Report on the

SURVEY NEEDS
for the
HAWAIIAN HOME LANDS

by the Bureau of Land Management

Bureau of Land Management
California State Office
Branch of Cadastral Survey

Report on the

Survey Needs for the Hawaiian Home Lands

A

BUREAU OF LAND MANAGEMENT

Cadastral Survey

REPORT

on the

SURVEY NEEDS

FOR THE

HAWAIIAN HOME LANDS COMMISSION

Prepared by

Clifford A. Robinson ..... California State Office

Patrick G. Carroll ..... Washington, D. C. Office

January, 1991

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TABLES

ACKNOWLEDGEMENTS

To accomplish our mission we had the assistance of many employees of the Hawaiian Home Commission.

We would like to thank Darrell Yagodich, from the Income Property Division, for making the arrangements to visit the various Districts and setting up the schedules with those district personnel.

We would like to thank the following District Managers for taking time from their normal schedules to tour us through virtually all parcels within their districts:

Donald Pakele	East Hawaii District Office
Bruce Taylor	West Hawaii District Office
Donald Awai, Jr.	Maui District Office
Gregory Helm, Sr.	Molokai District Office
Yvonne Koani	Kauai District Office

And we would especially like to thank Mr. Walter Tomita who accompanied us on the field trips to Maui, Molokai and Kauai, and who provided much of the historical background and general knowledge of the various tracts.

We would also like to convey are appreciation to Mr. Paul Nuha, State Surveyor for the State of Hawaii, who not only provided some plats of various Hawaiian Home Land Tracts, but was nice enough to have a quantity of them waiting at the District Office when we arrived on the Island of Hawaii.

FORWARD

The Secretary of the Department of the Interior, Manuel Lujan, Jr. was petitioned by Mrs. Hoaliku L. Drake, Chairperson of the Hawaiian Homes Commission for assistance in assessing what it would take to properly survey those lands set aside for the native Hawaiians under the Hawaiian Home Lands Act of 1920.

At the request of Secretary Lujan, in a letter dated March 22, 1990, Ed Hastey, the California State Director of the Bureau of Land Management (BLM), assigned Clifford "Skip" Robinson, Chief of the Cadastral Survey Branch within the California State Office, to make contact with Mrs. Drake, determine what, specifically, the Hawaiian Home Commission was needing help with and, if necessary, plan a trip to the Islands of Hawaii to conduct an evaluation. Mr. Robinson was aided by Patrick Carroll, a staff assistant from the Division of Cadastral Survey in the Washington Office of BLM. Mr. Carroll's assistance was requested because of his knowledge of surveys in Hawaii, having executed surveys there in the past. His location in Washington provides a direct communication link between the Director, Bureau of Land Management and the Secretary of the Interior.

Misters Robinson and Carroll conducted an on site examination of nearly every parcel of Hawaiian Home Lands (HHL) within the Hawaiian chain, totalling 34 tracts, from August 27 through September 7, 1990. This on site visit provided an opportunity to meet face to face with those personnel managing the HHLs. It also furnished knowledge on the vegetation and topography of each parcel, the type of structures or improvements presently existing that might attempt to represent the boundaries of any given tract (e.g. monuments, fence lines, etc.), and allowed direct examination and review of the records on file with the State Surveyor for the State of Hawaii.

The analysis contained herein utilizes those maps contained within the publication An Overview of the Hawaiian Home Land Program as a means to relate between and to provide some consistency for anyone reviewing both reports.

This analysis identifies the labor, equipment, subsistance and logistical costs necessary to perform these surveys.

It is recommended that a project supervisor be in charge of these surveys. This should be an individual who can provide oversight, technical guidance and a degree of congruity for the entire project; someone who can also perform surveys if and when necessary. This person would be the point of contact with both the State Surveyor and the Hawaiian Home Commission. The other land surveyors assigned to conduct the surveys must be journeyman land surveyors capable of functioning on their own with minimal guidance.

The plats and other documents created through these surveys should have a separate level of review to assure legal requirements are met, and must require some approving authority similar to those surveys conducted by the Cadastral Survey service of the Bureau of Land Management. It is imperative that the State Surveyor's Office be provided copies of all documents generated, and it is strongly suggested that the HHL Commission build or expand their records maintenance system to use the survey as a base for all land title and tenure dispositions such as leases, rentals, grants, etc. This would mean eventually expanding the surveys beyond identifying just the exterior boundaries of the 34 parcels.

The Bureau of Land Management has expertise in all these areas and it is suggested this expertise be strongly considered as a resource when approaching this project. The Bureau's involvement in Land Information Systems (LIS) development would add a degree of automated modernization that would be extremely beneficial to future management of these lands for native Hawaiians.

SURVEY NEEDS
for the
HAWAIIAN HOME LANDS COMMISSION

INTRODUCTION

The State of Hawaii is part of an archipelago in the North Pacific Ocean, stretching along a line nearly 1,600 miles in length. These islands were formerly known as the Sandwich Islands after discovery by Captain Cook in 1778. The islands consist of a number of coral reefs and volcanic islets in the western section to larger volcanic islands, eight of which are inhabited, in the eastern section. These eight inhabited islands comprise an area in excess of 6,400 square miles.

Climate

Although all the inhabited Hawaiian Islands lie south of the Tropic of Cancer, they have an equable climate unusual in this latitude. There is much sunshine, and the islands are generally free from destructive tropical storms. During the winter months the "kana", a southerly wind, brings some mugginess and heavy rains. The rainy, or northeasterly, slopes are cooler than the drier leeward, or southwesterly, slopes. The rainfall varies rather significantly from one side of any particular island to the other side, which is testimony to the difference in the type and amount of vegetation one finds at various locations on the islands.

Geology

The islands, in a geological frame, owe their existence to fairly recent volcanic eruptions. These eruptions, which generally are non explosive, have created unique ecosystems rising to above 13,000 feet above sea level, where varying heights in elevation bring distinctive types of vegetation.

The lava flows are characterized by two major types. One, a smooth glass like formation is locally known as "pahoehoe"; and the other a porous, clinkery flow of pumice locally referred to as "a'a". This latter type of lava is extremely difficult to walk and navigate across, and presents special problems to a survey crew carrying delicate bulky equipment. As these "a'a" flows age they begin to decompose and provide some soils that support a hardy grass growing to a couple feet in height, compounding even more the ability to negotiate this terrain.

Even at this time lava flows occur periodically on the islands. During the time of this examination a flow was happening southwest of Hilo on the big island of Hawaii. The Island of Hawaii shows the greatest evidence of present day lava flows throughout the island chain.

HAWAIIAN LAND OWNERSHIP

In ancient times the natives of the islands felt the land was owned by the Polynesian gods 'Lono', 'Kane', 'Kanaloa' and 'Ku'. However, to a Western outlook the ruling chiefs did, because the ruling chiefs were the closest living relatives of the major gods.

In 1790, ruling Chief Kaeokulani owned and ran the Islands of Kauai and Ni'ihau. Ruling Chief Kahekilinuiahumanu had Oahu. And Maui, Lanai, Kaho'olawe and Molokai islands were owned by Chief Kalanikupule. Ruling Chiefs Kamehameha and Keouakuahu'ula each owned half of the Big Island of Hawaii.

Each ruling chief was trying to do what Kamehameha finally did; conquer and rule all the islands. By 1795, Kamehameha had conquered all but Kauai and Ni'ihau. In 1810 they joined up with Kamehameha to avoid a bloody invasion.

Kamehameha set aside for his own use and enjoyment the best parcels spread over most of the islands. He divided the rest among his principal warrior chiefs, including some foreigners ('haoles').

Land Divisions

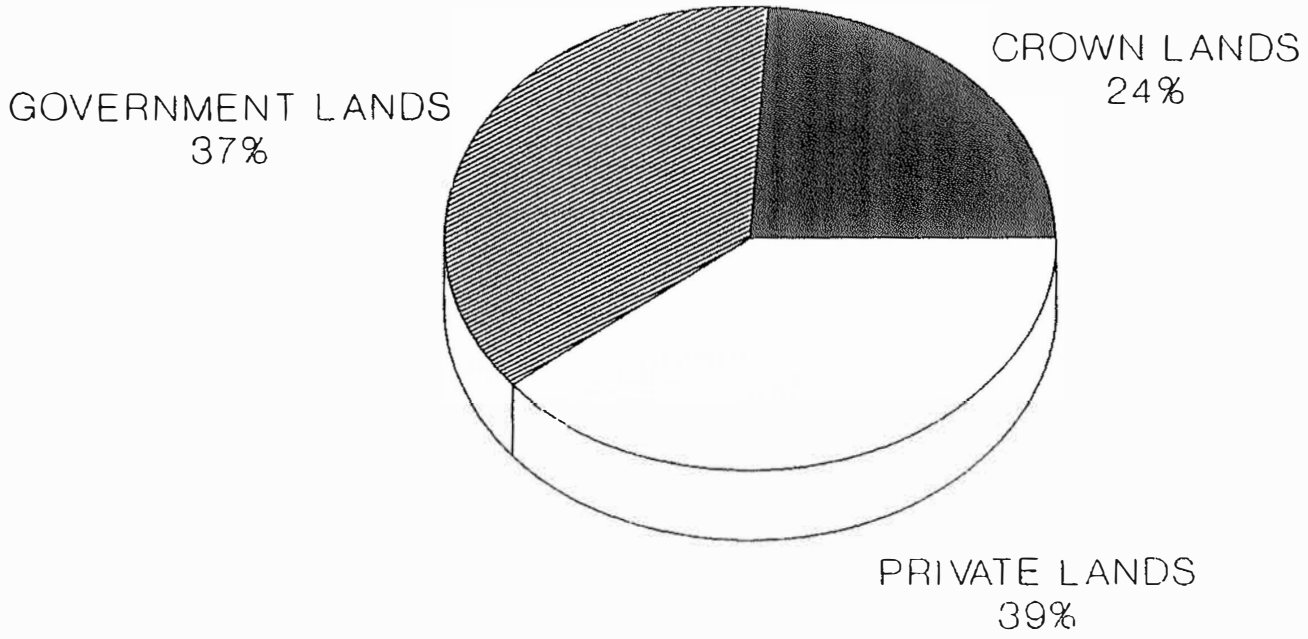
Think of an island as a circle; then slice it and think of each slice as a chiefdom headed by a ruling chief. Now take that slice and split it into many small wedges. Each narrow wedge can be considered as the basic Hawaiian land division, an "ahupua'a", wide at the bottom (or ocean side) and narrowing as it moves toward the top (or mountain side). This is an idealized, theoretical ahupua'a. In the real ancient Hawaii, chiefdoms and ahupua'a slices were determined by the island's topography, size and natural resources.

If one looks at the deed of any Hawaiian land ownership, chances are the description places you in one of these old ahupua'a (and even gives the lengthy Hawaiian place name). Island ahupua'a are the basis of modern Hawaii's land ownerships.

Some of the ahupua'a used natural boundaries, such as the steep sides of valleys. Some of the man-made boundaries were marked by piles of rocks spaced here and there (long since gone). In the Hawaiian language each pile of rock was called "ahu". An old tree or stump could also do.

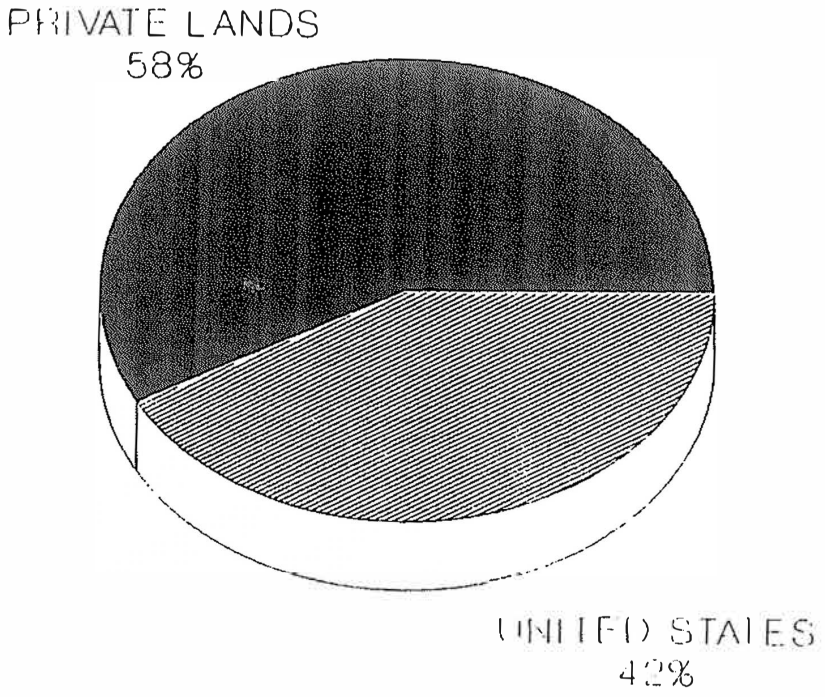
In the time of Kamahameha the Great a degree of permanent association of one-chiefly family with a parcel of land began (a type of permanent family-tenant family relationship), setting up an ownership pattern that was later recognized in a "Western legal way" in the Great Mahele. There were many tenant families on each parcel, of course. When the Great Mahele came along in 1848, during the rule of Kamehameha III, the descendants to these earlier landlords took Western-style legal titles.

LAND OWNERSHIP 1850
The Great Mahele



Values are approximations

LAND OWNERSHIP 1900
TERRITORY OF HAWAII



The Great Mahele divided the Kingdom of Hawaii into 1) Crown Lands (approximately 1 million acres), 2) Government Lands (approximately 1.5 million acres), 3) Konohiki Lands (approximately 1.6 million acres), and 4) Kuleana Lands (approximately 30,000 acres). The latter two categories would be considered lands in private ownership.

This pattern of ownership remained into the reign of Queen Liliuokalani. On January 17, 1893, Queen Liliuokalani was dethroned and the monarchy ended. A provisional government was formed and in 1894 the Republic of Hawaii was formed. In 1898 the provisional government was successful in getting the Republic of Hawaii annexed into the United States. Those lands which formerly were Crown Lands now became part of the Government Lands.

HAWAIIAN HOME LANDS

It is from these Government Lands (presently referred to as Public Lands) that the Hawaiian Home Lands Trust was carved.

In 1920, a delegation representing the Territory of Hawaii was sent to the United States Congress. One of the outcomes of that delegation's visit was the submittal of legislation to provide rural homesteads for Hawaiians. This led directly to the Hawaiian Home Commission Act of 1920, enacted on July 9, 1921. It was later adopted as part of the State under the Hawaii Constitution in 1959 when statehood was obtained. The Act of 1920 represented an attempt to rehabilitate the native Hawaiian people through a government sponsored homesteading program.

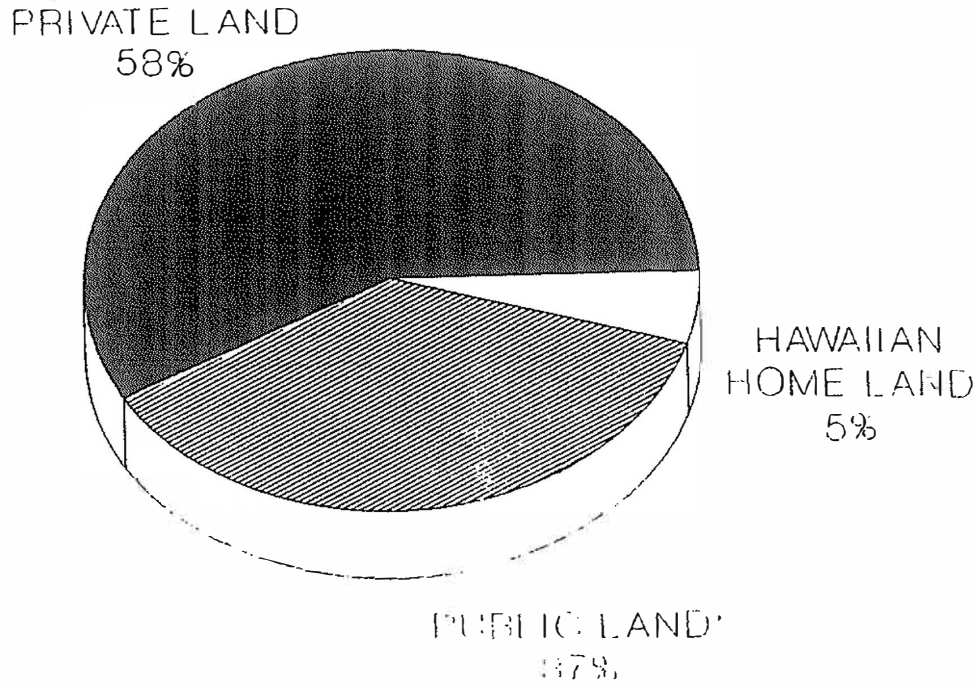
Presently the land base of the State of Hawaii is divided with approximately 62 percent in private ownership and the remaining 38 percent in some form of public control, either federal, state or county. Approximately 5 percent of the base (187,421 acres by current figures) are lands managed in trust through the Hawaiian Home Lands Commission within the Hawaii State Government.

Available Lands

The Hawaiian Homes Commission Act identified public lands throughout the Territory of Hawaii which were to be used for the purposes of the Act. These lands are referred to in the Act as "available lands."

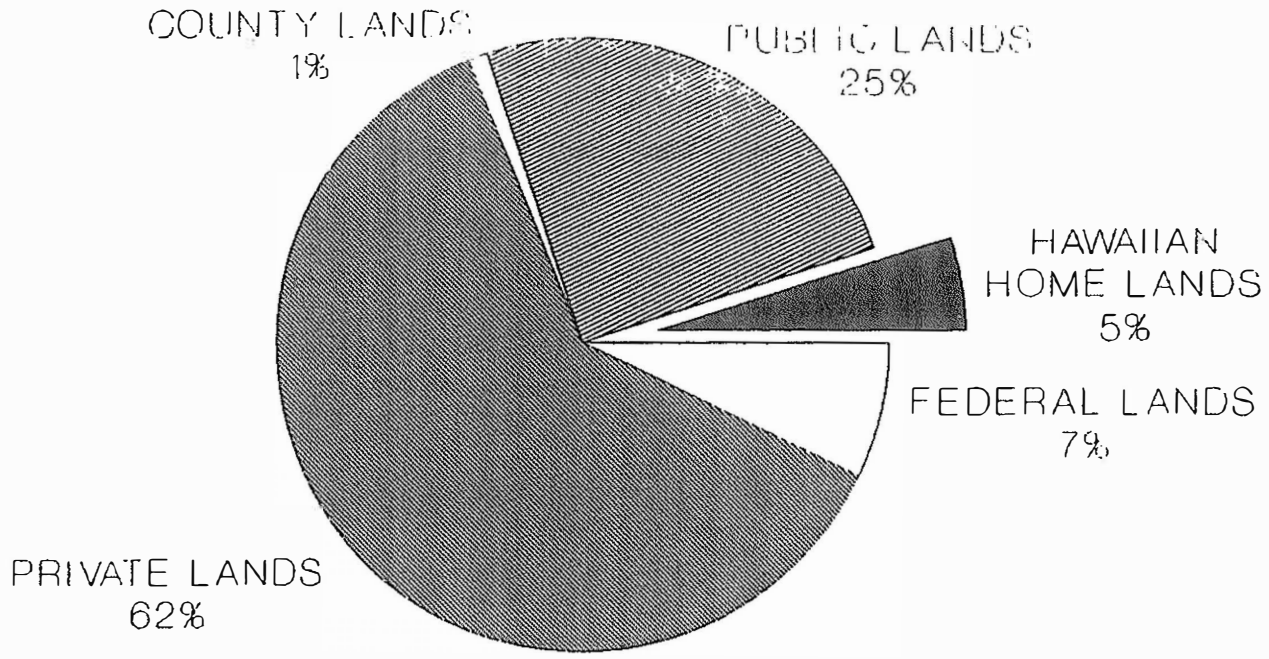
Only in the Act have these lands been identified. No known government survey or other cartographic materials were prepared prior to or immediately after the passage of the Act in 1921. Extensive searches for maps of these "available lands" have been undertaken both within the state and in Federal Records Centers and the National Archives in Washington D.C. The most recent efforts were undertaken prior to a field examination to assess estimates for surveying these lands in August, 1990, to no avail.

LAND OWNERSHIP 1920
Hawaiian Home Commission Act



*Public Land Represents State Lands

LAND OWNERSHIP 1990
STATE OF HAWAII



Hawaiian Home Lands = 187,421 acres

Physical Characteristics

The "available lands" inventory of the Hawaiian Home Lands trust currently includes thirty-four tracts of land on five major islands in the State of Hawaii. Together, these tracts encompass some 187,421 acres (see Table 1).

Congress used as its major boundary determinant for identifying "available lands" the traditional Hawaiian land system of "ahupua'a." They did not rely solely on ahupua'a boundaries, however, since there was a consensus that any homesteading program could not impact on the Territory's economic situation nor disrupt its existing settlement patterns. Therefore, Congress expressly excluded from the inventory "(a) all lands within any forest reservation, (b) all cultivated sugar-cane lands, (c) all public lands held under a certificate of occupation, homestead lease, right of purchase lease, or special homestead agreement" at the time of the Act's passage.

The thirty-four tracts of Hawaiian Home Lands in the State provide a full array of geographic landscapes from coastal beaches to mountain peaks and every variant in between.

HAWAIIAN HOME LAND SURVEYS

Many of the Hawaiian Home Land Tracts have been surveyed in the past, either specifically to identify the tract or as adjoining lands to some other parcel. The documents that describe these surveys are only plats, and are on file in the State Surveyor's Office. As a rule they do not clearly define what physical evidence exists (or existed at the time of the survey) or how the areas surveyed were actually determined. Although some of these surveys are recent (within the last 15 years), many date back 50 to 60 years.

Physical Evidence Defining Tracts

Nearly all of the tracts examined, with the exception of those that are residential in nature, are encompassed by some type of fence. The fences are either wooden post with strung wire or constructed with native stone, the predominant choice in areas where the tracts run through "a'a" lava flows. In some cases it is evident that older rock fences have deteriorated and newer fences constructed alongside the older ones. In addition certain angle breaks on various tracts, according to the plats of survey, were shown to have an "ahu" (rock cairn) identifying these locations. However, with the exception of one location, field examination of a number of these locations failed to recover any ahu.

The District Managers who provided tours of their individual districts are knowledgeable of the general locations of tract boundaries, but in many cases could not specifically state with certainty where the boundaries truly are.

Current surveying practice in the State of Hawaii appears to have no set standards for monumentation of property boundary corners. This was confirmed through conversations with the State Surveyor's Office. During the examination of numerous survey plats relating to the Hawaiian Home Lands not one corner was noted to be monumented with a modern day iron, steel or aluminum survey monument.

In the rural environment adjoiners currently seem to be content with recognizing fence lines as the demarcation of their property boundaries. In the more developed urban areas greater emphasis is placed on property corners and the boundary lines between properties. This is a natural progression when increasing settlement takes place in a limited land base. As greater numbers migrate into both these urban and rural surroundings stronger concerns will develop on knowing more precisely where property boundaries are truly located. Boundaries, eventually, will become critical and the extent of individual ownership will become a prime commodity to the possessor, whether in fee or trust. As a trustee, the trustor embodies a level of confidence to know and manage this land base as though they belonged to the trustee.

As a land manager the key to successful management is not only to know your land base extensively, but to make sure your neighbors are aware of where these lands are. This is especially true when the land base is as fractured and scattered as those within the Hawaiian Home Lands.

RECOMMENDATIONS

A. **Reviewing existing documents.**

1. All existing written original grants and/or deeds should be reviewed by a journeyman land surveyor who understands descriptions and can physically relate them to the ground. Journeyman land surveyors employed by the Bureau of Land Management have considerable expertise in this area and are skilled in performing large scale survey projects. However, it would require someone to provide interpretations where documents are written in the native Hawaiian language.

2. All surveying documents on file with the State Surveyor's Office should be acquired and reviewed for a comparison against original grants/deeds and to isolate any conflicts in descriptions and evidence.

B. Surveying exterior boundaries of tracts.

1. After, or coincidental with, the review of the grant/deed documents and other supporting records from the State Surveyor's Office, and those that might be in the possession of the Hawaiian Home Commission, a retracement of each tract's exterior boundaries should be performed to recover and document all physical evidence relating to the location of the tract boundaries.

2. Once decisions are reached on where the true boundaries of each tract are located the survey should be physically monumented with modern metallic survey type monuments. The Bureau of Land Management has conducted extensive tests on various monument materials and has prescribed standards to assure lasting monumentation.

   a) Monuments should be placed at each angle break on the exterior boundaries, except along water courses and sea shores.

   b) Distance between monuments on exterior boundaries should not exceed one mile. On extremely long legs this will require intermediate monumentation.

   c) Water courses and sea shores should be meandered to determine acreage, but only the beginning (or entry of the water course) and ending (exit) should be monumented. The shore or water course will represent the true boundary wherever this occurs.

   d) Off shore ownership of exposed rocks or small islets, should any exist, will be tied to a mainland, monumented corner position from a monumented point on the separate parcel and then fully described.

   e) It is recommended that a unique design be fashioned for the cap to adorn the top of each monument. This could relate to some heritage image that will provide easy recognition of the corners of these lands. (Similar to what the Navajo Indian Nation is doing on their reservation.)

3. It is suggested that all land based boundaries separating Hawaiian Home Lands from other public or private lands be posted with signs at no greater than 500 foot intervals, identifying entering of HHL.

C. **Surveying inholding within the HHL tracts.**

1. Certain tracts have inholdings which will have to be identified at some point in time. These are generally parcels that were excluded at the time the tracts were identified (e.g. sugarcane lands). See Overview Report on the Hawaiian Home Lands.

   a) These inholding were not evaluated during this examination as the HHL Commission, at this point in time, is only concerned with identifying the exterior boundaries of the tracts. To properly determine an estimate of cost for surveying within the tracts will require an in depth examination of the source grants/deeds and a much greater, detailed examination on the ground.

   b) It would be more logical and cost effective to examine these inholding during the retracement and surveying process.

2. To properly build a base layer for a Land Information System (LIS) eventually surveys should be performed for all individual divisions within each tract.

D. **Developing the base layer for a Land Information System (LIS)**

1. Satellite surveying technology is currently at a state where it would be ideal to either 1) place precise geographic coordinates at several locations on each tract so that relative coordinates can be computed for the entire boundaries, or 2) perform the entire survey with GPS receivers. Either method should provide a suitable framework to which a LIS can be correlated.

   a) Under present conditions the first (1) option would be the recommended approach. The satellite constellation for the Global Positioning System (GPS) is not fully deployed, and will not be for a number of years. The usable window for the limited satellite configuration does not provide 24 hour coverage, and the window at certain times of the year occurs only during darkness.

   b) If the satellite constellation was increased to provide usable coverage for large portions of the daylight period on every day, and the Defense Department decided to continue <u>not</u> to degrade the signals with selective availability, it could be logical and cost beneficial to perform the surveys with satellite receivers.

   c) A set of three satellite receivers (the minimum for adequate relative positioning) presently cost $60,000 to $75,000 for survey grade instruments ($20-$25,000/unit). These 3 units would supply the necessary equipment for a one crew operation. Each additional crew that would be working simultaneously would require two additional receivers.

2. The Cadastral Surveying service within the Bureau of Land Management has been effectively utilizing satellite positioning receivers for nearly 15 years and has broad knowledge and experience in this area. Personnel from the BLM could provide the expertise necessary to make this aspect operational.

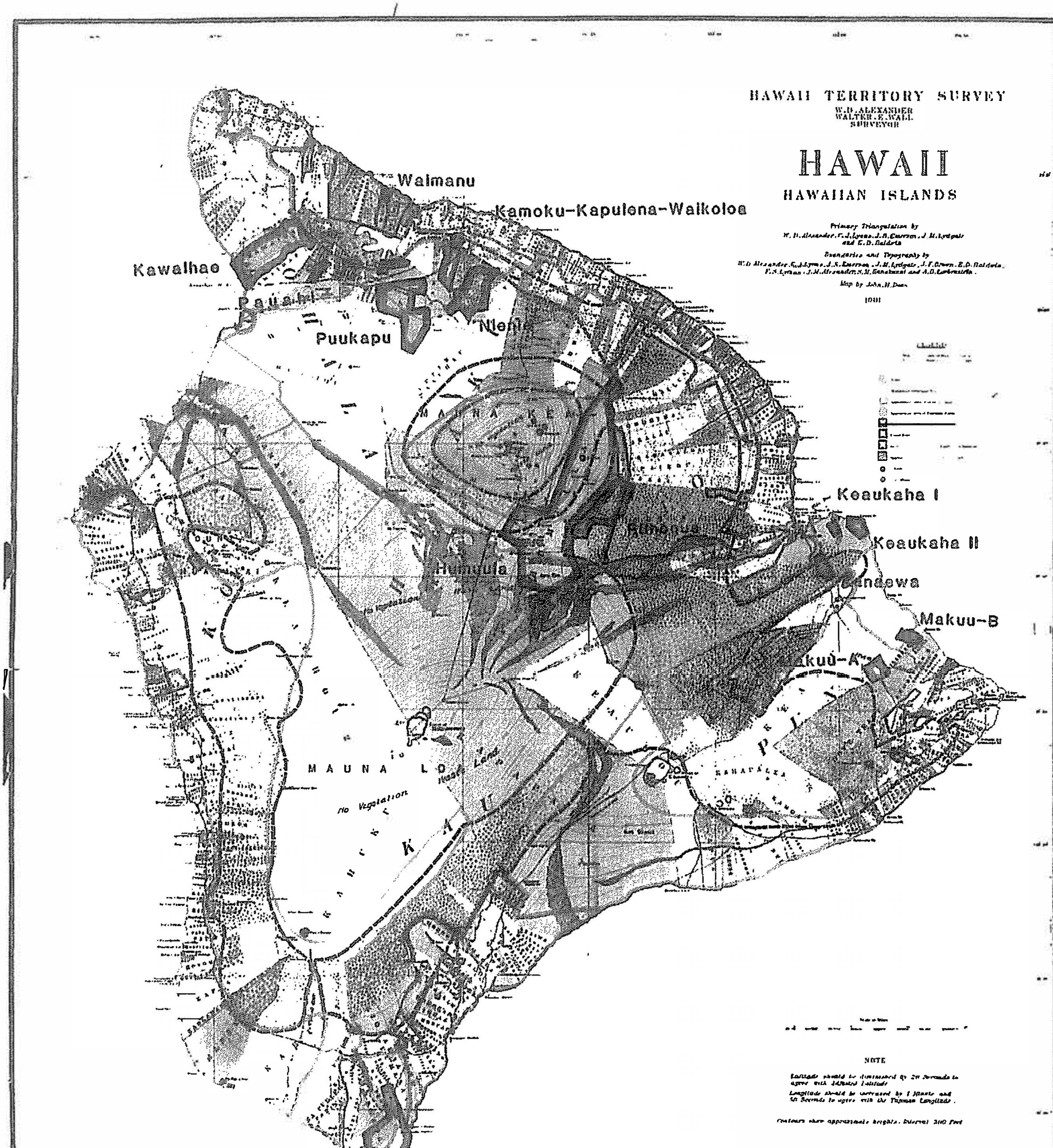
E. **Records preservation and maintenance.**

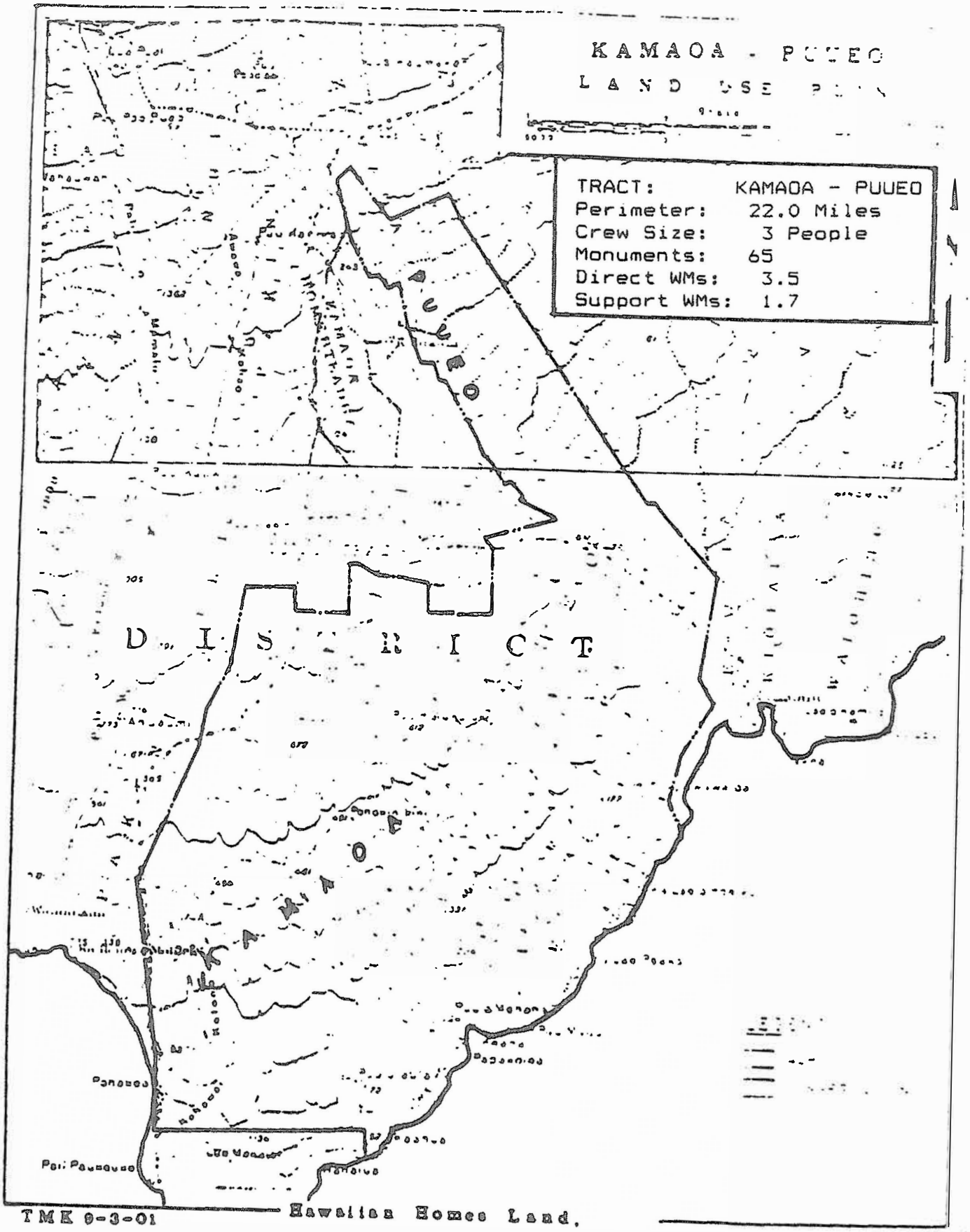
1. As surveys are performed a base set of records will be compiled through the gathering of existing records and creation of new documents. It is recommended that the Hawaiian Home Commission utilize the survey base as a control layer to correlate all land dispositions to. This would provide similarity to the way the Bureau of Land Management references all of their land records and would be a beginning process to establishing a Land Information System (LIS).

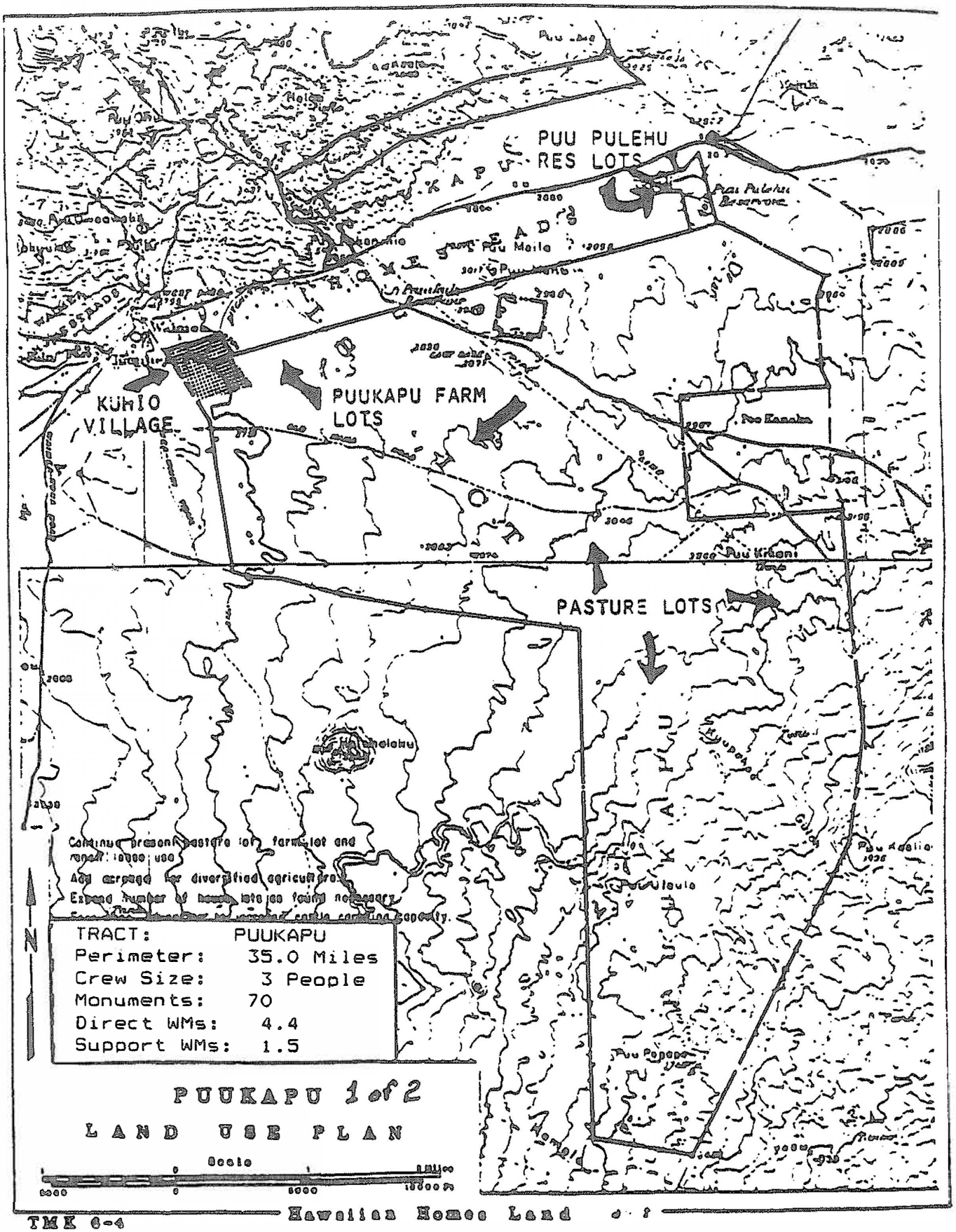
2. The BLM has nearly two hundred years of experience in managing title documents, they are becoming leaders in the field of automating this information and could provide expertise in building and managing this type of operation.

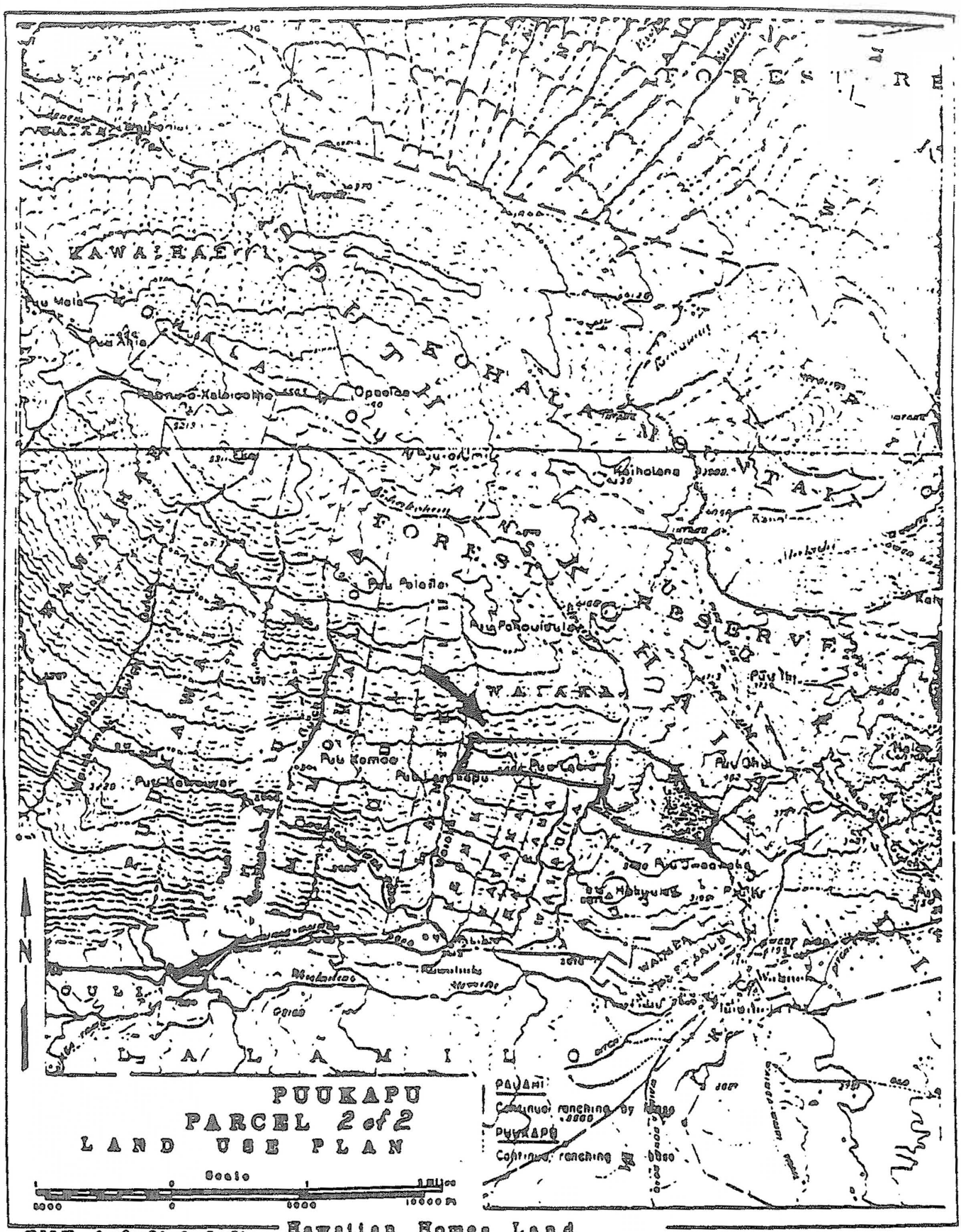
ISLAND OF HAWAII - SURVEY WORKMONTH ESTIMATES

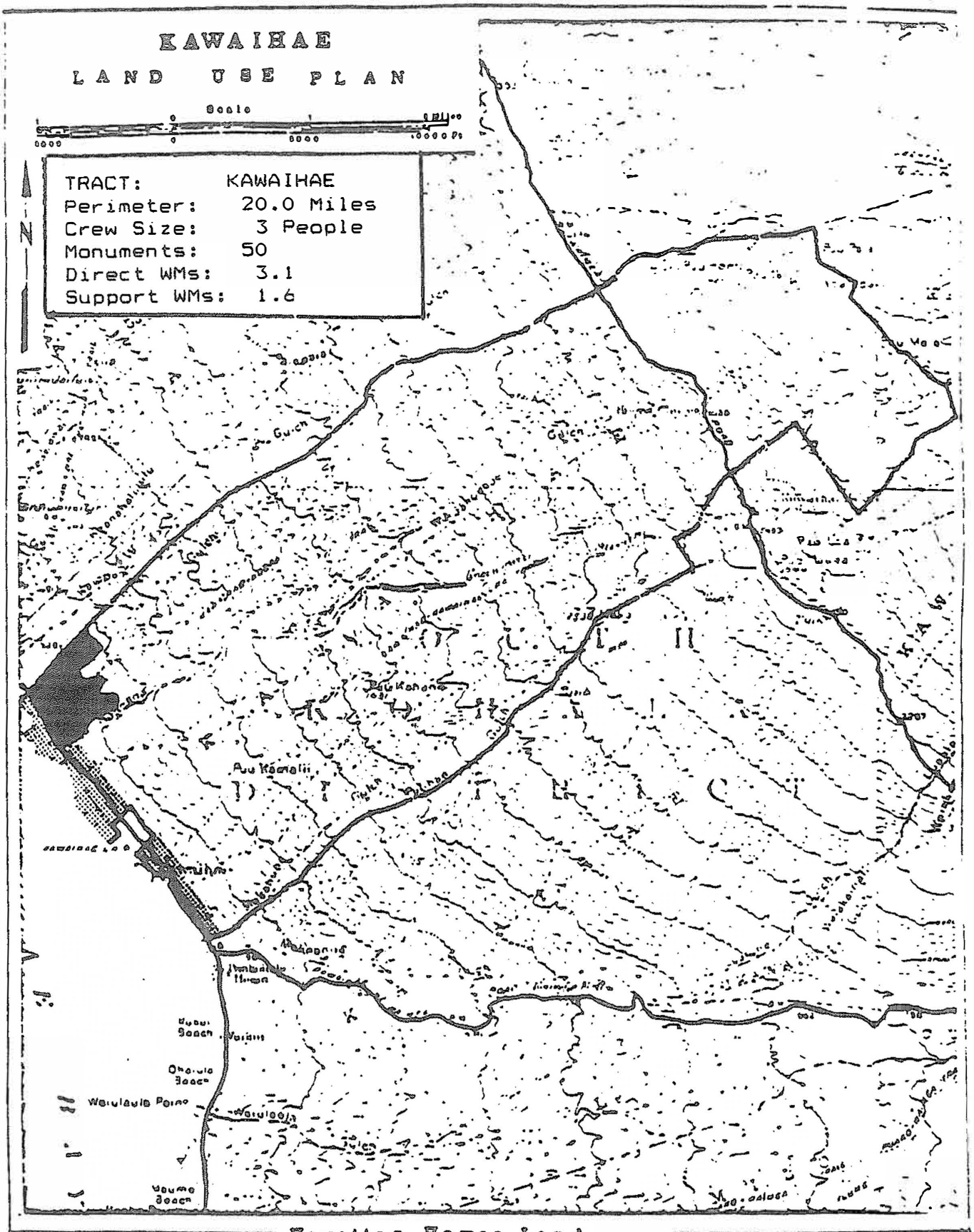
TRACT	Tract Type	Perimeter In Miles	Monuments Needed	Crew Size	Miles /Day	Monuments /Day	Person Days	Field Work Mos	Support Work Mos
Kamaoa - Puueo	Rural	22.0	65.0	3.0	2.5	4.0	75.2	3.5	1.7
Puukapu	Rural	35.0	70.0	3.0	2.5	4.0	94.5	4.4	1.5
Kawaihae	Rural/Urban	20.0	50.0	3.0	2.0	4.0	67.5	3.1	1.6
Paushi	Rural	7.5	30.0	3.0	2.0	5.0	29.3	1.4	1.0
Kamoku-Kapulena-Waikoloa	Rural	20.0	60.0	3.0	2.0	5.0	66.0	3.0	1.6
Waimanu	Jungle	6.4	50.0	4.0	0.2	3.0	194.7	9.0	3.6
Nienie	Rural	18.0	50.0	3.0	2.0	5.0	57.0	2.6	1.4
Humuula	Rural	53.0	90.0	3.0	2.0	4.0	147.0	6.8	2.9
Panaewa	Urban	11.0	25.0	3.0	1.0	2.2	67.1	3.1	1.6
Keaukaha I	Urban/Resid	4.0	12.0	3.0	1.0	3.0	24.0	1.1	0.9
Keaukaha II	Urban/Resid	8.0	25.0	3.0	0.5	3.0	73.0	3.4	1.7
Piihonua	Rural	15.0	40.0	4.0	1.0	3.0	113.3	5.2	2.3
Makuu - A	Urban/Resid	7.0	13.0	4.0	0.8	3.0	52.3	2.4	1.3
Makuu - B	Urban/Resid	5.0	15.0	4.0	0.8	3.0	45.0	2.1	1.2
TOTALS		231.9	595.0	46.0	20.3	51.2	1105.8	51.0	24.3


HAWAII TERRITORY SURVEY
W. D. ALEXANDER
WALTER E. WALL
SURVEYOR
HAWAII
HAWAIIAN ISLANDS
Primary Triangulation by
Boundaries and Topography by
NOTE
Waimanu
Kamoku-Kapulena-Waikoloa
Kawaihae
Puukapu
Nienie
Keaukaha I
Keaukaha II
Humuula
Makuu-B
MAUNA LOA
No Vegetation
Kamaoa-Puueo

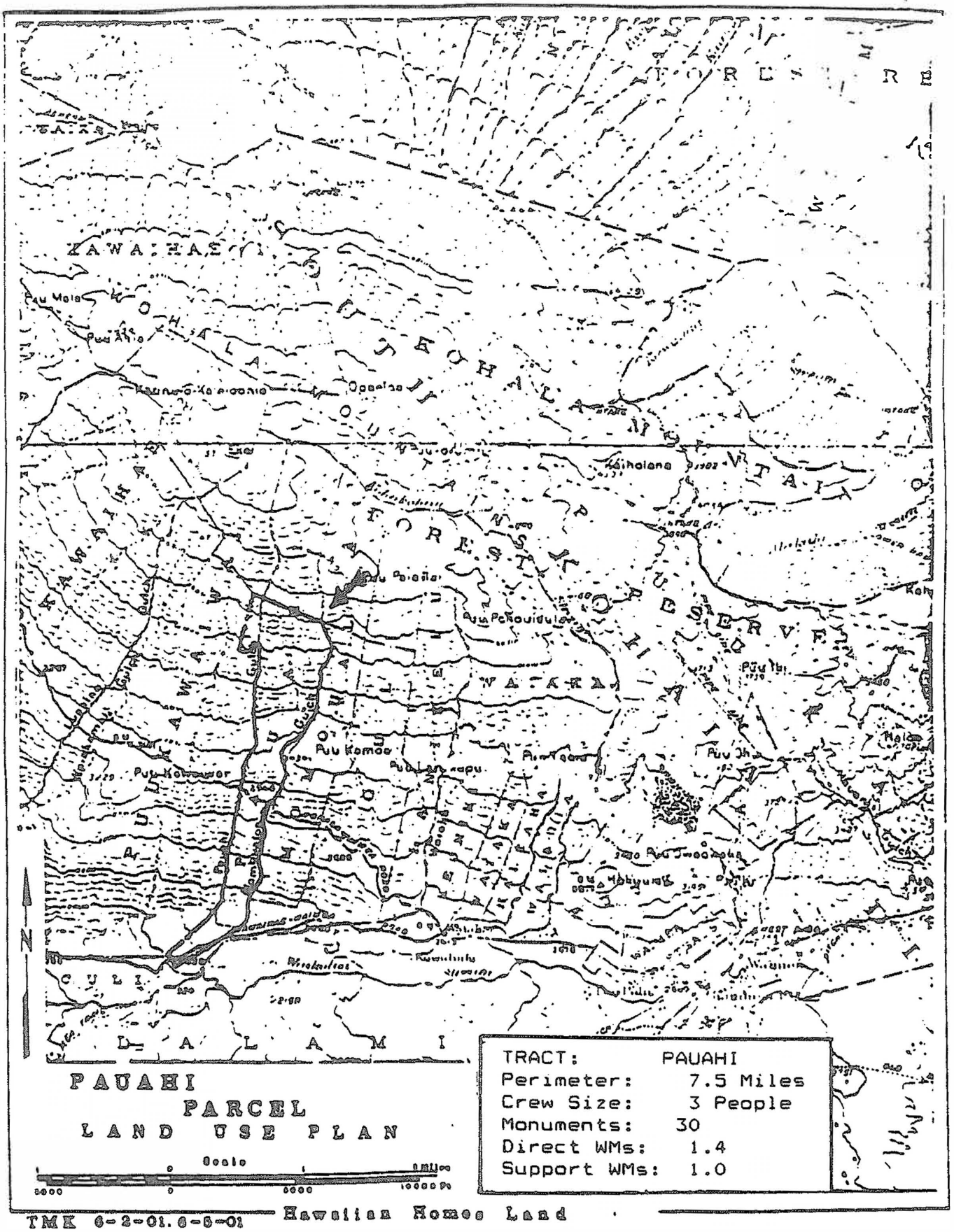

KAMAOA - PUUEO
LAND USE PLAN
TRACT: KAMAOA - PUUEO
Perimeter: 22.0 Miles
Crew Size: 3 People
Monuments: 65
Direct WMs: 3.5
Support WMs: 1.7
DISTRICT
Hawaiian Homes Land.
TMK 9-3-01

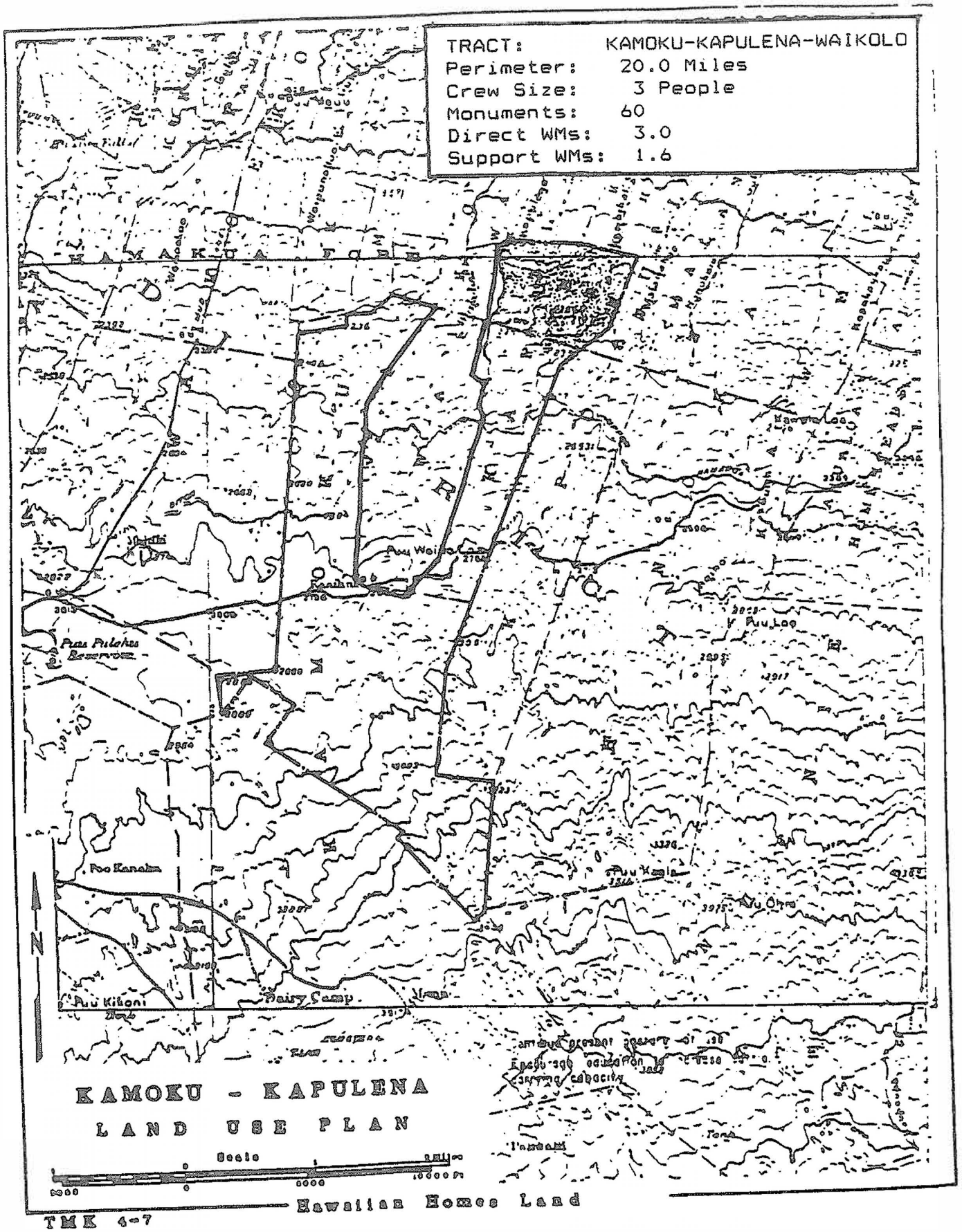

PUU PULEHU
RES LOTS
KAPUA
HOMESTEADS
KUHIO
VILLAGE
PUUKAPU FARM
LOTS
PASTURE LOTS
Puu Maila
Puu Kiaoni
Puu Pulehu
Reservoir
Puu Popoo
Puu Adelia
Puu Iaula
Hale Pulehu
Continue present pasture for farm lot and
ranch lease use
Add cropped for diversified agriculture
Expand number of house lots as found necessary
TRACT: PUUKAPU
Perimeter: 35.0 Miles
Crew Size: 3 People
Monuments: 70
Direct WMs: 4.4
Support WMs: 1.5
N
PUUKAPU 1 of 2
LAND USE PLAN
Scale
Hawaiian Homes Land
TMK 6-4

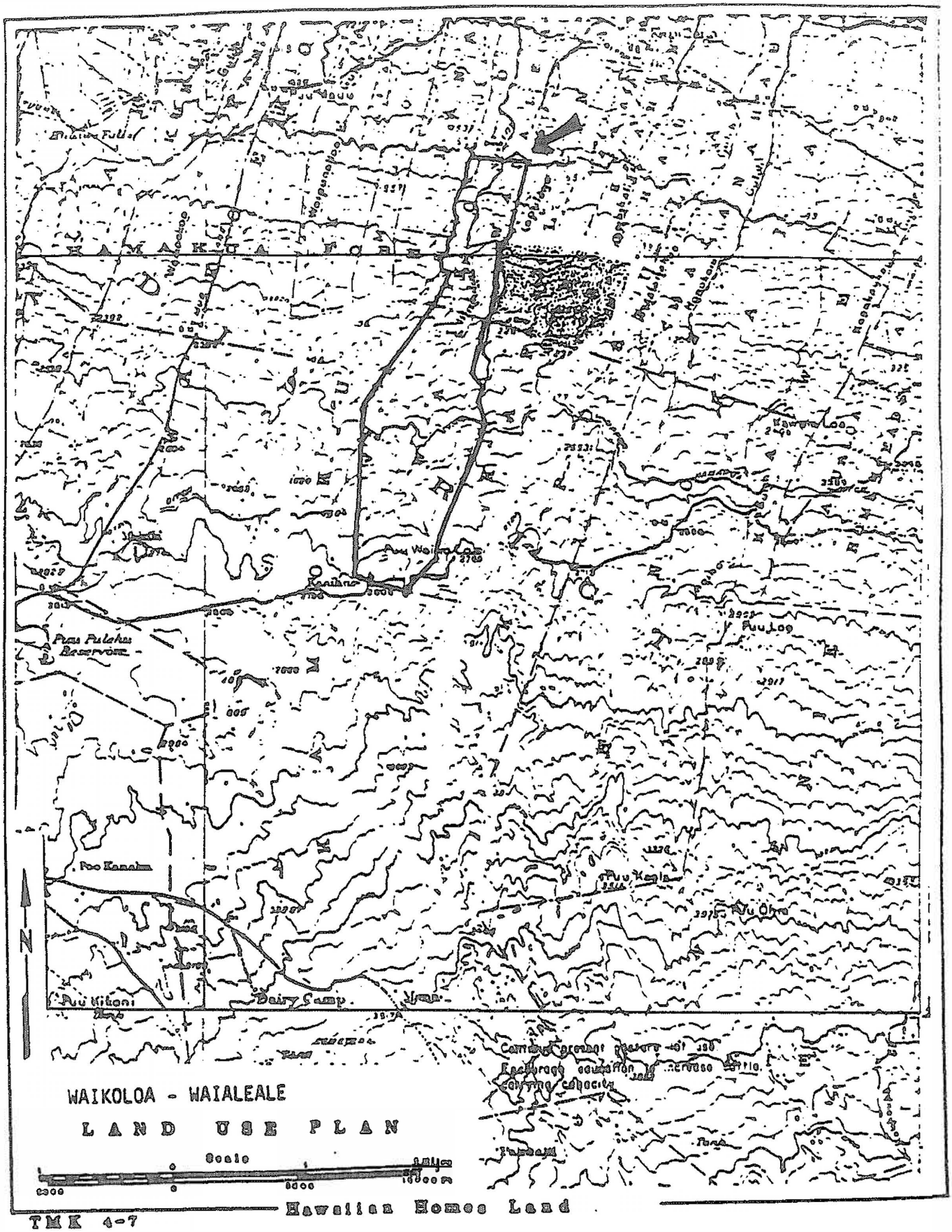

KAWAIHAE
Pu Mala
Pu Kala
Opaeoa
Kaiholena
Pu Pakaulaula
Pu Komoa
Pu Kapapu
Pu Kalaemilo
Pu Ohu
Pu Ohia
WAIMEA
KAMUELA
PUUKAPU
PARCEL 2 of 2
LAND USE PLAN
Scale
PUUAMI
Continued ranching by
PUUKAPU
Continued ranching
TMK 6-3-01, 6-5-01
Hawaiian Homes Land

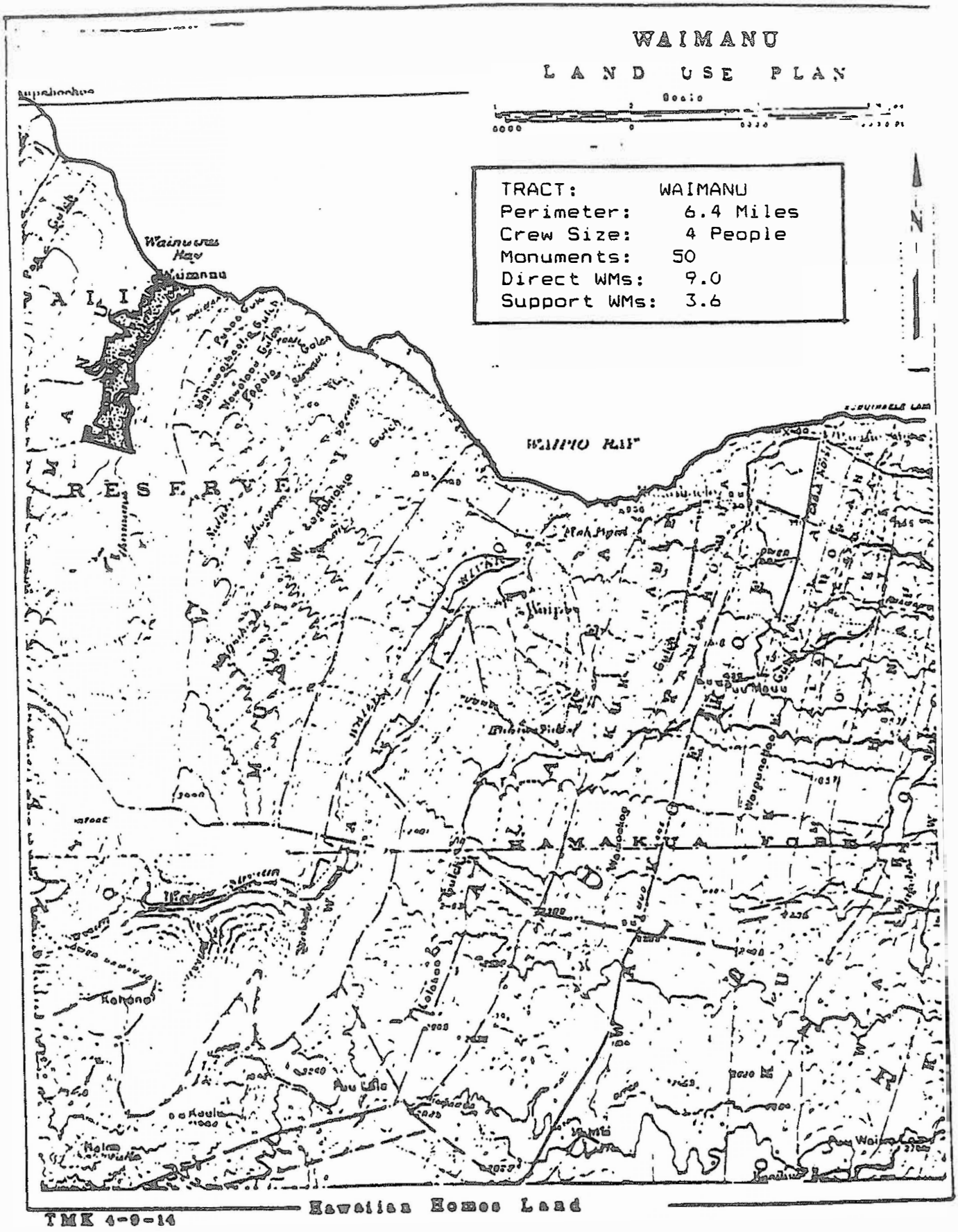

KAWAIHAE
LAND USE PLAN
Scale
TRACT: KAWAIHAE
Perimeter: 20.0 Miles
Crew Size: 3 People
Monuments: 50
Direct WMs: 3.1
Support WMs: 1.6
N
Auwaiolimu
Waiulaula Point
Waiulaula
Hawaiian Homes Land.

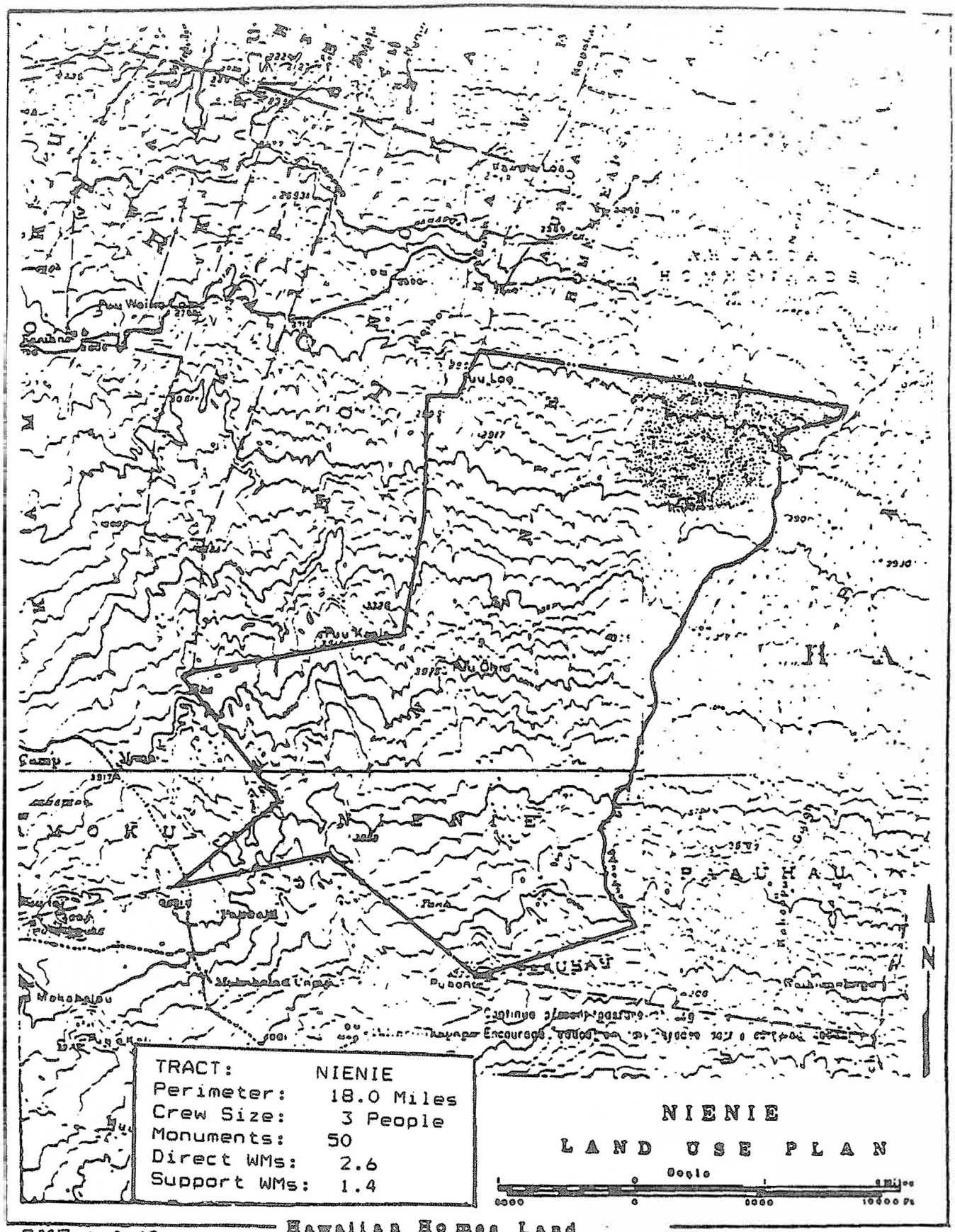
TMK 6-1

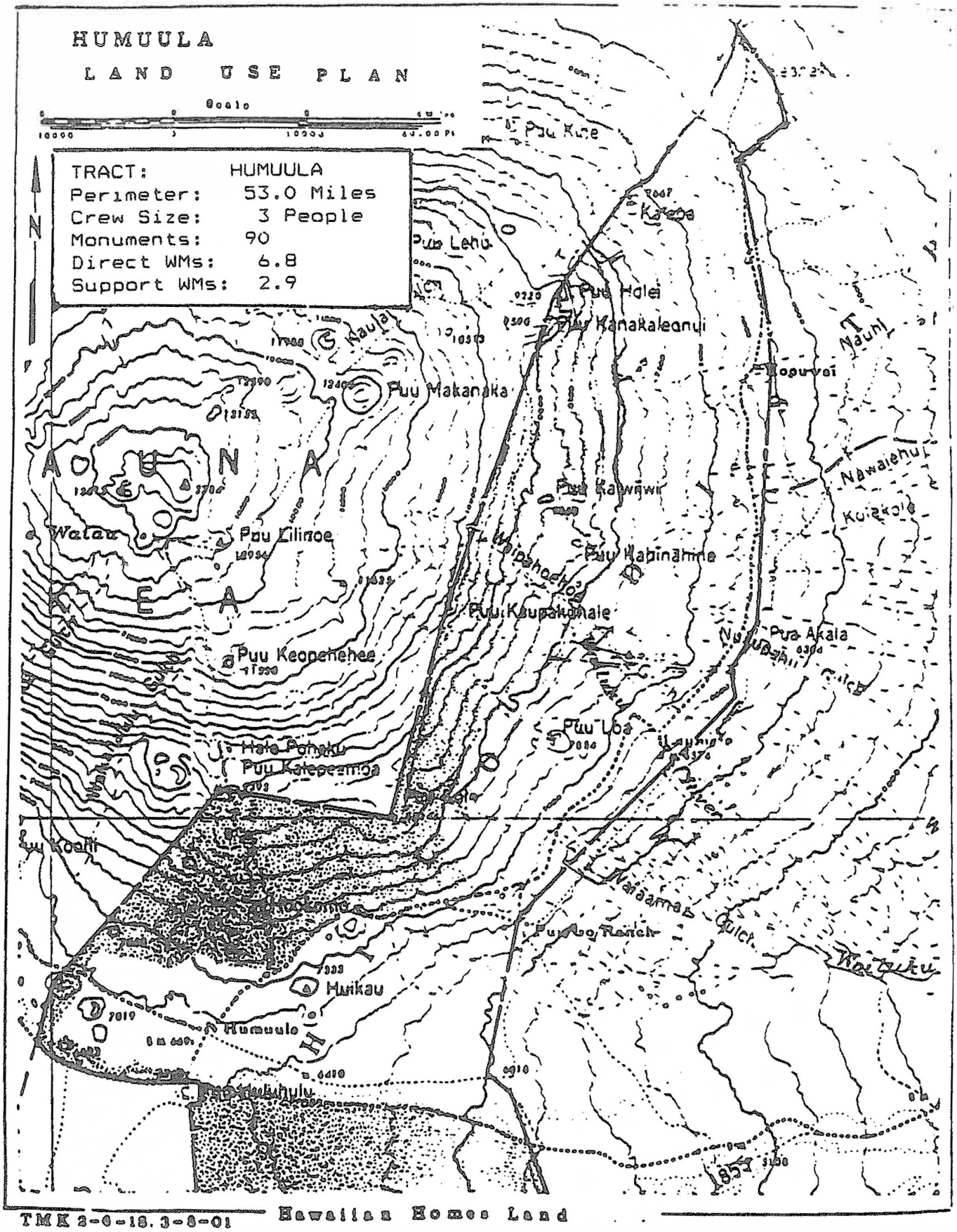

PAUAHI
PARCEL
LAND USE PLAN
Scale
TRACT: PAUAHI
Perimeter: 7.5 Miles
Crew Size: 3 People
Monuments: 30
Direct WMs: 1.4
Support WMs: 1.0
TMK 6-2-01.6-5-01
Hawaiian Homes Land

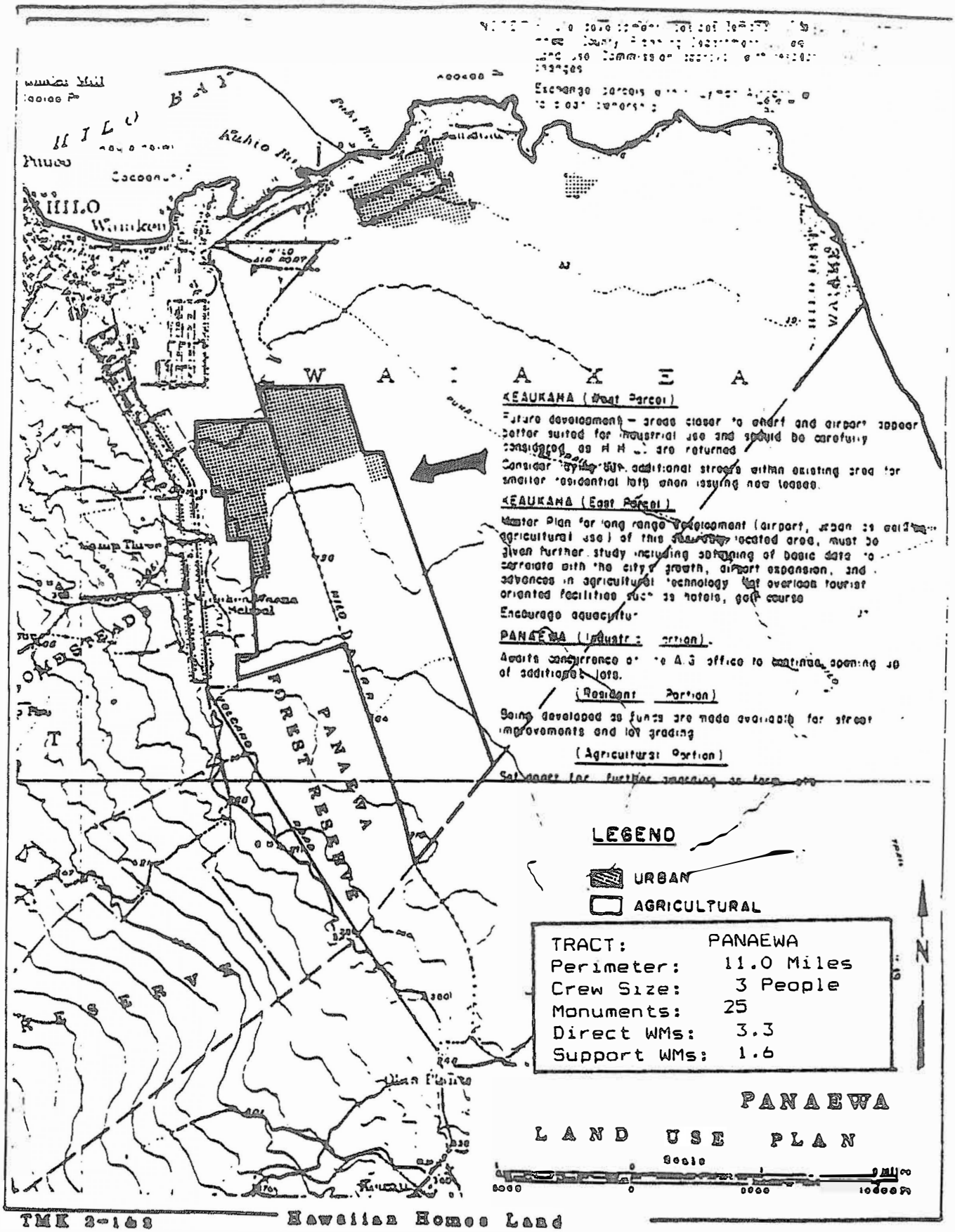

TRACT: KAMOKU-KAPULENA-WAIKOLO
Perimeter: 20.0 Miles
Crew Size: 3 People
Monuments: 60
Direct WMs: 3.0
Support WMs: 1.6
KAMAKUA FOREST
Puu Pulehu Reservoir
Puu Kanaka
Puu Kiloni
Dairy Camp
Puu Kala
Puu Ohia
N
KAMOKU - KAPULENA
LAND USE PLAN
Hawaiian Homes Land
TMK 4-7

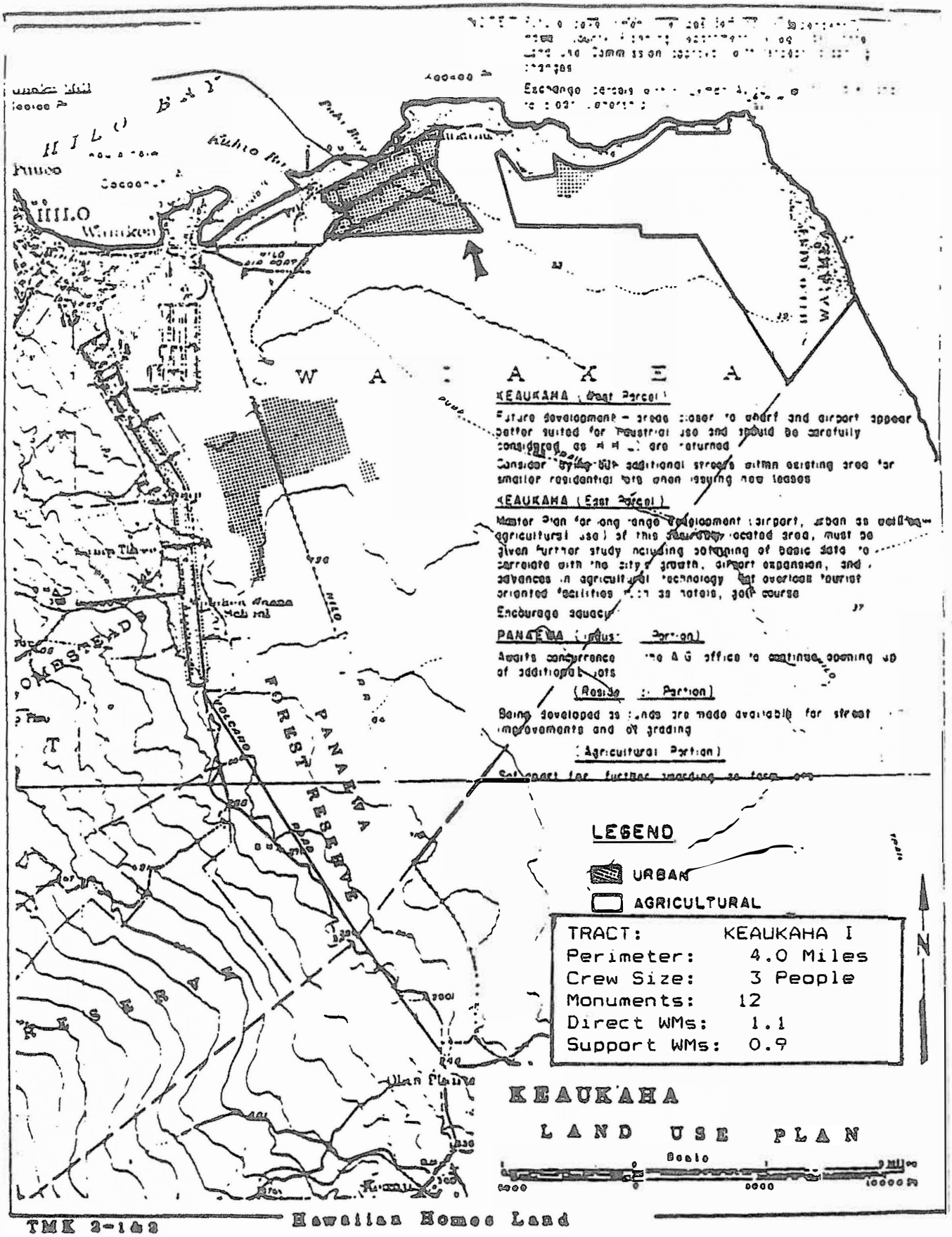

WAIKOLOA - WAIALEALE
LAND USE PLAN
Scale
Hawaiian Homes Land
TMK 4-7

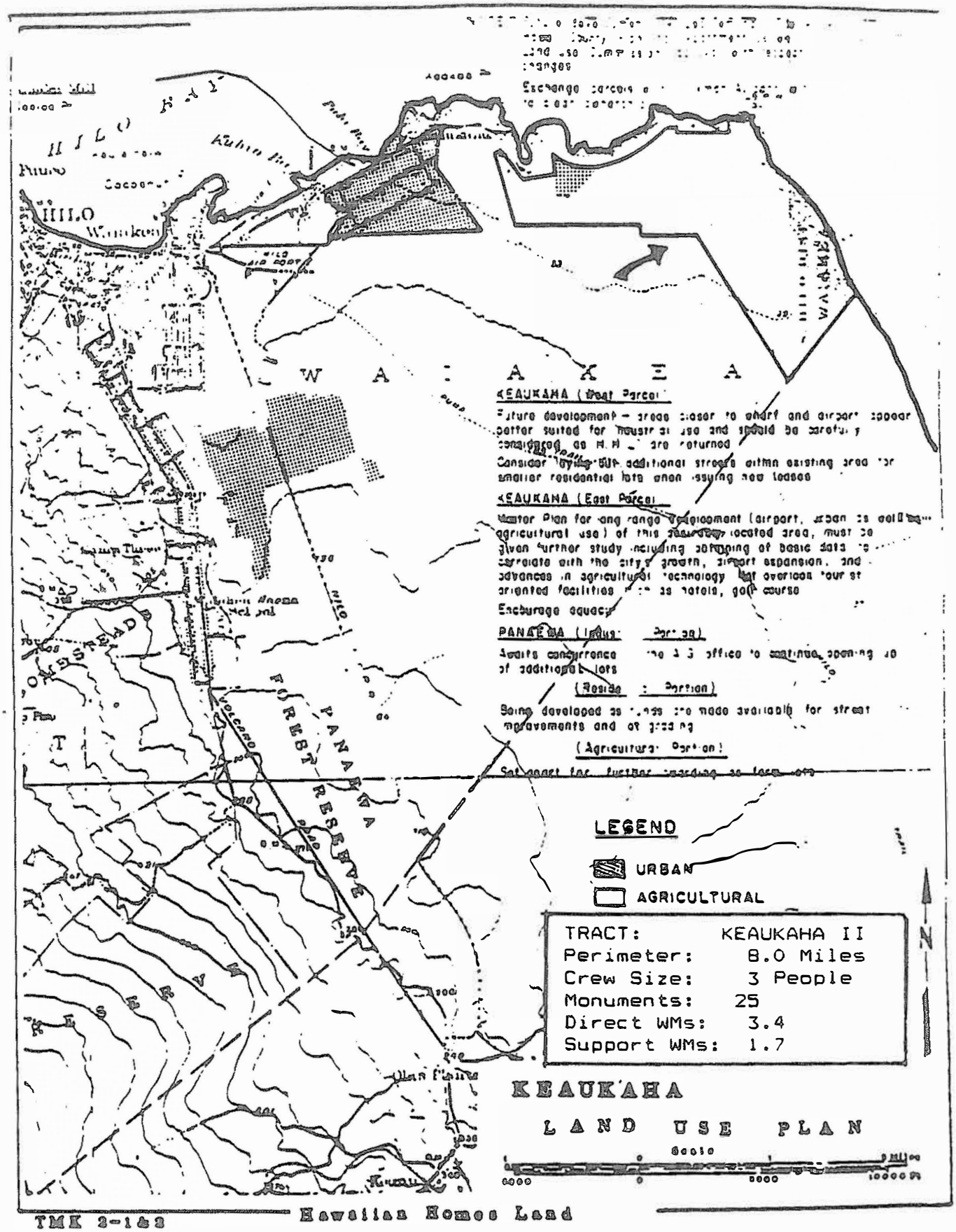

WAIMANU
LAND USE PLAN
TRACT: WAIMANU
Perimeter: 6.4 Miles
Crew Size: 4 People
Monuments: 50
Direct WMs: 9.0
Support WMs: 3.6
N
Waimanu Bay
Waimanu
PAILI
RESERVE
WAIMEA
KAMAKUA
Kahana
Hawaiian Homes Land
TMK 4-9-14

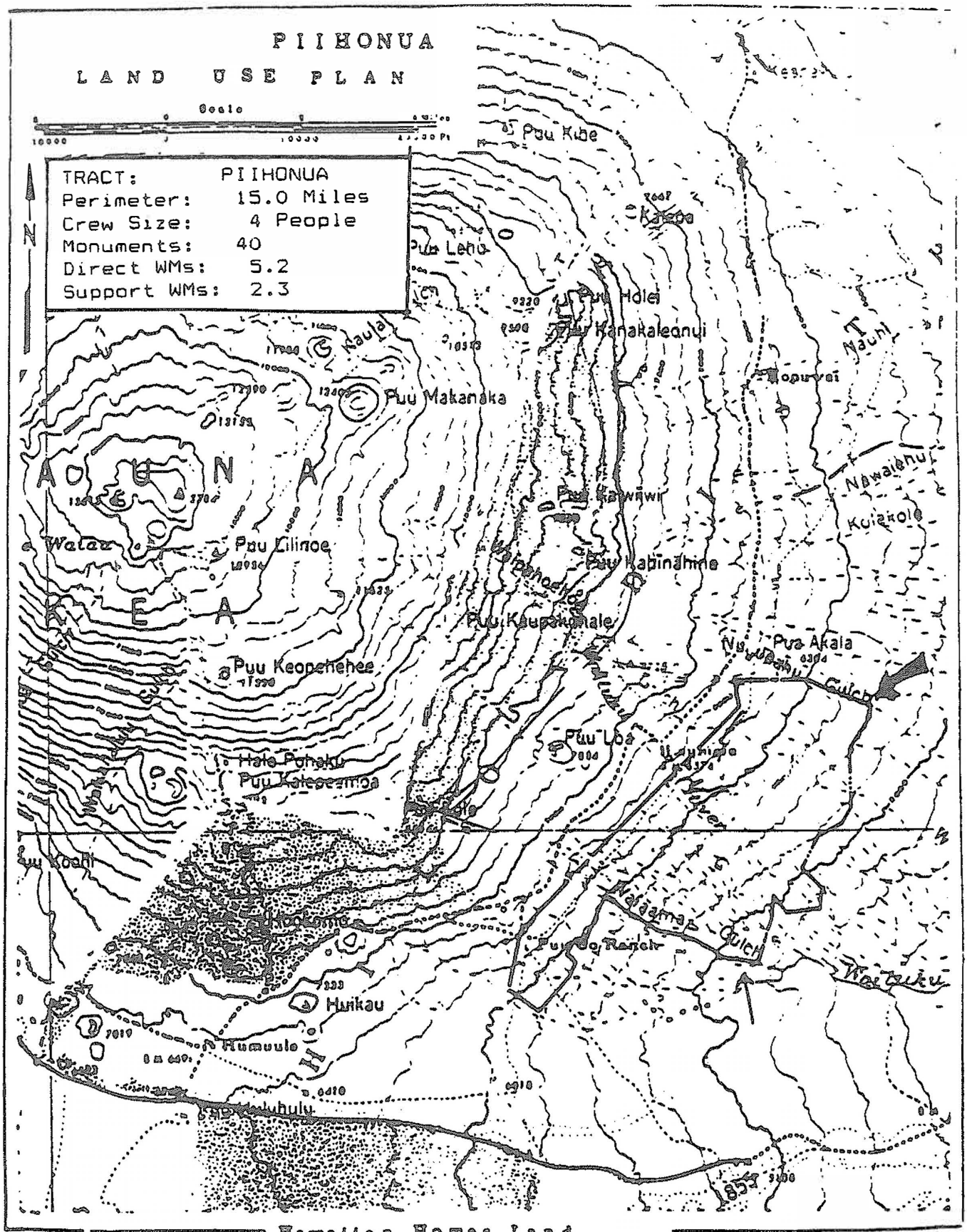

TRACT: NIENIE
Perimeter: 18.0 Miles
Crew Size: 3 People
Monuments: 50
Direct WMs: 2.6
Support WMs: 1.4
NIENIE
LAND USE PLAN
N
Hawaiian Homes Land
TMK 4-6-12


HUMUULA
LAND USE PLAN
TRACT: HUMUULA
Perimeter: 53.0 Miles
Crew Size: 3 People
Monuments: 90
Direct WMs: 6.8
Support WMs: 2.9
N
Puu Kue
Puu Lehu
Puu Holei
Puu Kanakaleanui
Kaulai
Puu Makanaka
Puu Kawiwi
Puu Lilinoe
Puu Kapinahine
Puu Kaupakuhale
Puu Keapenehee
Puu Akala
Puu Loa
Hale Pohaku
Puu Kalepeamoa
Hurikau
Humuulo
Puu Ao Ranch
Kaluuku
Nawaiehu
Kuiakole
Topuwai
Nauhi
TMK 2-6-18.3-8-01
Hawaiian Homes Land


HILO BAY
HILO
WAIAKEA
KEAUKAHA (West Parcel)
Future development - areas closer to airport and airport appear better suited for industrial use and should be carefully considered as HHC lands are returned
Consider opening additional streets within existing area for smaller residential lots when issuing new leases.
KEAUKAHA (East Parcel)
Master Plan for long range development (airport, urban to agricultural use) of this seaward located area, must be given further study including obtaining of basic data to correlate with the city's growth, airport expansion, and advances in agricultural technology for overseas tourist oriented facilities such as hotels, golf course
Encourage aquaculture
PANAEWA (Industrial portion)
Awaits concurrence of the A.G. office to continue opening up of additional lots.
(Residential Portion)
Being developed as funds are made available for street improvements and lot grading
(Agricultural Portion)
Set aside for further planning as long
HOMESTEAD
FOREST RESERVE
PANAEWA
LEGEND
URBAN
AGRICULTURAL
TRACT: PANAEWA
Perimeter: 11.0 Miles
Crew Size: 3 People
Monuments: 25
Direct WMs: 3.3
Support WMs: 1.6
N
PANAEWA
LAND USE PLAN
Scale
TMK 2-1-68
Hawaiian Homes Land

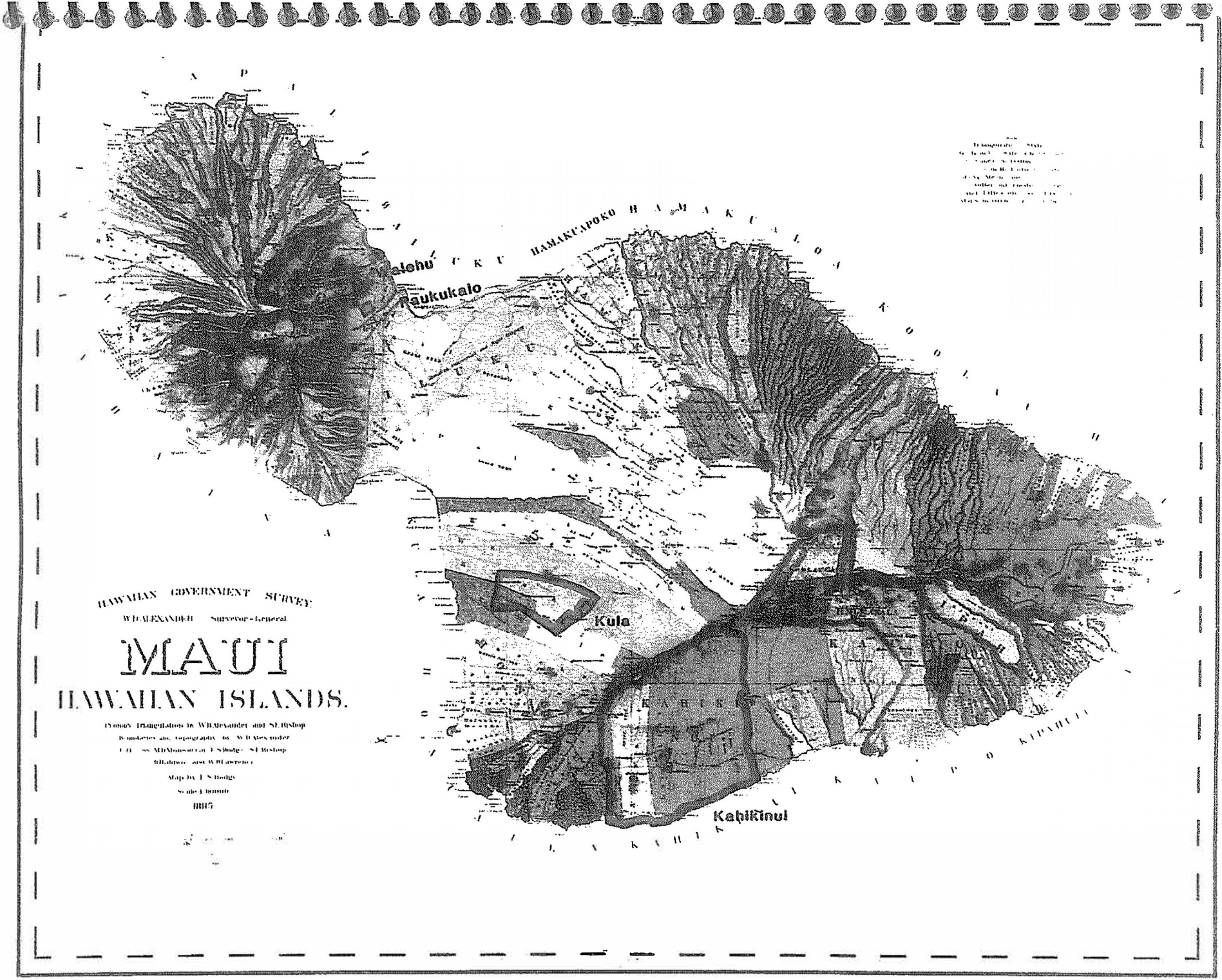

W A I A K E A
KEAUKAHA (East Parcel)
KEAUKAHA (East Parcel)
PANAEWA (Plus: Portion)
(Residential Portion)
(Agricultural Portion)
LEGEND
URBAN
AGRICULTURAL
TRACT: KEAUKAHA I
Perimeter: 4.0 Miles
Crew Size: 3 People
Monuments: 12
Direct WMs: 1.1
Support WMs: 0.9
N
KEAUKAHA
LAND USE PLAN
Scale
TMK 2-1-03
Hawaiian Homes Land

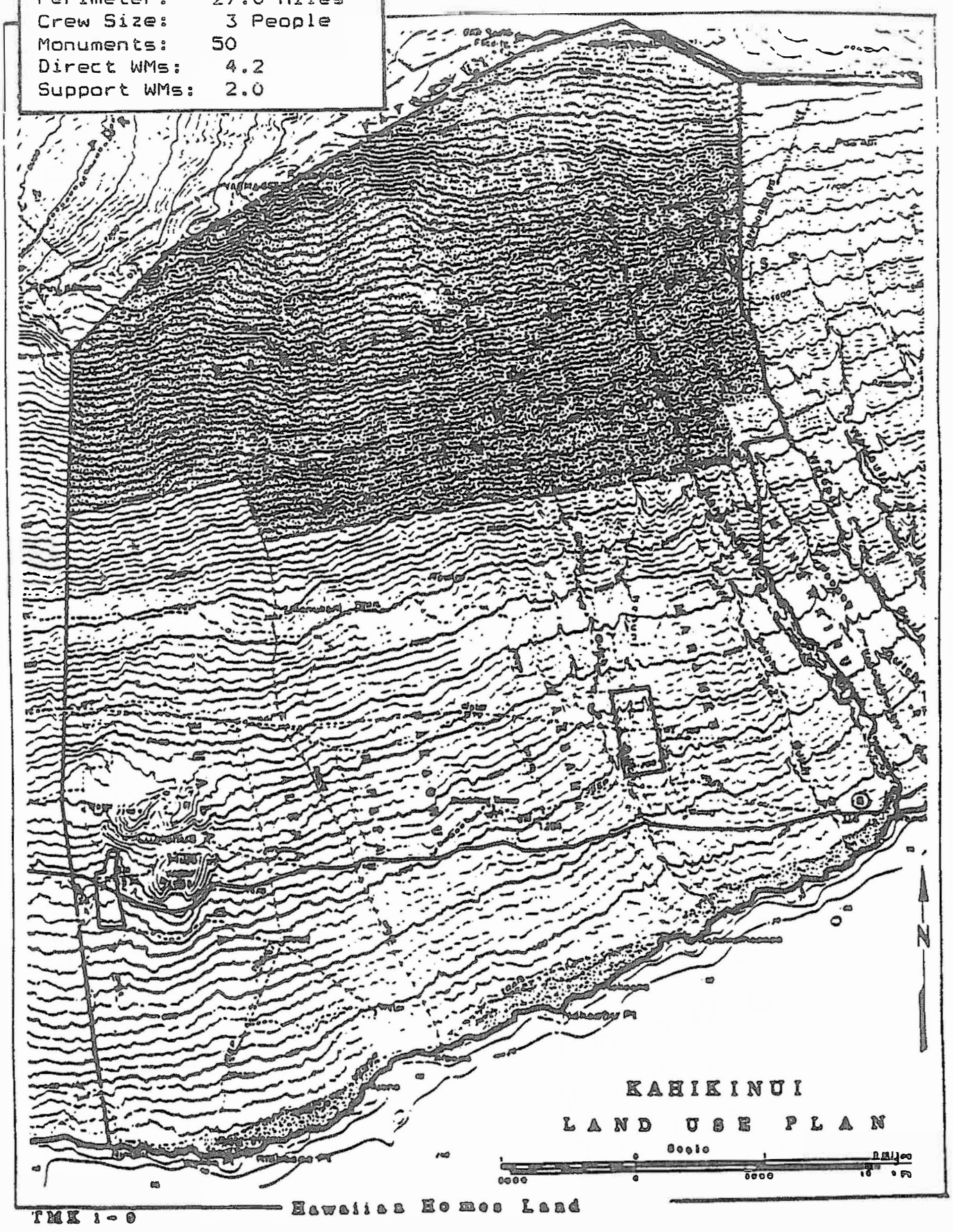

HILO
WAIAKEA
KEAUKAHA (East Parcel)
Future development - areas closer to airport appear better suited for industrial use and should be carefully considered as H.H.L. are returned
Consider layout for additional streets within existing area for smaller residential lots when issuing new leases
KEAUKAHA (East Parcel)
Master Plan for long range development (airport, urban vs agricultural use) of this seaward located area, must be given further study including gathering of basic data to correlate with the city's growth, airport expansion, and advances in agricultural technology for overseas tour oriented facilities such as hotels, golf course
Encourage aquaculture
PANAEWA (Hawaiian Portion)
Awaits concurrence of the H.H.L. office to continue opening of additional lots
(Residential Portion)
Some developed as lots are made available for street improvements and of grading
(Agricultural Portion)
Set aside for further leasing as long as
FOREST RESERVE
PANAEWA
LEGEND
URBAN
AGRICULTURAL
TRACT: KEAUKAHA II
Perimeter: 8.0 Miles
Crew Size: 3 People
Monuments: 25
Direct WMs: 3.4
Support WMs: 1.7
N
KEAUKAHA
LAND USE PLAN
Scale
TMK 2-1-12
Hawaiian Homes Land

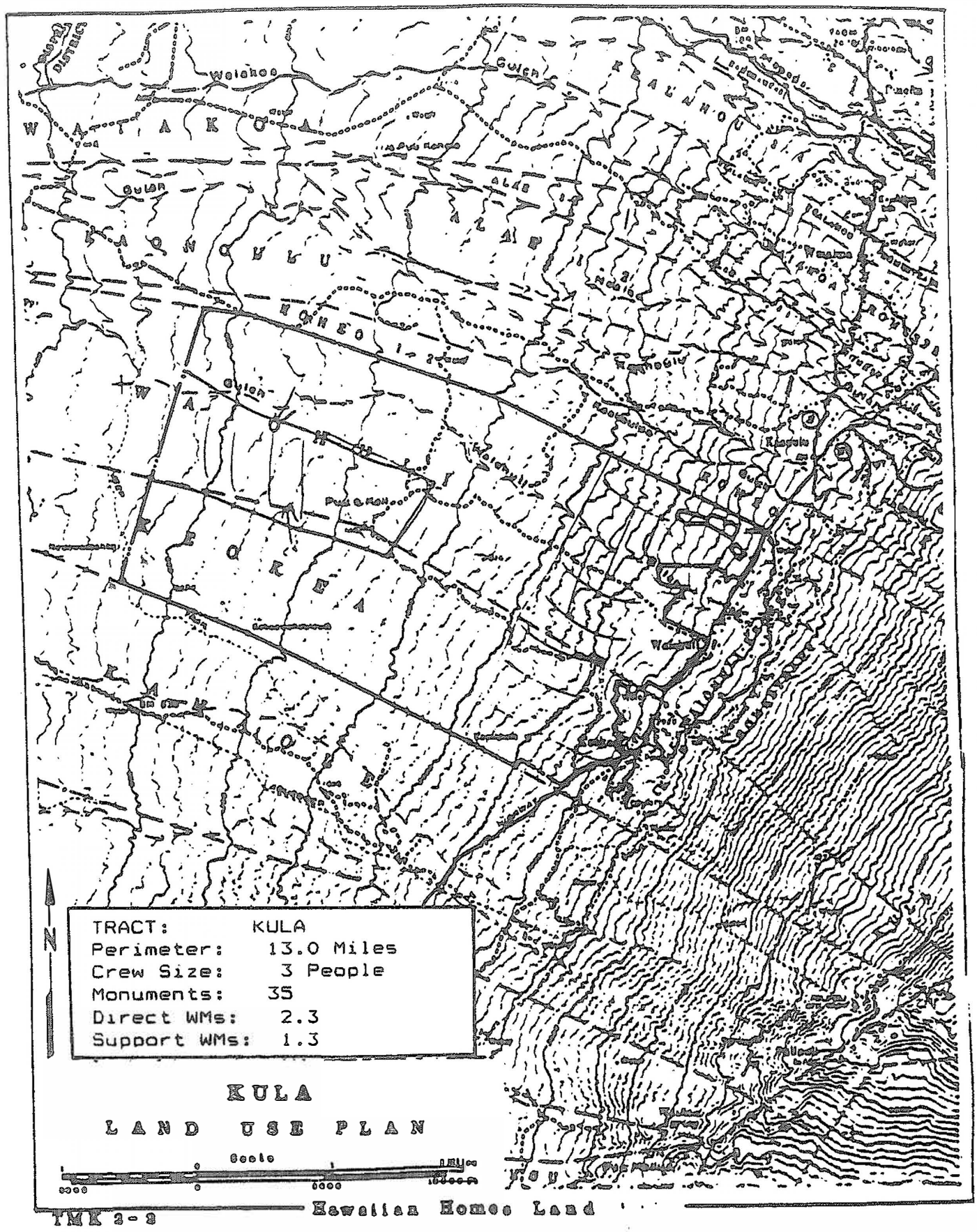

PIIHONUA
LAND USE PLAN
TRACT: PIIHONUA
Perimeter: 15.0 Miles
Crew Size: 4 People
Monuments: 40
Direct WMs: 5.2
Support WMs: 2.3
N
Puu Kobe
Puu Lehu
Puu Holei
Kanakaleonui
Kaula
Puu Makanaka
Puu Kalwiwi
Puu Lilinoe
Puu Kalainahine
Puu Kaupakuhale
Puu Keopeheheo
Puu Akala
Puu Loa
Hale Pohaku
Puu Kalepeamoa
Puu Koahi
Hunkau
Humuula
Kuhuhulu
Hawaiian Homes Land
TMK 3-6-18.3-8-01

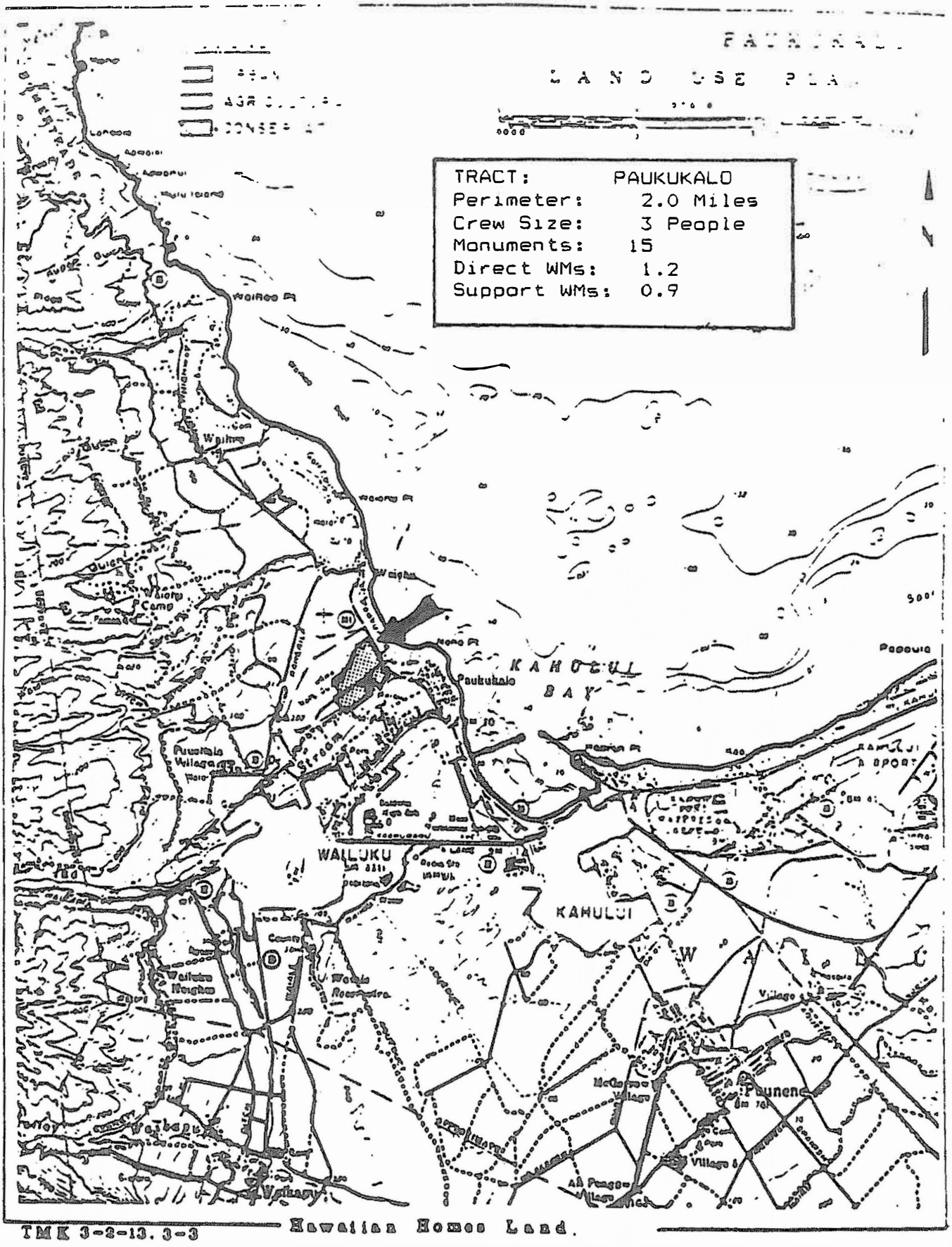
ISLAND OF MAUI - SURVEY WORKMONTH ESTIMATES

TRACT	Tract Type	Perimeter In Miles	Monuments Needed	Crew Size	Miles /Day	Monuments /Day	Person Days	Field Work Mos	Support Work Mos
Kahikinui	Rural	27.0	50.0	3.0	2.0	3.0	90.5	4.2	2.0
Kula	Rural	13.0	35.0	3.0	2.5	3.0	50.6	2.3	1.3
Paukukalo	Urban/Resid	2.0	15.0	3.0	0.5	3.0	27.0	1.2	0.9
Waiehu	Urban/Resid	1.0	10.0	3.0	0.5	3.0	16.0	0.7	0.8
TOTALS		43.0	110.0	12.0	5.5	12.0	184.1	8.5	5.0

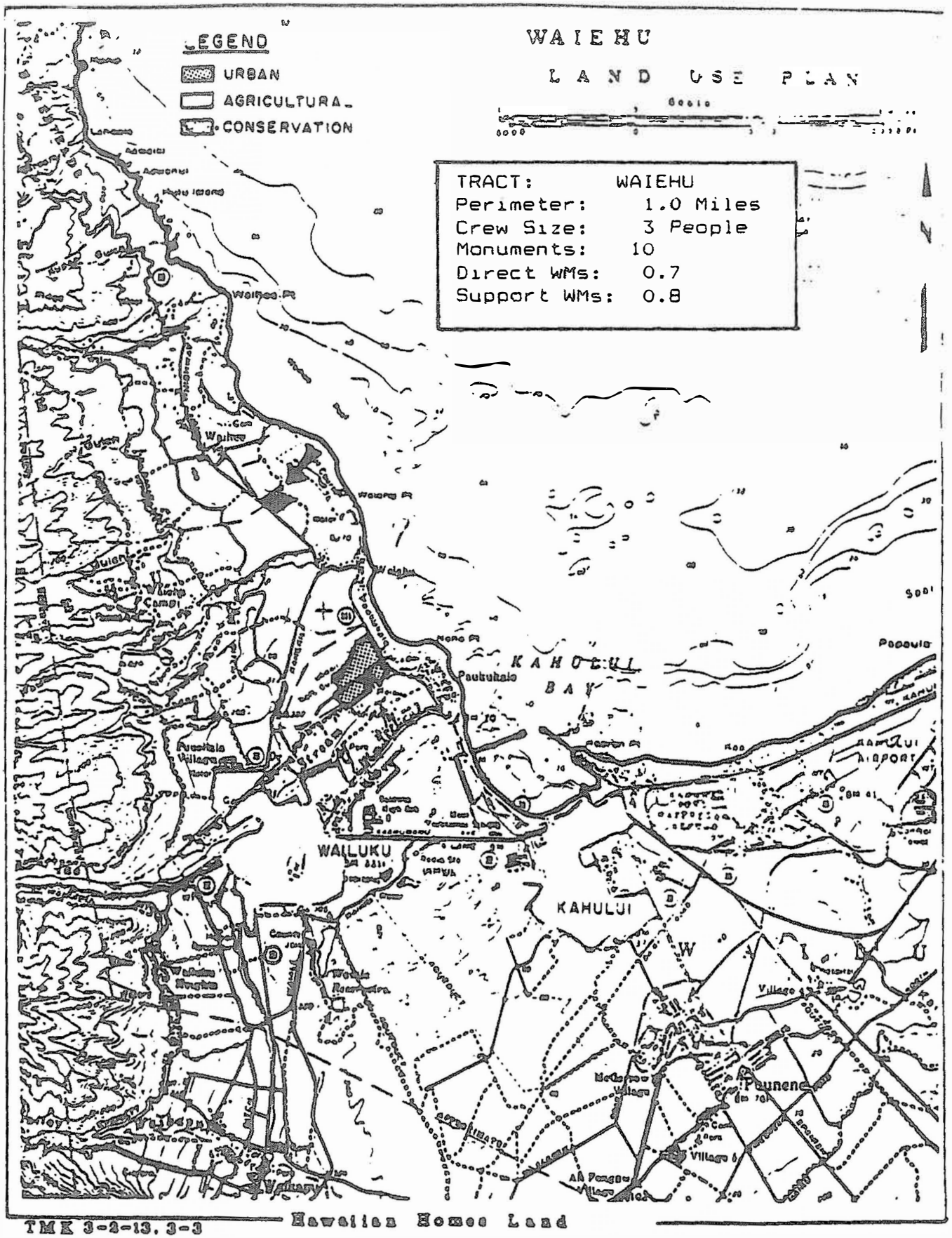

HAWAIIAN GOVERNMENT SURVEY
W D ALEXANDER Surveyor-General
MAUI
HAWAIIAN ISLANDS.
Kula
Kahikinui


TRACT: KAHIKINUI
Perimeter: 27.0 Miles
Crew Size: 3 People
Monuments: 50
Direct WMs: 4.2
Support WMs: 2.0
KAHIKINUI
LAND USE PLAN
N
TMK 1-8
Hawaiian Homes Land


TRACT: KULA
Perimeter: 13.0 Miles
Crew Size: 3 People
Monuments: 35
Direct WMs: 2.3
Support WMs: 1.3
N
KULA
LAND USE PLAN
Scale
TMK 2-3
Hawaiian Homes Land

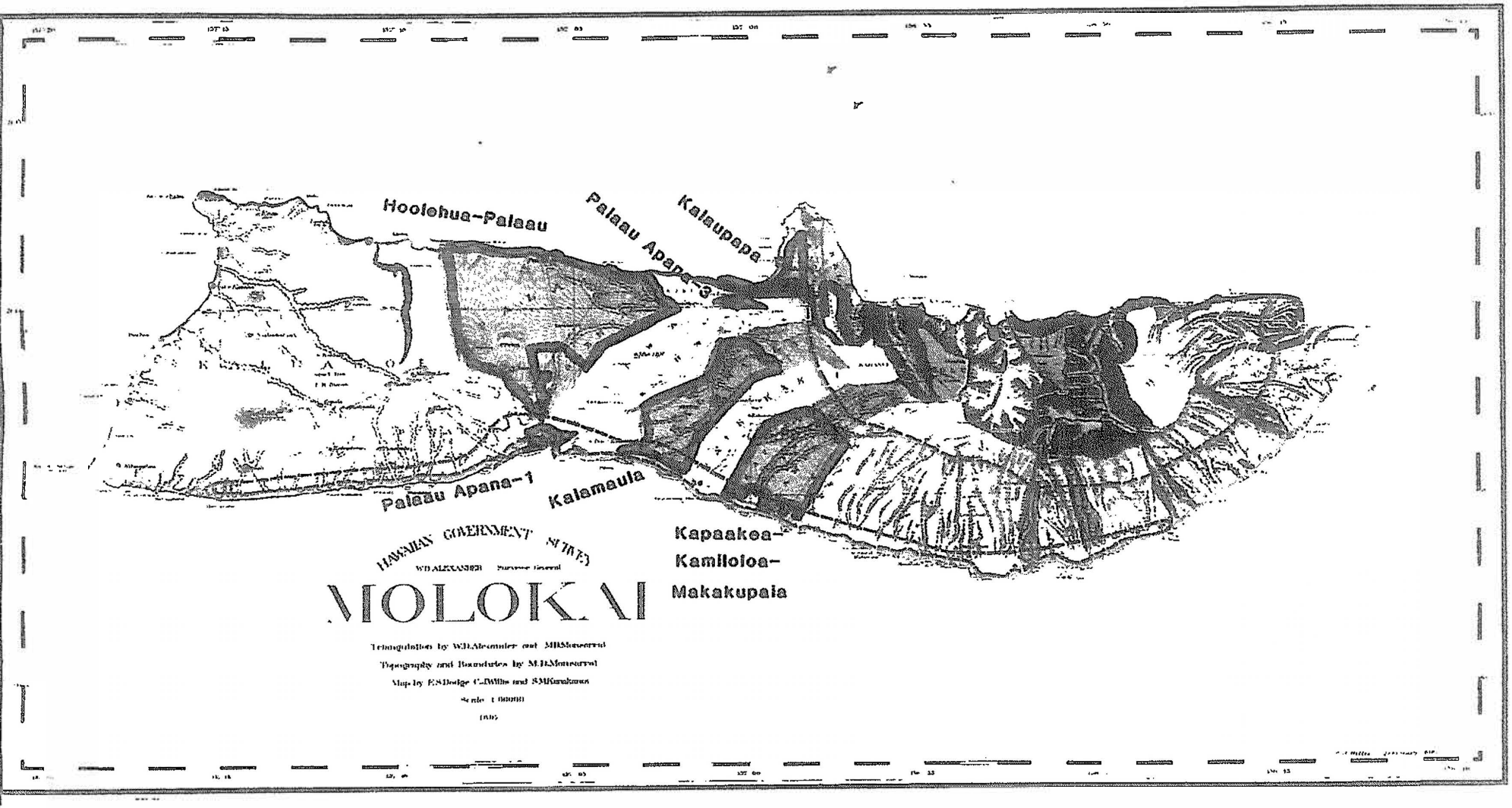

TRACT: PAUKUKALO
Perimeter: 2.0 Miles
Crew Size: 3 People
Monuments: 15
Direct WMs: 1.2
Support WMs: 0.9
KAHULUI
BAY
WAILUKU
KAHULUI
Paukukalo
Hawaiian Homes Land.

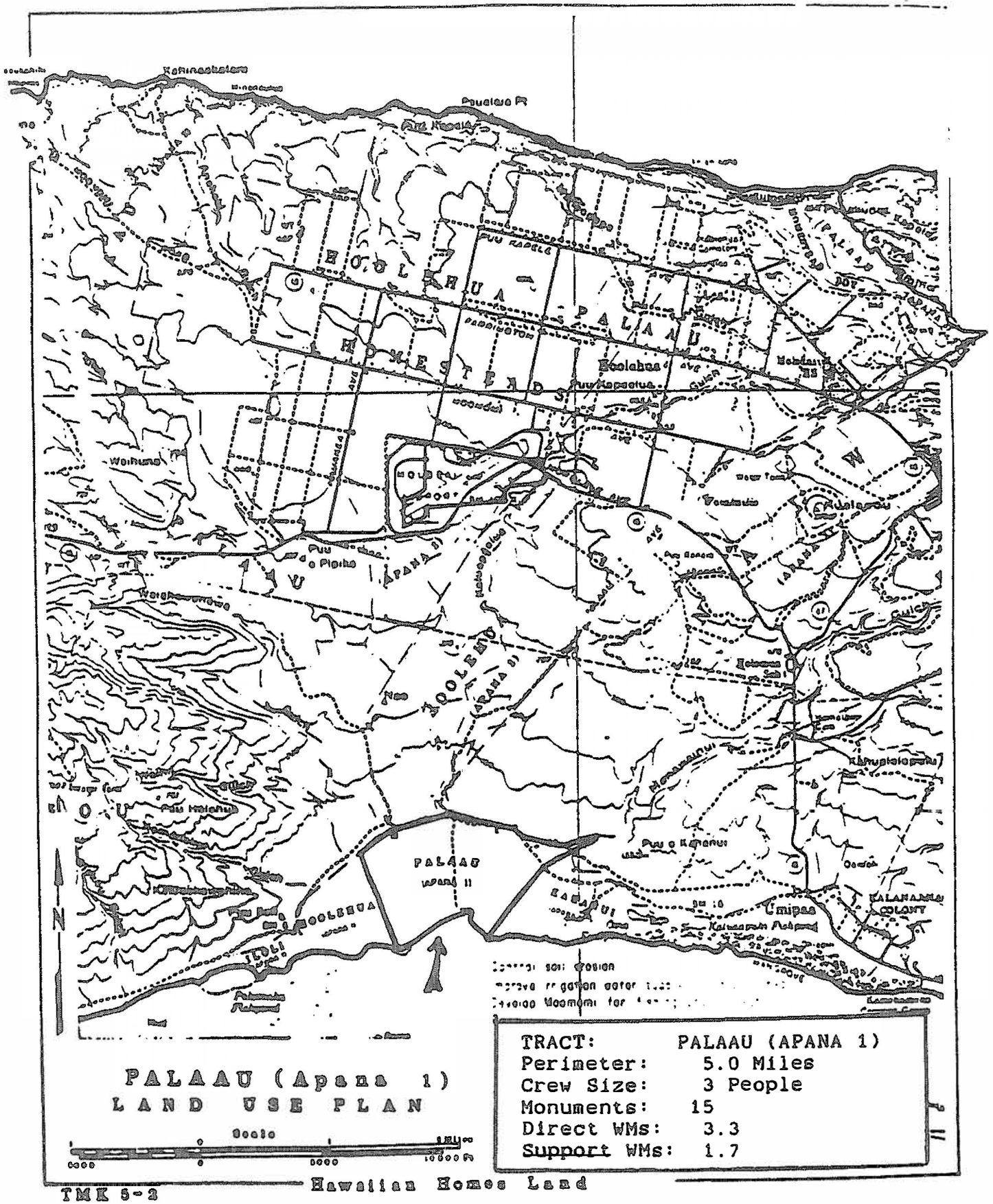
TMK 3-8-13. 3-3

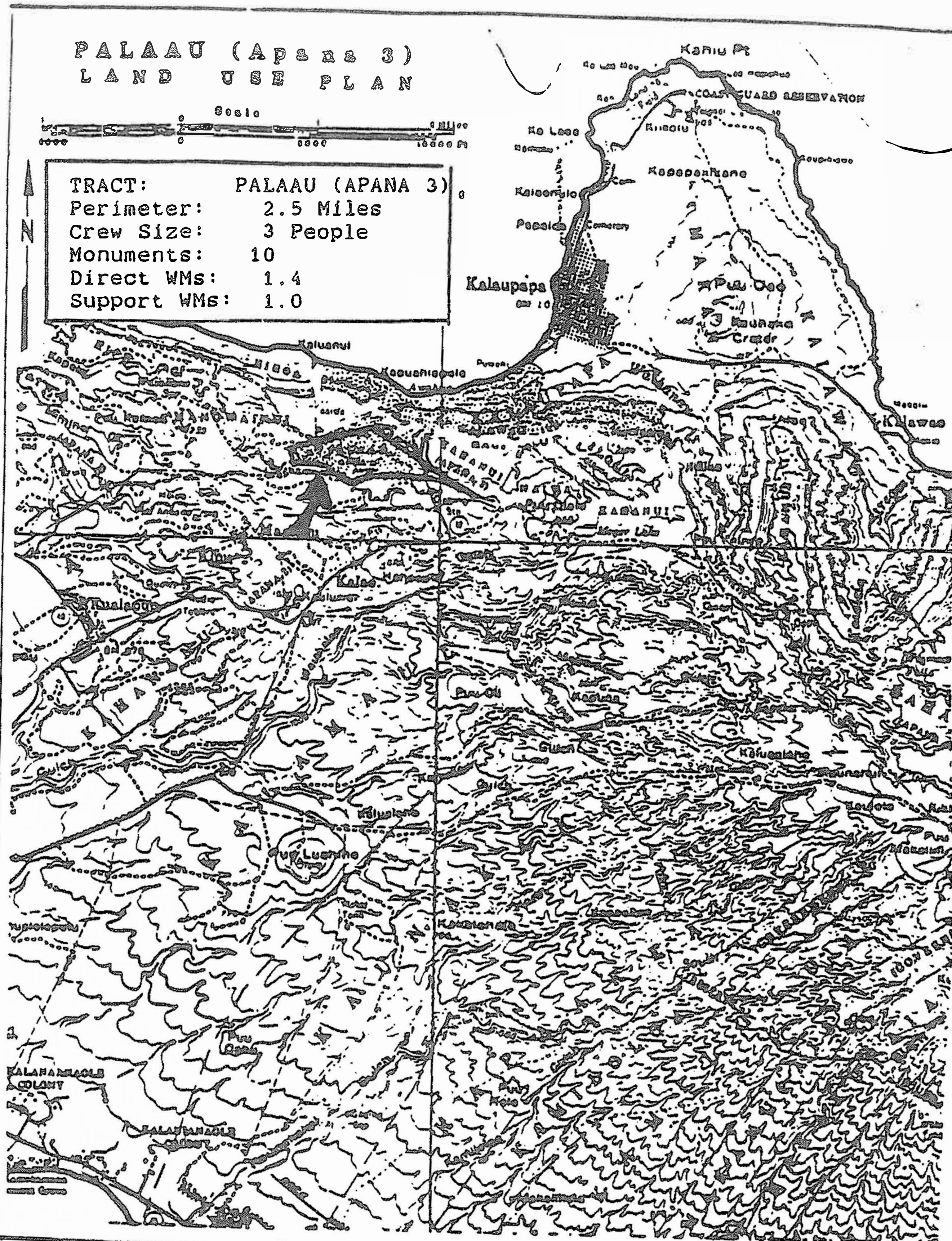

LEGEND
URBAN
AGRICULTURAL
CONSERVATION
WAIEHU
LAND USE PLAN
TRACT: WAIEHU
Perimeter: 1.0 Miles
Crew Size: 3 People
Monuments: 10
Direct WMs: 0.7
Support WMs: 0.8
KAHULUI
BAY
WAILUKU
KAHULUI
Paunene
Hawaiian Homes Land
TMK 3-2-13, 3-3

ISLAND OF MOLOKAI - SURVEY WORKMONTH ESTIMATES

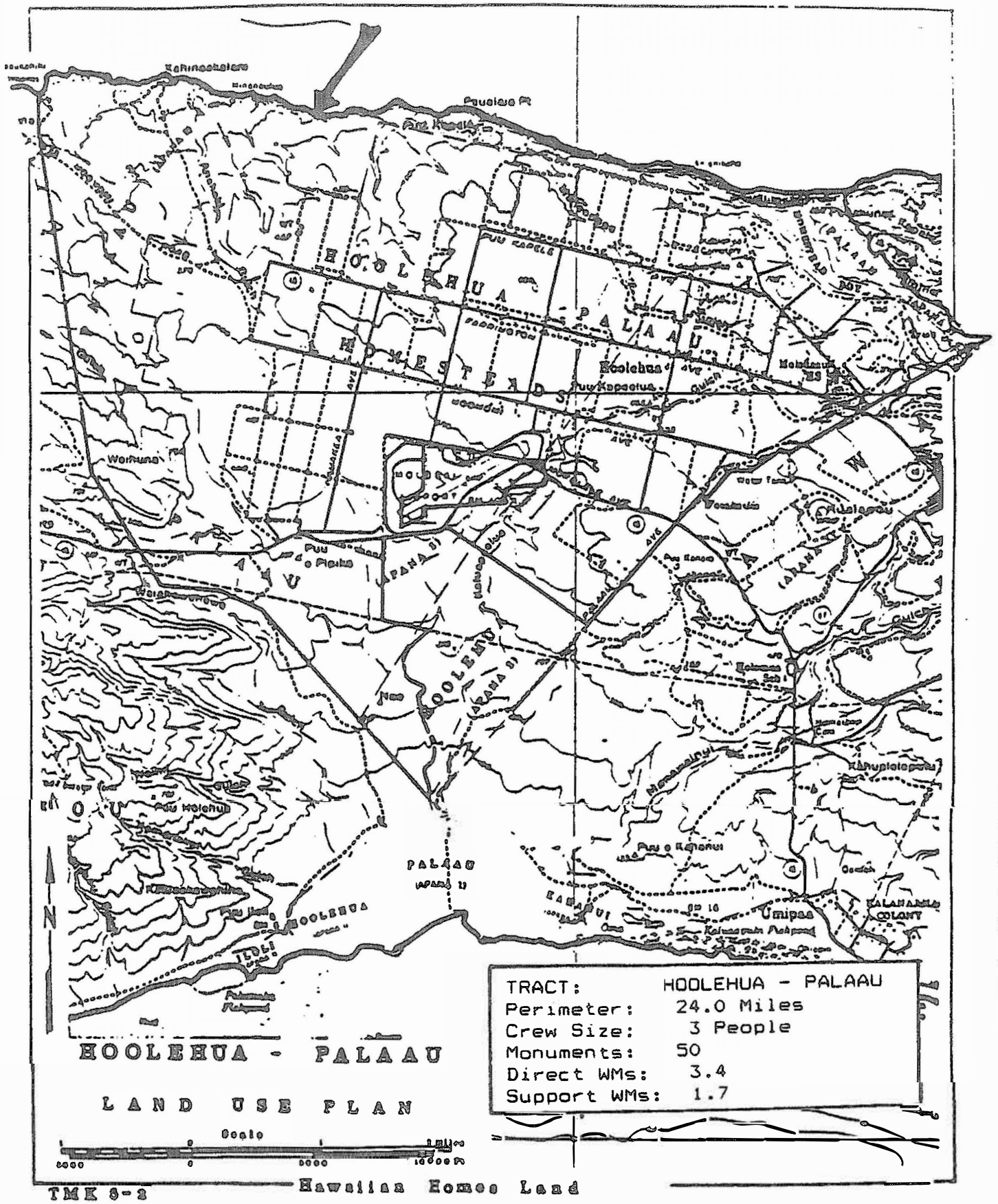
TRACT	Tract Type	Perimeter In Miles	Monuments Needed	Crew Size	Miles /Day	Monuments /Day	Person Days	Field Work Mos	Support Work Mos
Palaau (Apana 1)	Rural	5.0	15.0	3.0	0.3	2.0	72.5	3.3	1.7
Palaau (Apana 3)	Rural	2.5	10.0	3.0	0.5	2.0	30.0	1.4	1.0
Hoolehua - Palaau	Rural/Urban	24.0	50.0	3.0	2.0	4.0	73.5	3.4	1.7
Kalahaula	Rural	16.5	40.0	3.0	2.0	4.0	54.8	2.5	1.4
*Kapaakea (contiguous)	Rural	12.5	35.0	3.0	1.5	3.0	60.0	2.8	1.5
*Kamiloloa (contiguous)	Rural	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*Makakupaia (contiguous)	Rural	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kalaupapa	Rural/Urban	9.0	35.0	4.0	0.3	2.0	190.0	8.8	3.6
TOTALS		69.5	185.0	19.0	6.6	17.0	480.8	22.2	10.9

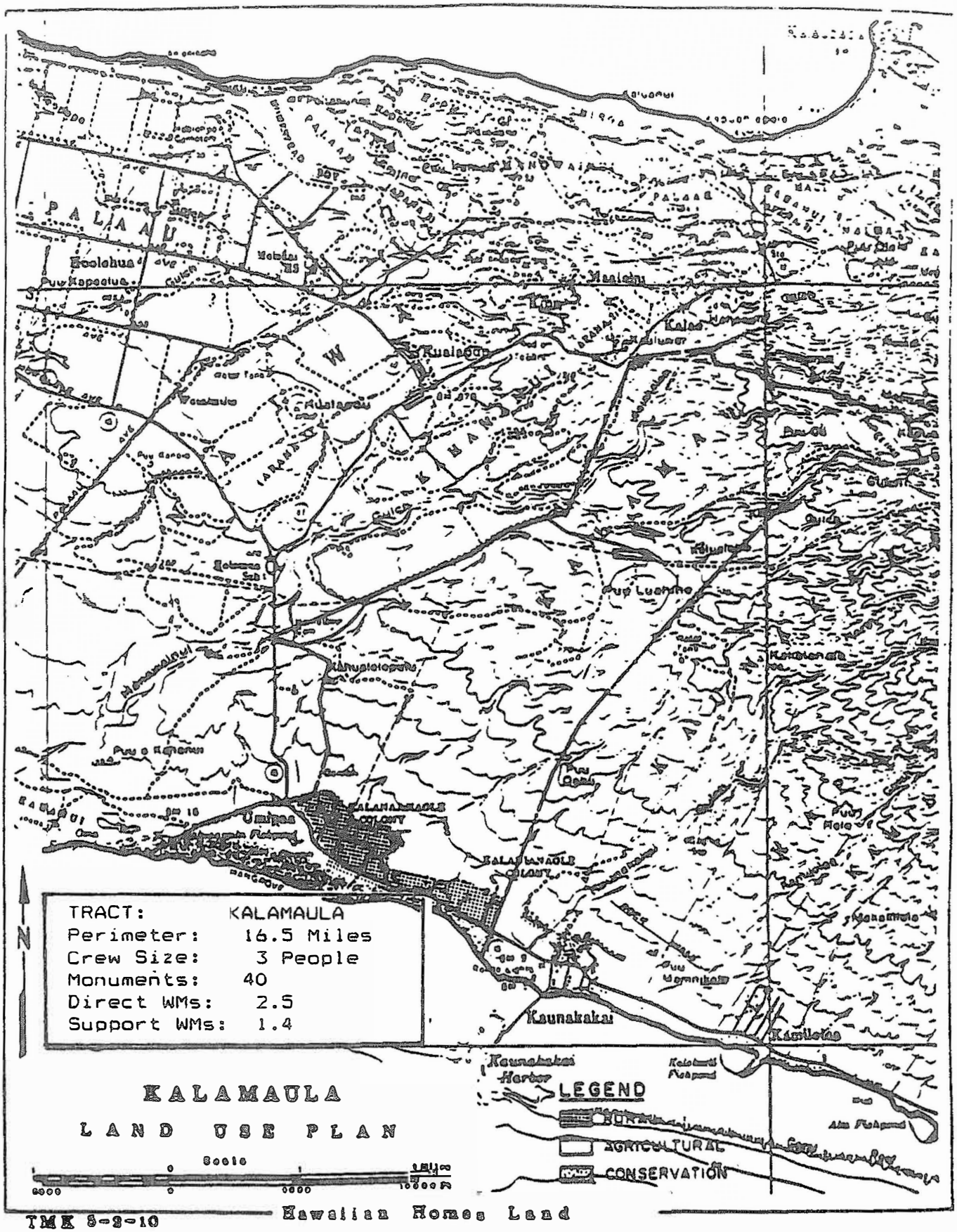

Hoolehua-Palaau
Palaau Apana-3
Kalaupapa
Palaau Apana-1
Kalamaula
Kapaakea-
Kamiloloa-
Makakupala
HAWAIIAN GOVERNMENT SURVEY
W D ALEXANDER Surveyor General
MOLOKAI
Triangulation by W.D.Alexander and M.R.Sanford
Topography and Boundaries by M.R.Sanford
Map by E.S.Dodge C.J.Wills and S.M.Kanakanui
Scale 1:80000
1885

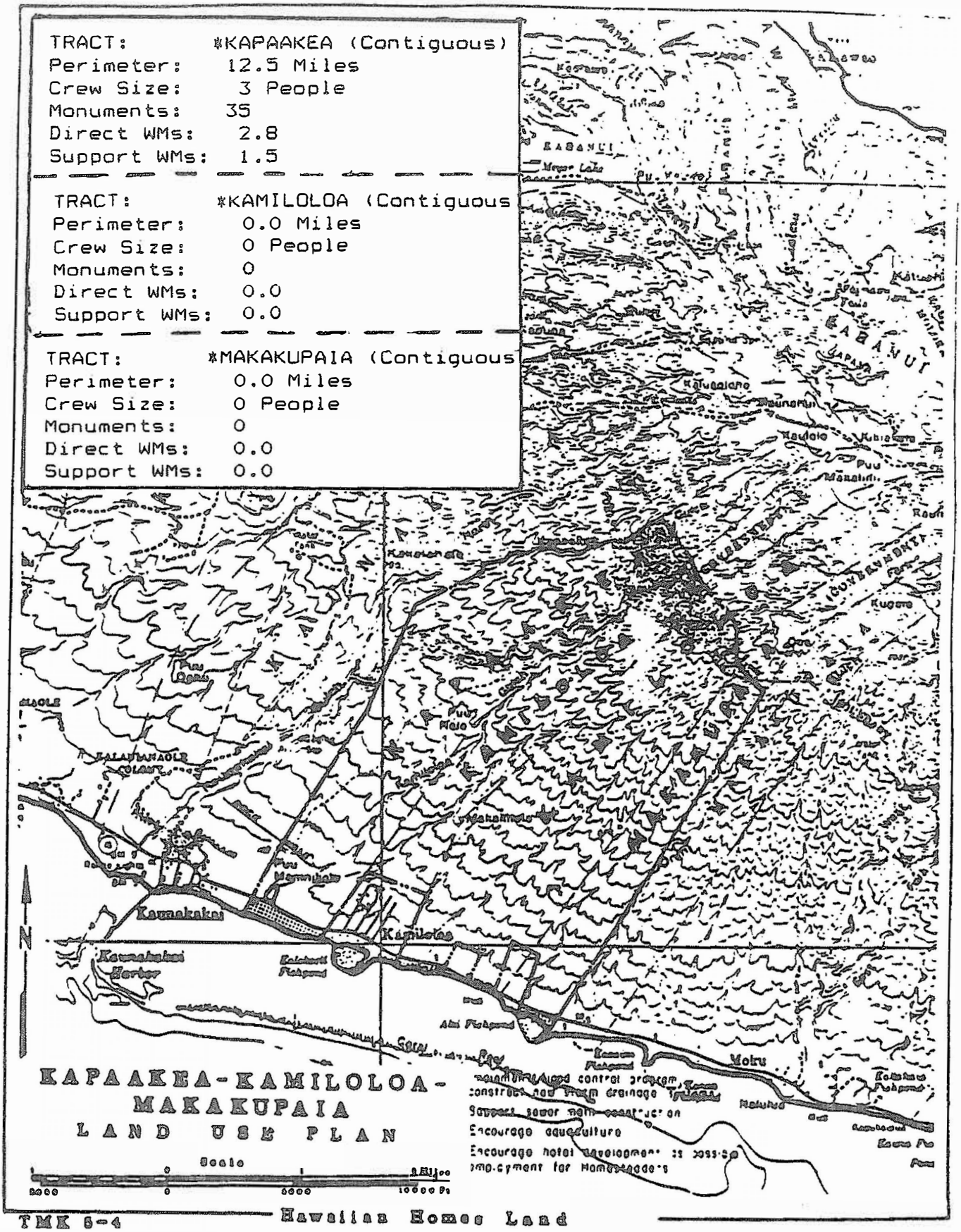

PALAAU (Apana 1)
LAND USE PLAN
TRACT: PALAAU (APANA 1)
Perimeter: 5.0 Miles
Crew Size: 3 People
Monuments: 15
Direct WMs: 3.3
Support WMs: 1.7
Hawaiian Homes Land
TMK 5-2



TMK 5-2-13, 6-1-01 Hawaiian Homes Land

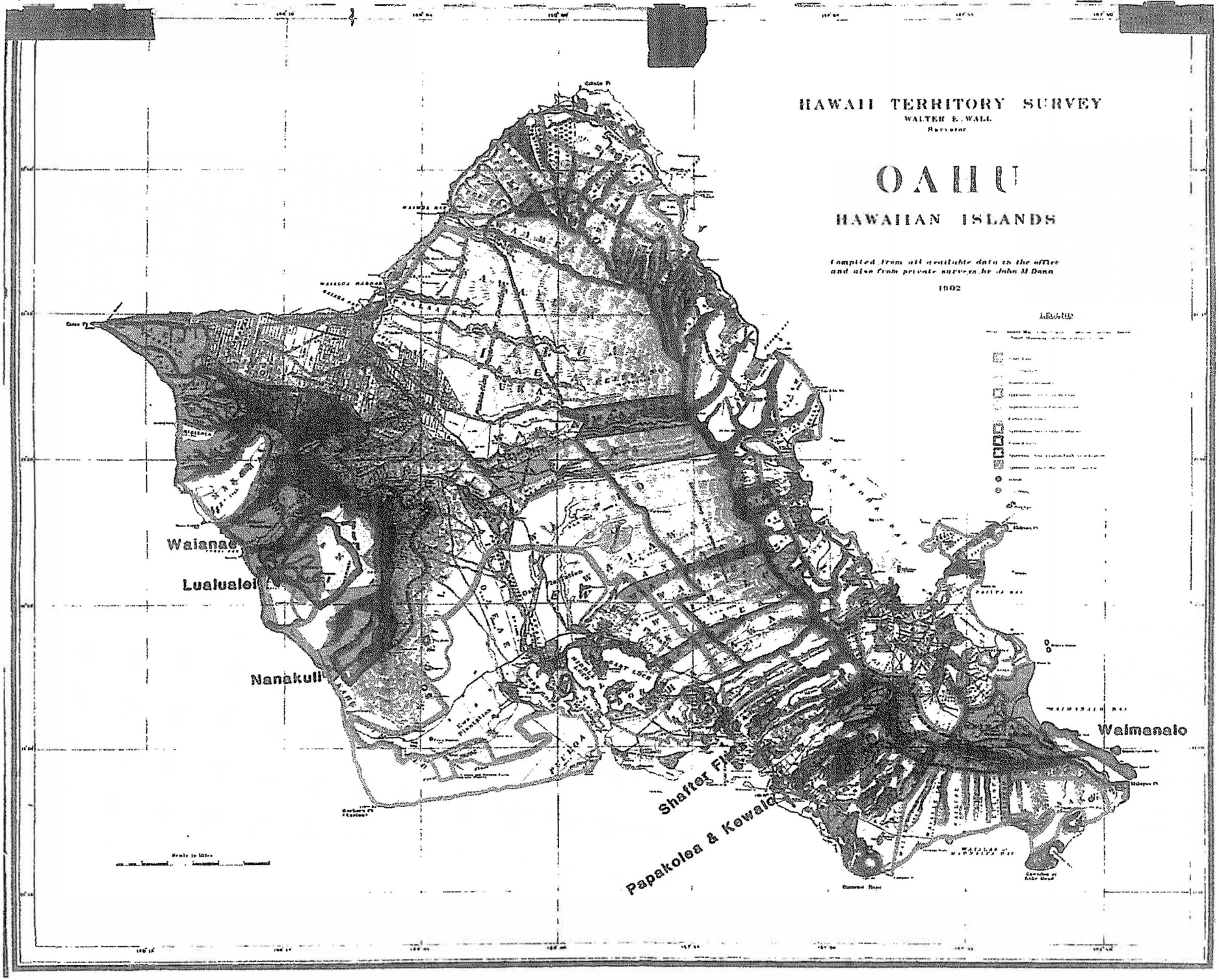

HOOLEHUA - PALAAU
HOMESTEAD
HOOLEHUA - PALAAU
LAND USE PLAN
Scale
N
PALAAU
HOOLEHUA
TRACT: HOOLEHUA - PALAAU
Perimeter: 24.0 Miles
Crew Size: 3 People
Monuments: 50
Direct WMs: 3.4
Support WMs: 1.7
TMK 6-2
Hawaiian Homes Land

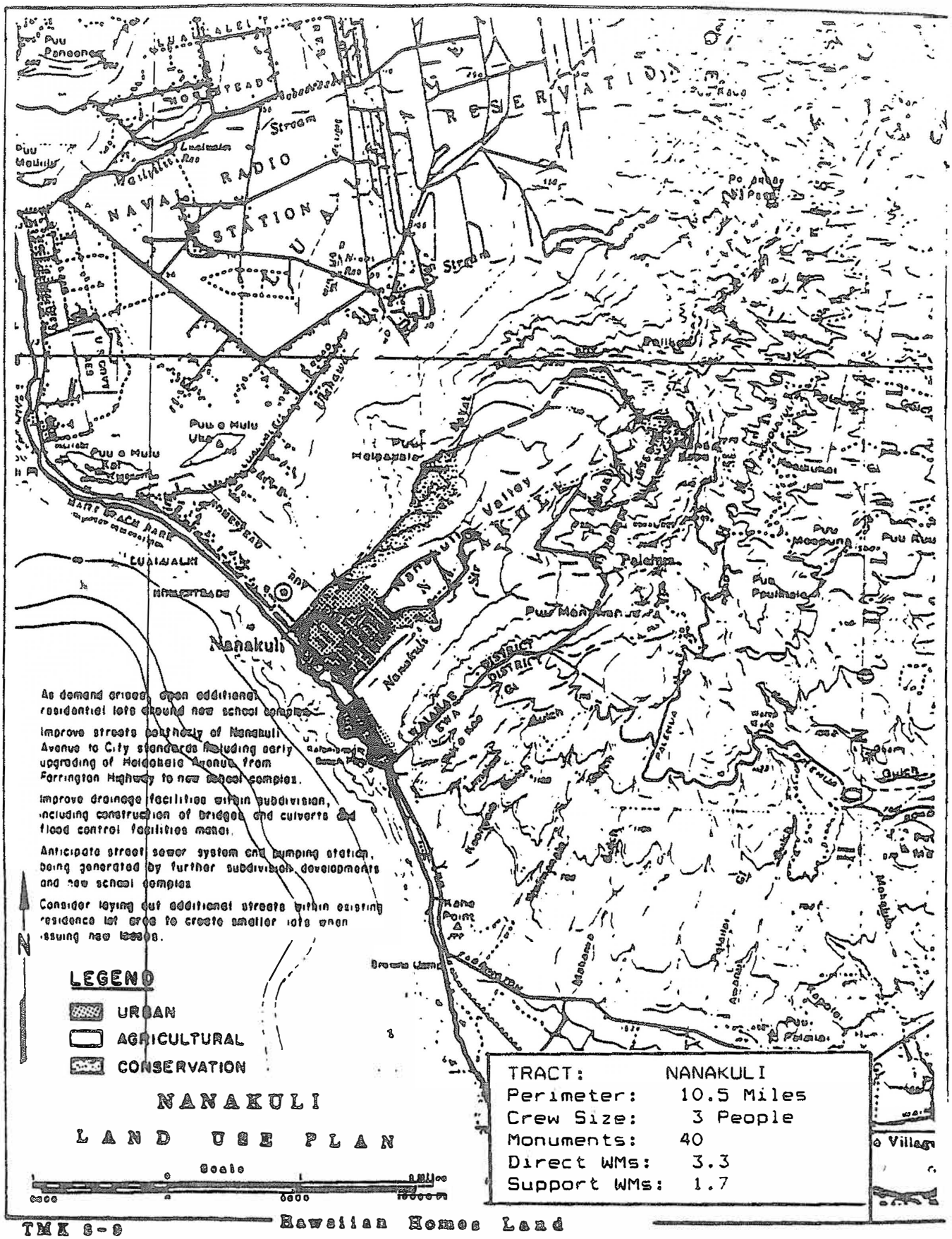

TRACT: KALAMAULA
Perimeter: 16.5 Miles
Crew Size: 3 People
Monuments: 40
Direct WMs: 2.5
Support WMs: 1.4
N
KALAMAULA
LAND USE PLAN
Scale
LEGEND
AGRICULTURAL
CONSERVATION
Kaunakakai
Kaunakakai Harbor
KALAWAHAOLE COLONY
Kamiloloa
Hawaiian Homes Land
TMK 5-3-10

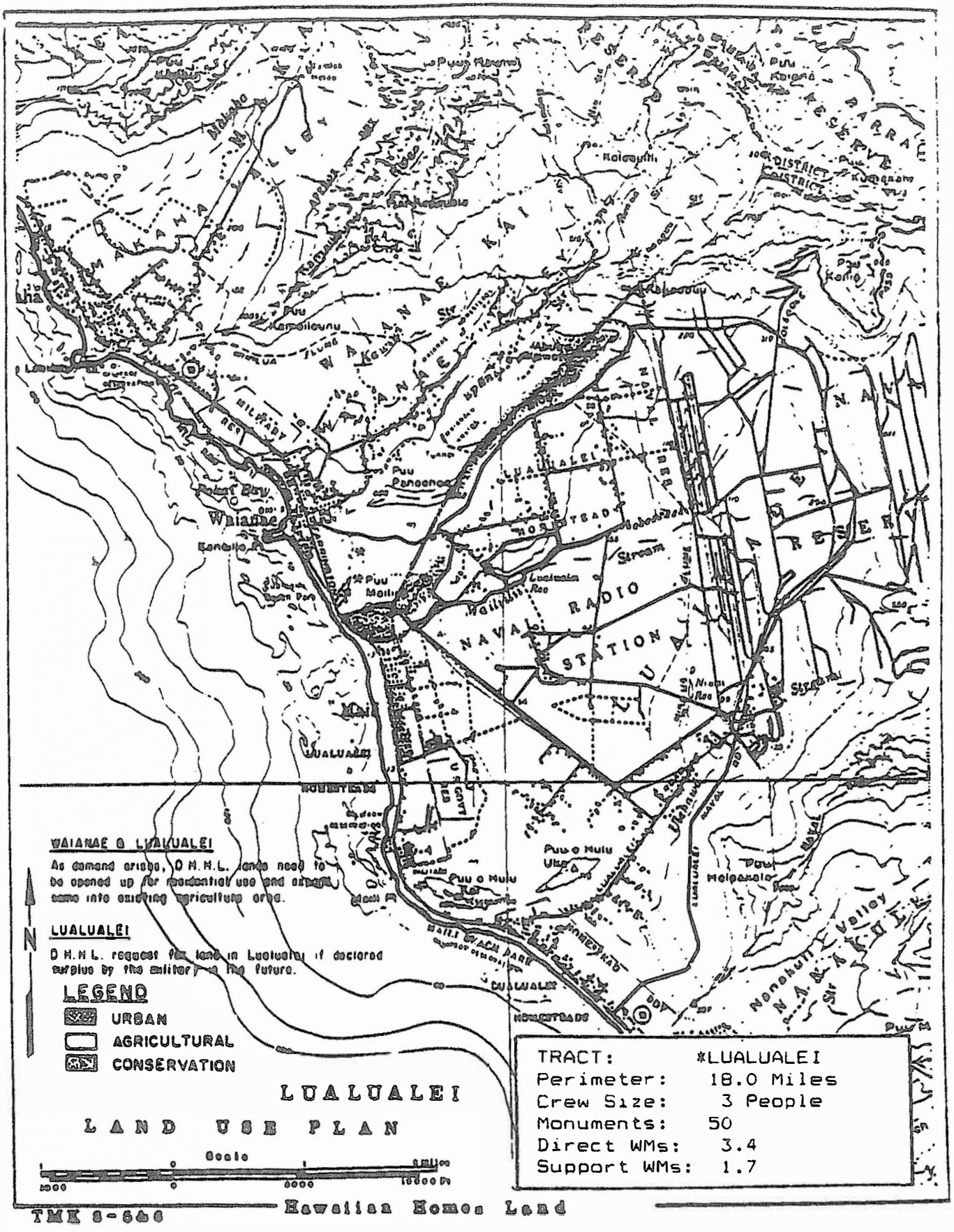

TRACT: *KAPAAKEA (Contiguous)
Perimeter: 12.5 Miles
Crew Size: 3 People
Monuments: 35
Direct WMs: 2.8
Support WMs: 1.5
TRACT: *KAMILOLOA (Contiguous
Perimeter: 0.0 Miles
Crew Size: 0 People
Monuments: 0
Direct WMs: 0.0
Support WMs: 0.0
TRACT: *MAKAKUPAIA (Contiguous
Perimeter: 0.0 Miles
Crew Size: 0 People
Monuments: 0
Direct WMs: 0.0
Support WMs: 0.0
KAPAAKEA-KAMILOLOA-
MAKAKUPAIA
LAND USE PLAN
Scale
Kawaihae
Kawaihae Harbor
Kamiloloa
Mo'o'u
Encourage aquaculture
TMK 6-4
Hawaiian Homes Land

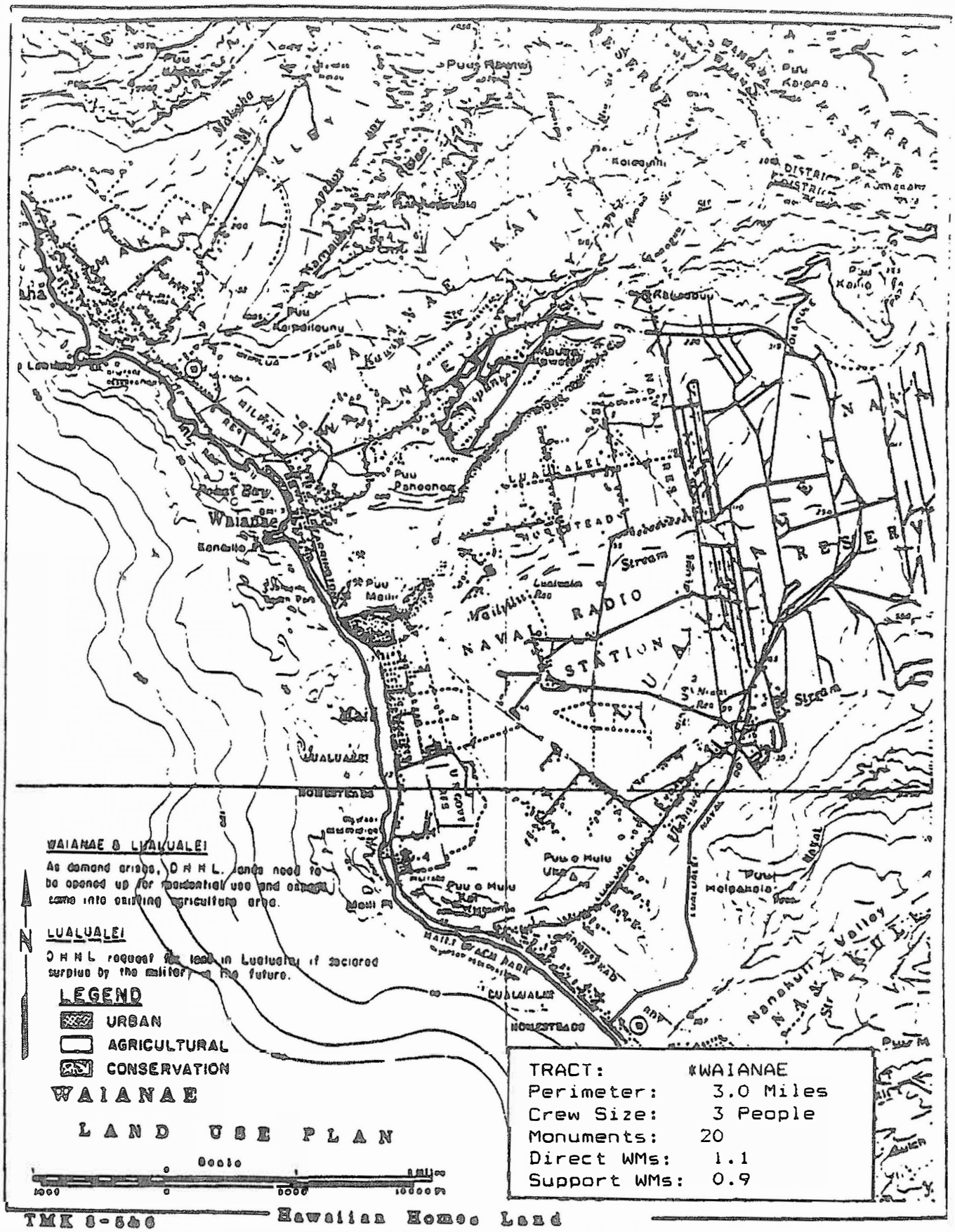
ISLAND OF OAHU - SURVEY WORKMONTH ESTIMATES

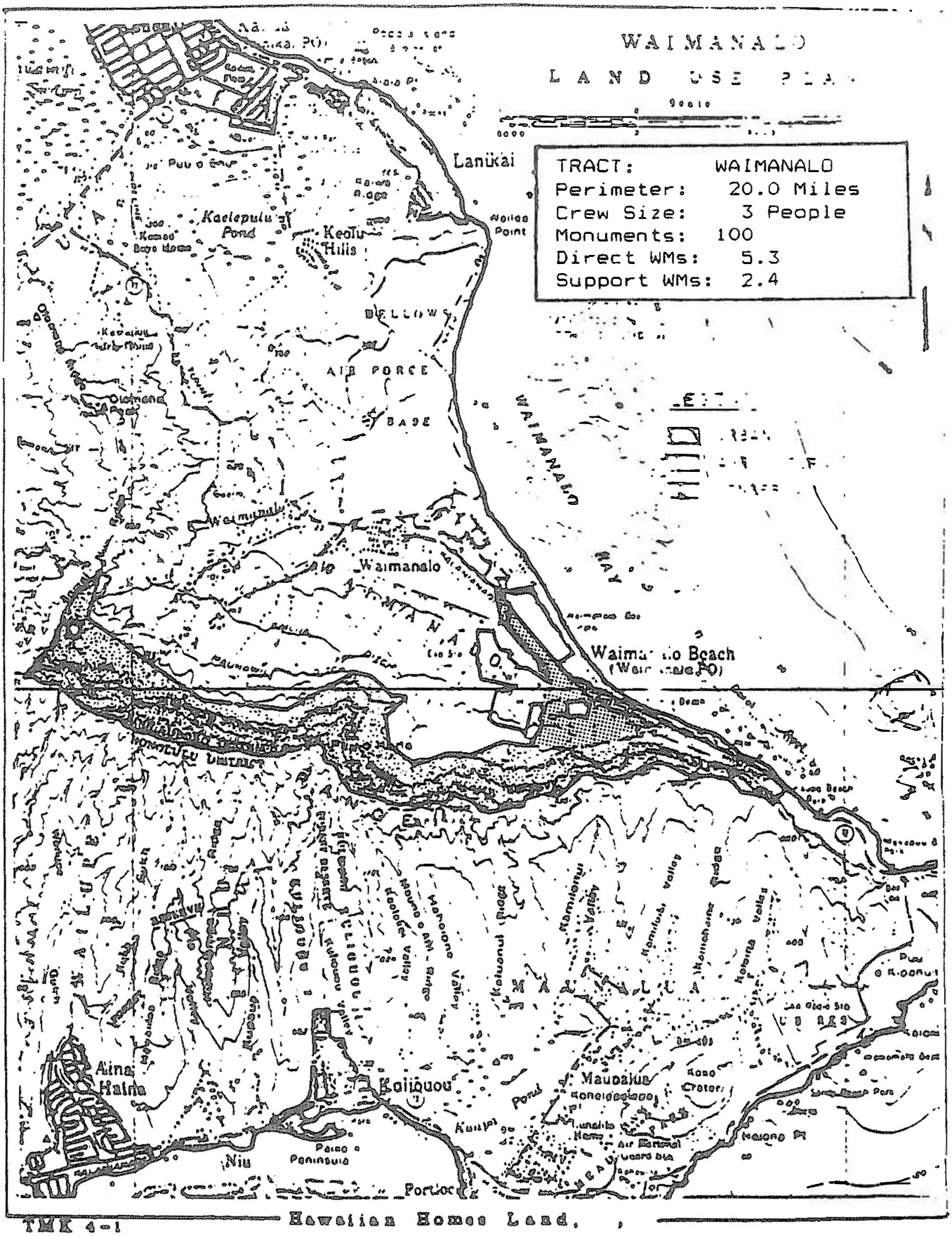
TRACT	Tract Type	Perimeter In Miles	Monuments Needed	Crew Size	Miles /Day	Monuments /Day	Person Days	Field Work Mos	Support Work Mos
Nanakuli	Rural/Urban	10.5	40.0	3.0	1.0	3.0	71.5	3.3	1.7
*Lualualei	Urban/Rural	18.0	50.0	3.0	1.5	4.0	73.5	3.4	1.7
*Waianae	Urban/Rural	3.0	20.0	3.0	1.0	4.0	24.0	1.1	0.9
Waimanalo	Urban/Rural	20.0	100.0	3.0	1.5	4.0	115.0	5.3	2.4
Papakolea & Kewalo	Urban/Resid	3.0	30.0	3.0	0.5	4.0	40.5	1.9	1.2
Shafter Flats (Airport)	Industrial	1.0	25.0	3.0	0.5	5.0	21.0	1.0	0.8
TOTALS		55.5	265.0	18.0	6.0	24.0	345.5	15.9	8.7


HAWAII TERRITORY SURVEY
WALTER E. WALL
Surveyor
OAHU
HAWAIIAN ISLANDS
Compiled from all available data in the office and also from private surveys by John M Dana
1902
Waianae
Lualualei
Nanakuli
Waimanalo
Papakolea & Kewalo

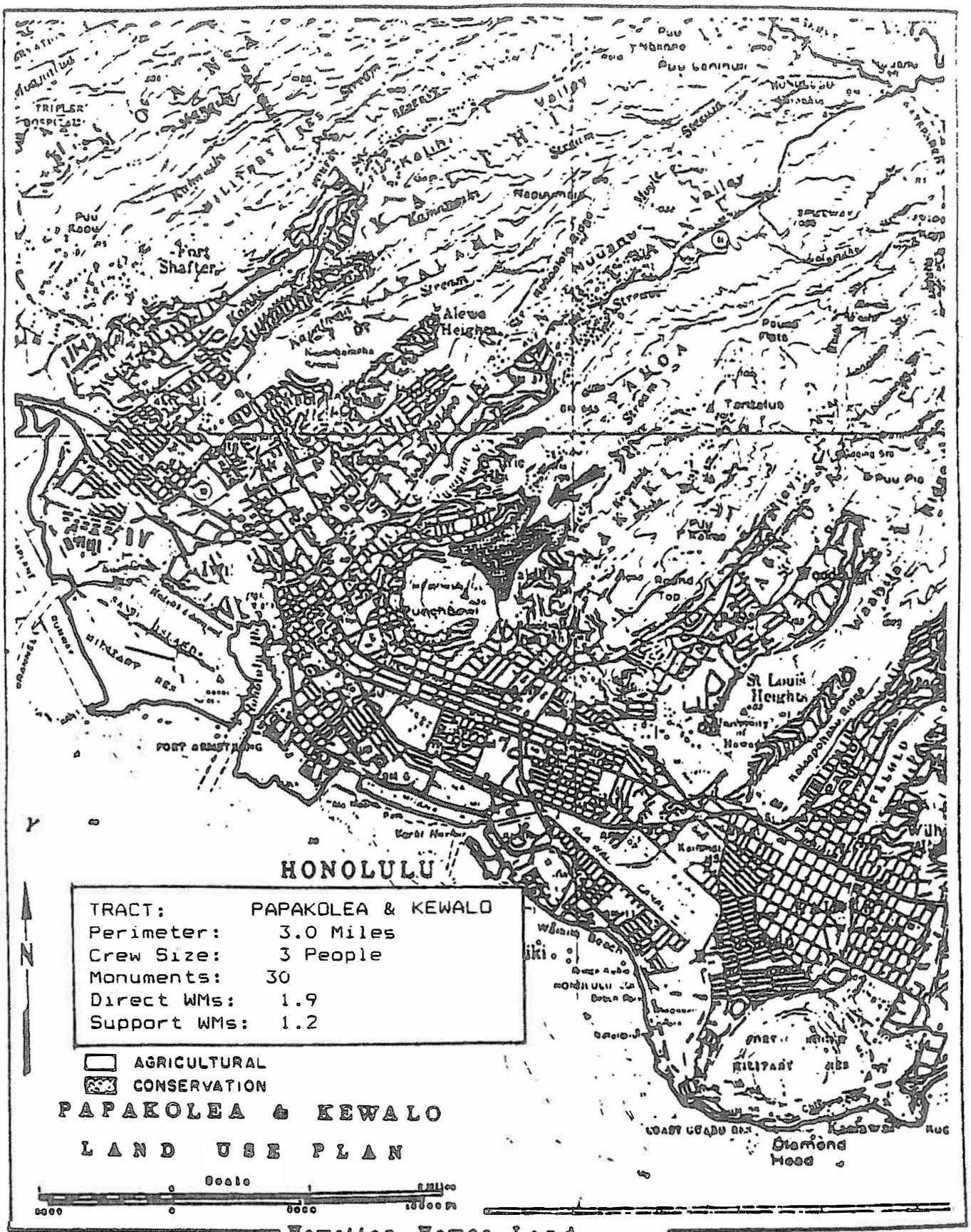

Nanakuli
As demand arises, open additional residential lots around new school complex.
Improve streets southerly of Nanakuli Avenue to City standards including early upgrading of Haleakala Avenue from Farrington Highway to new school complex.
Improve drainage facilities within subdivision, including construction of bridges and culverts and flood control facilities makai.
Anticipate street, sewer system and pumping station, being generated by further subdivision developments and new school complex.
Consider laying out additional streets within existing residence lot area to create smaller lots when issuing new leases.
N
LEGEND
URBAN
AGRICULTURAL
CONSERVATION
NANAKULI
LAND USE PLAN
Scale
TRACT: NANAKULI
Perimeter: 10.5 Miles
Crew Size: 3 People
Monuments: 40
Direct WMs: 3.3
Support WMs: 1.7
TMK 8-9
Hawaiian Homes Land

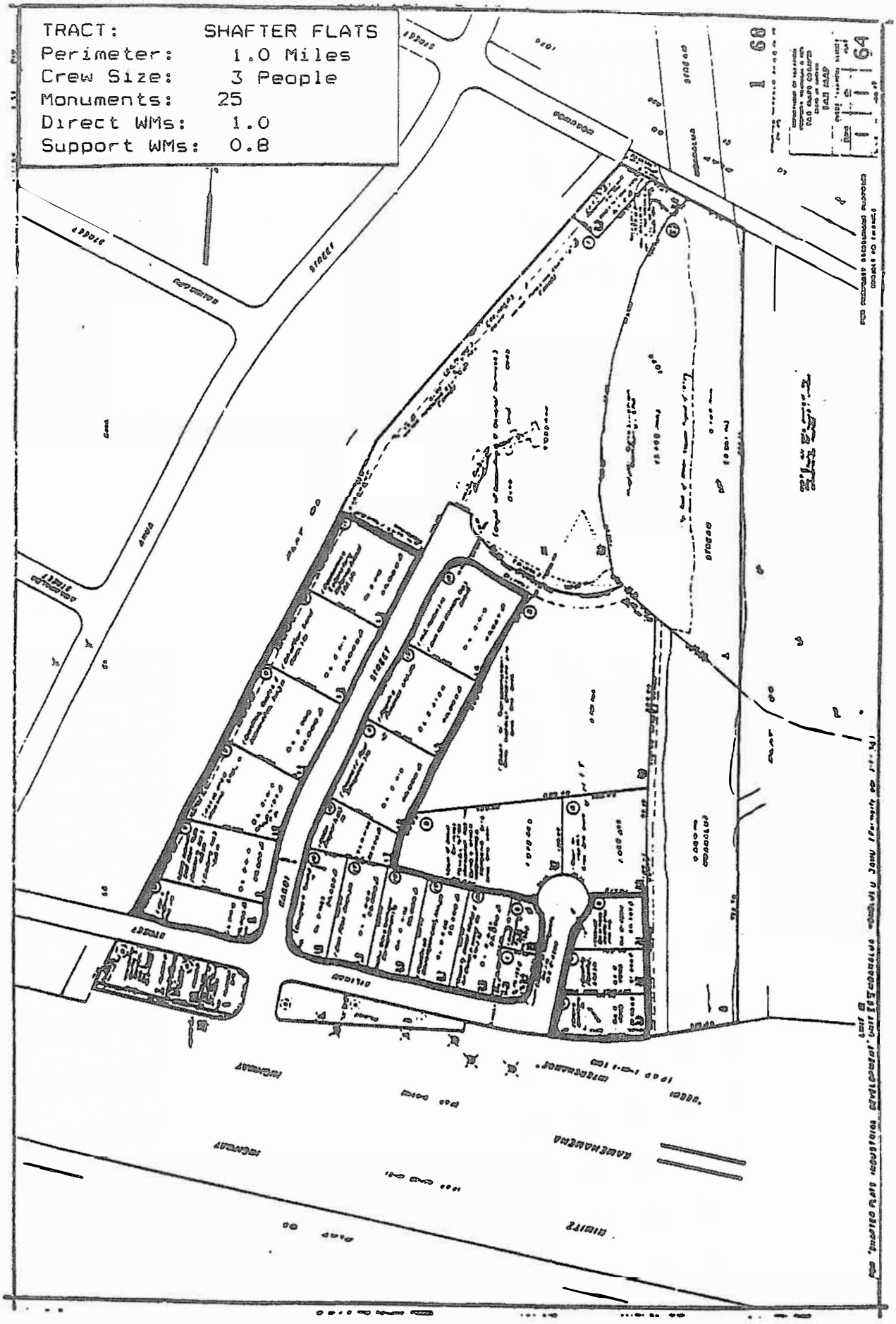

WAIANAE & LUALUALEI
As demand arises, D.H.H.L. lands need to be opened up for residential use and already come into existing agricultural areas.
LUALUALEI
D.H.H.L. request for land in Lualualei if declared surplus by the military in the future.
LEGEND
URBAN
AGRICULTURAL
CONSERVATION
LUALUALEI
LAND USE PLAN
Scale
TRACT: *LUALUALEI
Perimeter: 18.0 Miles
Crew Size: 3 People
Monuments: 50
Direct WMs: 3.4
Support WMs: 1.7
TMK 8-6-6
Hawaiian Homes Land


WAIANAE & LUALUALEI
As demand arises, D H H L. lands need to be opened up for residential use and others come into existing agricultural areas.
LUALUALEI
D H H L request for land in Lualualei if declared surplus by the military in the future.
LEGEND
URBAN
AGRICULTURAL
CONSERVATION
WAIANAE
LAND USE PLAN
TRACT: *WAIANAE
Perimeter: 3.0 Miles
Crew Size: 3 People
Monuments: 20
Direct WMs: 1.1
Support WMs: 0.9
TMK 8-5&6
Hawaiian Homes Land


WAIMANALO
LAND USE PLAN
TRACT: WAIMANALO
Perimeter: 20.0 Miles
Crew Size: 3 People
Monuments: 100
Direct WMs: 5.3
Support WMs: 2.4
Lanikai
Kaelepulu Pond
Keolu Hills
Mokulua Islands
BELLOWS
AIR FORCE
BASE
Waimanalo
Waimanalo Bay
Waimanalo Beach
Kailua
Maunalua
Aina Haina
Niu
Hawaiian Homes Land.

TMK 4-1


HONOLULU
TRACT: PAPAKOLEA & KEWALO
Perimeter: 3.0 Miles
Crew Size: 3 People
Monuments: 30
Direct WMs: 1.9
Support WMs: 1.2
AGRICULTURAL
CONSERVATION
PAPAKOLEA & KEWALO
LAND USE PLAN
Scale
Hawaiian Homes Land
TMK 2-2-64-8
N
Aleva Heights
St Louis Heights
Diamond Head
Fort Shafter
Punchbowl
Tantalus
Waikiki
Kalihi
Nuuanu
Pauoa
Manoa
Makiki
Palolo
Kaimuki
Kapalama
Iwilei
Moanalua
Valley
Stream
Beach
Park
Harbor
Canal
Reservoir
Ridge
Hill
Hills
Crater
Point
Pali
Pass
Channel
Basin
Dam
Golf Course
Cemetery
Airport
Military Res
Coast Guard Res
Fort Armstrong


TRACT: SHAFTER FLATS
Perimeter: 1.0 Miles
Crew Size: 3 People
Monuments: 25
Direct WMs: 1.0
Support WMs: 0.8

ISLAND OF KAUAI - SURVEY WORKMONTH ESTIMATES

TRACT	Tract Type	Perimeter In Miles	Monuments Needed	Crew Size	Miles /Day	Monuments /Day	Person Days	Field Work Mos	Support Work Mos
Waimea	Rural	20.0	65.0	4.0	1.5	3.0	140.0	6.5	2.8
Moloaa	Rural	5.0	25.0	4.0	1.5	3.0	46.7	2.2	1.3
Anahola - Kamalomalo	Rural/Urban	15.0	60.0	4.0	0.8	4.0	135.0	6.2	2.7
Kekaha	Urban/Resid	2.0	10.0	4.0	1.0	4.0	18.0	0.8	0.8
TOTALS		42.0	160.0	16.0	4.8	14.0	339.7	15.7	7.6

HAWAII TERRITORY SURVEY

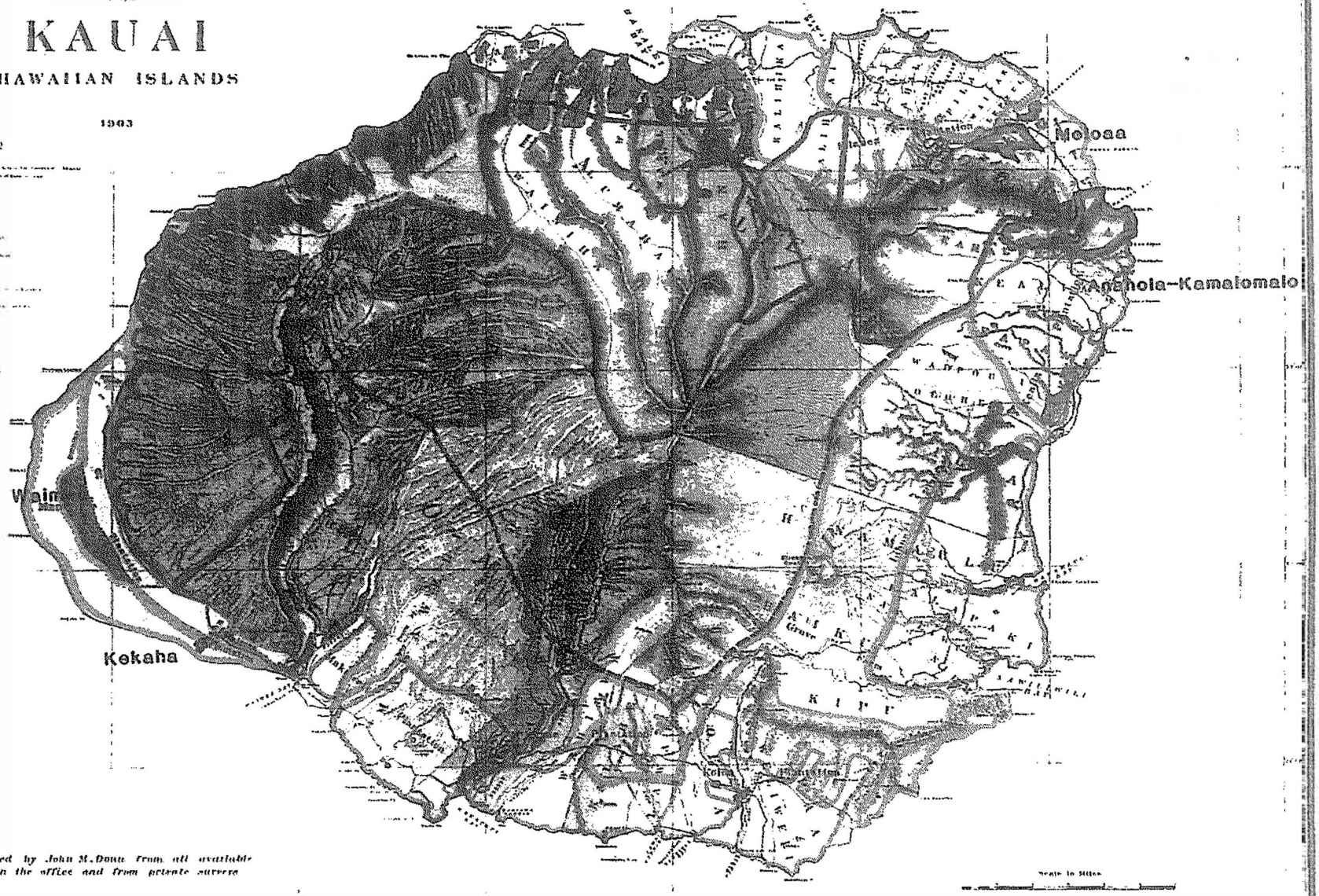
WALTER E. WALL
Surveyor

KAUAI

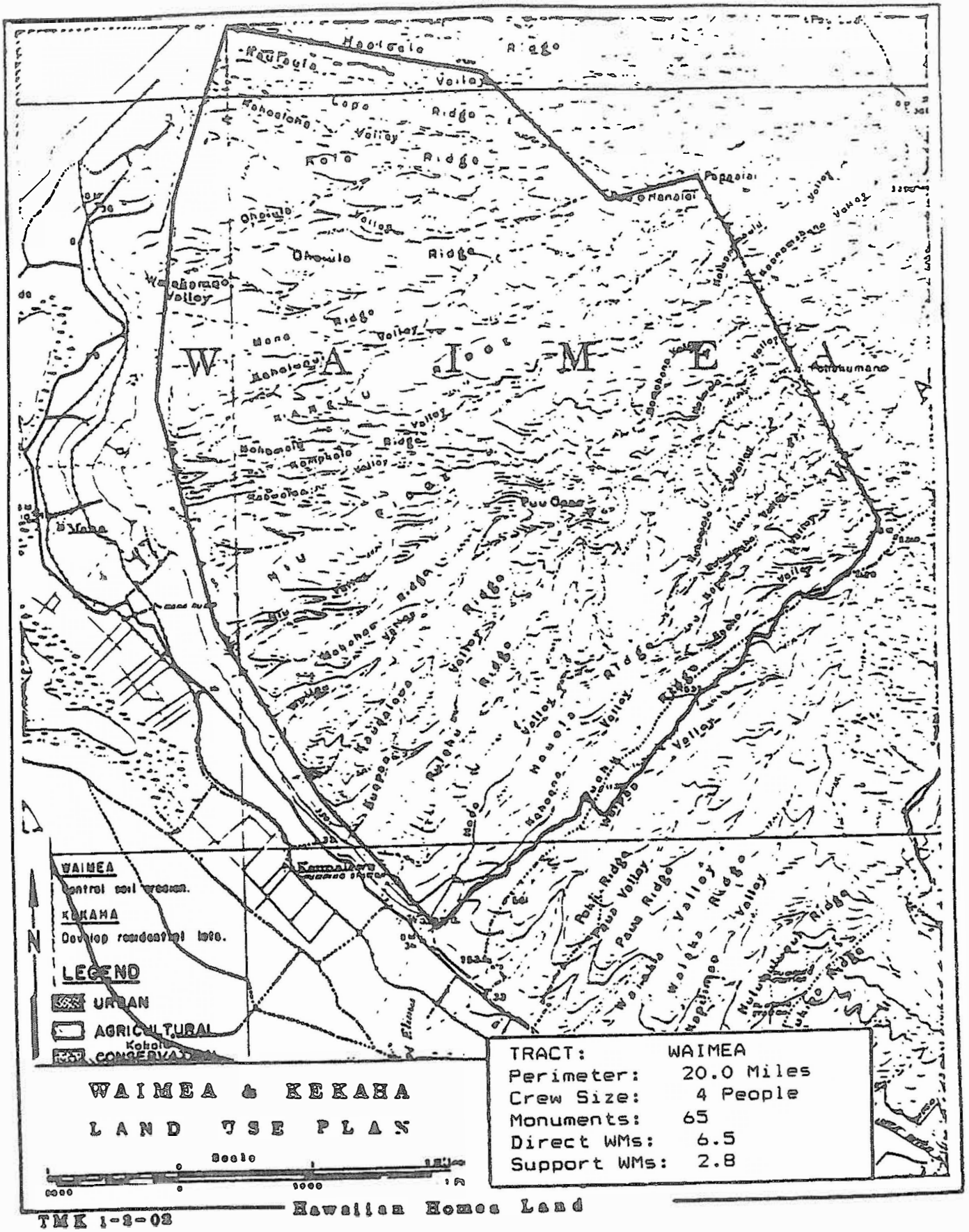
HAWAIIAN ISLANDS

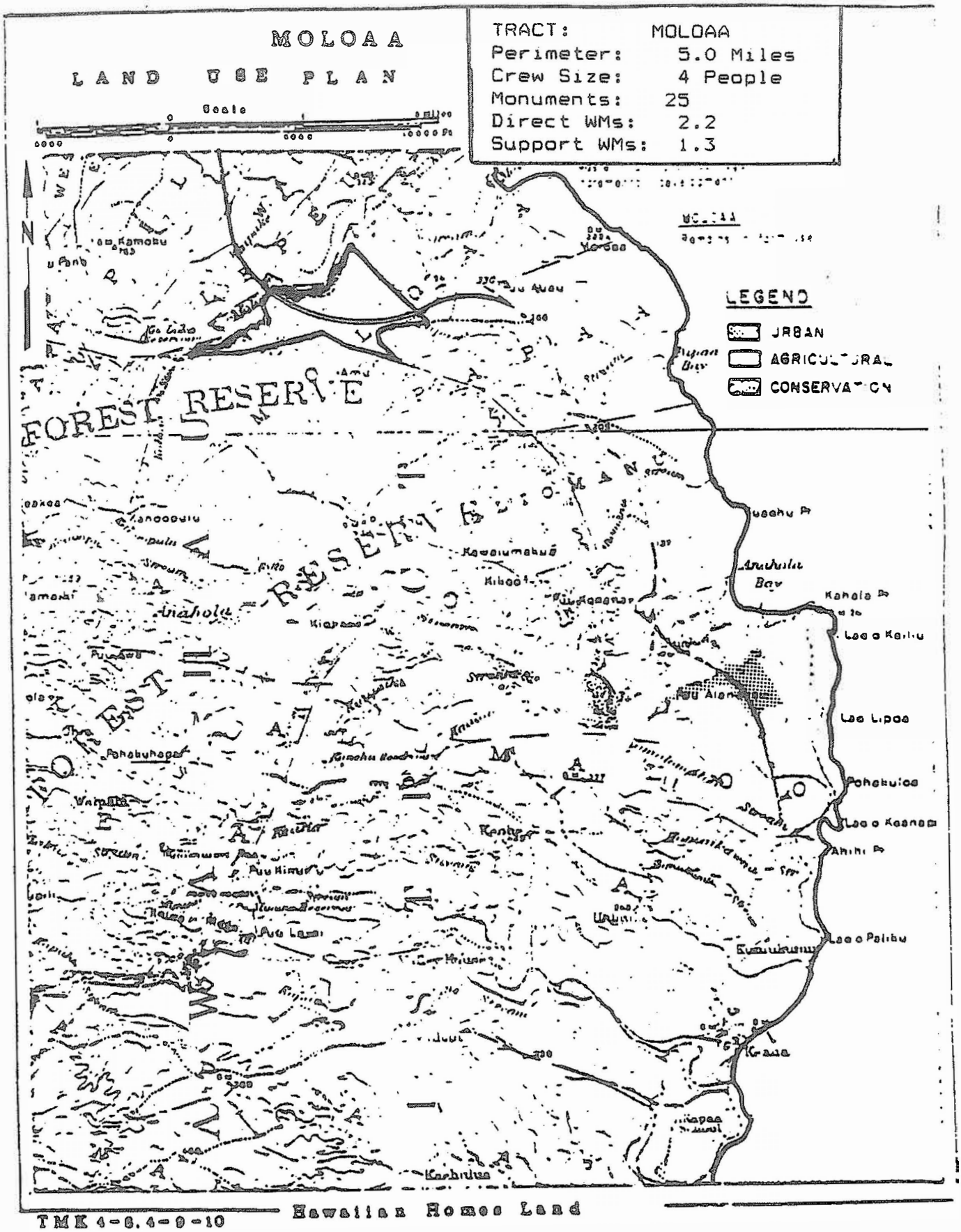
1903

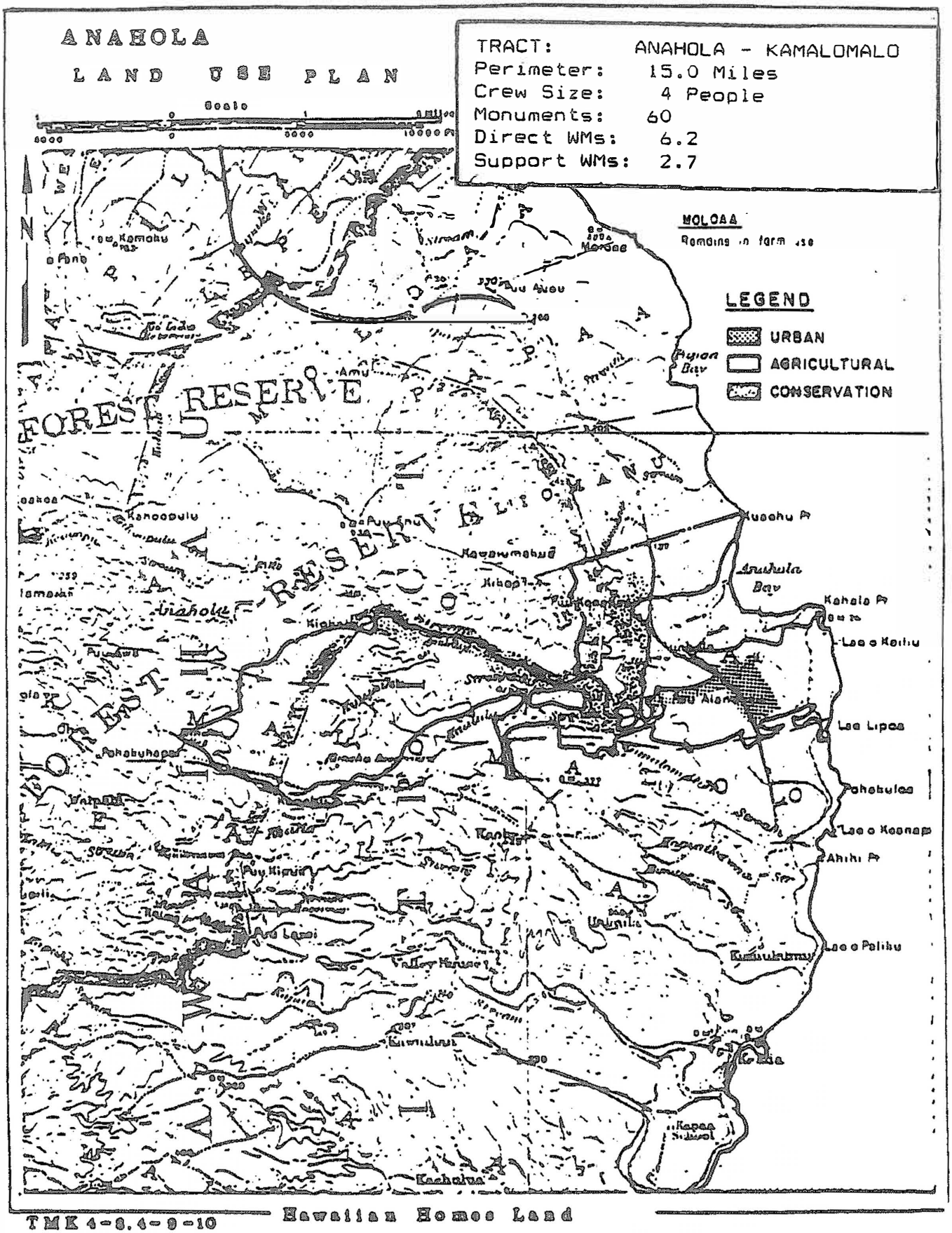
LEGEND

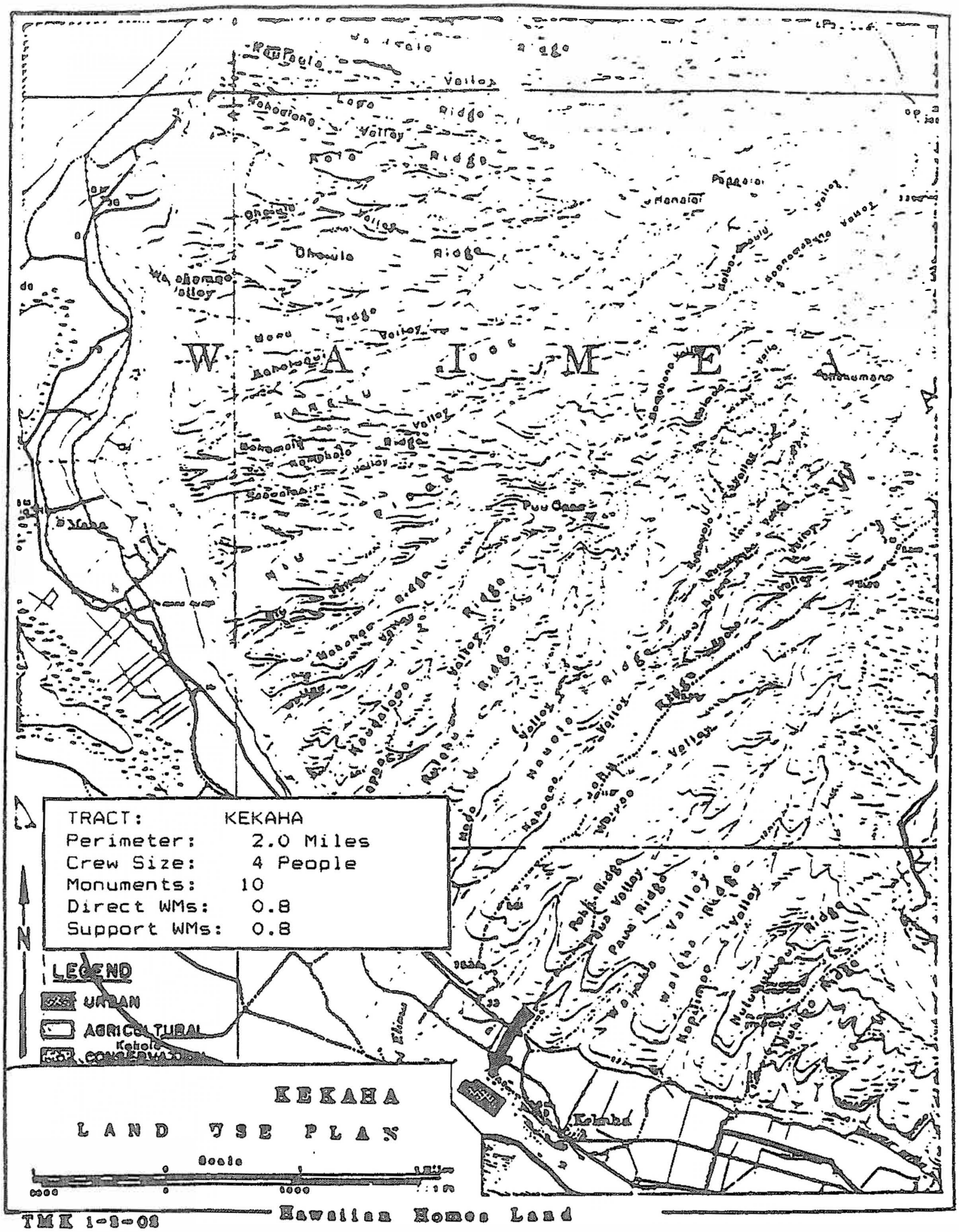


Compiled by John M. Dowa from all available data in the office and from private surveys


WAIMEA
Control soil erosion.
KEKAHA
Develop residential lots.
LEGEND
URBAN
AGRICULTURAL
CONSERVA
N
WAIMEA & KEKAHA
LAND USE PLAN
Scale
TRACT: WAIMEA
Perimeter: 20.0 Miles
Crew Size: 4 People
Monuments: 65
Direct WMs: 6.5
Support WMs: 2.8
Hawaiian Homes Land
TMK 1-2-02


MOLOAA
LAND USE PLAN
TRACT: MOLOAA
Perimeter: 5.0 Miles
Crew Size: 4 People
Monuments: 25
Direct WMs: 2.2
Support WMs: 1.3
LEGEND
URBAN
AGRICULTURAL
CONSERVATION
FOREST RESERVE
Hawaiian Homes Land
TMK 4-6-4-9-10


ANAHOLA
LAND USE PLAN
TRACT: ANAHOLA - KAMALOMALO
Perimeter: 15.0 Miles
Crew Size: 4 People
Monuments: 60
Direct WMs: 6.2
Support WMs: 2.7
MOLOAA
LEGEND
URBAN
AGRICULTURAL
CONSERVATION
FOREST RESERVE
Anahola Bay
Kehala
Lae o Keiliu
Lae Lipea
Lae o Keonap
Ahihi
Lae o Paliku
Kapaa
Kachalua
TMK 4-8.4-9-10
Hawaiian Homes Land


W A I M E A
TRACT: KEKAHA
Perimeter: 2.0 Miles
Crew Size: 4 People
Monuments: 10
Direct WMs: 0.8
Support WMs: 0.8
N
LEGEND
URBAN
AGRICULTURAL
KEKAHA
LAND USE PLAN
Scale
TMK 1-2-08
Hawaiian Homes Land

COST ANALYSIS SUMMARY

The cost estimates in this report were derived utilizing certain assumptions.

First, it is assumed that the project will be headquartered from the Island of Oahu, since the main office of the Hawaiian Home Commission and the State Land Surveyor's Office, where most of the records are kept, are located in Honolulu.

Second, it is assumed that the project will be comprised of the following staff:

1	Project Manager
3	Land Surveyors
1	Cartographic Technician
1	Clerk Typist

Surveying Technicians should be employed on a seasonal basis as needed. These technicians as well as the cartographic technician and clerk typist could possibly be native Hawaiian employees hired through the Hawaiian Home Commission.

Third, it is assumed that when crews are on other islands away from Oahu the employees would commute on monday mornings and friday evenings, and be in travel status during the week, only. This appears to be common practice on the islands.

Fourth, it is assumed that this group of personnel will be receiving administrative support (e.g. payroll, travel, procurement, etc.) from some other supporting agency.

In line with the above assumptions it is estimated that to complete the survey of the exterior boundaries of the 34 tracts, comprising the Hawaiian Home Lands, <u>will require four and one half (4.5) years.</u>

The following cost estimates are based on fiscal year 1990 dollar amounts relating to the average expenses for the Cadastral Survey Program at the California State Office within the Bureau of Land Management. Travel is figured utilizing the GSA rates as listed in the Federal Register dated January 19,1990.

If Bureau of Land Management professional land surveying personnel were to assist the Hawaiian Home Commission in performing any aspect of these surveys, relocation costs for these personnel have not been factored into the cost estimates. For each individual relocated from the mainland relocation could cost between $10,000 to $30,000, depending on whether the individual owned a residence that was to be sold.

HAWAIIAN HOME LANDS SURVEY - LABOR AND TRAVEL COST ESTIMATES

ISLAND	Field Work Months	Support Work Months	FY 1990 Average WM Cost	Leave Surcharge* and COLA**	Labor Cost	Person Days	1990 Per Diem Rate	Travel Cost	Work Weeks	Inter IS. Air Trans Cost
Hawaii	51.0	24.3	$3,770	$785	$342,999	1105.8	$99	$109,474	221	$13,270
Maui	8.5	5.0	$3,770	$785	$61,494	184.1	$135	$24,854	37	$2,209
Molokai	22.2	10.9	$3,770	$785	$150,774	480.8	$99	$47,599	96	$5,770
Oahu	15.9	8.7	$3,770	$785	$112,056	345.5	$126	$43,533	69	$0
Kauai	15.7	7.6	$3,770	$785	$106,134	339.7	$142	$48,237	68	$4,076
TOTALS	113.3	56.5			$773,456			$273,697		$25,325

*Leave surcharge was factored at 17%.
[Leave would cover annual, sick and holidays]
**COLA was factored at 22.5%.
[COLA = Cost of Living Adjustment]

Labor Cost	$773,456
Travel Cost	$273,697
Transportation	$25,325
TOTAL	$1,072,478

HHL SURVEY - OTHER MISC. COST ESTIMATES

ITEM	Quantity	FY 1990 Cost	Total	Start up Items
Surveying stakes *	500	$20	$10,000	
Survey Monuments	1315	$40	$52,600	
Total Stations	3	$13,000	$39,000	*
Peripherals	3	$1,500	$4,500	*
Field Computers	4	$4,000	$16,000	*
Plotter	1	$5,000	$5,000	*
Field vehicles 4x4	3	$18,000	$54,000	*
Fuel	3	$15,000	$45,000	
Maintenance	3	$3,000	$9,000	
Chainsaws	3	$400	$1,200	*
Power drivers	2	$500	$1,000	*
Field calculators	6	$250	$1,500	*
Misc. supplies	3	$5,000	$15,000	
Two way radios	6	$500	$3,000	*
Equipment transport **	3	$2,000	$6,000	
Equipment maintenance ***	5	$2,000	$10,000	
		TOTAL	$262,800	

Start up equipment cost $125,200

* [Surveying stakes are figured in lots of 50 to a bundle]

** [Equipment transport is to cover inter-island vehicle movement]

*** [Equipment maintenance is to maintain the major items for each year; e.g. computers, total stations, etc.]

SINGLE YEAR PROJECT ESTIMATE
Based on FY 1990 Expenditures
[Rounded to even thousands]
(To complete in a single year would require 15 crews and a greater amount of support items and cost)

LABOR and TRAVEL COST	$1,072,000
OTHER MISC. COSTS	$263,000
*ADMINISTRATIVE SURCHARGE	$266,000
GRAND TOTAL **	$1,601,000

* Administrative surcharge is an assessment to cover necessary administrative support such as payroll, procurement, employment processing, etc. (The BLM current average assessment is approximately 20 %)

PROJECT COST ESTIMATES
WHEN SPREAD OVER 4 1/2 YEARS
With 5% yearly inflation applied
and
*Based on FY 1990 cost structure
[Rounded to even thousands]

First Year	Start up equipment	$126,000	
	Other	$328,000	
	TOTAL		$454,000
Second Year			$345,000
Third Year			$363,000
Fourth Year			$382,000
Fifth Year (1/2 yr.)			$201,000
GRAND TOTAL **			$1,745,000

* [Cost structure for year when project does begin must be adjusted to cover inflation to current year]

** [An additional $120,000 for relocation of four land surveyors during the first year would be necessary if BLM personnel were utilized on this project]

Table 1

HAWAIIAN HOME LANDS
AND ACREAGES

TRACT	PERIMETER Miles	TRACT AREAS Acres	SHORELINE Miles
** Hawaii			
KAMAOA - PUUEO	22.0	11037.38	4.0
PUUKAPU	35.0	11978.92	0.0
KAWAIHAE	20.0	10142.87	0.0
PAUAHI	7.5	600.00	0.0
KAMOKU-KAPULENA-WAIKOLOA	20.0	4736.96	0.0
WAIMANU	6.4	200.00	0.4
NIENIE	18.0	7135.14	0.0
HUMUULA	53.0	49100.00	0.0
PANAEWA	11.0	2210.36	0.0
KEAUKAHA I	4.0	1671.27	0.3
KEAUKAHA II	8.0	0.00	2.0
PIIHONUA	15.0	7078.00	0.0
MAKUU - A	7.0	2000.00	0.0
MAKUU - B	5.0	0.00	0.2
** Subtotal **	231.9	107890.90	6.9
** Maui			
KAHIKINUI	27.0	22809.27	8.0
KULA	13.0	6111.95	0.0
PAUKUKALO	2.0	61.04	0.0
WAIEHU	1.0	12.46	0.0
** Subtotal **	43.0	28994.72	8.0
** Molokai			
PALAAU (APANA 1)	5.0	548.00	1.0
PALAAU (APANA 3)	2.5	234.00	0.0
HOOLEHUA - PALAAU	24.0	13038.06	7.0
KALAMAULA	16.5	5116.00	2.5
*KAPAAKEA (Contiguous)	12.5	1955.23	2.5
*KAMILOLOA (Contiguous)	0.0	2501.67	0.0
*MAKAKUPAIA (Contiguous)	0.0	726.00	0.0
KALAUPAPA	9.0	1247.00	3.0
** Subtotal **	69.5	25365.96	16.0

Table 1

HAWAIIAN HOME LANDS
AND ACREAGES

TRACT	PERIMETER Miles	TRACT AREAS Acres	SHORELINE Miles
** Oahu			
NANAKULI	10.5	2297.03	1.5
*LUALUALEI	18.0	1924.58	4.0
*WAIANAE	3.0	263.37	0.0
WAIMANALO	20.0	1965.12	2.0
PAPAKOLEA & KEWALO	3.0	136.46	0.0
SHAFTER FLATS (Airport)	1.0	13.82	0.0
** Subtotal **	55.5	6600.38	7.5
** Kauai			
WAIMEA	20.0	15061.00	0.0
MOLOAA	5.0	315.97	0.0
ANAHOLA - KAMALOMALO	15.0	3172.29	2.5
KEKAHA	2.0	19.95	0.0
** Subtotal **	42.0	18569.21	2.5
**	0.0	0.00	0.0
** Subtotal **	0.0	0.00	0.0
*** Total ***	441.9	187421.17	40.9

Table 2

HAWAIIAN HOME LANDS
SURVEY WORKMONTHS

TRACT	TRACT TYPE	SURVEY MILES	MONS NEEDED	CREW SIZE	FIELD WK MOS	SUPPORT WK MOS
** ISLAND Hawaii						
KAMAOA - PUUEO	Rural	22.0	65	3	3.5	1.7
PUUKAPU	Rural	35.0	70	3	4.4	1.5
KAWAIHAE	Rural/Urban	20.0	50	3	3.1	1.6
PAUAHI	Rural	7.5	30	3	1.4	1.0
KAMOKU-KAPULENA-WAIKOLOA	Rural	20.0	60	3	3.0	1.6
WAIMANU	Jungle	6.4	50	4	9.0	3.6
NIENIE	Rural	18.0	50	3	2.6	1.4
HUMUULA	Rural	53.0	90	3	6.8	2.9
PANAEWA	Urban	11.0	25	3	3.3	1.6
KEAUKAHA I	Urban/Resid	4.0	12	3	1.1	0.9
KEAUKAHA II	Urban/Resid	8.0	25	3	3.4	1.7
PIIHONUA	Rural	15.0	40	4	5.2	2.3
MAKUU - A	Urban/Resid	7.0	13	4	2.4	1.3
MAKUU - B	Urban/Resid	5.0	15	4	2.1	1.2
** Subtotal **		231.9	595		51.3	24.3
** ISLAND Maui						
KAHIKINUI	Rural	27.0	50	3	4.2	2.0
KULA	Rural	13.0	35	3	2.3	1.3
PAUKUKALO	Urban/Resid	2.0	15	3	1.2	0.9
WAIEHU	Urban/Resid	1.0	10	3	0.7	0.8
** Subtotal **		43.0	110		8.4	5.0
** ISLAND Molokai						
PALAAU (APANA 1)	Rural	5.0	15	3	3.3	1.7
PALAAU (APANA 3)	Rural	2.5	10	3	1.4	1.0
HOOLEHUA - PALAAU	Rural/Urban	24.0	50	3	3.4	1.7
KALAMAULA	Rural	16.5	40	3	2.5	1.4
*KAPAAKEA (Contiguous)	Rural	12.5	35	3	2.8	1.5
*KAMILOLOA (Contiguous)	Rural	0.0	0	0	0.0	0.0
*MAKAKUPAIA (Contiguous)	Rural	0.0	0	0	0.0	0.0
KALAUPAPA	Rural/Urban	9.0	35	4	8.8	3.6
** Subtotal **		69.5	185		22.2	10.9

Table 2

HAWAIIAN HOME LANDS
SURVEY WORKMONTHS

TRACT	TRACT TYPE	SURVEY MILES	MONS NEEDED	CREW SIZE	FIELD WK MOS	SUPPORT WK MOS
** ISLAND Oahu						
NANAKULI	Rural/Urban	10.5	40	3	3.3	1.7
*LUALUALEI	Urban/Rural	18.0	50	3	3.4	1.7
*WAIANAE	Urban/Resid	3.0	20	3	1.1	0.9
WAIMANALO	Urban/Rural	20.0	100	3	5.3	2.4
PAPAKOLEA & KEWALO	Urban/Resid	3.0	30	3	1.9	1.2
SHAFTER FLATS (Airport)	Industrial	1.0	25	3	1.0	0.8
** Subtotal **		55.5	265		16.0	8.7
** ISLAND Kauai						
WAIMEA	Rural	20.0	65	4	6.5	2.8
MOLOAA	Rural	5.0	25	4	2.2	1.3
ANAHOLA - KAMALOMALO	Rural/Urban	15.0	60	4	6.2	2.7
KEKAHA	Urban/Resid	2.0	10	4	0.8	0.8
** Subtotal **		42.0	160		15.7	7.6
** ISLAND		0.0	0	0	0.0	0.0
** Subtotal **		0.0	0		0.0	0.0
*** Total ***		441.9	1315		113.6	56.5

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