui;
TMK: 2-2-02:55; dated September 4, 1998

Dear Mr. Stook,

I am in receipt of your letter dated September 4, 1998; regarding Pre-Assessment Consultation Request for the Department of Hawaiian Homelands; Keokea Agricultural Lots; Unit I Draft Environmental Assessment.

Thank you for the opportunity to comment on this project.

The Department of Fire Control has two major areas of concern with projects of this size. One is adequate water supply for firefighting; and the other is access for fire department apparatus. The County of Maui has determined that water systems installed and maintained by the Department of Hawaiian Home Lands are private water systems. This water system will be reviewed by the Department of Fire Control for installation prior to construction of the subdivision.

Regarding the adequacy of a supply of water for firefighting, the guidelines used by this department for private water systems for firefighting are the Insurance

Services Office, Fire Suppression Rating Schedule, Sections 300-340. As indicated in your letter, other improvements include: paved roadways, drainage, irrigation and wastewater systems, aboveground utilities and road improvements to Kula Highway. However, there is no mention of water supply for firefighting. Consideration should be given to the placement of hydrants and water mains before the construction of roadways, to ensure proper installation and adequacy.

The second area of concern regards the fire department apparatus access roadways. As a starting point for planning and implementing the required access roadways, the Uniform Fire Code, 1988 Edition as amended by the Maui County Code, Chapter 16.04A, Section 10.207(a) through (l) as appropriate, shall be referenced for the construction requirements for the roadways.

The Fire Prevention Bureau will receive all plans and specifications for review and approval prior to any construction for this project. If you have any questions direct them in writing to the Fire Prevention Bureau, 21 Kinipopo Street, Wailuku, HI 96793, Attn: Captain Leonard Niemczyk.

Sincerely,

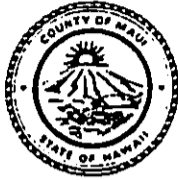

RONALD P. DAVIS
Fire Chief

LINDA LINGLE
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

Telephone: (808) 243-7845
Fax: (808) 243-7955



COUNTY OF MAUI
**DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT**
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

EASSIE MILLER, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

September 28, 1998

Mr. Richard Stock, Environmental Planner
Wil Chee Planning, Inc.
HMSA Center
1400 Rycroft Street, Suite 928
Honolulu, Hawaii 96814

Dear Mr. Stock:

**SUBJECT: EARLY CONSULTATION FOR DRAFT ENVIRONMENTAL
ASSESSMENT
DEPARTMENT OF HAWAIIAN HOME LANDS
TMK (2) 2-2-002:055**

We reviewed the subject submittal and have the following comments.


1. Submit an erosion and dust control Best Management Practices (BMP) plan with the construction plans for review and approval. The erosion control plan shall show the location of structural and non-structural measures to control erosion, sedimentation, and dust to the maximum extent practicable. The plan shall also specifically address BMP details, retention calculations, proposed scheduling, and narration on the control of site erosion and sedimentation. Special provisions shall be taken to control dust during grubbing and grading operations as the soil in the area is a very fine volcanic ash which is easily suspended in the air when disturbed.
2. Submit a detailed and final drainage report with the construction plans for review and approval of compliance with the provisions of Chapter 20.08 of the Maui County Code. The drainage report shall include hydrologic and hydraulic calculations and the schemes for disposal of runoff waters. It must comply with the provisions of the "Rules for Design of Storm Drainage Facilities in the County of Maui" and shall provide verification that the grading and runoff water generated by the project will not have an adverse effect on adjacent and downstream properties.

Mr. Richard Stock
September 28, 1998
Page 2

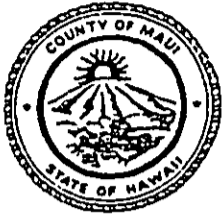
3. Contractors for the project should limit the work hours including equipment servicing to daylight hours only and schedule work only during weekdays. Work at night and on weekends shall be prohibited to limit noise impacts on the surrounding community.
4. The subdivision should comply with the provisions of Title 18, Maui County Code, "Subdivisions".

If you have any questions, please contact David Goode at 243-7845.

Sincerely,


for CHARLES JENCKS
Director of Public Works
and Waste Management

DG:co/mt
S:\LUCA\ICZM\HAWAIIAN.WPD



DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C KAAHUMANU AVENUE WAILUKU, HAWAII 96793

LINDA LINGLE
Mayor

HENRY OLIVA
Director

ALLEN SHISHIDO
Deputy Director

(808) 243-7230
FAX (808) 243-7934

September 16, 1998

Richard Stook
Environmental Planner
Wil Chee - Planning, Inc.
1400 Rycroft Street, Suite 928
Honolulu, Hawaii 96814

Dear Mr. Stook:

SUBJECT: DEPARTMENT OF HAWAIIAN HOMELANDS
KEOKEA AGRICULTURAL LOTS SUBDIVISION

We would like to inquire as to your intentions on meeting the park dedication requirements of the subdivision ordinance. We would like to meet with you to further discuss this matter. Please feel free to contact me or Mr. Patrick Matsui, Chief of Parks Planning and Development, at (808)243-7387 should you have any other questions.

Sincerely,

HENRY OLIVA
Director

c: Patrick Matsui, Chief of Planning and Development

s:\planning\ptm\dhhiheok.wpd

LINDA LINGLE
Mayor

LISA M. NUYEN
Director

DONALD A. SCHNEIDER, II
Deputy Director



COUNTY OF MAUI
DEPARTMENT OF PLANNING

CLAYTON I. YOSHIDA
Planning Division

AARON H. SHINMOTO
Zoning Administration and
Enforcement Division

October 2, 1998

Mr. Richard Stook, Environmental Planner
Wil Chee - Planning, Inc.
1400 Rycroft Street, Suite 928
Honolulu, Hawaii 96814

Dear Mr. Stook:

RE: Pre-Assessment Consultation for the Department of Hawaiian
Homelands Agricultural Lots in Keokea, Maui (TMK: 2-2-02:055)

Thank you for the opportunity to provide you with input for the draft assessment. The Maui Planning Department requests that you consider the following:

1. That this project be considered cumulatively with the Waiohuli development.

While we support the development of these lands, the ag lots will mean a significant increase in the population of Keokea, and bring about all of the associated pressures on infrastructure and services. Combined with Waiohuli, the area's population will more than double. It is important that the County and State be apprised of the impacts so infrastructure and services can be reevaluated. This will assure a safe and clean living environment for the existing and future residents of the whole area.

2. Considering the above, the draft document should include analysis on the following:


- All of the upcountry public schools to be used by the homesteaders, including projected enrollment. We would expect some of the impacts to be offset by the construction of the new Kamehameha Campus;

Mr. Richard Stook
October 2, 1998
Page 2

- Projected water source and use for farming and residential medical facilities;
 - Transportation facilities;
 - Park facilities; and
 - Commercial establishments.
3. We believe the Keokea and Waiohuli Homesteaders Associations, and the Kula Community Association should be apprised of the Draft Environmental Assessment and allowed to comment.

If you have any questions, please contact Mr. William Spence, Staff Planner, of this office at 243-7735.

Sincerely,


for LISA M. NUYEN
Director of Planning

LMN:WRS:cmb

c: Clayton Yoshida, AICP, Planning Program Administrator
Will Spence, Staff Planner
Project File
General File
(S:\ALL\WILL\CORESPON\STOOK1.WPD)



REPLY TO
ATTENTION OF

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

June 28, 2001

SSFM INTERNATIONAL, INC.
RECEIVED

JUN 28 2001

FILE _____

Regulatory Branch

Mr. Richard Stook
Project Planner
SSFM International, Inc.
501 Sumner Street, Suite 502
Honolulu, Hawaii 96817

FILE COPY

Dear Mr. Stook:

This letter responds to your June 26, 2001 letter regarding a jurisdictional determination on whether a Department of the Army (DA) permit will be required for the proposed DHHL agricultural lots identified as TMK 2-2-02:55 located in Keokea, Maui. The proposed project includes developing an agricultural subdivision on Hawaiian Homestead land which will be leased in the future to eligible native Hawaiians. Corps jurisdiction is limited to road crossings which are being constructed within tributaries of an unnamed gulch.

Based on a field site visit conducted on June 14, 2001 by Ms. Lolly Silva and Mr. Farley Watanabe of my staff, the areas observed where the road crossings would be constructed did not have any indication of an ordinary high water mark and is considered to be an ephemeral waterway. Therefore a DA permit will not be required. This determination of no DA permit authorization does not relieve you of your responsibility to obtain other federal, state or county permits or approvals.

File number 200100395 is assigned to this project. If you have any questions, you may contact Ms. Silva of my staff at 438-7023 or by FAX at 438-4060.

Sincerely,

George P. Young
George P. Young, P.E.
Chief, Regulatory Branch

APPENDIX A-2

Draft Environmental Assessment Comments

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOMELANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

Mr. Neal S. Fujiwara, District Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Imi Kala Street, Suite 209
Wailuku, Hawaii 96793

Dear Mr. Fujiwara:

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated August 7, 2001 regarding the subject project. We have the following responses to your comments:

Best Management Practices will be incorporated in the design plans established for the construction of infrastructure, utilities, and other site improvements initiated by DHHL. In addition, diversion ditches have been incorporated into the project's design plans to reduce cross-lot runoff.

Development of individual lots will be the responsibility of each individual lessee; however, provisions will be incorporated to have them similarly implement Best Management Practices. Further, lessees will be required to obtain applicable building, grading, or farm permits from the County as a condition of their leases. These permits will require lessees to comply with County soil erosion and sedimentation control regulations.

Appropriate coordination has been and will continue to be conducted with the County Department of Water Supply to address water resources and necessary water system improvements to serve the project. This coordination includes the preparation of a water master plan for this project.

Mr. Neal S. Fujiwara
November 21, 2001
Page 2

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

Aloha,



Raynard C. Soon, Chairman
Hawaiian Homes Commission

c: Ronald A. Sato, SSFM



WAYNE H. KIMURA
COMPTROLLER
MARY ALICE EVANS
DEPUTY COMPTROLLER

BENJAMIN J. CAYETANO
GOVERNOR

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

LETTER (P)1460.1

JUL 19 2001

SSFM INTERNATIONAL, INC.
RECEIVED

JUL 20 2001

TRAC

FILE

Mr. Ronald A. Sato, AICP
SSFM International, Inc.
501 Sumner Street, Suite 502
Honolulu, Hawaii 96817

Dear Mr. Sato:

**Subject: Keokea Agricultural Lots - Unit 1
Draft Environmental Assessment**

Thank you for the opportunity to review the subject Draft Environmental Assessment. The proposed development of an agricultural subdivision in Keokea, Maui does not impact any of our existing facilities or projects. However, we suggest that you contact the Department of Education to determine if they have any comments and/or concerns relating to their facilities in the vicinity of the project (i.e. Makawao Elementary School, Pukalani Elementary School, Kula Elementary School, and Kalama Intermediate School).

If there are any questions regarding the above, please have your staff call Mr. Tyler Fujiyama of the Planning Branch at 586-0490.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

TF:mo

c: Mr. Larry Lum, Department of Hawaiian Home Lands

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



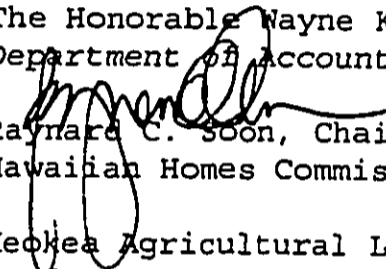
RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

To: The Honorable Wayne Kimura, Comptroller
Department of Accounting and General Services

From: 
Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated July 19, 2001, regarding the subject project. We note that your department has determined that this project will not impact your existing facilities or projects.

We have consulted with the State Department of Education regarding potential impacts on their facilities which included providing them with a copy of the Draft Environmental Assessment.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

c: Ronald A. Sato, SSFM

BENJAMIN J. CAVETANO
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

PAUL G. LEMAHIEU, Ph.D.
SUPERINTENDENT

OFFICE OF THE SUPERINTENDENT

July 27, 2001

SSFM INTERNATIONAL, INC.
RECEIVED

JUL 31 2001

✓ PAS

FILE _____

FILE COPY

Mr. Ronald A. Sato, AICP
SSFM International, Inc.
501 Sumner Street, Suite 502
Honolulu, Hawai'i 96817

Dear Mr. Sato:

Subject: Keokea Agricultural Lots Unit 1 - Draft EA

The Department of Education has no comment on the subject draft environmental assessment.

Thank you for the opportunity to respond.

Very truly yours,

Paul G. LeMahieu, Ph.D.
Superintendent of Education

PLeM:hy

cc: A. Suga, DAS
L. Lum, DHHL

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



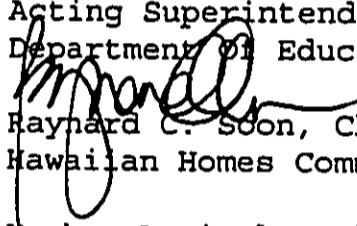
RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

To: The Honorable Patricia Hamamoto
Acting Superintendent of Education
Department of Education

From: 
Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated July 27, 2001 regarding the subject project. We note that your department has no comments to offer on the proposed project at this time.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

c: Ronald A. Sato, SSFM

BENJAMIN J. CAYetano
GOVERNOR OF HAWAII



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

SSFM INTERNATIONAL, INC. BRUCE S. ANDERSON, Ph.D., M.P.H.
RECEIVED DIRECTOR OF HEALTH

AUG 16 2001

TRAS

FILE _____

In reply, please refer to:
File:

01-083/epo

August 13, 2001

Mr. Ronald A. Sato AICP
SSFM International, Inc.
501 Sumner Street, Suite 502
Honolulu, Hawaii 96817

Dear Mr. Sato:

Subject: Keokea Agricultural Lots

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Wastewater Branch

The area has been designated a non-critical wastewater disposal area as determined by the County of Maui's Wastewater Advisory Committee. Therefore, as the area is not serviced by a County sewer service system, one (1) cesspool may be constructed per dwelling serving no more than five (5) bedrooms or bedroom like rooms. Each cesspool must be designed by a licensed engineer and approved by our office prior to use. However, should the County sewer line become available, connection will be required.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We reserve the right to review the detailed wastewater plans for conformance to applicable rules.

Should you have any questions, please contact the Planning/Design Section at 586-4294.

Clean Air Branch

The Department of Health, Clean Air Branch has reviewed the Draft Environmental Assessment for the Keokea Agricultural Lots - Unit 1 Development project. As indicated in the report, construction activities would occur in close proximity to 2 thoroughfares and existing residential establishments on the site. Provided that the mitigation measures proposed in the report are able to comply with the provisions of Chapter 11-60.1, Hawaii Administrative Rules, section §11-60.1-33 on Fugitive Dust, the Clean Air Branch has no further comments.

Mr. Ronald A. Sato, AICP
August 13, 2001
Page 2

If you have any questions on fugitive dust issues, please contact 586-4200.

Noise, Radiation and Indoor Air Quality Branch

Activities associated with the construction of the project shall comply with the Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control."

1. The contractor shall obtain a noise permit if the noise levels from the construction activities are expected to exceed the maximum permissible sound levels of the regulations as stated in Section 11-46-6(a);
2. Construction equipment and on-site vehicles requiring an exhaust of gas or air shall be equipped with mufflers as stated in Section 11-46-6(b)(1)(A); and
3. The contractor shall comply with the requirements pertaining to construction activities as specified in the rules and the conditions issued with the permit as stated in section 11-46-7(d)(4).

Should there be any questions, please contact 586-4701.

Clean Water Branch

1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. If a federal permit is required, then a Section 401 Water Quality Certification is required from the State Department of Health, Clean Water Branch;
2. A National Pollutant Discharge Elimination System (NPDES) general permit is required for the following discharges to waters of the State:
 - a. Storm water discharges relating to construction activities, such as clearing, grading, and excavation for projects equal to or greater than five acres;
 - b. Storm water discharges from industrial activities;
 - c. Construction dewatering activities;
 - d. Noncontact cooling water discharges less than one million gallons per day;
 - e. Treated groundwater from underground storage tank remedial activities;
 - f. Hydro testing water;
 - g. Treated effluent from petroleum bulk stations and terminals; and

Mr. Ronald A. Sato, AICP
August 13, 2001
Page 3

h. Treated effluent from well drilling activities.

Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department's Clean Water Branch at least 30 days prior to commencement of any discharge to waters of the State; and

3. After construction of the proposed facility is completed, an NPDES individual permit will be required if the operation of the facility involves any wastewater discharge into State waters.

Any questions regarding these comments can be directed to the Clean Water Branch at 586-4309.

Sincerely,



GARY GILL
Deputy Director
Environmental Health Administration

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

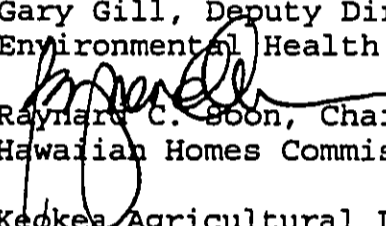
JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

To: The Honorable Bruce S. Anderson, Director
Department of Health

Attn: Gary Gill, Deputy Director
Environmental Health Administration

From: 
Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated August 13, 2001, regarding the subject project. We have the following responses to comments provided by your various branches:

Wastewater Branch

Development of the wastewater systems serving the individual lots will be the responsibility of each lessee and would consist of either cesspools or septic tanks. Such individual wastewater systems would be designed by a licensed engineer in compliance with your Administrative Rules governing wastewater systems. Lessees will also be required to submit such plans to your department for review and approval.

Clean Air Branch

Construction of infrastructure and other improvements implemented by the Department of Hawaiian Home Lands (DHHL) for this project will include appropriate mitigative measures to comply with your Administrative Rules regulating fugitive dust. Lessees developing their individual lots will similarly be

The Honorable Bruce S. Anderson
November 21, 2001
Page 2

required to include mitigative measures to address fugitive dust in accordance with your Administrative Rules.

Noise, Radiation and Indoor Air Quality Branch

Construction of infrastructure and other improvements implemented by DHHL for this project will comply with your Administrative Rules Chapter 11-46 and requirements identified. Lessees developing their individual lots will similarly be required to comply with these Administrative Rules and requirements.

Clean Water Branch

Consultation with the Regulatory Branch of the U. S. Department of the Army (Army) was conducted and it was determined that an Army permit will not be required for this subdivision project. A copy of the Army's letter confirming this determination will be included in the Final Environmental Assessment.

An NPDES general permit will be required for storm water discharges relating to construction activities associated with infrastructure and other improvements constructed by DHHL. A Notice of Intent request to be covered by a NPDES general permit will be filed with your department at least 30 days prior to commencement of activities.

No wastewater discharges into State waters are anticipated for this subdivision project when completed. However, if necessary, an NPDES individual permit will be obtained for wastewater discharge into State waters.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

c: Ronald A. Sato, SSFM

FILE COPY
GOVERNOR OF HAWAII



GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

SSFM INTERNATIONAL, INC.
RECEIVED

DEPUTIES
JANET E. KAWILO
LUNEL NISHIOKA

DEC 10 2001
JRS

FILE

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION
Kekuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE
MANAGEMENT
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

September 17, 2001

Ronald Sato
SSFM International Inc.
501 Sumner Street, Suite 502
Honolulu, Hawaii 96817

LOG NO: 28088 ✓
DOC NO: 0108CD17

Dear Mr. Sato,

SUBJECT: Chapter 6E-8 Historic Preservation Review Pertaining to the Draft Environmental Assessment for the Department of Hawaiian Homelands Keokea Agricultural Lots – Unit 1 Project Keokea Ahupua`a, Makawao District, Island of Maui TMK: 2-2-02:055

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (DEA) for the proposed Department of Hawaiian Homelands Keokea Agricultural Lots – Unit 1 Project. A field inspection of the proposed project area was headed by Dr. Ross Cordy, SHPD Archaeology Branch Chief, and we note that you have closely coordinated your planning with our office.

The proposed undertaking consists of the subdivision of approximately 351 acres into 77 2.0-2.5 acre lots, a 96-acre reserve lot, a 29-acre historic preserve lot, and three lots fronting Kula Highway to be set aside for future community use. Other improvements to the subject property will include paved roadways, drainage and irrigation installations, above ground utilities, and road and waterline improvements on Kula Highway.

The EA clearly notes that project area has undergone an acceptable inventory survey (by PHRI Inc. with additional fieldwork by the State Historic Preservation Division). 108 historic sites were found, scattered habitation sites and burials, a few religious sites, and agricultural sites covering much of the landscape. These sites are significant for one or multiple criteria of the Hawaii Register of Historic Places.

Mitigation commitments have been made to preserve 18 sites, including burials (as indicated in Table 4.1). A number of these sites are in a historic preserve centered about Molohai heiau (including excellent examples of houses and fields in this area of Kula). The remainder of the sites (excluding a very few) are to undergo archaeological data recovery. This point is also clear in the EA.

Ronald Sato
Page 2

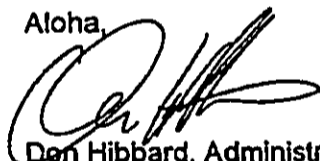
The mitigation section of the EA (pp. 34-35) accurately summarizes the mitigation plans. Buffer zones have been established for all the sites to be preserved. Our office has committed to prepare the preservation plan for non-burial sites and the archaeological data recovery plans. A burial treatment plan will need to be prepared by DHHL or its agent. It also is clear that all these plans be developed, be approved, and be successfully executed prior to land alteration, or that interim protection measures would be needed.

At this point, it is not clear if the applicant will prepare and execute the plans first or opt for interim protection measures. It is very important that whichever option is selected, it is clear that the detailed plans or the interim protection plan needs to be approved by our Division (and the Maui Island Burial Council in the case of the burial treatment issues). Such approval needs to occur well before construction. We must also verify that plans have been successfully executed or that interim protection measures are in place, before construction occurs.

We look forward to working with the Department of Hawaiian Home Lands and your agency on the mitigation planning of this project, to ensure "no adverse effect" to the significant historic sites in this project area.

Please call Cathleen Dagher, at 692-8023, if you have any questions.

Aloha,



Don Hibbard, Administrator
State Historic Preservation Division

CD:jen

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

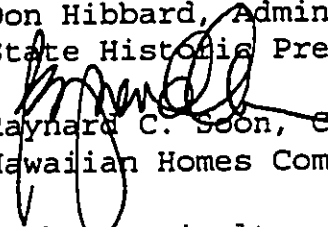
JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

To: The Honorable Gilbert S. Coloma-Agaran, Chairperson
Board of Land and Natural Resources

Attn: Don Hibbard, Administrator
State Historic Preservation Division

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated September 17, 2001, regarding the subject project.

We appreciate your department's confirmation of the findings from the archaeological inventory survey along with proposed mitigative measures.

We look forward to working with your department regarding development of the archaeological data recovery plan and preservation plan. We will prepare a burial treatment plan which will also be coordinated with your department along with the Maui/Lanai Islands Burial Council.

Our department would like to pursue interim protection measures at this time to allow the start of construction. We will appropriately coordinate with your department on the implementation of this interim protection plan.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

The Honorable Gilbert S. Coloma-Agaran
November 21, 2001
Page 2

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

c: Ronald A. Sato, SSFM

BENJAMIN J. CAYETANO
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

AUG 21 2001

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
JADINE Y. URASAKI

SSFM INTERNATIONAL, INC.
RECEIVED

AUG 22 2001

JRA

FILE _____

IN REPLY REFER TO:

HWY-PS
2.3890

SSFM International, Inc.
501 Sumner Street, Suite 502
Honolulu, Hawaii 96817

Gentlemen:

Subject: Draft Environmental Assessment (EA) for the Department of Hawaiian Home Lands Keokea Agricultural Lots - Unit 1; TMK: 2-2-021: 55, Keokea, Maui

Thank you for requesting our review of the draft EA. We have the following comments:

1. Please consult our Highways Division Right-of-Way Branch concerning fees and requirements for right-of-access to Kula Highway. Highway access will be limited to the proposed subdivision driveways. No direct highway access will be allowed from individual lots.
2. Please clarify what improvements are proposed to Kula Highway at project driveways. Page 47 of the draft EA proposes "share left-turn/right-turn deceleration lanes" while page 20 of the project Traffic Impact Analysis Report states that no left-turn lanes will be provided.
3. Along the project's highway frontage, the Department of Hawaiian Home Lands should widen the pavement and improve roadway geometrics to facilitate a better operating speed in the area.
4. Plans for work within the State highway right-of-way must be coordinated and submitted to our Highways Division Maui District Office for review and approval. All improvements must meet our current State highway requirements.

SSFM International, Inc.
Page 2

HWY-PS 2.3890

If there are any questions, please contact Ronald Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,


BRIAN K. MINAI
Director of Transportation

cc: DHHL
1099 Alakea Street 20th Floor
Honolulu, Hawaii 96813

Attn: Larry Lum

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



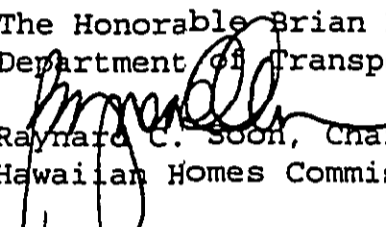
STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

November 21, 2001

To: The Honorable Brian K. Minaai, Director
Department of Transportation

From: 
Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated August 21, 2001, regarding the subject project. We have the following responses to your comments that are numbered to correspond to your comments:

1. Consultation with your Highways Division, Right-of-Way Branch, concerning fees and requirements for access to Kula Highway will be conducted. Access to Kula Highway will only be from the proposed subdivision driveways.
2. Separate left-turn lanes or right-turn deceleration lanes for Kula Highway at driveway intersections were not warranted based upon the traffic study. However, after discussion with your department's staff, right-turn deceleration lanes for both driveway intersections will be provided to address roadway geometric concerns. The Final Environmental Assessment will be revised to better clarify this matter.
3. As already discussed, appropriate coordination has been and will continue to be conducted with your Highways Division to address improvements to Kula Highway to address roadway geometrics at project driveways.
4. Plans for work within the State highway right-of-way will be coordinated and submitted to your Highways Division, Maui District Office, for review and approval.

The Honorable Brian K. Minaai
November 21, 2001
Page 2

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

c: Ronald A. Sato, SSFM

BENJAMIN J. CAYETANO
GOVERNOR



GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
236 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4185
August 6, 2001

Raynard Soon
Department of Hawaiian Home Lands
PO Box 1879
Honolulu, Hawaii 96805

Attn: Gerald Lee

Dear Mr. Soon:

Subject: Draft environmental assessment (EA) for Keokea Agricultural Lots – Unit 1

We have the following comments to offer:

Contacts: Consultation with the community is required by law. Notify the nearest neighbors, neighboring landowners or citizen groups of the proposed project, allowing them sufficient time to review the draft EA and submit comments. The Department of Planning recommends consultation with the Waiohuli Homesteaders Association and the Kula Community Association. Document all contacts in the final EA and include copies of any correspondence.

Park dedication: The Maui Department of Parks & Recreation requested consultation on park dedication for this development. There is no discussion of this in the draft EA. Please include this in the final EA.

Dry water line: Section 2.3.2, *Infrastructure (Water Supply)*, notes that a non-potable water line will be installed but not immediately put into service. Will landscaping be postponed until this line is in service? If so, how will this affect runoff and the generation of dust? If landscaping will not be postponed, how will it be irrigated?

Segmentation: This project is entitled Unit 1. Are additional "units" planned? If so impacts (and related mitigation measures) for all units must be disclosed. The Environmental Impact Statement law prohibits segmentation of larger projects and requires that full disclosure of impacts be made on projects in their entirety.

If you have any questions call Nancy Heinrich at 586-4185.

Sincerely,

A handwritten signature in cursive script that reads "Genevieve Salmonson".

GENEVIEVE SALMONSON
Director

c: Ron Sato

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

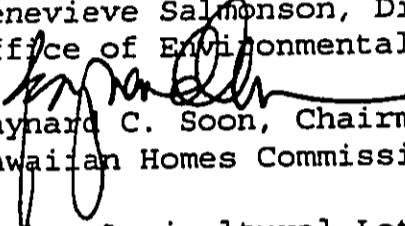
JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

To: The Honorable Bruce S. Anderson, Director
Department of Health

Attn: Genevieve Salmonson, Director
Office of Environmental Quality Control

From: 
Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated August 7, 2001, regarding the subject project. We have the following responses to your comments:

Consultation with the community was conducted, which involved providing both the Waiohuli Homesteaders Association and Kula Community Association with a copy of the Draft Environmental Assessment for their review. In addition, the Department of Hawaiian Home Lands (DHHL) has been coordinating our development plans with these communication associations along with attending their meetings.

Under the County's Subdivision regulations, government agencies are exempt from the park dedication requirements of the subdivision ordinance. However, consultation with the County Department of Parks and Recreation will be conducted to address park requirements. The Final Environmental Assessment (Final EA) will include more discussion on this matter.

Landscaping is currently not planned for infrastructure improvements (roadways, water, etc.) being constructed by DHHL. Landscaping of individual lots will be the responsibility of lessees who will need to comply with County soil erosion,

The Honorable Bruce S. Anderson
November 21, 2001
Page 2

sedimentation control, and dust control regulations as part of normal grading and building permit requirements.

No additional lots associated with this project are planned in the immediate future.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801, or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

c: Ronald A. Sato, SSFM

PHONE (808) 594-1888



STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813

SSFM INTERNATIONAL, INC.
RECEIVED
JUL 19 2001
/PAS

FILE _____

July 16, 2001

FILE COPY

SSFM International, Inc.
501 Sumner St., Ste 502
Honolulu, HI 96817

Re: Draft Environmental Assessment for Keokea Agricultural Lots Unit 1
Project Proposed by the State of Hawaii, Department of Hawaiian Home Lands,
TMK 2-2-02:55.

To whom it may concern,

Thank you for the opportunity to comment on the above referenced Draft
Environmental Assessment. OHA has the following comments:

Water

OHA understands that DHHL will be drawing water off the existing off-site
DHHL Kula Residential Reservoir. Additional water for the lower service zone
of the Subdivision will be connected to a proposed on-site reservoir. The Draft
EA does not specify which streams or irrigation systems will feed this reservoir.

DHHL will draw non-potable agricultural water from the upper Kula System,
which is draws water from the Waiakamoi watershed.

Water use for this project is minimal compared to all water use in the up-
country Maui area. Furthermore, there is enough water in the East Maui
watershed for all East Maui users. However, OHA is concerned that the
County of Maui is drawing water out of the East Maui watershed without an

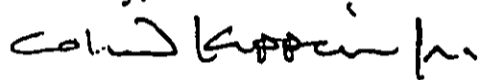
assessment of the impact of water loss to Native Hawaiians relying on water in the watershed. Hawaiians in the homesteads, as well as Hawaiians on kuleana lands along riparian streams each have rights to water. OHA is concerned that there is enough water for all Hawaiians relying on the watershed in Maui County's water plans.

Historic Sites

OHA relies on DHHL's assurance that it will work closely with the State Historic Preservation Division to mitigate any negative effects to the many historic sites in the area. DHHL will also work closely with the State Historic Preservation Division to develop burial treatments for any planned reburials or inadvertent burials that are found.

If you have further questions, please contact Pua Aiu, policy analyst at 594-1931.

Sincerely,



Colin Kippen, Jr.
Deputy Administrator, Hawaiian Rights Division

CK:pa

cc: Administration
BOT
Maui CAC

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

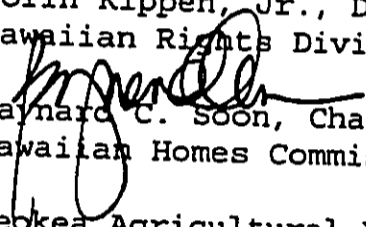
RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

November 21, 2001

To: Clyde Namuo, Administrator
Office of Hawaiian Affairs

Attn: Colin Kippen, Jr., Deputy Administrator
Hawaiian Rights Division

From: 
Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated July 16, 2001 regarding the subject project. We have the following responses to your comments:

Water

The water system serving the Keokea Agricultural Lots project will follow the water master plan developed for this project and will be coordinated with the County Department of Water Supply (DWS). The water system serving the project will consist of: 1) a potable water system and 2) an irrigation water system for the agricultural needs of lessees. The potable water serving the proposed on-site reservoir will come from the same water source serving the existing Kula Residential Reservoir which are surface water sources associated with the DWS Kula water system. Chapter 5, Section 5.1 of the Draft EA provided a description of these surface water sources.

The water source serving the irrigation water system portion would likely come from these same surface water sources. However, the details of this water system will be developed by

Mr. Clyde Namuo
November 21, 2001
Page 2

the State Department of Agriculture in the future as described in Chapter 2 of the Draft EA.

We greatly appreciate your comments supporting the water rights of native Hawaiians and the availability of sufficient water sources to serve this project. The comment on the County drawing water out of the East Maui watershed without an assessment of its impact on water loss to native Hawaiians should be more appropriately addressed by the DWS.

Historic Sites

The Department of Hawaiian Home Lands (DHHL) has been and will continue to work closely with the State Historic Preservation Division of the Department of Land and Natural Resources and the Maui/Lanai Islands Burial Council to address necessary mitigative measures for historic sites along with the treatment of any burial that may be encountered.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 586-3818.

c: Ronald A. Sato, SSFM

135
JAMES "KIMO" APANA
MAYOR



CLAYTON T. ISHIKAWA
CHIEF

FRANK E. FERNANDEZ, JR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 270-7561
FAX (808) 270-7919

August 9, 2001

Department of Planning
County of Maui

RE: Keokea Agricultural Lots Subdivision, TMK: (2) 2-2-002:05

Dear Mr. Niles

Thank you for the opportunity to comment on the proposed Keokea Agricultural Subdivision,
Fire Department Requirements are:

Fire Apparatus Access Road:

Fire apparatus access roads shall be required for every building hereafter constructed when any portion of an exterior wall of the first story is located more than 150 feet from fire department vehicle access. (Sec. 10.207.a UFC 1988)

Water Supply:

An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which buildings or portions of buildings are hereafter constructed. When any portion of the building protected is in excess of 150 feet from a water supply on a public street. (Sec. 10.301.c UFC 1988)

If you have any questions, please call me at 270-7122

Sincerely,

A handwritten signature in cursive script that reads "Lance Wendel".

Lance Wendel
Fire Prevention Bureau

01 AUG 13 PM 2:56
DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

Mr. Lance Wendel
Fire Prevention Bureau
Department of Fire Control
County of Maui
200 Dairy Road
Kahului, Hawaii 96732

Dear Mr. Wendel:

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated August 9, 2001, regarding the subject project. We have the following responses to your comments:

The Keokea subdivision access roads will be designed to provide necessary access for fire apparatus in compliance with your County fire code requirements.

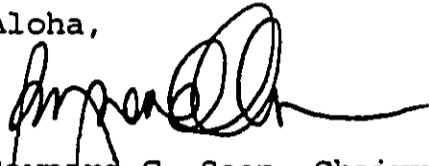
The water system serving this subdivision will include water supply capable of supplying the required fire flow for fire protection in compliance with your fire code requirements. A water master plan is being developed and coordinated with the County Department of Water Supply.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Mr. Lance Wendel
November 21, 2001
Page 2

Should you have any additional questions or comments regarding the project itself, please call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

Aloha,



Raynard C. Soon, Chairman
Hawaiian Homes Commission

c: Ronald A. Sato, SSFM



DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C KAAHUMANU AVENUE
WAILUKU, HAWAII 96793

JAMES "XIMO" APANA
Mayor

FLOYD S. MIYAZONO
Director

ELIZABETH D. MENOR
Deputy Director

Office 808-270-7230
Fax 808-270-7934

FILE COPY

July 25, 2001

SSFM INTERNATIONAL, INC.
RECEIVED

~~JUL 27 2001~~

JRAG

FILE _____

Ronald A. Sato, AICP
SSFM International
501 Summer Street, Suite 502
Honolulu, Hawaii 96817

**RE: Keokea Agricultural Lots - Unit 1
TMK: (2) 2-2-02:55
Draft Environmental Assessment**

Dear Mr. Sato:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment for the Keokea Agricultural Lots - Unit 1.

Included in the June 2001 Draft Environmental Assessment booklet, Appendix A, *Early Consultation Comment Letters* is a copy of a correspondence, dated September 16, 1998, from the then Director of the Department of Parks and Recreation to Wil Chee - Planning Inc. The letter asks what the intentions were concerning the park dedication requirements. This subject was not addressed in the Draft Environmental Assessment. An early consultation comment letter from the County Planning Director also requested information on park facilities. This information did not appear to be in the assessment either.

Our only comment at this time would be to request that the aforementioned information be provided. Should you have any questions or need of additional comment, please call me or Patrick Matsui, Chief of Parks Planning & Development, at 808-270-7931.

Sincerely,

Floyd S. Miyazono
Director

FSM:PTM:rh

c: Patrick Matsui, Chief of Parks Planning & Development

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOMELANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

November 21, 2001

The Honorable Floyd S. Miyazono, Director
Department of Parks and Recreation
County of Maui
1580-C Kaahumanu Avenue
Wailuku, Hawaii 96793

Dear Mr. Miyazono:

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated July 25, 2001, regarding the subject project. We have the following responses to your comments:

The Final Environmental Assessment will include a section providing information on existing park facilities in the project area and addressing the project's impact.

Regarding park dedication requirements, the County's subdivision code (§18.16.320) indicates that subdivisions by State agencies are exempt from the parks and playground dedication requirements that would subsequently apply to this DHHL project. However, our agency is working with the community to address park and playground facilities.

A 16-acre parcel is being provided for future park use within the DHHL Kula Residential Lot, Unit 1 project (Waiohuli). The 77 lots proposed for Keokea would require parkland of 38,500 square feet or less than one acre (500 sf per lot). If the future additional 40 lots were included, the total 117 lots created (77 plus 40) would only require 1.34 acres of park area. The land requirement for the Waiohuli development of 386 lots was only 4.43 acres. Thus, this future park site would be more than adequate to address the Keokea park requirements.

The Honorable Floyd S. Miyazono
November 21, 2001
Page 2

Other options being considered are designating one of the future 40 lots (1F to 40F) associated with Lot 82 as a future park within the Keokea subdivision. Another option is designating one of the parcels along Kula Highway for a future park. A third option is developing Lot 52 as a cultural park for passive recreational use that includes preservation efforts for historic sites.

The future development of one or more of these lots for park use would be dependent upon the wishes of the Keokea Homestead Community Association. Appropriate coordination would be conducted by DHHL with both the Community Association along with your department concerning development of these areas into park facilities at that time.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

Aloha,



Raynard C. Soon, Chairman
Hawaiian Homes Commission

c. Ronald A. Sato, SSFM

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director



COUNTY OF MAUI
DEPARTMENT OF PLANNING

July 23, 2001

SSFM INTERNATIONAL, INC.
RECEIVED

JUL 25 2001

TOAC

FILE _____

Mr. Ronald A. Sato, AICP
SSFM International, Inc.
501 Summer Street, Suite 502
Honolulu, Hawaii 96817

Dear Mr. Sato:

RE: Comments on Draft Environmental Assessment (DEA) for Hawaiian
Homelands Agricultural Lots in Keokea, Maui

Thank you for the opportunity to provide you with comments regarding this project. This office certainly supports the development of this project, as well as the project at Waiohuli only several miles away. Both are consistent with our land use policies, and we believe their development is overdue. We do, however, have some concerns with the analysis provided. Our comments are related to government agencies' ability to provide for the regional increase in population, rather than any concerns about the project itself.

1. **Cumulative Impacts.** In our preconsultation letter dated October 2, 1998, we requested that this project be considered in conjunction with the Waiohuli project. We note that awardees have not yet started moving onto their properties at Waiohuli, thus the full increase in area population has yet to be realized.

There is no analysis in the DEA for the combined projects. These ag lots alone will mean a significant increase in the population of Keokea. Together with Waiohuli, the immediate area's population is likely to double. Again, we are concerned that agencies cannot plan for services without a full evaluation of the projected population increase.

From personal conversations with the Department of Hawaiian Homelands' personnel, we also note that Hawaiian Homestead lots are not limited to one house per lot, but awardees could build several homes. While this will not be in every case, the EA should

250 SOUTH HIGH STREET, WAILUKU, MAUI, HAWAII 96793
PLANNING DIVISION (808) 270-7735; ZONING DIVISION (808) 270-7253; FACSIMILE (808) 270-7634

Quality Seamless Service - Now and for the Future

Mr. Ronald A. Sato, AICP
July 23, 2001
Page 2

still examine that the number of persons living in the subdivision is likely to be somewhat higher than projected in the document.

2. **Schools.** The analysis on this topic should include considerably more detailed than presented. The DEA notes a number of facilities, but only their current enrollment, not their capacity. Therefore from the information provided, the actual impact to these facilities cannot be determined.

For instance, the DEA points out that there are estimated to be 26 elementary school aged children. This is approximately the capacity of one entire classroom. Does Kula School have this capacity? How many children are anticipated to attend this school or Kamehameha Schools? The latter notwithstanding, we also believe that it is only a small percentage of the regions' students who utilize the mentioned private schools.

Especially in light of No. 1 above, the EA should especially look at the commutative impacts of both Keokea and Waiohuli on the school system.

3. **Water.** We note the inclusion of several policies from the Makawao-Pukalani-Kula Community Plan, identifying them as "proposed improvements." Please be aware that the Department of Water Supply (DWS) is a semi-autonomous agency, and may not recognize these statements as a mandate, nor include them in their capital improvement program. We request that you confirm with DWS that they do indeed plan on these projects before using these statements as "fact" in the Final EA.

Our preconsultation letter also requested analysis with respect to agricultural water use, yet we find none. Since these are farm lots, it is expected that agricultural operations would consume a significant amount of water.

4. **Wastewater.** We question the use of cesspools as the wastewater treatment for the entire subdivision. A minimum of 77 homes putting untreated sewage into the ground may have serious implications. There have been discussions at the homeowners association meetings regarding groundwater exploration. We do

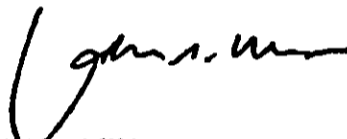
Mr. Ronald A. Sato, AICP
July 23, 2001
Page 3

not know of the viability of this option, but the use of cesspools may dispose of this possibility.

5. We believe the Keokea and Waiohuli Homesteaders Associations, and the Kula Community Association should be apprized of the Draft Environmental Assessment and allowed to comment.

If you have any questions, please contact Mr. William Spence, Staff Planner, of this office at 270-7735.

Very truly yours,



JOHN E. MIN
Planning Director

JEM:WRS:cmb

c: Clayton Yoshida, AICP, Planning Program Administrator
William Spence, Staff Planner
Project File
General File
(S:\ALL\WILL\AACORESP\2001\keokeaEA.wpd)

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

The Honorable John E. Min, Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated July 23, 2001, regarding the subject project. We greatly appreciate your department's support of this important project for our beneficiaries. We are also grateful for your department's inclusion of its finding that the project is consistent with your land use policies and the statement that its development is overdue.

We have the following responses to your department's comments and have numbered them to correspond to the comments:

1. The Final Environmental Assessment (Final EA) will include a section addressing cumulative impacts associated with this project along with the Kula Residential Lot (Waiohuli) project. Other pertinent sections of the Final EA will be revised to address the project's 77 agricultural lots, future commercial area, and future (40) agricultural lots planned as a reserve area.

Some of these future 40 lots may be used to replace any of the 77 lots deemed unusable due to unsuitable agricultural potential, archaeological constraints, drainage impacts or other issues that prohibit one of the 77 lots from meeting the needs of lessees. Revised sections will address the cumulative impact of the

The Honorable John E. Min
November 21, 2001
Page 2

resident population in the area and its effects on public facilities.

2. The Final EA will revise the section on school facilities to address your comments. Appropriate coordination would be conducted with the State Department of Education to address such impacts and necessary mitigative measures.
3. Appropriate coordination is being conducted with the Department of Water Supply (DWS) to address water source and system requirements to serve the project. A water master plan prepared to address water system requirements is currently being coordinated with DWS. The Final EA will also address irrigation water for small-scale agricultural activities conducted by lessees on their lots.
4. Development of wastewater systems serving individual lots will be the responsibility of each lessee and would consist of either cesspools or septic tanks. As a condition of their lease, each lessee will be required to have their individual wastewater systems designed in compliance with the State Department of Health's Administrative Rules governing wastewater systems by a licensed engineer.

DHHL seriously shares your concern over the use of cesspools since coordination with the U.S. Geological Survey is being conducted to evaluate the possibility of future groundwater development in the Waiohuli area. DHHL will continually evaluate the appropriateness of cesspools as occupation of the area progresses.


5. Copies of the Draft EA for this project were provided to the Keokea Homestead Association, the Waiohuli Homestead Association, and the Kula Community Association. In addition, our department has been coordinating our development plans with these communication associations along with attending their meetings.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

The Honorable John E. Min
November 21, 2001
Page 2

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

Alpha,



Raynard C. Soon, Chairman
Hawaiian Homes Commission

c. Ronald A. Sato, SSFM

JAMES "KIMO" APANA
Mayor

DAVID C. GOODE
Director

MILTON M. ARAKAWA, A.I.C.P.
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955



COUNTY OF MAUI
**DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT**

200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

September 11, 2001

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

SSFM INTERNATIONAL, INC.
RECEIVED

SEPT 7 2001

JRS

FILE

FILE COPY

Mr. Ronald A. Sato, AICP
SSFM International, Inc.
501 Summer Street, Suite 502
Honolulu, Hawaii 96817

Dear Mr. Sato:

**SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT
DEPARTMENT OF HAWAIIAN HOME LANDS KEOKEA
TMK: (2) 2-2-002:055**

We have reviewed the subject application and would like to note that our comments dated September 8, 1998 are still applicable. We have one supplemental comment to offer.

1. The drains and drainage systems, inclusive of drainage detention/retention basins, within the development shall be privately maintained and not turned over to the County for maintenance. The drainage inlet grating in lieu of catch basins are major maintenance problems during rain storms when debris get caught on the grating and floods adjacent areas.

If you have any questions, please feel free to call Milton Arakawa at 270-7845.

Sincerely,
Milton Arakawa
for DAVID GOODE
Director

MA:jso
S:\LUCA\CM\hawaii\homa.wpd

BENJAMIN J. CAVETANO
GOVERNOR
STATE OF HAWAII



RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

The Honorable David Goode, Director
Department of Public Works and Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Goode:

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated September 11, 2001, regarding the subject project.

We note your comment that the drains and drainage systems, inclusive of detention/retention basins within the Keokea development will be privately maintained. Appropriate coordination will be conducted with your department associated with the review and approval of design plans.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

Aloha,


Raynard C. Soon, Chairman
Hawaiian Homes Commission

c: Ronald A. Sato, SSFM



**DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI**
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 243-7816 • Fax (808) 243-7833

SSFM INTERNATIONAL, INC
RECEIVED
AUG 11 2001
JKAS

FILE _____

August 7, 2001

Mr. Ronald A., Sato, AICP
SSFM International, Inc.
501 Sumner Street, Suite 502
Honolulu, Hawaii 96817

Re: ID: Draft Environmental Assessment
TMK: 2-2-02:055
Project: Department of Hawaiian Homelands Keokea Agricultural Lots Units 1

Dear Mr. Sato:

Thank you for the opportunity to review this Draft Environmental Assessment. The following comments are made in reference to information contained in the Draft Environmental Assessment for The Department of Hawaiian Home Lands, Keokea Agricultural Lots - Unit 1; TMK: 2-2-02:055.

Based on the Memorandum of Understanding of December 8, 1997 and Water Credits Agreement of December 9, 1997, DWS will guarantee the allocation of 500,000 gpd to TMK lots 2-2-02:055 and :056. The Final EA should identify sources and anticipated consumption for current and cumulative phases of the project. In addition, the Water Master Plan For Keokea Farm Lots, Unit 1, appears to show all water being pumped up from the lower line to the highway. This will not be an acceptable method of delivery to the farm lots due to the high energy cost of pumping, unless DHHL wants to operate the system. We recommend the applicant coordinate with our engineering division.

The applicant will be required to comply with Water Department Rules and Regulations for Subdivisions as well as provide for adequate fire protection in accordance to system standards. To determine actual domestic, agricultural and commercial demand, calculations need to be made and stamped by a certified engineer. Fire flow demand for the area and structures is determined by using fire flow calculations prepared by a certified engineer. The approved fire flow calculation methods for the applicant's use include "Fire Flow" - Hawaii Insurance Bureau, 1991; and Guide for Determination of Required Fire Flow" - Insurance Services Office, 1974. The applicant is encouraged to contact our engineering division at 270-7835 to discuss the matter further.

The project is served by the Lower Kula water system. We ask the applicant to consider conservation measures in and around the property. Some of these measures are listed for your use.

By Water All Things Find Life

Utilize Low-Flow Fixtures and Devices: Maui County Code Subsection 16.20A.680 requires the use of low-flow water fixtures and devices in faucets, Showerheads, Urinals, water closets and hose bibs. Water conserving washing machines, icemakers, and other units are also available.

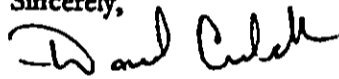
Maintain Fixtures to Prevent Leaks: A simple, regular program of repair and maintenance can prevent the loss of hundreds or even thousands of gallons a day. Refer to the attached handout, "The Costly Drip." The applicant should establish a regular maintenance program.

Look for Opportunities to Conserve Water: A few examples of these actions are as follows - When clearing driveways, etc. of debris, use a broom instead of a hose. When washing cars, use a hand-operated spray nozzle instead of an open hose. Additionally, Check for leaks in faucets and toilet tanks.

In the event of any future landscape renovations, we encourage the applicant to utilize appropriate native and non-invasive species and avoid use of potentially invasive plants. This project is located in the overlap of Maui County Planting Plan Plant Zone 2 and Zone 4. Native plants adapted to the area conserve water and further protect the watershed from degradation due to invasive alien species. Attached is a list of the appropriate plants for these zones.

Please feel free to contact our Water Resources and Planning Division at 270-7199, should you have any other questions.

Sincerely,



David Craddick

Director

Mel

CC: Engineering Division
Applicant, w/ attachments

1. "The Costly Drip"
2. Ordinance 2108 - "An ordinance amending Chapter 16.20 of the Maui County Code, pertaining to the Plumbing Code"
3. "A Checklist of Conservation Ideas for the Home"
4. Zone - Specific Native and Polynesian Plants : Zone 2 and 4
5. "A Checklist of Water Conservation Ideas for Commercial Buildings"
6. Best Management Practices -EPA's Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters - Construction Activities
7. Xeriscape - Water Conservation Through Creative Landscaping

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

DEPUTY TO THE CHAIRMAN

November 21, 2001

The Honorable David Craddick, Director
Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Hawaii 96793-7109

Dear Mr. Craddick:

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated August 7, 2001, regarding the subject project. We have the following responses to your department's comments:

We understand that the Department of Water Supply (DWS) will guarantee the allocation of 500,000 gallons per day of water in accordance with the "Water Credits Agreement" entered into by both DHHL and DWS on December 9, 1997. This water allocation was for TMK parcels 2-02-02: 055 and 056 that correspond to this Keokea Agricultural Lots project and the Kula Agricultural Lots (Waiohuli) development. The Final Environmental Assessment (Final EA) will further clarify the sources and anticipated consumption for both of these developments.

Appropriate coordination has been and will continue to be conducted with your department to address the necessary water system improvements for this project. As agreed, the Lower Kula Water System will serve this project by connecting to this system's upper water tank along Kula Highway. An off-site transmission main will be provided along the highway to connect to the Keokea project site.

The Honorable David Craddick
November 21, 2001
Page 2

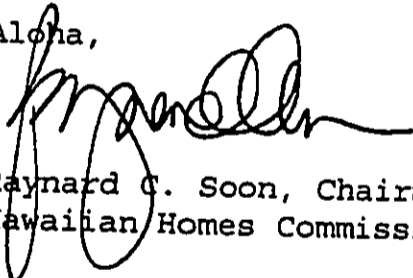
The water system developed for this project will comply with your department's rules and regulations and provide for adequate fire protection. A licensed engineer will prepare the necessary calculations.

Thank you for the information and materials provided with your letter covering various methods and options that can be incorporated in conserving water. These materials will be used in considering potential conservation measures that can be integrated with the project. Any landscaping provided for this project would consider the use of appropriate native and non-invasive plant species.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call me at 586-3801 or ask your staff to call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

Aloha,



Raynard C. Soon, Chairman
Hawaiian Homes Commission

c: Ronald A. Sato, SSFM



JAMES "KIMO" APANA
MAYOR

OUR REFERENCE
TV
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
Fax (808) 244-6411

July 30, 2001

FILE COPY



THOMAS M. PHILLIPS
CHIEF OF POLICE

KEKUHAUPIO R. AKANA
DEPUTY CHIEF OF POLICE

Mr. Ronald A. Sato, AICP
SSFM International, Inc.
501 Sumner Street, Suite 502
Honolulu, HI 96817

Dear Mr. Sato:

SUBJECT: Draft Environmental Assessment
Keokea Agricultural Lots - Unit 1
TMK: 2-2-02:55

We are in receipt of your letter of July 6, 2001 requesting comments on the above subject.

We have reviewed the proposed summary and have enclosed our comments and recommendations. Thank you for giving us the opportunity to comment on the proposed project.

Very truly yours,

Assistant Chief Robert Tam Ho
for: Thomas M. Phillips
Chief of Police

Enclosure

c: John E. Min, Planning Department
Mr. Larry Lum, State Dept. of Hawaiian Home Lands

SSFM INTERNATIONAL, INC
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AUG - 7 2001

JRAS

FILE

COPY

TO : THOMAS PHILLIPS, CHIEF, MAUI POLICE DEPARTMENT
VIA : CHANNELS
FROM : RANDALL BURGESS, P.O.III, COMMUNITY POLICING
SUBJECT : DEPARTMENT OF HAWAIIAN HOME LANDS KEOKEA AGRICULTURAL LOTS

A *CB*
7/30/01

Sir, this To/From is being submitted as requested and in regards to police comments and recommendations to the proposed Department of Hawaiian Home Lands Keokea Agricultural Lots project located at TMK 2-2-02:55 Keokea, Maui.

Project review revealed the following comments:

Chapter 5.9 Police and Fire Protection states, "the Makawao-Pukalani-Kula community is serviced by the new Kula police substation". To clarify this statement, the stated location is a Community Police Officer office that is available for use by beat officers and equipped with telephone and typewriter.

In regards to roadways and traffic:

Concur that roadway improvements should consist of left-turn turn-out lanes and right turn deceleration lanes at Project Access Roads A and C.

In closing, there are no further police comments/recommendations at this time.

Respectfully submitted,

Randall Burgess
Randall BURGESS #1023
071901 @ 1300 hours

Noted, Officer BURGESS' clarification regarding police service should be noted and corrected.

[Signature]
Sgt. Barry #041
07/25/01 @ 1545 hours

*Note comments made
by Off. Burgess regarding
CPO office.*

Capt. [Signature]
7/26/01

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOMELANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

November 21, 2001

Mr. Robert Tam Ho, Assistant Chief
Police Department
County of Maui
55 Mahalani Street
Wailuku, Hawaii 96793

Dear Mr. Ho:

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated July 30, 2001 regarding the subject project. We have the following responses to your comments.

The Final Environmental Assessment will include your comments clarifying the description of the Community Police Officer office located in Kula.

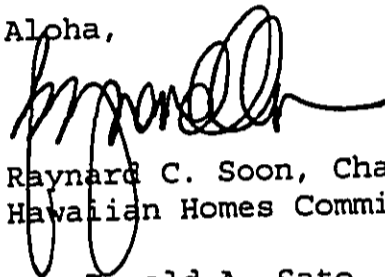
It should be clarified that no separate left-turn lanes are proposed for Kula Highway at driveway intersections because such improvements are not warranted based upon the traffic study. However, right-turn deceleration lanes at each driveway will be provided to address roadway geometric concerns based upon consultation with the State Department of Transportation. Revisions will be made in the Final Environmental Assessment to clarify this. Appropriate coordination will continue to be conducted with the State Department of Transportation, Highways Division, to discuss necessary improvements to Kula Highway.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Mr. Robert Tam Ho
November 21, 2001
Page 2

Should you have any additional questions or comments regarding the project itself, please call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

Aloha,



Raynard C. Soon, Chairman
Hawaiian Homes Commission

c: Ronald A. Sato, SSFM



SSFM INTERNATIONAL, INC.
 RECEIVED
 AUG 13 2001
 ✓ RAS

 FILE _____

August 13, 2001

Mr. Ronald A Sato, AICP
 SSFM International, Inc.
 501 Sumner Street, Suite 502
 Honolulu, HI 96817

Dear Mr. Sato:

Subject: Department of Hawaiian Home Lands
 Keokea Agricultural Lots Unit 1
 Draft EA
 (TMK: 2-2-02:55)

Thank you for allowing us to comment on the subject project.

In reviewing the information transmitted and our records, Maui Electric Company (MECO) at this time has no objections to the proposed project.

MECO encourages the project's consultant meet with us as soon as practical so that we may discuss the electrical requirements of this project.

If you have any questions or concerns, please call Fred Oshiro at 872-3202.

Sincerely,

Neal Shinyama
 Manager, Energy Delivery

NS/fo:lkh

cc: Mr. Larry Lum, DHHL

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOMELANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

Mr. Neal Shinyama, Manager
Energy Delivery
Maui Electric Company, Ltd.
210 West Kamehameha Avenue
Kahului, Hawaii 96733-6898

Dear Mr. Shinyama:

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated August 13, 2001, regarding the subject project. We note that your department has no objections to this project.

Appropriate coordination will be conducted with your company as soon as practical to discuss electrical requirements for this project.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

Aloha,


Raynard C. Soon, Chairman
Hawaiian Homes Commission

c: Ronald A. Sato, SSFM

KULA COMMUNITY ASSOCIATION
P.O. Box 417 - Kula, HI 96790
<http://kulamaui.com>

The vision of the Kula Community Association is to preserve open space, support agriculture, maintain a rural residential atmosphere, and to work together as a community. The specific purpose of this association is to improve the quality of life for the residents of Kula, to promote civic welfare and generally to benefit the community of Kula.

SSFM INTERNATIONAL, INC.
RECEIVED

AUG - 8 2001

JRAS

FILE _____

August 7, 2001

SSFM International, Inc.
501 Summer Street, Suite 502
Honolulu, HI 96817

Dear Sirs:

Subject: Draft Environmental Assessment (EA) for the Department of Hawaiian Home Lands (HHL) Keokea Agricultural Lots

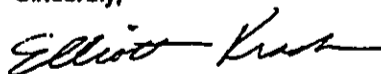
The Kula Community Association (KCA) received a copy of the Draft EA for the HHL project in Keokea in mid-July. We are circulating the document among our Board Members for individual review, but we have not yet had the opportunity, as a group, to include it on a Board Meeting agenda for discussion and action.

Following are the concerns and questions raised by those members who have had the chance to briefly review the document:

- Water - Is the estimate of 45,000gpd sufficient for the 75 lot subdivision when built out? Will building proceed only as water source and delivery are available?
- Wastewater - Although a 1991 State Department of Health (DoH) regulation amendment allows cesspools in the project area, an updated analysis by the DoH should be required before cesspools are permitted.
- Solid Waste - Recycling is a concern and should be addressed.
- Education - The projected increase in student population of 50 children seems low for 77 lots, with one or more homes per lot.
- Medical - No mention is made of the fact that at present the region from Omaopio Road to Ulupalakua and beyond is served only ten hours a day (increasing to 12 hours on October 1, 2001) by a locally based ambulance. After hours ambulance service is provided by the Makawao ambulance, or the nearest available unit.
- Police - No mention is made of the fact that at this time the region's Community Police Officer position is vacant and filling it appears to be low priority given available resources and urgent needs countywide.
- Plans - No reference is made to the Pukalani-Makawao-Kula Community Plan. This document includes the Hawaiian Home Lands projects at Keokea and Waiohuli as an integral part of the community.
- Lighting - Light pollution from street lights, signs, and other sources in this area of proximity to the Haleakala observatory facilities and native species territories is a major concern the KCA Lighting Subcommittee will study.
- Traffic - Transportation issues are a major concern island-wide. The traffic impact of the project will be studied by the KCA Roads and Highways Committee.

The KCA Board of Directors will review these and other aspects of the project during the next few months. Thank you for the opportunity to review the Draft EA.

Sincerely,



Elliott Krash, President

cc: State of Hawaii, Department of Hawaiian Home Lands

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOMELANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 21, 2001

Ms. Elliott Krash, President
Kula Community Association
P.O. Box 417
Kula, Hawaii 96790

Dear Mr. Krash:

Subject: Keokea Agricultural Lots, Unit 1 Project
Draft Environmental Assessment
Keokea, Kula, County of Maui, Hawaii

Thank you for your letter dated August 7, 2001, regarding the subject project. We have the following responses to your association's comments that are numbered to correspond to the comments:

1. A water master plan is being prepared to address the potable water demand and system improvements necessary to serve this project. This master plan projected an average daily demand of 118,200 gallons that includes the 77 proposed agricultural lots and future commercial area. This total also includes an additional 40 agricultural lots planned as a reserve area to replace any of the 77 lots deemed unusable due to unsuitable agricultural potential, archaeological constraints, drainage impacts, or other issues that prohibit one of the 77 lots from meeting the needs of lessees. Information from this water master plan will be included in the Final Environmental Assessment (Final EA). Infrastructure development of the subdivision will proceed prior to the granting of lots to lessees of which the water system is one component.
2. Development of individual wastewater systems (cesspools or septic tanks) for lots will be implemented in compliance with State Department of Health (DOH) Administrative Rules governing wastewater systems. The need for an updated analysis of the DOH regulations is a matter that should be more appropriately addressed by DOH.

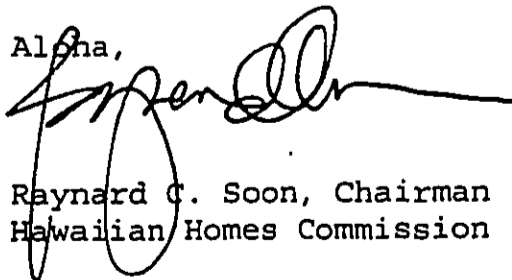
Ms. Elliot Krash
November 21, 2001
Page 2

3. DHHL will look into incorporating recycling programs and container facilities as part of this subdivision in coordination with the County and the future homestead community.
4. The projected increase in student population was based upon information provided by the State Department of Education (DOE). These projections were also consistent with information provided by the DOE for the Kula Residential Lot project. The State DOE also had no comments in their review of the Draft EA for this project.
5. The information you provided regarding the ambulance service in the project area will be incorporated in the Final EA.
6. The information you provided regarding the status of the County's Community Police Officer position will be incorporated in the Final EA.
7. The Final EA will include a discussion of the project's relation to the County's Pukalani-Makawao-Kula Community Plan.
8. DHHL will continue working with the Kula Community Association along with the State Department of Transportation to address comments and concerns over lighting and traffic associated with the project.

Should you have any questions regarding the contents or preparation of the Environmental Assessment, please contact Mr. Ronald Sato of SSFM International, Inc. at 531-1308.

Should you have any additional questions or comments regarding the project itself, please call Mr. Gerald Lee of our Design and Construction Branch, Land Development Division at 587-6447.

Alpha,



Raynard C. Soon, Chairman
Hawaiian Homes Commission

c: Ronald A. Sato, SSFM

APPENDIX B

Botanical Field Survey

CHAR & ASSOCIATES

Botanical/Environmental Consultants

4471 Puu Panini Ave.
Honolulu, Hawaii 96816
(808) 734-7828

05 June 2001

SSFM International, Inc.
501 Sumner Street, Suite 502
Honolulu, Hawaii 96817

Attention: Richard Stook

SUBJECT DHHL Keokea Agricultural Lots
Botanical Survey Report Update

Dear Mr. Stook:

A survey of the botanical resources found on the Keokea Agricultural Lots (TMK: 2-2-02: 55) was conducted by Char & Associates in August 1998. At that time, 71 farm lots of approximately 2 acres in size, Lots 1 to 71, and three larger lots fronting Kula Highway Lots 72 to 74, were proposed. Lot 75, which comprises ±140 acres, was not planned for development.

Since then, plans for the subdivision have been revised and the ±140-acre parcel will be subdivided into smaller lots. Due to these proposed changes, I have reviewed the revised subdivision layout and our original botanical survey report.

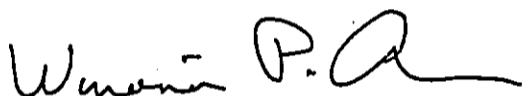
The revised subdivision layout is not expected to have a significant negative impact on the botanical resources. The vegetation on the site is dominated by introduced black wattle (Acacia mearnsii) forest and scrub vegetation with abundant thickets of lantana (Lantana camara). A total of 124 plant species were inventoried in the 1998 survey. Of these, 104 (84%) were introduced species; two (2%) were originally of Polynesian introduction; and 18 (14%) were native. Of the natives, 15 were indigenous (native to the Hawaiian Islands and elsewhere) and three were endemic (native only to the Hawaiian Islands). The endemic species were: kumu-niu fern (Doryopteris decipiens), wiliwili (Erythrina sandwicensis), and Cyperus hillebrandii (formerly Mariscus Wagner et al. 1999a). All of the native plants can be found in similar environmental habitats throughout the Hawaiian Islands. None of the plants

inventoried on the site is on the most recent lists of threatened and endangered species or species of concern (U.S. Fish and Wildlife Service 1999; Wagner et al. 1999b).

The 1998 study recommended that areas cleared of vegetation be grassed over as soon as possible to prevent soil loss and generation of dust. Native plants found on the site such as wiliwili, 'ilima (Sida fallax), 'ilihe'e (Plumbago zeylanica), etc., as well as native plants found on the slopes of Haleakala were recommended for landscaping. These recommendations are still valid.

Please do not hesitate to contact me should you have any questions regarding the botanical resources.

Sincerely,



Winona P. Char

References

- Char, W.P. (Char & Associates). 1998. Botanical Survey, Keokea Farm Lots, Unit 1, Makawao District, Maui. Prepared for SSFM Engineers, Inc. August 1998.
- U.S. Fish and Wildlife Service. 1999. U.S. Fish and Wildlife Service species list, plants. March 23, 1999. Pacific Islands Ecoregion Office, Honolulu, HI.
- Wagner, W.L., & D.R. Herbst. 1999a. Supplement to the Manual of flowering plants of Hawai'i, p. 1855-1918. In: Wagner, W.L., D.R. Herbst, & S.H. Sohmer, Manual of the flowering plants of Hawai'i. Revised edition. 2 vols. University of Hawai'i Press and Bishop Museum Press, Honolulu.
- Wagner, W.L., M.M. Bruegmann, D.R. Herbst, & J.Q.C. Lau. 1999b. Hawaiian vascular plants at risk: 1999. Bishop Museum Occasional Papers No. 60.

BOTANICAL SURVEY
KEOKEA FARM LOTS, UNIT 1
MAKAWAO DISTRICT, MAUI

by

Winona P. Char
CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: SSFM ENGINEERS, INC.

August 1998

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DISCUSSION AND RECOMMENDATIONS	6
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BOTANICAL SURVEY
KEOKEA FARM LOTS, UNIT 1
MAKAWAO DISTRICT, MAUI

INTRODUCTION

The Keokea Farm Lots, Unit 1, project site (TMK: 2-2-02: 55) consists of approximately 350 acres of land belonging to the Department of Hawaiian Home Lands (DHHL), and located near Keokea and the Kula Sanatorium. The property is bounded on the south by Kula Highway, on the east by a few homes, and on the west and south by undeveloped lands used for pasture. Elevation on the property is roughly 2,250 ft. along the lower, makai boundary to slightly more than 2,800 ft. along the upper, mauka boundary near the highway and stores. Average annual rainfall is 30 inches.

DHHL proposes to develop 71 farm lots of approximately 2 acres in size, Lots 1 to 71, and three larger lots fronting Kula Highway, Lots 72 to 74. Lot 75, which comprises \pm 140 acres, is not planned for development.

Field studies to assess the botanical resources found on the \pm 350-acre Keokea project site were conducted on 17 and 18 August 1998. A team of three botanists was used to gather the data contained in this report. The primary objectives of the survey were to:

- 1) provide a general description of the vegetation;
- 2) inventory the flora;
- 3) search for threatened and endangered plants as well as species of concern; and
- 4) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps were examined to determine terrain characteristics, boundaries, reference points, access and roads. Access was from Kula Highway on to Road "B", by Grandma's Country Cafe, and also Road "A" which is gated but not locked.

A walk-through (pedestrian) survey method was used. Notes were made on plant associations and distribution, substrate types, drainage, exposure, disturbances, topography, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium (Bishop Museum - BISH), or for comparison with the most recent taxonomic literature. Areas with large rocky outcrops and drainageways/gullies were more intensively surveyed as these places were more likely to harbor native plant communities and, perhaps, rare plants.

The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the survey. A survey taken at a different time of the year and under varying environmental conditions would no doubt yield slight variations in the species list, especially of the weedy, annual plants.

DESCRIPTION OF THE VEGETATION

There have been a few studies which have described the vegetation on the project site or on the nearby DHHL Kula Residential Lot subdivision which has similar vegetation types and environmental conditions. The archaeological study for the Keokea parcel (PHRI

1989) briefly described the vegetation on the site. Black wattle forest dominated the eastern half of the site; the report concluded that this was probably as a result of the extensive and recurrent ground disturbance associated with recent habitation at higher elevation. Dense lantana scrub dominated the lower western portion of the project site. The botanical resources on the nearby Kula Residential Lot were surveyed by Char & Associates in 1994. Three vegetation types were recognized on the Kula site. These were black wattle forest, from the 2,300-foot elevation contour up to the highway; lantana-cactus scrub, from the 2,300-foot contour down to the lower boundary; and gulch vegetation which occurred in the large gulches which dissect the parcel.

On the Keokea site, the black wattle forest is associated primarily with soils of the Kula series -- "KxD", Kula loam, 12 to 20 percent slopes; and "KxbE", Kula very rocky loam, 12 to 40 percent slopes (Foote et al. 1972). Scrub vegetation with abundant lantana thickets is associated primarily with Kaimu extremely stony peat, 7 to 25 percent slopes, "KCXD". The more open black wattle forest is also found on this soil type closer to the highway.

The two vegetation types are described in more detail below. A checklist of all the plants observed on the site during the field studies is presented at the end of the report.

Black Wattle Forest

Black wattle (Acacia mearnsii), native to Australia, forms a dense forest, 50 to 60 ft. tall, on the eastern half of the property, primarily on the somewhat deeper soils of the Kula series. Where the soils are nearly free of stones, Kikuyu grass (Pennisetum clandestinum), a native of tropical Africa, forms a low, yellow-green colored mat along with scattered tussocks of

African dropseed grass (Sporobolus africanus). In places where the tree cover is more open, there may be many young saplings of black wattle, 1 to 3 ft. tall. Where there are small stony areas or a few small rock outcrops, such as on knolls or the sides of small drainages, lantana shrubs (Lantana camara) are locally abundant forming dense thickets sometimes reaching 6 to 7 ft. in height. Small gullies, especially on the northwestern portion of the black wattle forest, support large patches of airplant (Kalanchoe pinnata) interspersed among the lantana thickets.

Where the black wattle forest borders Kula Highway, the tree cover is more open, that is, the trees are more widely spaced apart. Scattered here and there are large shrubs to small trees of Christmas berry (Schinus terebinthifolius) and Bocconia frutescens. Ground cover consists of Kikuyu grass with smaller localized patches of Bermuda grass (Cynodon dactylon), meadow ricegrass (Ehrharta stipoides), African dropseed, buffel grass (Cenchrus ciliaris), and Guinea grass (Panicum maximum).

Scattered throughout the black wattle forest are open, grassy meadows of Kikuyu grass. These areas were bulldozed in the past and are more or less level with deep soil and few stones. A few, very large trees of Chinaberry (Melia azedarach), silk oak (Grevillea robusta), and jacaranda (Jacaranda mimosifolia) are associated with the meadow areas. Small drainageways/gullies near the meadow areas remain damper during the summer months and support a dense, green carpet of Kikuyu grass along with a weedy mixture of other species which include honohono (Commelina diffusa), spiny amaranth (Amaranthus spinosus), popolo (Solanum americanum), Neonotonia wightii -- a pasture legume, "Panicum" sp., castor bean (Ricinus communis), four-o'clock (Mirabilis jalapa), hairy swordfern (Nephrolepis multiflora), bull thistle (Cirsium vulgare), etc.

There are also remnant plantings, perhaps from former home sites, scattered through the black wattle forest. These include orange (Citrus sinensis), 'ape (Alocasia macrorrhiza), loquat (Eriobotrya japonica), and a large grove of avocado trees (Persea americana). On Lot 58 (and 59?), there is a large pile of rusted trucks and cars, large home appliances, concrete blocks, household trash, etc. Several ornamental species thrown out with the trash have rooted or sprouted here. These include a trailing pink geranium (Pelargonium peltatum), an Aloe species, spider lily (Crinum sp.), a vining relative of the airplant (Kalanchoe beauverdii), and cherimoya (Annona cherimola).

Scrub Vegetation

Scrub vegetation is found on the western half of the site on Kaimu extremely stony peat, 7 to 25 percent slopes, "KXCD", and on a small portion of Kamaole very stony silt loam, 12 to 20 percent slopes, "KGKC" on the soil maps (Foote et al. 1972). These are well-drained, very shallow soils. The Kaimu soils are especially stony with rough, undulating, relatively young 'a'a lava flows forming a number of small ridges or pali and knolls. In a few places, there are exposed pahoehoe flows.

The general physiognomy of this vegetation type is of low thickets of lantana, 3 to 6 ft. tall, interspersed among grassy patches. Scattered through the scrub are a few trees and large shrubs. The grasses tend to be found in low lying swale areas and consist of a mixture of Kikuyu grass, Bermuda grass, buffel grass, pitted beardgrass (Bothriochloa pertusa), and Bothriochloa sp. Smaller amounts of Natal reedtop (Melinis repens) and molasses grass (Melinis minutiflora) are also here. Tree and shrub cover is about 20 to 30 percent and consists of scattered small stands or individuals of black wattle, Christmas berry, Bocconia, koa

haole (Leucaena leucocephala), panini (Opuntia ficus-indica), and Chinaberry. A few trees of the native wiliwili (Erythrina sandwicensis) are found on the southwest corner of Lot 75. Several large shrubs of Cotoneaster pannosa, up to 12 ft. tall, are also found in the scrub vegetation on the southwest portion of the property. This member of the rose family is an attractive ornamental shrub which has escaped cultivation and is apparently naturalizing on the site and adjacent areas.

The lichen-covered ridges and knolls scattered through the scrub vegetation support a number of native plants. These include several ferns such as kumu-niu (Doryopteris decipiens), kalamoho (Pellaea ternifolia), 'iwa'iwa (Asplenium adiantum-nigrum), 'oali (Pteris cretica), and pakahakaha (Pleopeltis thunbergiana); small shrubs of 'ulei (Osteomeles anthyllidifolia), 'ilima (Sida fallax), and 'ilie'e (Plumbago zeylanica); the native lowland pepperomia or 'ala'ala wai nui (Pepperomia leptostachya); two vines, koali 'awa (Ipomoea indica) and huehue (Cocculus orbiculatus); and a sedge, Mariscus cf. hillebrandii.

DISCUSSION AND RECOMMENDATIONS

The vegetation on the project site is dominated by introduced or alien species such as black wattle, Kikuyu grass, lantana, etc. Introduced or alien species are all those plants which were brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, that is, Cook's discovery of the islands in 1778. Almost all of the project site has been disturbed in the past. The property until recently was used for grazing cattle and there are old stone cattle walls, stone cattle pens, and fencelines throughout the site. Axis deer tracks and droppings were found during the field studies. Portions of the

black wattle forest have been bulldozed in the past and there are remnant plantings on former house sites. The archaeological study conducted for the property (PHRI 1989) also noted similar disturbances.

A total of 124 plant species were inventoried during the field studies. Of these, 104 (84%) are introduced species; two (2%) are originally of Polynesian introduction; and 18 (14%) are native species. Of the 18 native species, 15 are indigenous, that is, they are native to the Hawaiian Islands and also elsewhere, and three are endemic, that is, they are native only to the Hawaiian Islands. The endemic plants are: the kumu-niu fern (Doryopteris decipiens), the wiliwili tree (Erythrina sandwicensis), and the sedge, Mariscus cf. hillebrandii. The majority of the native plants occur on the 'a'a ridges and knolls found in the scrub vegetation on Lot 75.

None of the plants found during the field studies is a threatened and endangered species; nor is any plant a species of concern (U.S. Fish and Wildlife Service 1997). All of the plants can be found in similar environmental habitats throughout the Hawaiian Islands. These findings are similar to those reported from the nearby DHHL Kula Residential Lot study (Char & Associates 1994).

The area to be developed for the farm lots is largely black wattle forest with a smaller portion in scrub vegetation. The most ground disturbance has taken place on the forested portions of the site.

Given the findings above, the proposed use of the site should not have a significant negative impact on the botanical resources. There are no botanical reasons to impose any restrictions, conditions, or impediments to the proposed development.

It is recommended that areas cleared of vegetation be grassed over as soon as possible to prevent soil loss. Native plants found on the site and nearby areas should be considered for landscaping, especially of the common areas. These species are adapted to the local environmental conditions and would require less water and soil. Some material recommended for landscaping include wiliwili, 'ulei, 'ilihe'e, and 'ilima; these already occur on the project site. There are several agencies and nurseries which could provide more information on native plants for landscaping. These include the Maui Native Plant Society and the State Department of Forestry and Wildlife. A directory of sources for native Hawaiian plants is available from the National Tropical Botanical Garden, Lawai, Kaua'i.

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PLANT SPECIES LIST -- Keokea Farm Lots, Unit 1

The following checklist is an inventory of all the plant species observed on the project site during the field studies. The plant names are arranged alphabetically by families within each of three groups: Ferns and Fern Allies, Dicots, and Monocots. The taxonomy and nomenclature of the Ferns and Fern Allies follow Lamoureux (1988), while the flowering plants, Dicots and Monocots, are in accordance with Wagner *et al.* (1990). The few recent name changes for the flowering plants follow those reported in the Hawaii Biological Survey series (Evenhuis and Miller 1995-1998).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
 - E = endemic = native only to the Hawaiian Islands.
 - I = indigenous = native to the Hawaiian Islands and also elsewhere throughout the Pacific and/or tropics.
 - I? = questionably indigenous = data not clear if dispersal by natural or human-related mechanisms, but weight of evidence suggests probably indigenous.
 - P = Polynesian = plants originally of Polynesian introduction prior to Western contact, that is, Cook's discovery of the Hawaiian Islands in 1778.
 - P? = questionably Polynesian = may be a Polynesian introduction, or possibly introduced fairly early in historical times (after 1778).
 - X = introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally after Western contact.
4. Presence (+) or absence (-) of a particular species within each of two vegetation types recognized on the project site (see text for discussion):

f = Black Wattle Forest
s = Scrub Vegetation

FERNS AND FERN ALLIES

ADIANTACEAE (Maidenhair fern family) Adiantum hispidulum Sw.			X	+	-
ASPLENIACEAE (Bird's-nest fern family) Asplenium adiantum-nigrum L.	'iwa'iwa	I		-	+
DENNSTAEDTIACEAE (Dennstaedtia family) Microlepia strigosa (Thunb.) Presl	palapalai, palai	I		+	-
NEPHROLEPIDACEAE (Sword fern family) Nephrolepis multiflora (Roxb.) Jarrett ex Morton	'okupukupu, hairy sword fern	X		+	+
POLYPODIACEAE (Common fern family) Pleopeltis thunbergiana Kaulf.	pakahakaha, 'ekaha 'akolea	I		-	+
PSILOTACEAE (Whisk fern family) Psilotum nudum (L.) Beauv.	moa, moa nahele, pipi	I		+	-
PTERIDACEAE (Pteris family) Pteris cretica L.	'oali, 'owali	I		-	+
SINOPTERIDACEAE (Cliffbrake family) Doryopteris decipiens (Hook.) J. Sm. Pellaea ternifolia (Cav.) Link	kumu-niu, manawahua, 'iwa'iwa kalamoho, lau-kaht	E I		- -	+
THELYPTERIDACEAE (Wood-fern family) Christella parasitica (L.) Levl.	wood-fern	X		+	-

Scientific name

Common name

Status

Vegetation type

FLOWERING PLANTS

DICOTS

AMARANTHACEAE (Amaranth family)

Amaranthus spinosus L.
Amaranthus viridis L.

spiny amaranth, pakai kuku
slender amaranth, pakai

X
X

+
+

+
-

ANACARDIACEAE (Mango family)

Schinus terebinthifolius Raddi

Christmas berry, wilelaiki

X

+

+

ANNONACEAE (Custard-apple family)

Annona cherimola Mill.

cherimoya

X

+

-

APIACEAE (Parsley family)

Anethum graveolens L.
Foeniculum vulgare Mill.
Petroselinum crispum (Mill.)
A.W. Hill

dill
fennel

X
X

+
+

-
-

wild parsley

X

+

+

ASCLEPIADACEAE (Milkweed family)

Asclepias physocarpa (E. Mey.)
Schlechter

balloon plant

X

+

+

ASTERACEAE (Daisy family)

Ageratina adenophora (Spreng.) R. King
& H. Robinson

Mau'i pamakani
Spanish needle, ki, ki nehe
bull thistle, pua kala
hairy horseweed, ilioha

X
X
X
X

+
+
+
+

-
+
-
+

Bidens pilosa L.
Cirsium vulgare (Savi) Ten.
Conyza bonariensis (L.) Cronq.
Conyza canadensis var. pusilla
(Nutt.) Cronq.

horseweed, lani wela
pualele
galinsoga
tree daisy

X
X
X
X

-
-
+
+

+
+
+
-

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

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			<u>f</u>	<u>s</u>
<i>Sigesbeckia orientalis</i> L.	small yellow crown-beard	X	+	+
<i>Xanthium strumarium</i> var. <i>canadense</i> (Mill.) Torr. & A. Gray	cocklebur, kikania	X	+	-
BIGNONIACEAE (Bignonia family) <i>Jacaranda mimosifolia</i> D. Don	jacaranda	X	+	-
BORAGINACEAE (Heliotrope family) <i>Heliotropium amplexicaule</i> Vahl	heliotrope	X	+	-
<i>Heliotropium procumbens</i> var. <i>depressum</i> (Cham.) Fosb.	heliotrope	X	+	-
BRASSICACEAE (Mustard family) <i>Lepidium virginicum</i> L.	pepperwort, peppergrass	X	+	+
<i>Sisymbrium officinale</i> (L.) Scop.	hedge mustard	X	+	+
CACTACEAE (Cactus family) <i>Opuntia ficus-indica</i> (L.) Mill.	panini	X	+	+
CARYOPHYLLACEAE (Pink family) <i>Polycarpon tetraphyllum</i> (L.) L.	allseed	X	-	+
<i>Silene gallica</i> L.	small-flowered catchfly	X	-	+
CHENOPODIACEAE (Goosefoot family) <i>Chenopodium carinatum</i> R. Br.	'aheahea	X	+	+
<i>Chenopodium murale</i> L.		X	+	+
CONVOLVULACEAE (Morning glory family) <i>Ipomoea indica</i> (J. Burm.) Merr.	koali 'awa, koali 'awahia	I	+	+
CRASSULACEAE (Orpine family) <i>Crassula</i> sp.		X	+	-
<i>Kalanchoe beauverdii</i> Raym.-Hamet		X	+	-
<i>Kalanchoe pinnata</i> (Lam.) Pers.	airplant	X	+	+

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			<u>f</u>	<u>s</u>
EUPHORBIACEAE (Spurge family)				
Euphorbia peplus L.	petty spurge	X	+	-
Ricinus communis L.	castor bean, koli	X	+	+
FABACEAE (Pea family)				
Acacia mearnsii De Wild.	black wattle	X	+	+
Chamaecrista nictitans (L.) Moench	partridge pea, lauki	X	+	-
Desmodium incanum DC	Spanish clover, ka'imi	X	+	-
Desmodium sandwicense E. Mey.	Spanish clover, chili clover, pua pilipili	X	+	-
Erythrina sandwicensis Degener	wiliwili	E	-	+
Indigofera suffruticosa Mill.	indigo, 'iniko	X	+	+
Leucaena leucocephala (Lam.) de Wit	koa haole	X	+	+
Macroptilium lathyroides (L.) Urb.	cow pea, wild bean	X	-	+
Medicago lupulina L.	black medic, nonesuch	X	+	+
Neonotonia wightii (Wight & Arn.) Lackey		X	+	+
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	kiawe	X	-	+
GENTIANACEAE (Gentian family)				
Centaurium erythraea Raf.	bitter herb, European centaury	X	+	+
GERANIACEAE (Geranium family)				
Pelargonium peltatum (L.) Ait.	ivy geranium	X	+	-
LAMIACEAE (Mint family)				
Hyptis suaveolens (L.) Poit.	scarlet sage, Texas sage,	X	+	+
Salvia coccinea Etl.	lililehua	X	+	+
LAURACEAE (Laurel family)				
Persea americana Mill.	avocado, alligator pear	X	+	-

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			f	s
MALVACEAE (Mallow family)				
Abutilon grandifolium (Willd.) Sweet	hairy abutilon	X	+	+
Malvastrum coromandelianum (L.) Garcke	false mallow	X	+	+
Sida fallax Walp.	'ilima	I	+	+
Sida rhombifolia L.	Cuba jute	X	+	+
MELIACEAE (Mahogany family)				
Melia azedarach L.	Chinaberry, Pride of India, 'inia	X	+	+
MENISPERMACEAE (Moonseed family)				
Cocculus orbiculatus (L.) DC	huehue, hue	I	-	+
MYRTACEAE (Myrtle family)				
Psidium guajava L.	guava, kuawa	X	+	+
NYCTAGINACEAE (Four-o'clock family)				
Mirabilis jalapa L.	four-o'clock, nani ahiahi	X	+	-
OXALIDACEAE (Wood sorrel family)				
Oxalis corniculata L.	yellow wood sorrel, 'ihi 'ai	P?	+	+
PAPAVERACEAE (Poppy family)				
Bocconia frutescens L.	bocconia	X	+	+
PASSIFLORACEAE (Passion flower family)				
Passiflora subpeltata Ort.	white passion flower	X	+	+
PHYTOLACCACEAE (Pokeweed family)				
Phytolacca octandra L.	southern pokeberry	X	+	-
PIPERACEAE (Pepper family)				
Peperomia leptostachya Hook. & Arn.	'ala'ala wai nui	I	-	+

Vegetation type

Scientific name	Common name	Status	f	s
PLANTAGINACEAE (Plantain family) Plantago lanceolata L.	narrow-leaved plantain	X	+	+
PLUMBAGINACEAE (Leadwort family) Plumbago auriculata Lam. Plumbago zeylanica L.	blue plumbago 'ilie'e, hilie'e	X I	+	- +
PORTULACACEAE (Purslane family) Portulaca oleracea L. Portulaca pilosa L.	pigweed, common purslane, 'ihl	X X	- -	+
PRIMULACEAE (Primrose family) Anagallis arvensis L.	scarlet pimpernel	X	-	+
PROTEACEAE (Protea family) Grevillea robusta A. Cunn. ex R. Br.	silk oak, 'oka kilika	X	+	+
ROSACEAE (Rose family) Cotoneaster pannosa Franch. Eriobotrya japonica (Thunb.) Lindl. Osteomeles anthyllifolia (Sm.) Lindl. Rubus sp.	cotoneaster loquat, biwa 'ulei, u'ulei	X X I X	- + - +	+
RUTACEAE (Citrus family) Citrus sinensis (L.) Osbeck	orange, Kona orange, 'alani	X	+	-
SOLANACEAE (Nightshade family) Nicandra physalodes (L.) Gaertn. Nicotiana glauca R.C. Graham Solanum americanum Mill. Solanum linnaeanum Hepper & P. Jaeger	apple of Peru tree tobacco popolo, glossy nightshade apple of Sodom, popolo kikania	X X I? X	+	- + - +
STERCULIACEAE (Cacao family) Waltheria indica L.	'uhaloa, hi'aloa, kanakalao	I?	+	+

Vegetation type

Scientific name	Common name	Status	Vegetation type	
			f	s
TILIACEAE (Linden family) <i>Triumfetta semitriloba</i> Jacq.	Sacramento bur	X	+	+
VERBENACEAE (Verbeña family) <i>Lantana camara</i> L. <i>Verbena litoralis</i> Kunth	lantana, lakana weed verbena, owi, oi	X X	+	+
MONOCOTS				
AGAVACEAE (Sisal family) <i>Furcraea foetida</i> (L.) Haw.	Mauritius hemp	X	+	+
ARACEAE (Aroid family) <i>Allocasia macrorrhiza</i> (L.) Schott	'ape	P	+	-
BROMELIACEAE (Pineapple family) <i>Aechmea</i> sp.	honohono	X	+	-
COMMELINACEAE (Spiderwort family) <i>Commelina diffusa</i> N.L. Burm.	McCoy grass	X	+	-
CYPERACEAE (Sedge family) <i>Cyperus gracilis</i> R. Br. <i>Mariscus</i> cf. <i>hillebrandii</i> (Boeck.) T. Koyama		E	-	+
LILIACEAE (Lily family) <i>Aloe</i> sp. <i>Crinum</i> sp.	aloe	X X	+	-
POACEAE (Grass family) <i>Andropogon virginicus</i> L. <i>Bothriochloa pertusa</i> (L.) A. Camus <i>Bothriochloa</i> sp. <i>Briza minor</i> L.	broomsedge pitted beardgrass little quacking grass	X X X X	+	+

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			f	s
Bromus mollis L.	soft chess	X	+	+
Bromus rigidus Roth	ripgut grass	X	-	+
Bromus willdenowii Kunth	rescue grass	X	+	-
Cenchrus ciliaris L.	buffelgrass	X	+	+
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X	+	+
Dactylis glomerata L.	cocksfoot, orchardgrass	X	+	-
Digitaria setigera Roth	kukaepua a, itchy crabgrass	I?	+	-
Digitaria sp.	crabgrass	X	+	+
Ehrharta stipoides Labill.	meadow ricegrass	X	-	+
Lolium perenne L.	perennial ryegrass	X	+	-
Melinis minutiflora P. Beauv.	molasses grass	X	-	+
Melinis repens (Willd.) Zizka	Natal redtop, Natal grass	X	+	+
Panicum maximum Jacq.	Guinea grass	X	+	+
Panicum maximum var. trichoglume Eyles ex Robyns	green panicgrass	X	+	+
"Panicum" sp.	kikuyu grass	X	+	+
Pennisetum clandestinum Chiov.	bristly foxtail, mau'u pilipili	X	+	+
Setaria verticillata (L.) P. Beauv.		X	+	+
Sporobolus africanus (Poir.) Robyns & Tournay	African dropseed, smut grass	X	+	+
Sporobolus indicus (L.) R. Br.	Indian dropseed	X	-	+



APPENDIX C

Avifauna and Feral Mammal Survey

SURVEY OF THE AVIFAUNA AND FERAL MAMMALS AT DEPARTMENT
OF HAWAIIAN HOMELANDS - KEOKEA AGRICULTURAL LOTS,
UNIT I, KULA, MAKAWAO, MAUI, HAWAII

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3 September 1998

INTRODUCTION

The purpose of this report is to summarize the findings of a two day (29, 30 August 1998) bird and mammal field survey of approximately 350 acres at Kula, Maui (Fig. 1). Also included are references to pertinent literature and unpublished reports.

The objectives of the field survey were to:

- 1- Document what bird and mammal species actually occur on the property. Note what other birds and mammals potentially could occur in this area.
- 2- Provide some baseline data on the relative abundance of each species.
- 3- Note the presence or likely occurrence of any native fauna particularly those that are listed as "Endangered" or "Threatened".
- 4- Determine if the property contains any special or unique resources that if lost or altered by development might result in a significant impact on the native fauna in this region of the island

SITE DESCRIPTION

This property is located between 3000 and 2000 feet elevation. The site occurs in an area of relatively low rainfall and contains mostly introduced plants. Black Wattle is the numerically most

dominant tree on the property. The recent drought was clearly evident in the dry vegetation and dusty soil. The Black Wattle were brown and many appeared to be dying. The topography of this property is steep. No wetland habitat was found at this site.

The weather during the survey was clear in the mornings but cloudy and cool in the afternoons. Winds were 5-10mph. These climatic conditions made for good field observations.

STUDY METHODS

The property was surveyed on foot and by vehicle following existing roads and deer trails which traverse the property. Field observations were made with the aid of binoculars and by listening for vocalizations.

At scattered locations throughout the site, eight minute counts were made of all birds seen or heard. These data provide the basis for the relative abundance estimates given in Table One. Published reports of birds known from similar habitat on Maui were also consulted in order to acquire a better perspective of the possible fauna that could occur in this region and their potential relative abundance (Pratt et al. 1987, Hawaii Audubon Society 1993, Bruner 1994). Observations of feral mammals were limited to visual sightings and evidence in the form of scats and tracks. No attempts were made to trap mammals in order to obtain data on

their relative abundance and distribution/ Such an effort was not possible within the time constraint of the field survey.

Scientific names of birds and mammals used in this report follow those given in Checklist of the Birds of Hawaii (Pyle 1997) and Mammal Species of the World (Honacki et al. 1982).

RESULTS AND DISCUSSION

Resident Endemic (Native) Birds:

The only endemic native landbird recorded on the survey was the Common Amakihi (Hemignathus virens). This species is not listed as endangered or threatened. They are the most abundant and widespread of the native landbirds. Common Amakihi will utilize habitat with second growth introduced plants as well as native forest. A total of two Common Amakihi were tallied over the course of the field survey. Both were foraging for insects in a stand of Black Wattle. The Short-eared Owl or Pueo (Asio flammeus sandwichensis) forages in agricultural fields and pastures as well as in upland forested habitat (Hawaii Audubon Society 1993). They are frequently seen in Kula and upcountry Maui. None were recorded on this survey. Most of my observations of Pueo have been further to the east in wetter pasture lands. This species is listed by the State of Hawaii as endangered on the island of Oahu but not on Maui. No other native resident landbirds would be expected on this property.

Migratory Indigenous (Native) Birds:

Migratory shorebirds winter in Hawaii between the months of August through May. Some juveniles will stay over the summer months as well (Johnson et al. 1981, 1983, 1989). The most abundant shorebird species which winters in Hawaii is the Pacific Golden-Plover (Pluvialis fulva). Plover forage in open areas such as mud flats, lawns, pastures, plowed agricultural fields and roadsides. Plover are extremely site-faithful and most establish winter foraging territories which they defend vigorously. Such behavior makes it possible to accurately census the plover population in a particular area. These populations likewise remain relatively stable over many years (Johnson et al. 1989). A total of three plover were recorded on the survey. These birds were seen along existing ranch roads and in other open habitats on the site. The only other migrant which may occur in this area is the Ruddy Turnstone (Arenaria interpres). Neither the plover nor the turnstone are listed as endangered or threatened. The current drought conditions and restricted suitable habitat are limiting factors on the abundance of migrants in this area.

Resident Indigenous (Native) Seabirds:

No seabirds were recorded nor would any be expected at this location. Predators such as dogs, cats and the Small Indian Mongoose (Herpestes auropunctatus), along with human disturbance inhibit seabird nesting at all but a few isolated locations on the main Hawaiian Islands.

Resident (Native) Waterbirds:

No wetland habitat was found on this property. No waterbirds would be expected at this site. The endangered Nene or Hawaiian Goose (Neochen sandvicensis) occurs at higher elevation in and around Haleakala National Park. Nene have been introduced recently to Kauai where they utilize ranchlands and pastures. On Maui they are normally seen at higher elevation in more alpine and subalpine habitat.

Exotic (Introduced) Birds:

A total of 15 species of exotic birds were recorded during the field survey. This list compares favorably with that obtained by Bruner (1994) at DHHK Kula Residential Lots, Unit I located at the same elevation and habitat two miles to the east. Table One shows the relative abundance of each species. In addition to these species other exotic birds which potentially could occur on the property include: Chukar (Alectoris chukar), Barn Owl (Tyto alba), and Leiothrix (Leiothrix lutea) (Pratt et al. 1987, Hawaii Audubon Society 1993, Bruner 1994).

Feral Mammals:

Only one Small Indian Mongoose was observed on the survey. The harsh dry conditions may be impacting their abundance. Cat (Felix catus) tracks were also seen. Axis Deer (Axis axis) were seen at five locations throughout the property. Numerous trails

and tracks further testify to the abundance of deer in this area. Two feral pig (Sus scrofa) were also seen in the early evening hours of 29 August. They probably are not as abundant as deer which can thrive in drier habitat. Records of the endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) on Maui are relatively limited (Tomich 1986, Kepler and Scott 1990). No bats were seen on the evening of 29 August. Bruner (1994) saw one bat on the DHHL Kula Residential Lots. This species is known to roost solitarily in trees and forages for flying insects using echolocation (Jacobs 1993). They have been reported from a variety of habitats including native forest, alpine habitat, agricultural lands, second growth forest, ranchlands, ponds and bays as well as in urban areas (Jacobs 1991). The life history of this species is not well known. Kepler and Scott (1990) suggest that bats occur on Maui only as a "migrant, probably from the Big Island". Others (Duvall and Duvall 1991), report evidence that would suggest there may be a resident breeding population of bats on Maui. The most recent work on this species on the Big Island has yielded new insights into the behavior of this species (Reynolds et al. 1998).

CONCLUSION

A short field survey can only provide a limited view of the wildlife that may use the site. The number of species and their

relative abundance may vary throughout the year due to resource (food, water) availability and reproductive success. Species which are migratory will only be an important part of the faunal picture at certain times during the year. Exotic species sometimes prosper for a time only to later disappear or become a less significant part of the faunal community (Williams 1987, Moulton 1990). Thus only long term studies can provide a comprehensive view of the bird and mammal populations in a particular area. However, some general conclusions related to bird and mammal activity at this site can be made. Below is a summary of the findings of this survey.

- 1- The site was surveyed by walking and driving the roads and trails which traverse the property. All habitat types found on the property were sampled. Census data on birds were obtained at random locations throughout the property and are reported in Table One.
- 2- Only three migratory Pacific Golden-Plover were tallied on the survey. The dry conditions may be limiting their use of this area. Plover are not endangered or threatened.
- 3- The only native resident bird found on the survey was the endemic Common Amakihi. This species is the most abundant and widespread of the native forest birds. They are not listed as endangered or threatened. The native owl (Pueo) occurs in

this region but was not recorded on this survey. They are not endangered or threatened on Maui. The endangered Hawaiian Goose (Nene) occurs at higher elevation in Haleakala National Park.

- 4- The list of exotic birds recorded on the survey (Table 1) was typical for this region of Maui and compared favorably with the list obtained by Bruner (1994) on nearby DHHL property.
- 5- Axis Deer, Pig, Small Indian Mongoose and cats were recorded at this site. Rats (Rattus sp.) and mice (Mus musculus) probably occur in this area although not observed on this survey. The endangered Hawaiian Hoary Bat was not seen but has been found nearby (Bruner 1994). The occurrence and abundance of this species on Maui has not been extensively studied. Recent work on the Big Island has expanded our knowledge of this species (Reynolds et al. 1998).
- 6- This property has been significantly altered by introduced vegetation and ranching. No unusual or expected species were recorded nor was there unique or special resources important to native wildlife on this site. Disturbed second growth forest/ranch land is common over a large area in this region of Maui.

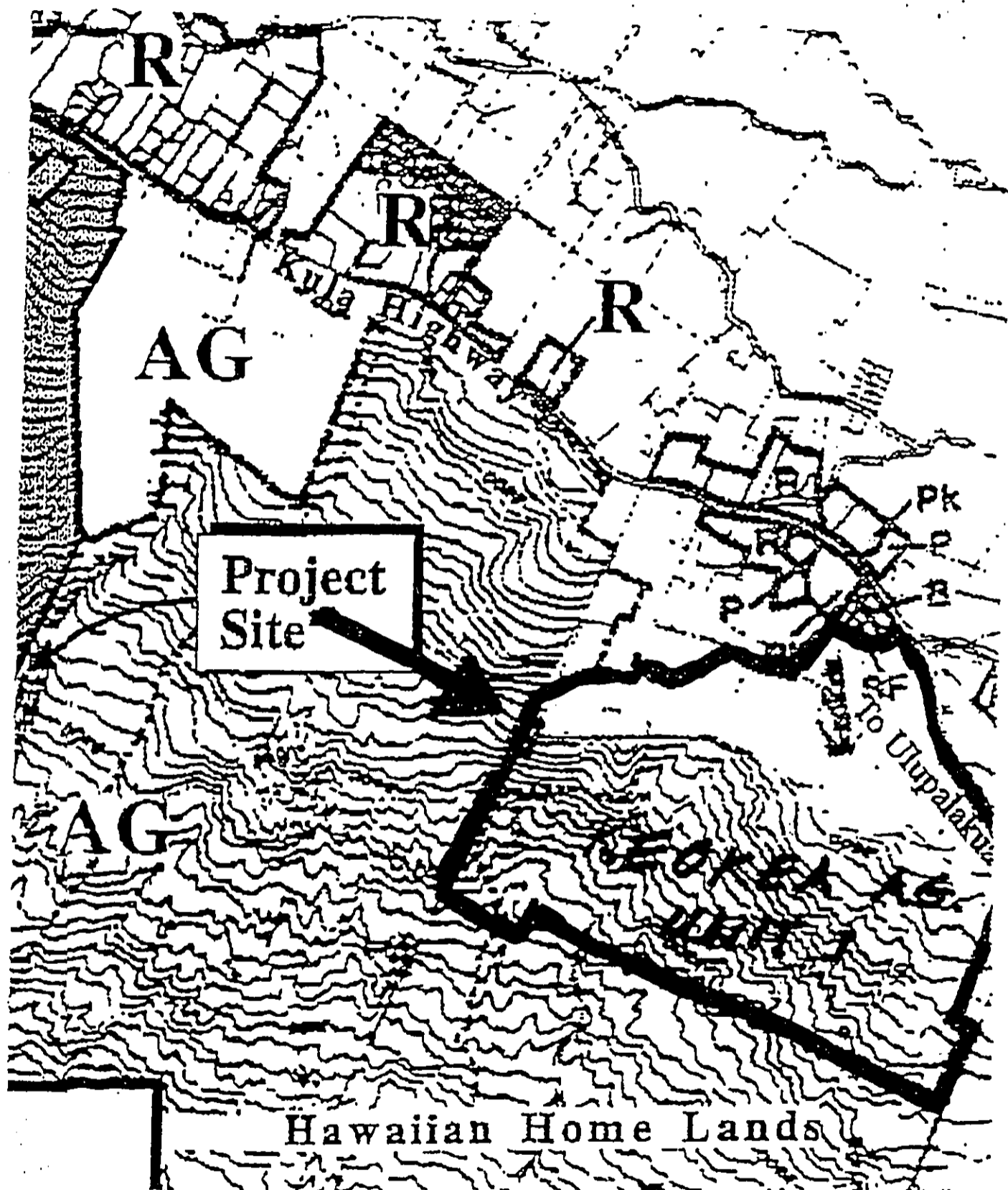


Fig. 1. Location of faunal survey. Arrow points to property.

TABLE 1

Exotic species of birds recorded at the Department of Hawaiian Homelands, Keokea Agricultural Lots, Unit I, Kula, Makawao, Maui, Hawaii

COMMON NAME	SCIENTIFIC NAME	RELATIVE ABUNDANCE
Cattle Egret	<u>Bubulcus ibis</u>	R = 3
Black Francolin	<u>Francolinus francolinus</u>	R = 2
Gray Francolin	<u>Francolinus pondicerianus</u>	A = 8
Ring-necked Pheasant	<u>Phasianus colchicus</u>	R = 1
Wild Turkey	<u>Meleagris gallopavo</u>	R = 3
Spotted Dove	<u>Streptopelia chinensis</u>	A = 9
Zebra Dove	<u>Geopelia striata</u>	C = 6
Sky Lark	<u>Alauda arvensis</u>	C = 6
Common Myna	<u>Acridotheres tristis</u>	U = 3
Japanese White-eye	<u>Zosterops japonicus</u>	A = 10
Northern Cardinal	<u>Cardinalis cardinalis</u>	U = 2
Northern Mockingbird	<u>Mimus polyglottus</u>	R = 2
House Finch	<u>Carpodacus mexicanus</u>	A = 8
House Sparrow	<u>Passer domesticus</u>	U = 2
Nutmeg Mannikin	<u>Lonchura punctulata</u>	U = 3

*(see page 11 for key to symbols)

KEY TO TABLE 1

Relative abundance = Number of times observed during the survey or frequency on eight minute counts in appropriate habitat.

A = abundant (ave. 10+)

C = common (ave. 5-10)

U = uncommon (less than 5)

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

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APPENDIX D

Archaeological Inventory Survey

Archaeological Inventory Survey
Keokea and Waiohuli Subdivisions

Lands of Keokea and Waiohuli
Makawao District, Island of Maui

PHRI

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Planning Office

NOV 7 1989

Report 442-050289

Dept. of Hawaiian Home Lands

Archaeological Inventory Survey Keokea and Waiohuli Subdivisions

Lands of Keokea and Waiohuli Makawao District, Island of Maui

(TMK:2-2-02:55,56)

by

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SUMMARY

At the request of the Department of Hawaiian Home Lands (DHHL), Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an archaeological inventory survey of Keokea and Waiohuli Subdivisions, situated in the Lands of Keokea and Waiohuli, Makawao (Kula) District, Island of Maui (TMK:2- 2-02:55,56). The subdivisions are comprised of 1,025 acres (351 in Keokea and 674 in Waiohuli) and range in elevation from 1,800-3,000 feet AMSL (above mean sea level). The survey field work was conducted between January 17, 1989 and March 30, 1989. During the survey, 159 sites consisting of 274 features were formally designated. Sites consisted of both single and multiple features and included a wide range of formal and functional types. Minor agricultural features in the project areas—which number in the hundreds—were not designated nor documented in detail; they were, however, generally described, and their extents and spatial relationships were plotted.

Waiohuli Subdivision has undergone extensive bulldozing. As a result, sites in Waiohuli are in generally poorer condition than those in Keokea Subdivision. Sites in Keokea are, in most instances, intact, and the area contains excellent examples of extensive agricultural and habitation complexes. Significant resources present in the project areas include heiau, human burials, intact dryland agriculture field systems, and residential complexes. These resources could be adversely affected by the proposed development.

Of the total 159 sites identified during the present survey, 108 are in Keokea and 51 are in Waiohuli. Of the 108 Keokea sites, 94 are assessed as significant solely for information content. Eighty-nine of the 94 sites are recommended for further data collection, and five of the 94 sites are recommended for no further work. Four of the remaining 14 sites are assessed as significant for information content, as an excellent example of a site type, and for cultural value. Further data collection and preservation with interpretive development are recommended for these four sites. Three of the remaining 14 sites are assessed as significant for information content and as an excellent example of a site type. For these three sites, further data collection and preservation with interpretive development are recommended. Another three sites are assessed as significant for information content and for cultural value; these three sites are recommended for further data collection and preservation as is. Three other sites are assessed as significant for information content and are tentatively assessed as

significant for cultural value. These three sites are recommended for further data collection and are provisionally recommended for preservation as is. The last site is assessed as significant for information content and as having cultural value. For this site, further data collection is recommended.

Of the 51 sites in Waiohuli Subdivision, 42 are assessed as significant solely for information content. Thirty-three of these 42 sites are recommended for further data collection, and nine of the 42 sites require no further work. Of the remaining nine sites, three are assessed as significant for information content, as excellent examples of a site type, and as culturally significant. Further data collection and preservation with interpretive development are recommended for these three sites. Two of the remaining six sites are assessed as significant for information content and are provisionally assessed as having cultural value. For these two sites, further data collection is recommended and preservation with interpretive development is provisionally recommended. The final four sites are assessed variously and require various recommended treatments (see Table 7 in Conclusions section for specific recommendations).

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INTRODUCTION

BACKGROUND

At the request of the Department of Hawaiian Home Lands (DHHL), Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an archaeological inventory survey of Keokea and Waiohuli Subdivisions, situated in the Lands of Keokea and Waiohuli, Makawao (Kula) District, Island of Maui (TMK:2-2-02:55,56). The overall objective of the survey was to provide information appropriate to and sufficient for satisfying the requirements of Chapter 6E, Historic Preservation, Hawaii Revised Statutes, as amended. Field investigations were conducted between January 17, 1989 and March 30, 1989 under the supervision of PHRI Supervisory Archaeologist Roderick S. Brown, and under the overall direction of PHRI Senior Archaeologist Dr. Alan E. Haun.

SCOPE OF WORK

The basic purpose of an inventory survey is to identify—to discover and locate on available maps—sites and features of potential archaeological significance present within a specified project area. Formerly called a reconnaissance survey and more recently referred to as an inventory survey, the survey comprises the initial level of archaeological investigation. It is extensive rather than intensive in scope, and is conducted basically to determine the presence or absence of archaeological resources within a specified project area. It indicates both the general nature and variety of archaeological remains present, and the general distribution and density of such remains. Finally, it permits a general significance assessment of the archaeological resources, and facilitates formulation of realistic recommendations and estimates for such further work as might be necessary or appropriate. Such work could include intensive survey—data collection involving detailed recording of sites and features, and selected test excavations; and possibly subsequent mitigation—data recovery research excavations, construction monitoring, interpretive planning and development, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural values.

The significance of all archaeological remains identified within the project areas was to be assessed in terms of the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60.4). These criteria are used by Department of Land and Natural Resources - Historic Sites Section (DLNR-HSS) to evaluate eligibility for both the Hawaii State and National Register of Historic Places.

The specific tasks for the current inventory survey were as follows:

1. **Documentary Historical Research** - The specific purposes of this work were (a) to locate and summarize readily available relevant documentary resources (books, maps, journals, archival records, and other materials) relating to the ahupuaa and project areas; (b) to integrate and synthesize the findings of this research in order to define prehistoric, early historic, and later historic land use patterns; and (c) to assess the potential for any further research that might be appropriate in connection with subsequent mitigation work required for subdivision development.
2. **Archaeological Background Research** - The specific purposes of this work were: (a) to locate and review all prior archaeological research conducted within the project area ahupuaa; (b) to summarize the past research in terms of the extent and intensity of survey coverage and in terms of the age, function, and distribution of previously identified sites; and (c) to prepare a revised summary of past land use defined on the basis of historical documentary research.
3. **Oral Historical Research** - The specific purposes of this work were: (a) to locate and interview knowledgeable local residents to determine their knowledge of past land use patterns and to elicit information concerning the age and function of specific sites; (b) to summarize and integrate the research findings with those from the historical documentary research and archaeological survey; and (c) to assess the potential for any further research that might be appropriate in connection with subsequent mitigation work required for subdivision development.
4. **Inventory Survey Field Work** - Inventory survey field work was to consist of the following specific tasks: (a) conduct 100% coverage low-level (c. 30-50 ft altitude) aerial reconnaissance (helicopter) of the entire 1,000-acre project area, with special emphasis upon identifying all sites observed and plotting them on aerial photographs and/or maps, and identifying areas devoid of sites (e.g., mechanically altered lands); (b) conduct 100%

coverage, variable-intensity (30- to 90-ft intervals) ground reconnaissance of the entire project area, with relatively higher intensity coverage being given to undisturbed lands and relatively lower intensity coverage to mechanically altered lands; (c) record identified sites, including preparation of scaled sketch plan maps, completion of standardized PHRI site forms, and photographic recordation; and (d) conduct limited subsurface testing when necessary to accurately determine the extent (spatial and/or temporal) of site in order to assess its significance.

5. Data Analysis and Reports - Both Interim and Final reports were to be prepared. The Interim report was to summarize (a) the relevant project background, (b) field work completed and findings, (c) preliminary interpretation and evaluation of findings, (d) assessment of potential development impacts upon significant remains, and (e) specific recommendations for any further archaeological work that might be appropriate and/or required. The Final Report was to include (a) the full description of project findings, (b) interpretation and evaluation of these findings, and (c) specific recommendations and justifications for any subsequent mitigation work that might be necessary or appropriate.

PROJECT AREA DESCRIPTION

Both proposed subdivisions are situated on the western slope of Mt. Haleakala, in Makawao (Kula) District, Island of Maui (Figure 1). The Keokea parcel consists of 351.41 acres (142.22 hectares), and the Waiohuli parcel consists of 673.99 acres (272.76 hectares). Combined, the two parcels total 1,025.40 acres (414.99 hectares). Each subdivision comprises the north-central portion of the *ahupuaa* which bears its name. The parcels are both bounded on the east by Highway 37. The northern and western boundaries of both parcels are fenced. Waiohuli Gulch more or less marks the southern boundary of the Waiohuli parcel. The southern boundary of the Keokea parcel is delineated by a high, stone cattle wall.

Both parcels are characterized by gentle to moderately steep west-facing dissected alluvial and volcanic slopes. Elevation in the Keokea parcel ranges from 2,225-2,850 ft AMSL, and in the Waiohuli parcel ranges from 1,800-3,000 ft AMSL. Drainages in the Keokea parcel are small and, for the most part, are poorly defined. Three large gulches extending east to west dissect the Waiohuli parcel; the gulches are fed by many smaller channels which drain the intervening slopes. Soils over all of the Keokea parcel and

the eastern majority of the Waiohuli parcel are well-drained, with medium to moderately fine-textured subsoils of the Pu'u Pa-Kula Pale association. The eastern periphery of the Waiohuli parcel is overlaid with well-drained very stony soils and fine- to medium-textured subsoils of the Keawakapu-Makena association (Foote et al 1972). The soils in both parcels are derived from decomposed lava flows and ash of the Kula and Hana Volcanic Series which are, respectively, eight and four hundred thousand years old.

Both parcels are dominated by introduced vegetation including black wattle (*Acacia decurrens* Willd.), Christmas-berry (*Schinus terebinthifolius* L.), lantana (*Lantana camara* L.), prickly pear or panini (*Opuntia megacantha* Salm-Dyck), koa-haole (*Leucaena glauca* L.), kiawe (*Prosopis pallida* L. Benth), grasses dominated by Kikuyu grass (*Pennisetum clandestinum* Hochst) and Chinaberry (*Melia azedarach* L.). Endemic vegetation includes abundant *ilima* (*Sida* spp.) and occasional *wiliwili* (*Erythrina sandwicensis* Degener).

Black wattle forests dominate the eastern halves of both parcels, probably as a result of the extensive and recurrent ground disturbance associated with recent habitation in higher elevations. Lantana is a dominant plant in the lower western portions of both parcels. Lantana is almost impenetrably dense in western Keokea where it is interspersed by occasional prickly pears. In western Waiohuli, lantana and prickly pear co-dominate and impair movement and visibility.

PREVIOUS ARCHAEOLOGICAL WORK

The only early previous archaeological work conducted in the project area was by Thrum (1907) and Walker (1931). Thrum included Papakea, Kaumehe'iwa, and Molohai *heiau* on a list of Maui *heiau* sites he compiled in the early decades of this century. Later, the three *heiau* were placed on the Hawaii Register of Historic Places. Walker listed and described 26 *heiau* in the Kula region.

In 1986, DHIL contracted B.P. Bishop Museum to monitor trailblazing for subdivision fences and to conduct an archaeological reconnaissance survey of both of the present proposed subdivisions (Riford 1987). This effort resulted in the discovery of 113 archaeological sites and "more than 252 archaeological features." During the study, the above-mentioned *heiau* and a diversity of prehistoric and historic agricultural, residential, and ceremonial sites were recorded. The survey focused on areas where residential lot awards are proposed. More than 410 acres of the total c. 1,025 acres comprising the project area were not examined during that survey.

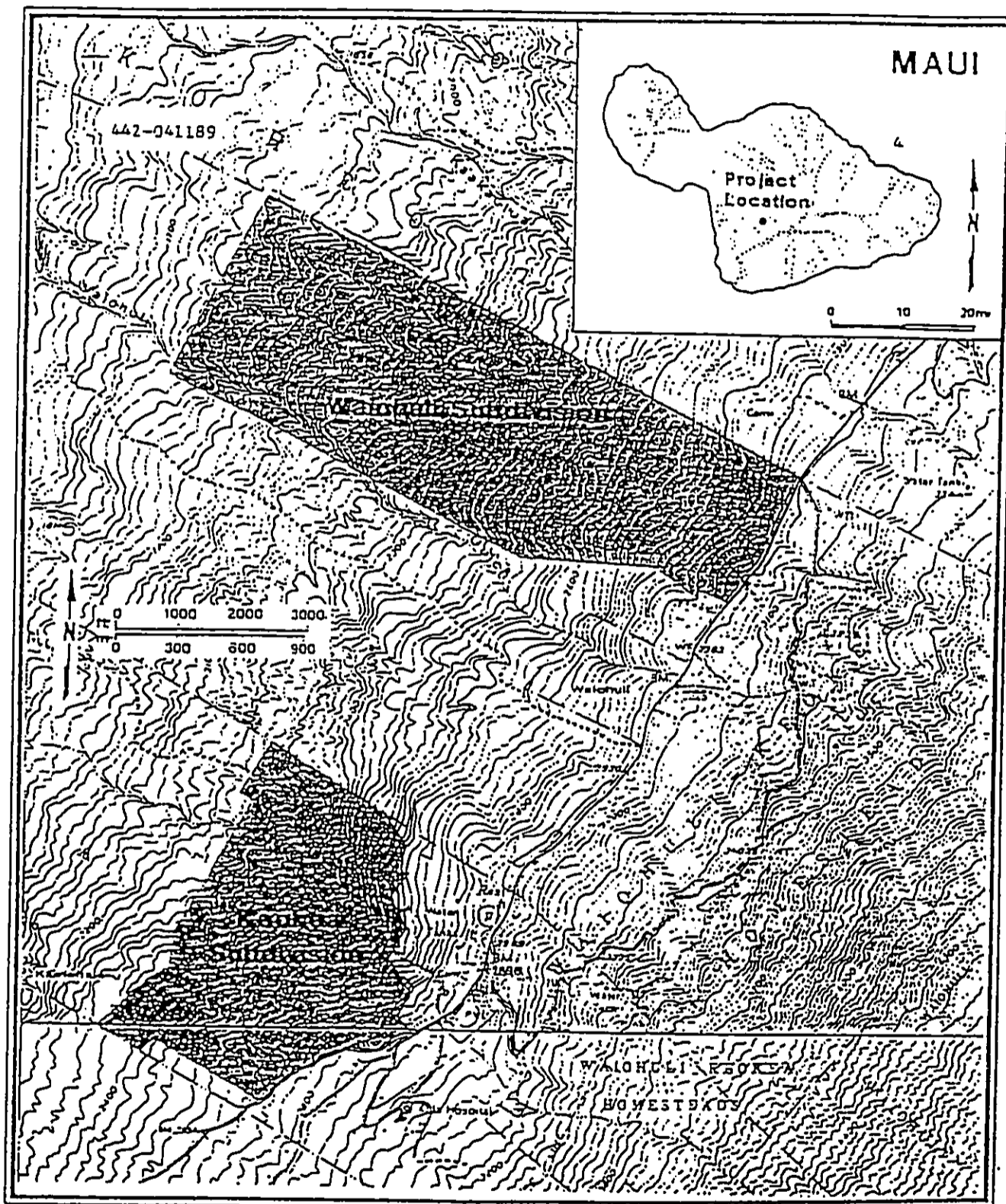


Figure I. PROJECT AREA LOCATION MAP

Keokea and Waiohuli Subdivisions
 Lands of Keokea and Waiohuli, Makawao District, Island of Maui
 (TMK:2-2-02:55,56)

PHRI Project No. 88-442

April 1989

SUMMARY OF LIMITED HISTORICAL DOCUMENTARY RESEARCH AND INFORMANT INTERVIEWS

The complete limited historical documentary research for the present project was conducted by PHRI Research Historian Helen Wong Smith, B.A.. Her report includes information obtained from the usual historical sources found in libraries, and information from other sources such as land and tax records, archaeological reports, maps, and various other manuscripts. The information in Wong's report is organized into five sections: Early Historical Accounts, *Heiau* in the Project Area, Land Commission Award (LCA) Information, Land Use and Tenure Information, and Informant Interviews.

Early accounts concerning the Makawao District generally either describe the area or relate early historical events. Ashdown (n.d.) writes, "kula-o-ka-ma'o-ma'o or Land of Mirages, where lost souls wandered until they could find their way to rest. The rain of Makawao is described by Mrs. Miverva Kalama to Sterling (n.d.) in this way: "ukiu rain = a soft drizzle (the ua Kama'aina of Makawao) when the kiu rain cloud from Makawao meets the Naulu rain cloud from Kula then the rain comes, the typical Makawao rain. Other early accounts, by Fomander and Kamakau, mention Makawao in relation to early historical events.

Three *heiau* are present in Keokea project area—Molohai, Papakea, and Kaumiiumimua *heiau*. Ashdown (1971:46) mentions other *heiau* in Keokea and Waiohuli—Ho'ola and Ho'oula Ua *heiau* in Keokea and Kaimupeclua *heiau* in Waiohuli. Other *heiau* mentioned by historic writers in the Makawao district include Kailua *heiau* (Thrum 1909:44), and Pa'uhu, Mahea, Kaumuopahu (or Kaunuopahu), Po'onahoe and Mana *heiau*. The latter *heiau* is now part of a modern cemetery (Ashdown 1971:57).

Although there were many small parcels granted in Keokea and Waiohuli, the Indices states that Keokea was Crown Land from the beginning and that Waiohuli was approved as such in 1890 by Kalakaua. The numerous parcels may be a result of an experiment conducted by the Kamehameha III's administration prior the Great Mahele concerning trial fee ownership runs. In a report by Riford (1987), 11 Land Commission Awards (LCA) either within or bordering the Keokea parcel and eight LCAs within the

Waiohuli parcel are listed. The bulk of the parcels are designated as *kula* land and houselots (1987).

Concerning land use and tenure, Kula has been used primarily for agriculture throughout history. C. Speakman, in his book entitled *MOWEE* mentions the fervor of cash-cropping in Kula:

During the gold [potatoes] rush, hundreds of Hawaiians were going into business for themselves on Maui-growing potatoes and hauling them to the port where they were snapped up and shipped to San Francisco. The Maui fields were called Nu Caliponi, or New California; potatoes were gold, and a fortune could be dug out of the ground by one man (1978:116).

In addition to Irish potatoes, the Kula farmers planted corn, beans, onions, Chinese cabbage, round cabbage, sweet potatoes, wheat and other grains, and even cotton. In the early 1970s, 35% of Hawaii's vegetables were grown in Kula, including a large percentage of the state's head lettuce, dry onions, and tomatoes. Much of the remaining land was devoted to livestock breeding by about 20 full and part-time ranchers. Today the cash crops in Kula are vegetables other than corn and potatoes, and flowers.

Wong's report includes information on Kula Sanatorium, and also includes informant interviews. Kula Sanatorium was founded for the care of tuberculosis sufferers. Initially the sanatorium consisted of two tent-houses which accommodated 12 patients. The tent-houses, which included kitchen and dining facilities, was financed by the County and Territory and cost \$500.00. The first permanent ward was built by W.E. Foster, former patient and superintendent. Wong's informant interviews provide information primarily on Kaonoulu Ranch, for which the interviewees once worked.

According to Wong, during this century, the project area has been used primarily for cattle grazing, hence the many archaeological sites obscured by grasses and lantana. If further historical documentary research is conducted for the project area, Wong suggests that a check be made for awards given out during the Kingdom of Hawaii and that the following topics be addressed: prehistoric environment and occupation in the area, as evidenced by historical documents; and local and regional cultural and residential sequences.

* References in summary are listed in Appendix C.

METHODS AND PROCEDURES

Field Work

The current field work was accomplished in five phases: preliminary field inspection, aerial (helicopter) survey, variable-intensity pedestrian survey, site recording, and limited surface collections and excavations.

Preliminary Field Inspection - PHRI Senior Archaeologist Dr. Alan E. Haun conducted a preliminary field inspection of portions of both Waiohuli and Keokea subdivisions in order to assess the project area terrain and vegetation with regard to logistical problems which might be faced by survey crews. In addition, Dr. Haun visited several previously recorded archaeological sites in each subdivision to evaluate the adequacy of existing archaeological records.

Helicopter Survey - On January 11, 1989, a low-level (30-50 ft. altitude) aerial reconnaissance survey was made of approximately 60% of both subdivisions. The areas surveyed included all portions of the project areas not obscured by black wattle forests (thus, eastern upslope portions were not examined aerially). Thirty-eight archaeological sites and/or features were identified from the air—34 in the Keokea parcel and four in the Waiohuli parcel. Each site/feature was flagged with weighted pink surveyor's tape, was labeled with a temporary aerial survey (AS) number, and was plotted on 1"=200' aerial photographs. A brief and very preliminary description of each site was recorded during the flight; these descriptions were upgraded during the subsequent variable-intensity 100% survey and recording phases of the field work.

Variable - Intensity 100% Coverage Ground Survey - The variable intensity ground survey began on January 17, 1989 and was completed on February 22, 1989. A crew of five archaeologists supervised by PHRI Supervisory Archaeologist Roderick S. Brown swept the entirety of both proposed subdivisions. Transects were spaced at 15-40 meter intervals. Transect spacing was determined exclusively by the surface integrity of the area being transected. In areas where no mechanical or erosional disturbance was evident, the survey interval was maintained at 15 meters. In disturbed areas the interval was increased to as wide as 40 meters. Surveyors were instructed to walk zigzag courses to search first for "islands" of undisturbed ground, and then to search within these "islands" for archaeological sites. The zigzagging resulted in an estimated maximum effective survey interval of 30 meters.

Locational control was maintained by plotting the course of each sweep on aerial photographs and/or 1"=200' scale topographic maps, and by marking each archaeologist's start and end points on each sweep with labeled surveyor's tape. As sites and features were encountered, each was marked with pink-and-blue surveyor's tape on which was labeled the project number (88-442), a temporary site number, and the date and name of the surveyor on whose transect the site was discovered. Each site was described in a field notebook at the time of discovery and was plotted on 1"=200' aerial photographs. Notation was made as to whether the site bore the (sometimes labeled) orange flagging with which some sites were marked by the Bishop Museum survey crew. Also noted were the direction and distance to nearby DHHL lot corner markers (where they existed) and the presence of aerial survey site markers.

Site Recording - Site recording began on February 22, 1989, immediately after the variable-intensity ground survey was completed. To facilitate the recording, two archaeologists were added to the field crew. The crew was divided into two teams of three persons each—one recorder, one mapper, and a rover, who measured, photographed, and described features and marked each site with an aluminum tag and flagging. Sites were recorded on standard PHRI site and feature forms. Scaled sketch maps were prepared of representative features and/or of the overall site configuration. Vegetation hampered visibility of, and even access to, some features, but the majority of features were adequately recorded.

During the pedestrian survey, sites and features were numbered as they were encountered. The numbering systems in each subdivision are independent. Temporary site numbers are prefixed by either "W-" (for Waiohuli) or "K-" (for Keokea). Site features were assigned letter designations (A,B,C,etc.).

During the pedestrian survey some sites of questionable nature were numbered. In some instances, subsequent examination of the questionable sites indicated they were natural or the result of recent ground disturbance; hence, the site was eliminated from site lists. Other sites were preliminarily recorded as separate entities and later were combined with other nearby sites and subsumed under a single site number. When sites were combined, the lowest site number was retained and other numbers were deleted; hence, the gaps in the numbering sequence. During the recording phase, many previously undiscovered sites were identified and were assigned numbers.

Data Management

Data management, cartography, and report production were computerized. Preliminary site and feature data gathered during the ground survey were entered from the field notebooks into formatted dBASE IV files. Output from these preliminary files included formatted listings of site and feature information and direct electronic input of site location coordinates (easting (X), northing (Y) and elevation (Z)) to the computer-aided drafting program. Output of these data allowed recording crews to return to sites with

printouts containing preliminary site descriptions and with contour maps illustrating the locations of the sites to be recorded.

Soon after the recording of each site and feature, the data were entered into dBASE IV files. These data files were formatted to allow direct output of revised site and feature location maps and the extraction of selected data in tabular format for inclusion in the Interim and Final reports. In addition, report-ready site survey records and site/feature descriptions were generated from the data files.

FINDINGS

ARCHAEOLOGICAL SITES

During previous archaeological surveys of Waiohuli and Keokea subdivisions (Riford 1987), 113 sites consisting of 252 component features were identified. Three of the 113 sites, all heiau, were assigned SIHP site numbers—Papakea Heiau (50-50-10-1036), Molohai Heiau (50-50-10-1037) and Kaumeheiwa Heiau (50-50-10-1039). The remaining 110 sites were assigned temporary numbers. As part of the present work, the work on the earlier survey was consulted. It was found that records for 77 of the previously identified sites were incomplete. In addition, when an attempt was made to relocate the earlier sites in the field, definite field identifications were often impaired by unclear locational information in the report and by the lack of site markers in the field.

The present survey resulted in the formal identification of 159 sites consisting of 274 features. During the present survey, 53 previously identified sites were relocated. These sites were reassigned PHRI temporary numbers. Table 1 correlates previously identified sites with PHRI temporary site numbers. Figures 2 and 3 depict the locations of all identified sites. Appendices A and B summarize the sites and their component features. Appendices D and E provide detailed descriptions for each site and feature.

Appendices D and E include for each site:

1. Site numbers - either State Inventory of Historic Places (SIHP) numbers, Bishop Museum temporary numbers, if previously assigned, or PHRI temporary site numbers. PHRI temporary numbers are one, two, and three-digit numbers prefixed by "K-" or "W-";
2. A site type designation - provides formal feature type for sites consisting of a single feature, or designates the site as a complex if site includes more than one feature. Also lists total number of features present;

3. A description of site topography - a brief description of the terrain in the area of the site;
4. A listing of site vegetation - lists principal components of the vegetation within and in the vicinity of the site;
5. A statement of site condition - overall state of preservation of the site (poor, fair, good, or excellent);
6. An assessment of site integrity - degree of historic modification by human agencies (unaltered, partially altered, and completely altered) and nature of modifications, if any;
7. A probable age - indicates probable/possible age of the site (i.e., historic or prehistoric);
8. A functional interpretation - probable or possible (*) functions for each site; or, if function cannot be determined, assigns indeterminate function. For sites with multiple functions, functions separated by "/";
9. Feature dimensions - maximum length, width, and maximum area. Dimensions immediately followed by a description of feature construction, associated portable remains, and other descriptive information; and
10. A site description - a brief overall description of the site listing types of constituent features; portable remains present, if any, and other site data.

Appendix F provides UTM coordinates, elevations, and proximity to water for all sites.

* State Inventory of Historic Places (SIHP) site designation system: all four-digit site numbers prefixed by 50-50-10 or 50-50-14 (50=State of Hawaii, 50=Island of Maui, 10 or 14=USGS 7.5' series quad map ("Puu o Kali" or "Makena," respectively)).

442-050289

FINDINGS

8

Table I.

CORRELATION OF SITE NUMBERS

PHRI Temporary Number	BPBM Site Number (T-)	SIHP Site Number
W- 1	—	2344
W- 2	6	2345
W- 3	7	2039
W- 4	8	2346
W- 5	—	2347
W- 6	—	2348
W- 8	—	2349
W-10	—	2350
W-11	5	2040
W-12	—	2351
W-13	—	2352
W-14	—	2353
W-15	—	2354
W-17	—	2355
W-18	—	2356
W-20	—	2357
W-21	—	2358
W-27	36	2039 2071
W-28	—	2042
W-30	110	2359
W-31	—	2360
W-32	—	2361
W-35	105	2362
W-36	—	2043
W-37	104	2363
W-42	75	2364
W-45	72	2044
W-46	71	2365
W-47	107	2366
W-48	108	2367
W-49	—	2368
W-55	—	2369
W-57	—	2370
W-58	—	2371
W-59	81	2372
W-60	—	2373
W-65	—	2374
W-67	—	2375
W-71	101	2376
W-73	—	2377
W-75	86-87	2378
W-77	—	2379
W-80	—	2380
W-82	—	2381

Table 1. (cont.)

PHRI Temporary Number	BPBM Site Number (T-)	SIHP Site Number
W-83	—	2382
W-88	—	2383
W-90	—	2384
W-96	—	2385
W-97	—	2386
W-98	69-70*	2387
W-101	—	2388
K- 1	15	2046
K- 2	16	2047
K- 3	14	2028
K- 4	19	2048
K- 5	—	2049
K- 6	—	2029
K- 7	22	2030
K- 8	—	2050
K- 9	38	2051
K-10	—	2052
K-11	39	2053
K-12	—	2054
K-13	—	2055
K-14	—	2056
K-16	—	2057
K-19	—	2058
K-20	—	2059
K-21	—	2060
K-25	—	2061
K-26	64	2062
K-27	62	2063
K-29	63	2064
K-30	—	1037
K-31	13	2065
K-32	—	2066
K-35	—	2067
K-36	—	2032
K-39	—	2068
K-40	—	2069
K-41	—	2070
K-42	—	2071
K-44	—	2072
K-45	60	2073
K-46	60	2074
K-48	61-17-58	2033
K-50	—	2075
K-51	—	2076
K-52	31	2077

Table 1. (cont.)

PHRI Temporary Number	BPBM Site Number (T-)	SIHP Site Number
K- 53	—	2078
K- 54	30	2079
K- 55	—	2080
K- 57	—	2081
K- 59	—	2082
K- 60	—	2083
K- 62	—	2084
K- 63	—	2085
K- 64	—	2034
K- 65	—	2086
K- 69	37	2087
K- 70	27	2088
K- 71	—	2089
K- 76	—	2090
K- 78	—	2091
K- 79	—	2092
K- 80	46	2093
K- 81	—	1036
K- 84	55	2095
K- 85	—	2096
K- 87	25	2097
K- 89	—	2098
K- 90	—	2099
K- 95	—	2300
K- 96	—	2301
K- 97	—	2302
K- 98	—	2303
K- 99	3	2304
K-100	—	2305
K-101	24	2306
K-102	—	2307
K-103	56	2308
K-105	—	2035
K-106	—	2310
K-107	—	2311
K-108	—	2312
K-109	49	2313
K-110	48	2314
K-111	—	2036
K-112	43	2315
K-115	42	2316
K-116	41	2317
K-118	—	2318
K-120	40	2319
K-124	—	2037
K-127	—	2320

Table 1. (cont.)

PHRI Temporary Number	BPBM Site Number (T-)	SIHP Site Number
K-130	—	2038
K-131	—	2321
K-134	—	2322
K-135	—	2323
K-137	—	2324
K-140	—	2325
K-142	—	2326
K-143	—	2327
K-146	—	2328
K-148	—	2329
K-149	—	2330
K-152	—	2331
K-200	—	2332
K-201	—	2333
K-202	—	2334
K-203	—	2335
K-204	—	2336
K-205	—	2337
K-206	1	2338
K-207	45	2339
K-208	—	2340
K-209	—	2341
K-210	—	2342
K-211	—	2343

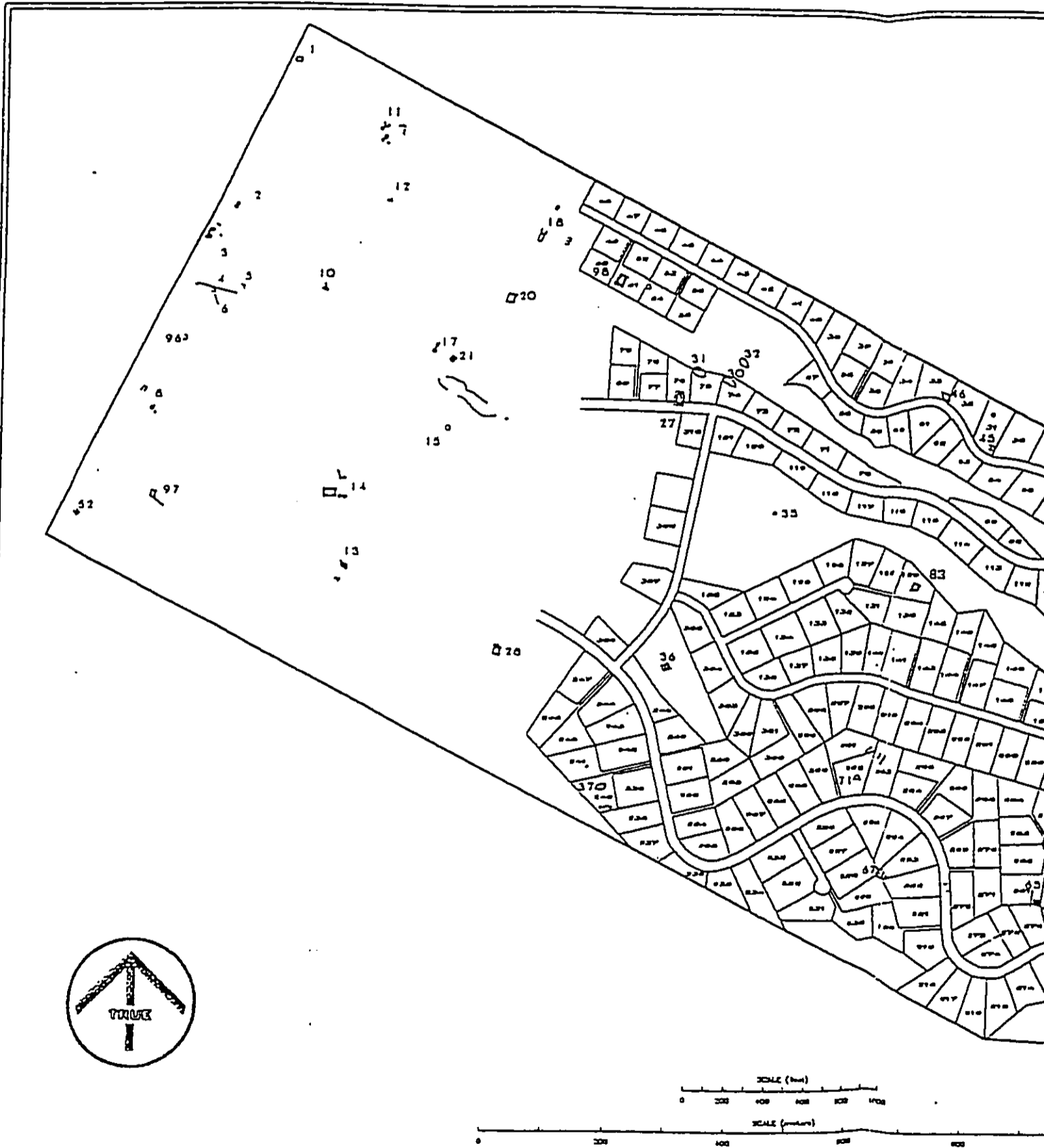
Of the 159 sites identified, 61 were complexes (sites consisting of more than one feature). In Waiohuli, nine complexes comprised of 21 features were identified, and in Keokea 52 complexes comprised of 156 features were identified. Ninety-eight of the identified sites consisted of single features (42 in Waiohuli and 56 in Keokea). Feature types present at sites include: wall, enclosure, terrace, mound, overhang, upright, wall, lithic scatter, alignment, cave, platform, bridge, and burial. Table 2 lists the frequencies of formal feature types recorded.

Probable functional interpretations were made for most sites. Site functions included: agricultural, habitation, religious, animal (cattle) control, burial, transportation, storage, roadway, lithic reduction, and indeterminate. The frequencies of functional site types are listed in Table 3.

Sites were interpreted as habitation sites if they appeared to have been permanent or semi-permanent residences. Habitation sites are those which include archaeological features traditionally associated with dwellings. In the project area, habitation features include enclosures, platforms, terraces, and C-, L-, and U-shaped walls. No sites in the project area were interpreted as temporary habitation sites; however, several sites did include features traditionally associated with temporary habitation—such as C-, L-, and U-shaped walls and overhang shelters. Also, no habitation sites in the project area were "open" sites—habitation sites not associated with stone architecture. This was because such open sites, if they existed, would have been manifested by surface exposures of midden, artifact scatters, and soil discolorations—none of which were likely to have been seen through the dense vegetative cover which characterizes most of both subdivisions.

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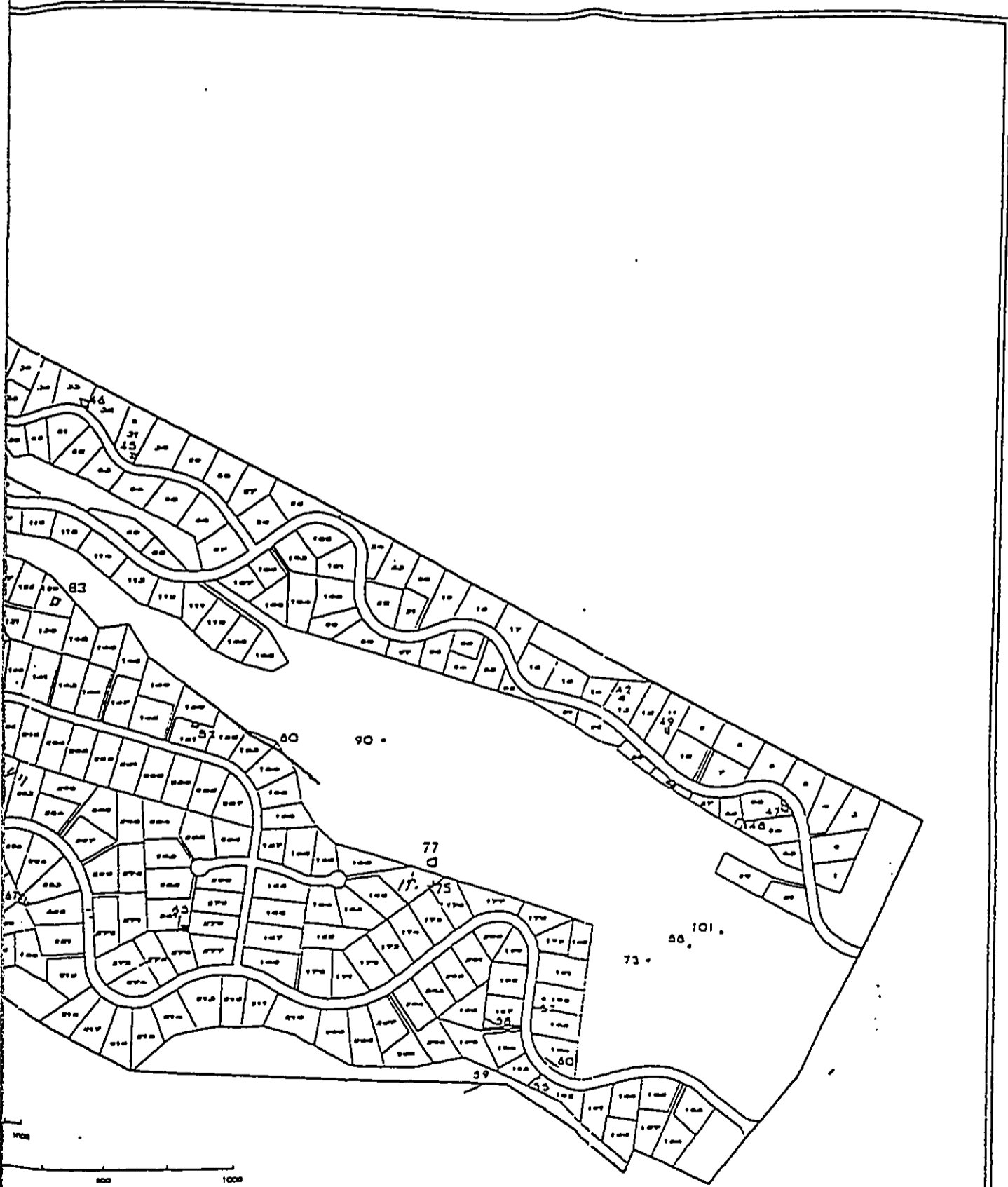


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LEGEND

SITE NUMBERS - FOR TEMPORARY SITE NUMBERS PROVIDED BY



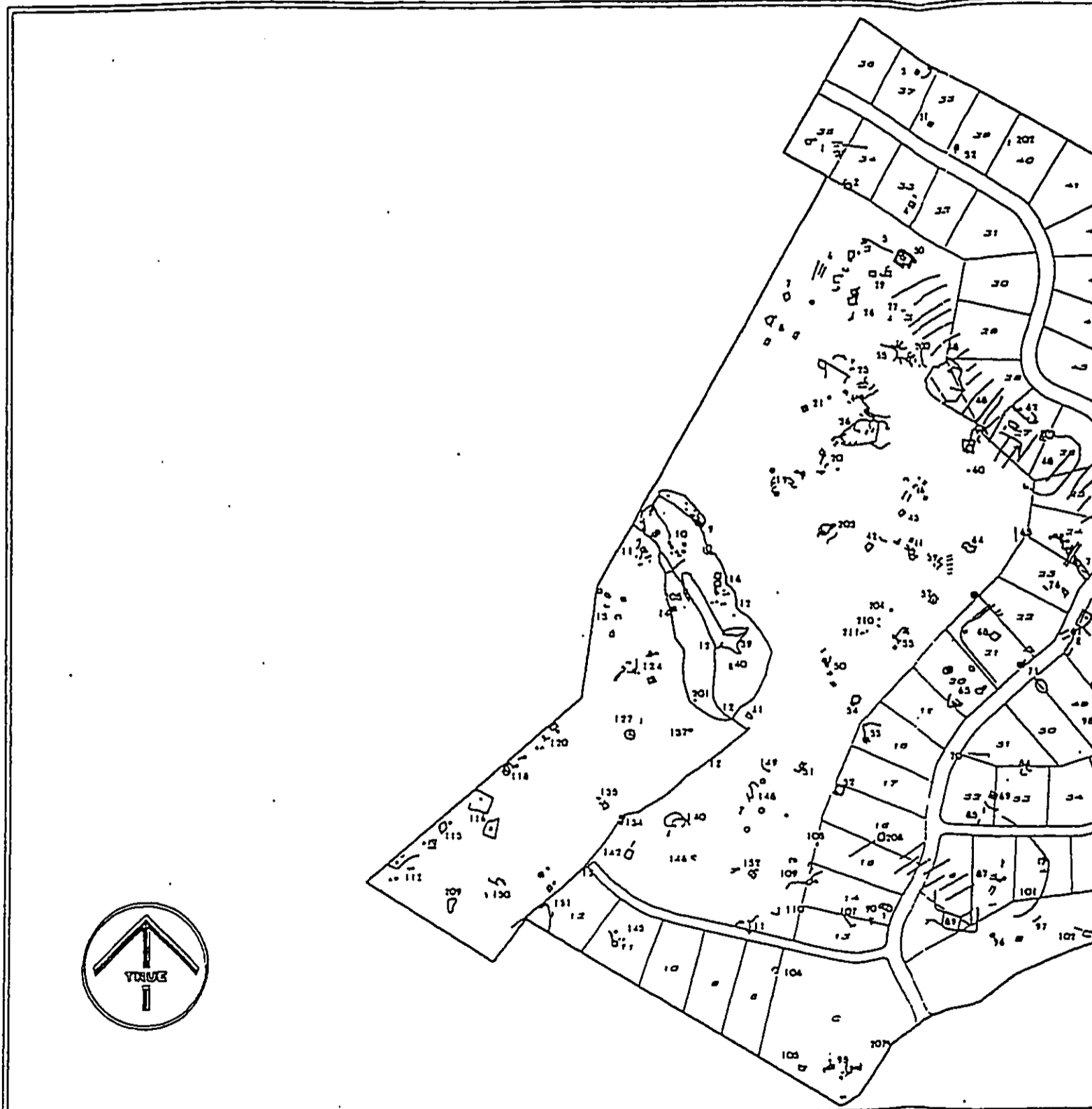
TEMPORARY SITE NUMBERS PROVIDED BY WHP

Archaeological Inventory Survey
Keokea and Waiohuli Subdivisions
PERI Project No. 88-442

FIGURE 2.
Site Location Map
Waiohuli Subdivision

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DRAGONFLY SITE NUMBERS - PLUS TEMPORARY SITE NUMBERS PREFIXED BY T

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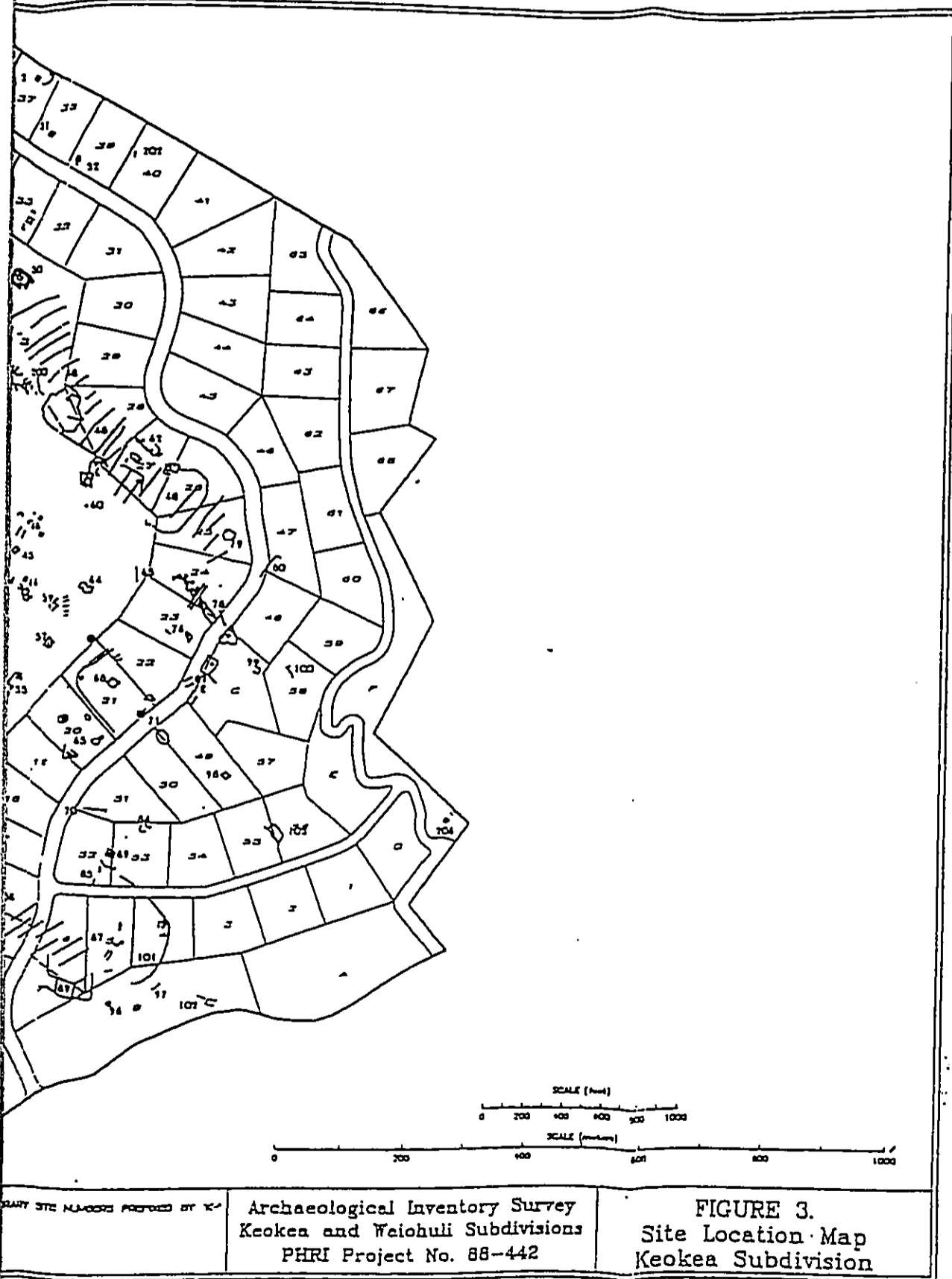


Table 2.

FREQUENCIES OF FORMAL FEATURE TYPES

Formal Type	Number	Percent
<i>WAIOHULI</i>		
Alignment	1	1.59
Bridge	1	1.59
Human Bone	1	1.59
Cave	1	1.59
Enclosure	30	47.62
Lithic Scatter	1	1.59
Mound	4	6.35
Overhang	3	4.76
Platform	1	1.59
Terrace	5	7.94
Upright	2	3.17
Wall	13	20.63
WAIOHULI TOTAL:	63	100.00%
<i>KEOKEA</i>		
Cairn	1	0.47
Enclosure	139	65.88
Heiau	1	0.47
Lava Tube	2	0.95
Lava Tube Enclosure	1	0.47
Mound	3	1.42
Overhang	21	9.95
Paved Area	1	0.47
Platform	6	2.84
Sink	1	0.47
Stone	1	0.47
Structure	1	0.47
Terrace	17	8.05
Wall	16	7.58
KEOKEA TOTAL:	211	100.00%

Nine sites were interpreted as religious or possibly religious, and 10 were interpreted as burials or potential burials. These include the previously recorded heiau, notched-rectangular enclosures, features with free-standing uprights and/or coral, large stepped and paved terraces, and features known or suspected to contain human remains. Several sites in the vicinity of Molohai Heiau in Keokea (a likely candidate for interpretation as an *ahupuaa*-level heiau) include a relatively high density of features tentatively assigned a religious function. Among these are Sites K-2, -3, -6, -29,

and -48. In addition, many large and probably high-status residential features, densely clustered agricultural features, and other features were found proximate to the heiau. For example, nearby Site K-78 consists of a series of stepped, paved terraces extending for more than 120 meters; the site may be a heiau (*ili* level?). In addition, the land between K-78 and Molohai Heiau—very much like what persists throughout the Keokea subdivision and nearby surrounding lands—is regularly terraced and includes at least six large features.

Table 3.

FREQUENCIES OF FUNCTIONAL SITE TYPES

Formal Type	Number	Percent
<i>WAIHOULI</i>		
Agriculture	8	15.69
Animal Control	5	9.80
Burial*/Ag.	1	1.96
Habitation/Ag.	23	45.10
Burial	2	3.92
Indeterminate	2	3.92
Lithic Reduction	1	1.96
Religious	1	1.96
Religious*	1	1.96
Religious*/Hab.	3	5.88
Transportation	3	5.88
Habitation	1	1.96
WAIHOULI TOTAL:	51	100.00%
<i>KEOKEA</i>		
Agricultural	5	4.63
Animal Control	6	5.55
Animal Control/Ag.	3	2.78
Burial*/Hab./Ag.	3	2.78
Burial	1	0.93
Burial/Habitation	2	1.85
Burial/Ag.	1	0.93
Tool Manufacturing	1	0.93
Habitation	22	20.37
Habitation*/Ag.	1	0.93
Habitation/Ag.	48	44.44
Habitation*/An. Cont.	1	0.93
Habitation/Indeterminate	1	0.93
Habitation/Ag./An. Cont.	4	3.84
Indeterminate	2	1.85
Religious*/Ag.	1	0.93
Religious/Hab./Ag.	1	0.93
Religious*/Hab./Ag.	1	0.93
Religious	1	0.93
Temp. Habitation	1	0.93
Temp. Hab./Ag.	1	0.93
Water Tank	1	0.93
KEOKEA TOTAL:	108	100.00%

* Tentative Function

One hundred thirty-nine enclosures were identified in Keokea Subdivision of which 127 were tentatively assigned a habitation function. This is a density of one major habitation feature for every 2.76 acres. Walls were found throughout both subdivisions. These varied in thickness, height, and construction. The historical documentary research for the present project suggests that most walls were built within the last century. Indeed, the majority of the walls appear to have been constructed in historic times to control ranging cattle.

During the present project, two extensive wall complexes of probable historic origin were recorded (W-4 and K-12). Site W-4 consists of a series of walls and wall segments bordering both sides of the northernmost large gulch in Waiohuli; these walls and segments apparently served to keep cattle out of portions of the gulch. Site K-12 consists of a meandering series of long and substantial walls situated in the southwest portion of Keokea subdivision. K-12 includes the long straight wall which marks the southern boundary of the Keokea project area. Aside from barbed wire and occasional posts in and associated with Site W-4, no historic artifacts were found in association with the walls.

Extensively scattered throughout both subdivisions were hundreds of minor agricultural features (mounds and terraces) which were found associated with most of the recorded sites. Most of these features were not formally recorded; instead, their distributions were plotted (Figure 4) and they were referred to in the records of formally recorded sites as being present in the site area. Recorded sites not associated with minor agricultural features were exclusively those found in areas where mechanical ground alteration had almost certainly obliterated them. This is particularly true in Waiohuli where perhaps 50% of the surface of the subdivision has been bulldozed. In the Waiohuli parcel, major residential features may have been bulldozed; this would account for the low density of sites in that subdivision, however, it is clear that the bulldozer operator made occasional attempts to avoid them.

The spatial associations between the various formal and functional feature types in Waiohuli have been so thoroughly obscured by ground disturbance that, aside from

focusing on a few small locales, any attempt to analyze site and feature distributions can be expected to yield very limited and unreliable results. This does not hold true in the Keokea subdivision where recent mechanical disturbance is primarily limited to areas along the eastern subdivision boundary and along the few roads which traverse the subdivision.

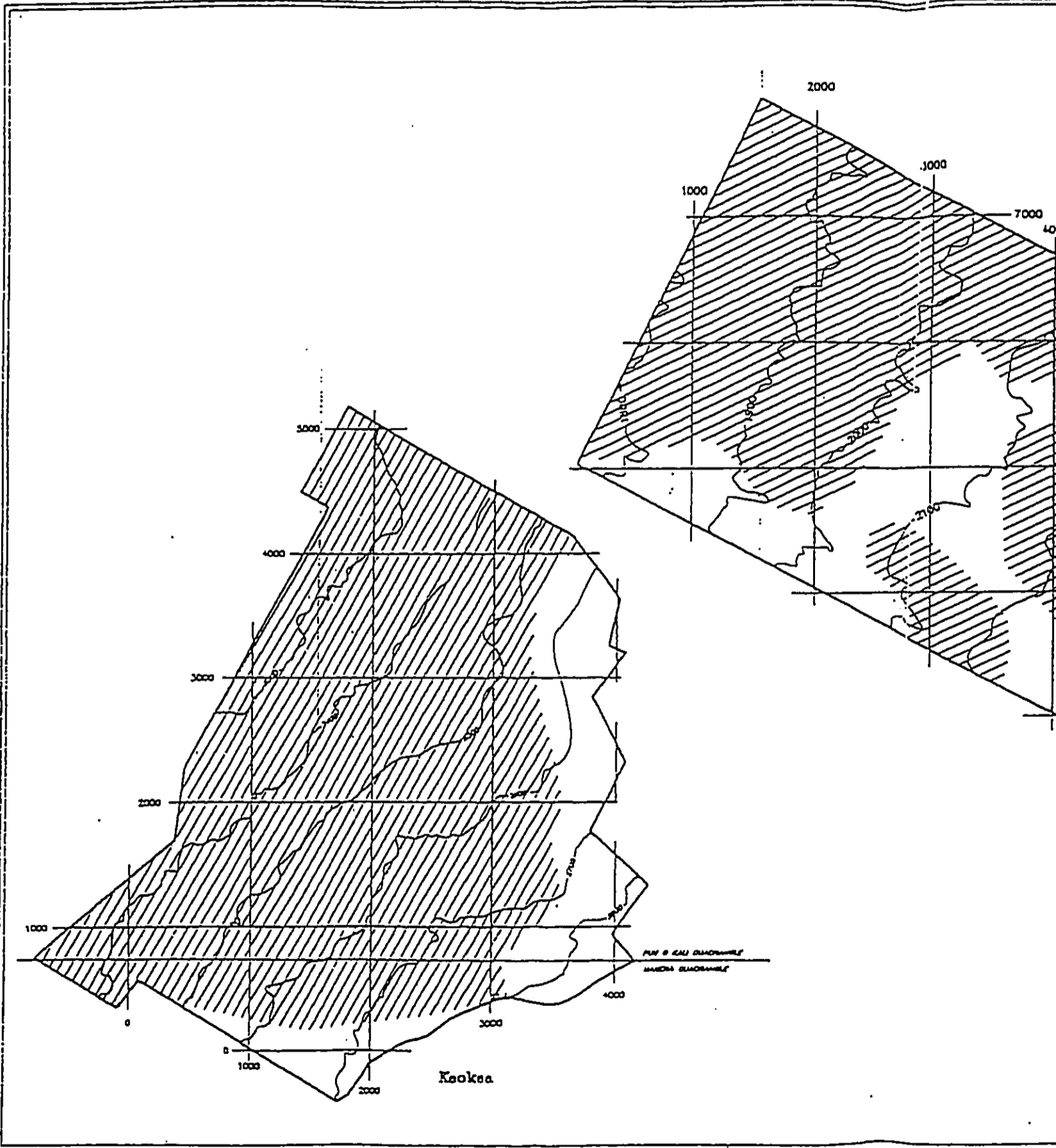
In Keokea, several of the residential features showed signs of having been disassembled in order to use their stones for building materials (Sites K-52 and K-90). In both Keokea (Site K-107) and Waiohuli (Site W-90), there was evidence that stone walls at the entrances to burial caves had been removed.

LIMITED SURFACE COLLECTIONS

Surface collection was limited to the recovery of four artifacts considered threatened by either collection by amateurs or displacement by natural forces. The artifacts were all indigenous Hawaiian types—a small polished basalt adze, a retouched, utilized basalt core, a retouched basalt flake tool, and a scoria abrader.

LIMITED TEST EXCAVATIONS

Limited test excavations were undertaken to recover charcoal for radiocarbon dating and to assess the depth and constituents in cultural strata at selected features. The features excavated included a sample of the major formal feature types present. Nineteen test excavations (12 in Keokea and seven in Waiohuli) were conducted. Each excavation was taken down to a maximum depth of 50 cmbs (centimeters below surface) or to sterile soil. The test excavations yielded ecofactual material and 112 artifacts, including abraders, a flaked lithic tool, and flaked lithic debitage. The ecofactual materials included medium mammal, small mammal bone, fish bone, marine shell, *kukui* (*Aleurites moluccana* [L.] Willd.), gourd, and floral remains. Twelve of the excavation units (at 12 separate features) yielded marine faunal remains. Nine units yielded terrestrial faunal remains. The test units also yielded radiocarbon samples, of which 17 were submitted for dating analysis.



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FIG. 1
Distribution of

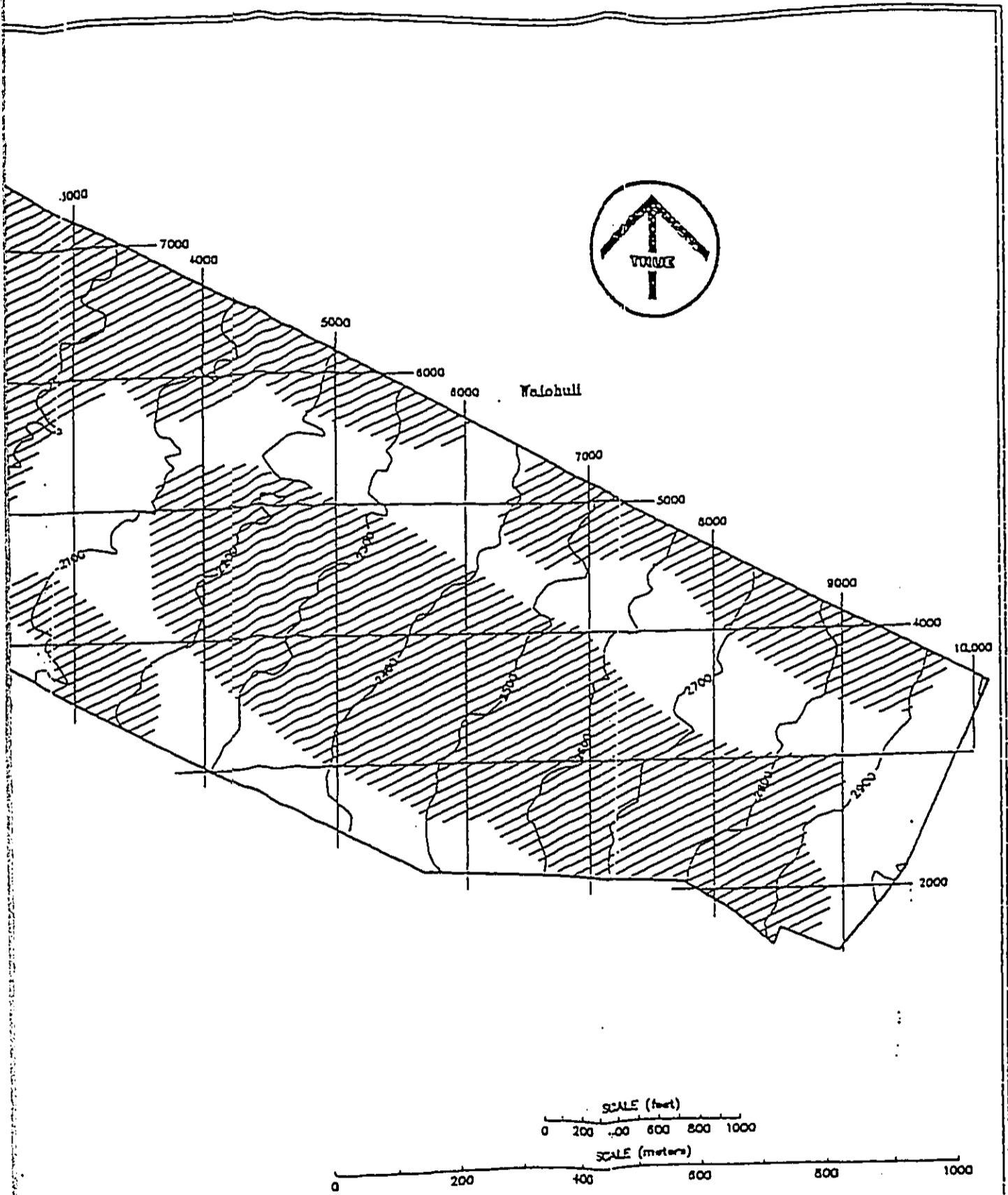


FIGURE 4.
Distribution of Agricultural Features

/// EXTENT OF AGRICULTURAL FEATURES

Table 7.

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS
AND RECOMMENDED GENERAL TREATMENTS
WAIOHULI PARCEL

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
W-1	+	-	-	-	+	-	-	-
W-2	+	-	-	-	+	-	-	-
W-3	+	-	-	-	+	-	-	-
W-5	+	-	-	-	+	-	-	-
W-6	+	-	-	-	+	-	-	-
W-8	+	-	-	-	+	-	-	-
W-10	+	-	-	-	+	-	-	-
W-12	+	-	-	-	+	-	-	-
W-13	+	-	-	-	+	-	-	-
W-14	+	-	-	-	+	-	-	-
W-15	+	-	-	-	+	-	-	-
W-17	+	-	-	-	+	-	-	-
W-18	+	-	-	-	+	-	-	-
W-20	+	-	-	-	+	-	-	-
W-21	+	-	-	-	+	-	-	-
W-31	+	-	-	-	+	-	-	-

General Significance Categories:

- A = Important for information content, further data collection necessary (PHRI=research value);
- X = Important for information content, no further data collection necessary (PHRI=research value, SHPO=not significant);
- B = Excellent example of site type at local, region, island, State, or National level (PHRI=interpretive value); and
- C = Culturally significant (PHRI=cultural value).

Recommended General Treatments:

- FDC = Further data collection necessary (further survey and testing, and possibly subsequent data recovery/mitigation excavations);
- NFW = No further work of any kind necessary, sufficient data collected, archaeological clearance recommended, no preservation potential (possible inclusion into landscaping suggested for consideration);
- PID = Preservation with some level of interpretive development recommended (including appropriate related data recovery work); and
- PAI = Preservation "as is," with no further work (and possible inclusion into landscaping), or minimal further data collection necessary.

* Provisional assessment; definite assessment pending results of further data collection.

Table 7. (cont.)

WAIOHULI PARCEL

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
W-37	+	-	-	-	+	-	-	-
W-42	+	-	-	-	+	-	-	-
W-46	+	-	-	-	+	-	-	-
W-48	+	-	-	-	+	-	-	-
W-49	+	-	-	-	+	-	-	-
W-55	+	-	-	-	+	-	-	-
W-65	+	-	-	-	+	-	-	-
W-67	+	-	-	-	+	-	-	-
W-71	+	-	-	-	+	-	-	-
W-73	+	-	-	-	+	-	-	-
W-75	+	-	-	-	+	-	-	-
W-77	+	-	-	-	+	-	-	-
W-82	+	-	-	-	+	-	-	-
W-83	+	-	-	-	+	-	-	-
W-96	+	-	-	-	+	-	-	-
W-97	+	-	-	-	+	-	-	-
W-98	+	-	-	-	+	-	-	-
Subtotal: 33	33	-	-	-	33	-	-	-
W-4	-	+	-	-	-	+	-	-
W-47	-	+	-	-	-	+	-	-
W-57	-	+	-	-	-	+	-	-
W-58	-	+	-	-	-	+	-	-
W-59	-	+	-	-	-	+	-	-
W-60	-	+	-	-	-	+	-	-
W-80	-	+	-	-	-	+	-	-
W-88	-	+	-	-	-	+	-	-
W-101	-	+	-	-	-	+	-	-
Subtotal: 9	9	-	-	-	-	9	-	-
W-27	+	-	+	+	+	-	+	-
W-28	+	-	+	+	+	-	+	-
W-36	+	-	+	+	+	-	+	-
Subtotal: 3	3	-	3	3	3	-	3	-
W-45	+	-	+	-	+	-	+	-
Subtotal: 1	1	-	1	-	1	-	1	-

Table 7. (cont.)

WAIOHULI PARCEL

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
W-11	+	-	-	-	+	-	-	-
Subtotal: 1	1	-	-	1	1	-	-	1
W-30	+	-	-	-	+	-	-	-
W-32	+	-	-	-	+	-	-	-
Subtotal: 2	2	-	-	2	2	-	2	-
W-90	+	-	-	+	+	-	-	+
Subtotal: 1	1	-	-	1	1	-	-	1
W-35	+	-	-	+	+	-	-	-
Subtotal: 1	1	-	-	1	1	-	-	-
Waiohuli Total: 51	42	9	4	8	42	9	6	2

KEOKEA PARCEL

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
K- 1	+	-	-	-	+	-	-	-
K- 2	+	-	-	-	+	-	-	-
K- 4	+	-	-	-	+	-	-	-
K- 5	+	-	-	-	+	-	-	-
K- 7	+	-	-	-	+	-	-	-
K- 8	+	-	-	-	+	-	-	-
K-10	+	-	-	-	+	-	-	-
K-11	+	-	-	-	+	-	-	-
K-13	+	-	-	-	+	-	-	-
K-14	+	-	-	-	+	-	-	-
K-16	+	-	-	-	+	-	-	-
K-19	+	-	-	-	+	-	-	-
K-21	+	-	-	-	+	-	-	-
K-20	+	-	-	-	+	-	-	-
K-25	+	-	-	-	+	-	-	-
K-26	+	-	-	-	+	-	-	-
K-27	+	-	-	-	+	-	-	-
K-31	+	-	-	-	+	-	-	-
K-32	+	-	-	-	+	-	-	-

Table 7. (cont.)

KEOKEA PARCEL

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
K-35	+	-	-	-	+	-	-	-
K-42	+	-	-	-	+	-	-	-
K-52	+	-	-	-	+	-	-	-
K-53	+	-	-	-	+	-	-	-
K-203	+	-	-	-	+	-	-	-
K-9	+	-	-	-	+	-	-	-
K-65	+	-	-	-	+	-	-	-
K-76	+	-	-	-	+	-	-	-
K-85	+	-	-	-	+	-	-	-
K-120	+	-	-	-	+	-	-	-
K-124	+	-	-	-	+	-	-	-
K-140	+	-	-	-	+	-	-	-
K-143	+	-	-	-	+	-	-	-
K-36	+	-	-	-	+	-	-	-
K-39	+	-	-	-	+	-	-	-
K-41	+	-	-	-	+	-	-	-
K-44	+	-	-	-	+	-	-	-
K-45	+	-	-	-	+	-	-	-
K-46	+	-	-	-	+	-	-	-
K-50	+	-	-	-	+	-	-	-
K-51	+	-	-	-	+	-	-	-
K-54	+	-	-	-	+	-	-	-
K-55	+	-	-	-	+	-	-	-
K-57	+	-	-	-	+	-	-	-
K-59	+	-	-	-	+	-	-	-
K-64	+	-	-	-	+	-	-	-
K-69	+	-	-	-	+	-	-	-
K-70	+	-	-	-	+	-	-	-
K-79	+	-	-	-	+	-	-	-
K-90	+	-	-	-	+	-	-	-
K-81	+	-	-	-	+	-	-	-
K-84	+	-	-	-	+	-	-	-
K-89	+	-	-	-	+	-	-	-
K-95	+	-	-	-	+	-	-	-
K-96	+	-	-	-	+	-	-	-
K-97	+	-	-	-	+	-	-	-
K-98	+	-	-	-	+	-	-	-
K-99	+	-	-	-	+	-	-	-
K-101	+	-	-	-	+	-	-	-
K-102	+	-	-	-	+	-	-	-
K-103	+	-	-	-	+	-	-	-
K-105	+	-	-	-	+	-	-	-
K-106	+	-	-	-	+	-	-	-
K-108	+	-	-	-	+	-	-	-

Table 7. (cont.)

KEOKEA PARCEL

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
K-109	+	-	-	-	+	-	-	-
K-110	+	-	-	-	+	-	-	-
K-111	+	-	-	-	+	-	-	-
K-112	+	-	-	-	+	-	-	-
K-116	+	-	-	-	+	-	-	-
K-118	+	-	-	-	+	-	-	-
K-127	+	-	-	-	+	-	-	-
K-130	+	-	-	-	+	-	-	-
K-131	+	-	-	-	+	-	-	-
K-135	+	-	-	-	+	-	-	-
K-137	+	-	-	-	+	-	-	-
K-142	+	-	-	-	+	-	-	-
K-146	+	-	-	-	+	-	-	-
K-148	+	-	-	-	+	-	-	-
K-149	+	-	-	-	+	-	-	-
K-152	+	-	-	-	+	-	-	-
K-200	+	-	-	-	+	-	-	-
K-201	+	-	-	-	+	-	-	-
K-202	+	-	-	-	+	-	-	-
K-204	+	-	-	-	+	-	-	-
K-205	+	-	-	-	+	-	-	-
K-206	+	-	-	-	+	-	-	-
K-208	+	-	-	-	+	-	-	-
K-209	+	-	-	-	+	-	-	-
K-210	+	-	-	-	+	-	-	-
K-211	+	-	-	-	+	-	-	-
Subtotal: 89	89	-	-	-	89	-	-	-
K-30	+	-	+	+	+	-	+	-
K-62	+	-	+	+	+	-	+	-
K-78	+	-	+	+	+	-	+	-
K-115	+	-	+	+	+	-	+	-
Subtotal: 4	4	-	4	4	4	-	4	-
K-12	-	+	-	-	-	+	-	-
K-60	-	+	-	-	-	+	-	-
K-63	-	+	-	-	-	+	-	-
K-80	-	+	-	-	-	+	-	-
K-100	-	+	-	-	-	+	-	-
Subtotal: 5	0	5	-	-	-	5	-	-

Table 7. (cont.)

KEOKEA PARCEL

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
K- 29	+	-	+	-	+	-	+	-
K- 40	+	-	+	-	+	-	+	-
K- 48	+	-	+	-	+	-	+	-
Subtotal: 3	3	-	3	-	3	-	3	-
K- 87	+	-	-	+	+	-	-	+
K-107	+	-	-	+	+	-	-	+
K-207	+	-	-	+	+	-	-	+
Subtotal: 3	3	-	-	3	3	-	-	3
K- 3	+	-	-	+	+	-	-	+
K- 6	+	-	-	+	+	-	-	+
K- 71	+	-	-	+	+	-	-	+
Subtotal: 3	3	-	-	3	3	-	-	3
K-134	+	-	-	+	-	-	-	+
Subtotal: 1	1	-	-	1	-	-	-	1
<i>Keokea</i> Total: 108	103	5	7	11	102	5	7	7
<i>Waiohuli</i> Total: 51	51	9	4	8	42	9	6	2
Grand Total: 159	154	14	11	19	144	14	13	9

Table 8.

**LOTS WHICH APPEAR TO CONTAIN SITES OR PORTIONS OF SITES
RECOMMENDED FOR PRESERVATION***

<u>Keokea Subdivision</u>		<u>Waiohuli Subdivision</u>	
<u>Lot No.</u>	<u>Site No.</u>	<u>Lot No.</u>	<u>Site No.</u>
5	87	30	45
13	107	31	45
14	107	74	30
21	71	75	30
22	71	76	27
23	78		
24	48,78		
25	48		
26	48,62		
27	48,62		
28	48		
29	48		
37	3		
48	78		
49	71		
50	71		
58	78		
A	78		
C	207		

* See page 29 for explanation of uncertainty regarding boundaries of lots in relation to sites.

Table 9.

RESIDENCE LOTS CONTAINING SITES

Keokea Subdivision		Waiohuli Subdivision	
Lot No.	Site No.	Lot No.	Site No.
11	143 A	11	49
12	12, 131	13	42
12	131, 131 A-C	2-33	46
13-14	90, 107	51-54	98
14	109, 109 A	74	30
15	108	75	31
16	208	76	27
16-17	52, 52 A-B	84-85	47
18	53	84-85-86	48
19-20-21-22	65	129	83
20	65 D-G	149-150-152-153-154	80
21	65 C, 71 B	150-151	82
21-22	65 A-B, 71 A	161-175-176	75
21-49-50	71	182-183	57
23	76, 76 A-B	184	60
23-24	63, 78 A	192	55
23-24-48-49	78	194-196-197	58
24	78 B-E	222-223-224-228-229	67
25	79		
26-27	48 C	240-241	37
27	48 D	262	71
27-28	62, 62 A-C	276-277-278-281	65
29-28	48 A	31	45
29-28-27-26-25	48		
33	4, 4 A-B		
34	2, 2 A-B		
34-35	1 B		
35	1 A		
4	K-101		
5-6-7	K-87, 89		
8	K-106		
20	K-71B		
24	K-48		
37	K-3		
38	K-31		
39	K-32		
40	K-202		
49	K-98		
51	K-70		
52	K-69, 85		
53	K-69, 84		
55-56	K-103		

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APPENDIX A

SUMMARY OF IDENTIFIED SITES AND FEATURES - WAIHOHULI

*Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	#CRM Value Mode Assess.			+Field Work Tasks		
			R	I	C	DR	SC	EX
1	Enclosure	Habitation/Ag.	M	L	L	+	+	+
2	Enclosure	Habitation/Ag.	M	L	L	+	+	+
3	Terrace	Habitation/Ag.	H	L	L	+	+	+
4	Wall	Animal Control	L	L	L	-	-	-
5	Overhang	Indeterminate	M	L	L	-	-	+
6	Lithic Scatter	Lithic Reduction	M	L	L	+	+	-
8	Enclosure	Habitation/Ag.	M	L	L	+	+	+
10	Terrace	Agriculture	M	L	L	+	-	+
11	Complex (6+)	Burial**/Ag.	M/H	L	L/H	+	-	+
A	Wall							
B	Mound							
C	Mounds							
D	Mound							
E	Platform							
F	Mound							
12	Terraces	Agriculture	M	L	L	+	-	+
13	Complex (2)	Habitation/Ag.	M	L	L	+	-	+
A	Enclosure							
B	Enclosure							

* PHRI temporary site numbers.

Cultural Resource Management - Value Mode Assessment—

Nature: R = scientific research
I = interpretive
C = cultural
Degree: H = high
M = moderate
L = low

+ Field Work Tasks:

DR = detailed recording (scaled drawings, photographs, and written descriptions)
SC = surface collections
EX = test excavations

SUMMARY OF IDENTIFIED SITES AND FEATURES - WAIHOLI (cont.)

Site/ Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess.			Field Work Tasks		
			R	I	C	DR	SC	EX
14 A B C	Complex Enclosure Enclosure Wall, L-shaped	Habitation/Ag.	M	L	L	+	-	+
15	Enclosure	Habitation/Ag.	M	L	L	+	-	+
17 A B	Complex (2) Enclosure Enclosure	Habitation/Ag.	M	L	L	+	-	+
18 A B	Complex (2) Enclosure Enclosure	Habitation/Ag.	M	L	L	+	-	+
20	Enclosure	Habitation/Ag.	M	L	L	+	+	+
21	Enclosure	Habitation/Ag.	M	L	L	+	-	+
27	Enclosure	Relig. (Heiau/Hab.)	H	H	H	+	-	+
28	Enclosure	Religious**/Hab.	H	H	H	+	-	+
30	Alignment	Religious**	L/H	L/H	L/H	+	-	+
31	Overhang	Habitation/Ag.	M	L	L	+	-	+
32	Upright	Religious**	L/H	L/H	L/H	+	+	+
35	Human Bone	Burial	L	L	H	+	+	-
36	Enclosure	Religious**/Hab.	H	H	H	+	+	+
37 A B	Complex (2) Enclosure Wall, U-shaped	Habitation/Ag.	M	L	L	+	-	+
42	Enclosure	Habitation/Ag.	M	L	L	+	-	+
45 A B	Complex (2) Enclosure Enclosure	Habitation/Ag.	H	H	L	+	-	+
46	Enclosure	Habitation/Ag.	M	L	L	+	-	+