

JOHN WAIHEE
GOVERNOR OF HAWAII



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

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

MANABU TAGOMORI
Dan T. Kochi

AQUACULTURE DEVELOPMENT
PROGRAM
AQUATIC RESOURCES
CONSERVATION AND
ENVIRONMENTAL AFFAIRS
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
PROGRAM
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:OCEA:SKK

FILE NO.: MA-12/6/91-2542
180-Day Exp. Date: 6/3/92
DOC. NO.: 2420E

JAN 17 1992

Mr. B. G. Moynahan
Waikapu Mauka Partners
745 Fort Street, Suite 208
Honolulu, Hawaii 96813

Dear Mr. Moynahan:

SUBJECT: Notice of Acceptance and Environmental Determination of
your Conservation District Use Application

Your Conservation District Use Application for water system
improvements has been accepted for processing and is currently
being reviewed by concerned State and County agencies.

According to your application, you propose to construct a 0.5
million gallon water storage tank, a 1.0 million gallon open
irrigation reservoir, a spillway, pipeline, access easement, and
appurtenant structures on two parcels, identified by Tmk's 3-6-3: 1
(por.) and 3-6-2: 2 (por.), at Waikapu, Maui. Upon completion of
the improvements, the project site will be subdivided from the
larger parcels and dedicated to the County Department of Water
Supply.

After initial review of the application, we have determined that:

1. The proposed use is a conditional use within the Resource
subzone of the Conservation District according to
Administrative Rules, Title 13, Chapter 2, as amended;
2. A public hearing pursuant to Section 183-41, Hawaii
Revised Statutes (HRS), as amended, is required in that
the proposed use includes subdivision of Conservation
District land; and

Mr. Moynahan

-2-

File No.: MA-2542

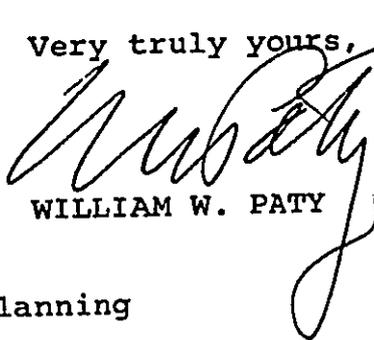
3. In conformance with Title 11, Chapter 200, of the Administrative Rules, a negative declaration was determined for the proposed action.

Please be advised that it is the applicant's responsibility to comply with the provisions of Section 205A-29(b), Hawaii Revised Statutes, on Interim Coastal Zone Management (Special Management Area) requirements. Board approval may be prohibited by law if Special Management Area requirements are not satisfied. Please consult the County of Maui, Department of Planning, regarding their requirements for the Special Management Area and furnish us with proof that the requirements have been met.

Your application will be placed on the agenda of the Board of Land and Natural Resources for their consideration after all reviews and evaluations of your proposal have been made.

If you have any questions regarding this notice or your application, please contact Don Horiuchi of our Office of Conservation and Environmental Affairs at 587-0377.

Very truly yours,



WILLIAM W. PATY

cc: Maui Board Member
County of Maui Dept. of Planning
DOH/OEQC/OHA/OSP/DOA

14

1992-02-08-MA-FBA-Waikapu Water System Imp.

CONSERVATION DISTRICT
USE APPLICATION

WAIKAPU WATER SYSTEM
IMPROVEMENTS

Waikapu, Maui, Hawaii

Wilson Okamoto & Associates
ENGINEERS · ARCHITECTS · PLANNERS



**CONSERVATION DISTRICT
USE APPLICATION**

**WAIKAPU WATER SYSTEM
IMPROVEMENTS**

Waikapu, Maui, Hawaii

**Prepared for:
Waikapu Mauka Partners**

**Prepared by:
Wilson Okamoto & Associates, Inc.**

December 1991

February 1983

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

DEPARTMENT MASTER APPLICATION FORM

FOR DLNR USE ONLY

Reviewed by _____
Date _____
Accepted by _____
Date _____
Docket/File No. _____
180-Day Exp. _____
EIS Required _____
PH Required _____
Board Approved _____
Disapproved _____
Well No. _____

(Print or Type)

I. LANDOWNER/WATER SOURCE OWNER
(If State land, to be filled
in by Government Agency in
control of property)

Name Wailuku Agribusiness
Company, Inc.
Address P. O. Box 1437
Wailuku, Hawaii 96793-1437

Telephone No. 242-6833

SIGNATURE B.G. Waiualau

Date OCT 17 1991

II. APPLICANT (Water Use, omit if applicant
is landowner)

Name Waikapu Mauka Partners

Address 745 Fort Street, Suite 208

Honolulu, Hawaii 96813

Telephone No. 522-9222

Interest in Property _____

(See letter attached)

(Indicate interest in property; submit
written evidence of this interest)

*SIGNATURE [Signature]

Date NOV - 6 1991

*If for a Corporation, Partnership,
Agency or Organization, must be signed
by an authorized officer.

III. TYPE OF PERMIT(S) APPLYING FOR

- () A. State Lands
- (X) B. Conservation District Use
- () C. Withdraw Water From A Ground
Water Control Area
- () D. Supply Water From A Ground
Water Control Area
- () E. Well Drilling/Modification

IV. WELL OR LAND PARCEL LOCATION REQUESTED

District Waikapu

Island Maui

County Maui

Tax Map Key 3-6-03:01 & 3-6-02:02

Area of Parcel 4,386.3 acres total
(Indicate in acres or
sq. ft.)

Term (if lease) Not applicable

February 1983

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

DEPARTMENT MASTER APPLICATION FORM

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District Waikapu

Island Maui

County Maui

Tax Map Key 3-6-03:01 & 3-6-02:02

Area of Parcel 4,386.3 acres total

(Indicate in acres or
sq. ft.)

Term (if lease) Not Applicable



October 24, 1991

Mr. William W. Paty, Chairperson
Board of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, HI 96809

Re: Conservation District Use Application (CDUA)
for Waikapu Mauka Water System Improvements,
Waikapu, Island of Maui

Dear Mr. Paty:

In regard to the above referenced CDUA, Wailuku Agribusiness Co., Inc., owner of tax map parcels 3-6-03:01 and a portion of 3-6-02:02, has authorized Waikapu Mauka Partners, Applicant, to develop the proposed water system improvements on a portion of the subject parcels as shown on the attached map.

Very truly yours,

WAILUKU AGRIBUSINESS CO., INC.

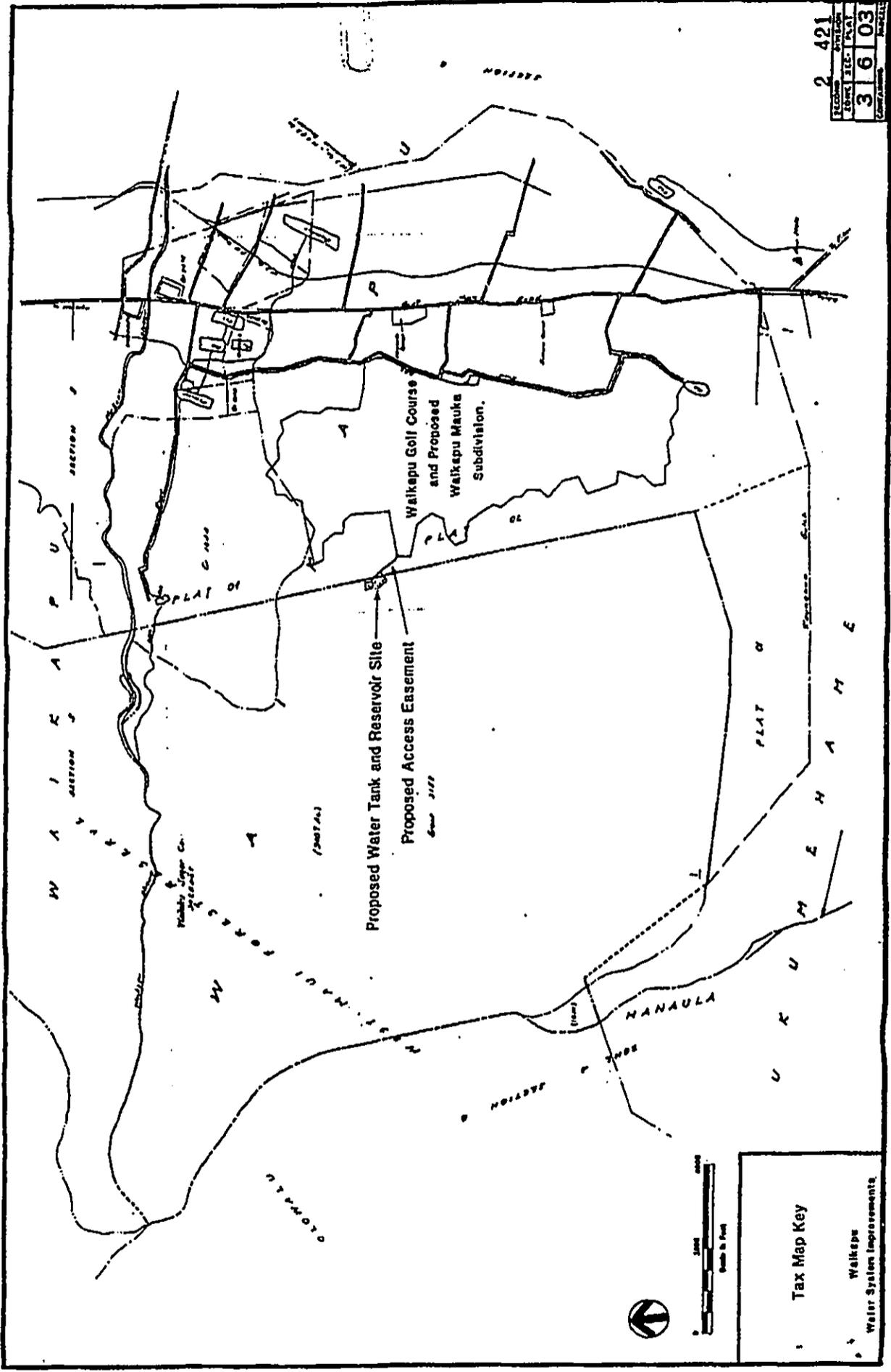
A handwritten signature in cursive script that reads 'B. G. Moynahan'.

B. G. Moynahan
Vice President

BGM/pah

cc Howard H. Hamamoto, Waikapu Mauka Partners
Stephen W. Knox, Wailuku Agribusiness Co.
David W. Blane, C. Brewer Properties

Attachment



SECTION	2	421
PLAT	3	603
DATE	MAY 1977	

Tax Map Key

- Waikapu
- Water System Improvements

W A I K A P U SECTION

Waikapu Golf Course
and Proposed
Waikapu Mauka
Subdivision.

Proposed Water Tank and Reservoir Site
Proposed Access Easement
June 1977



ENVIRONMENTAL ASSESSMENT
FOR
WAIKAPU WATER SYSTEM IMPROVEMENTS
WAIKAPU, MAUI, HAWAII

Prepared for:

WAIKAPU MAUKA PARTNERS

Prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.

December 1991

TABLE OF CONTENTS

	<u>Page No.</u>
I. INTRODUCTION	I-1
II. PROJECT DESCRIPTION	II-1
A. Proposed Improvements	II-1
B. Purpose and Need	II-4
C. Location and Ownership	II-4
D. Existing and Surrounding Uses	II-6
III. DESCRIPTION OF THE EXISTING ENVIRONMENT	III-1 ✓
A. Geology and Hydrology	III-1
B. Climate	III-1
C. Soils and Agricultural Productivity	III-1
D. Flora and Fauna	III-2
E. Archaeological and Historical Features	III-2
F. Air and Noise Quality	III-4 -
G. Population	III-4
H. Economy	III-4
I. Scenic Views	III-5
J. Roadways	III-5
K. Drainage	III-5
L. Water	III-5 ✓
IV. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS	IV-1
A. State Land Use Districts	IV-1
B. Maui County General Plan	IV-1
C. Wailuku-Kahului Community Plan	IV-4
V. POTENTIAL IMPACTS AND MITIGATIVE MEASURES	V-1
A. Short Term Construction-Related Impacts	V-1
1. Water Quality	V-1
2. Flora and Fauna	V-1
3. Archaeology	V-1
4. Noise	V-2
5. Air Quality	V-2
6. Traffic	V-2

Page No.

B. Potential Long Term Impacts V-2

- 1. Water Quality V-2
- 2. Flora and Fauna V-2
- 3. Noise V-3
- 4. Air Quality V-3
- 5. Visual V-3
- 6. Traffic V-3
- 7. Economy V-3

VI. ALTERNATIVES TO THE PROPOSED ACTION VI-1

REFERENCES

APPENDIX A - BIOLOGICAL SURVEY REPORT

APPENDIX B - ARCHAEOLOGICAL INVENTORY SURVEY

LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>	<u>Page No.</u>
1	Location Map	II-2
2	Proposed Waikapu Mauka Water Transmission System	II-3
3	Water Tank and Irrigation Reservoir Site Plan	II-5
4	State Land Use Districts	IV-2
5	Conservation District Subzones	IV-3
6	Wailuku-Kahului Community Plan	IV-5

I. INTRODUCTION

This Environmental Assessment documents the anticipated impacts of the proposed water system improvements on privately-owned land mauka of the proposed Waikapu Mauka Subdivision in Waikapu, island of Maui, Hawaii (Tax Map Key (TMK): 3-6-03: portion of 1 and TMK: 3-6-02: portion of 2). The water system improvements, consisting of a 0.5 million gallon (MG) water storage tank, a 1.0 MG open irrigation reservoir, a spillway, pipeline, fittings, access easement, and appurtenant facilities, are to be privately constructed and dedicated to the County of Maui, Department of Water Supply. The project site is to be subdivided from the larger parcels (TMKs: 3-6-03: 1 and 3-6-02: 2) prior to dedication of the water system improvements to the County Department of Water Supply. The project is intended to service the proposed Waikapu Mauka Subdivision, the two Waikapu Golf Course clubhouses and associated golf course facilities, and a proposed residential development in the immediate vicinity.

This Environmental Assessment (EA) has been prepared in accordance with Chapter 343, Hawaii Revised Statutes, and Chapter 11-200, Administrative Rules of the Department of Health. The preparation of this EA arises from the location of approximately 2 acres of the project site (including the water storage tank, irrigation reservoir, and 200 feet of the access easement) within the State Conservation District. A portion of the reservoir site (approximately 0.02 acre) and approximately 1,000 feet of the access easement are located within the State Agricultural District. The proposed action is not anticipated to generate any significant adverse impacts on the environment.

SUMMARY SHEET

Applicant: Waikapu Mauka Partners

Landowner: Wailuku Agribusiness Company, Inc. and Waikapu Mauka Partners

Accepting Agency: State of Hawaii Department of Land and Natural Resources

Project Location: Waikapu, Maui, Hawaii

Tax Map Key: 3-6-03: portion of 1 and 3-6-02: portion of 2

Land Area: Approximately 2.5 acres

State Land Use District: Conservation, Agricultural

Conservation Subzone: Resource

County General Plan: No designation

Community Plan: Agriculture

Zoning: No designation

Existing Use: Vacant undeveloped

Proposed Use: Water system improvements, including a 0.5 MG water storage tank, a 1.0 MG irrigation reservoir, access easement, and appurtenant facilities

Consulted Agencies: State Department of Land & Natural Resources, Office of Conservation and Environmental Affairs
Planning Department, County of Maui
Department of Water Supply, County of Maui

II. PROJECT DESCRIPTION

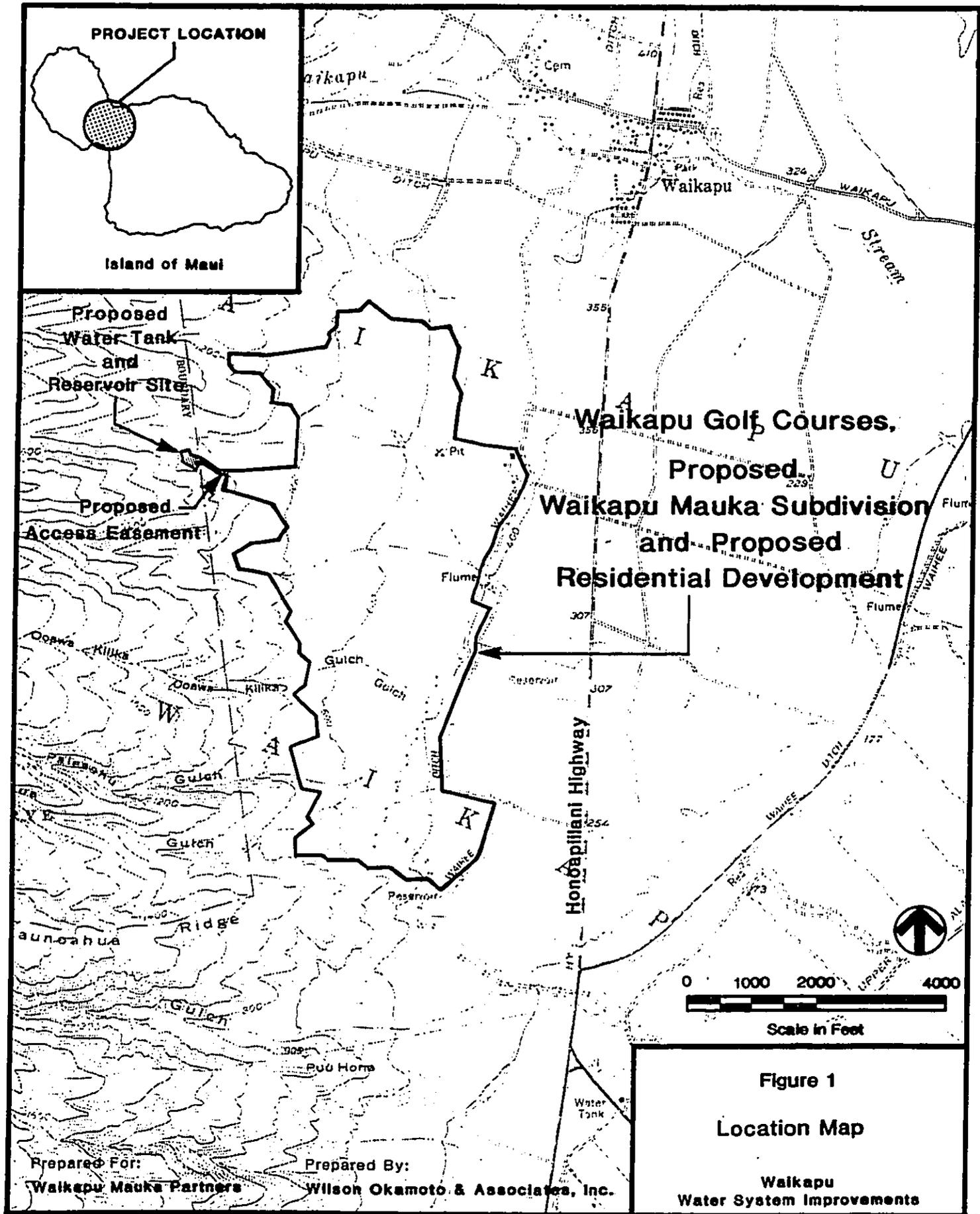
A. Proposed Improvements

The proposed project involves the construction of a 0.5 MG water storage tank, a 1.0 MG open irrigation reservoir, a 1,200-foot long access easement, and appurtenant facilities (appropriate fittings, appurtenances, a spillway, and transmission/distribution line) on privately-owned land mauka of the town of Waikapu, island of Maui (see Figure 1). The project area consists of the water tank, irrigation reservoir, and an access easement for a total of approximately 2.5 acres. Most of the 2.5-acre project site is in the State Conservation District, except for approximately 0.02 acre of the reservoir site and 1,000 feet of the access easement which are located in the State Agricultural District. The water system improvements will service the proposed Waikapu Mauka Subdivision, the two Waikapu Mauka Golf Course clubhouses and associated golf course facilities, and a proposed residential development in the immediate vicinity.

The 0.5 MG water storage tank will be situated at about the 1,077-foot elevation, west of the proposed Waikapu Mauka Subdivision (see Figure 2). The reinforced concrete tank will be 21 feet high and 70 feet in diameter. A 12-foot wide paved access easement to the storage tank site and a 10-foot wide perimeter road around the tank will be constructed for maintenance vehicles and personnel. The water tank will be surrounded by a 6-foot high chain link fence secured by a double-swing gate. Landscaping will be provided around the site for erosion control purposes.

Water for the proposed water storage tank is presently stored in a 3.0 MG tank located in Waiale. Water from this tank is pumped up to a 0.3 MG tank located northeast of the project site which serves the Wailuku Heights Subdivision. A proposed 12-inch transmission main will connect to an existing 8-inch water line in the Wailuku Heights Subdivision to convey water approximately 10,900 feet, through the proposed Waikapu Mauka Subdivision's roadways, to the proposed 0.5 MG water tank.

The 1.0 MG irrigation reservoir will be an open, lined pond located at the 1,030-foot base elevation adjacent and southeast of the proposed 0.5 MG water storage tank (see Figure 2). Water for the reservoir will be drawn from Waihee Ditch located approximately 1 mile east, and will be transported to the reservoir via a 12-inch transmission main. A 24-inch spillway will be constructed within the southwest portion of the reservoir to direct any potential overflow of water into natural drainage courses. Landscaping will be provided around the reservoir for erosion control purposes.



**OVERSIZED
DRAWING/MAP**

**PLEASE SEE
35MM ROLL**

0087 J

All mains will be sized to provide adequate carrying capacity and maintain pressure during peak consumptive periods. The transmission and distribution mains, access easement, and all water facilities are to be constructed according to the standards set forth by the County's Department of Water Supply, and shall be dedicated to the Department upon completion. The County Department of Water Supply requires the project site be subdivided from the larger parcels prior to dedication of the water system improvements. The project site is to be subdivided from the larger parcels (TMKs: 3-6-03: 1 and 3-6-02: 2) in order to be dedicated to the Department. Since the majority of the project site is located in the State Conservation District, the subdivision must first be approved through a Conservation District Use Application by the State Board of Land and Natural Resources. A site plan for the proposed water tank and irrigation reservoir is depicted in Figure 3.

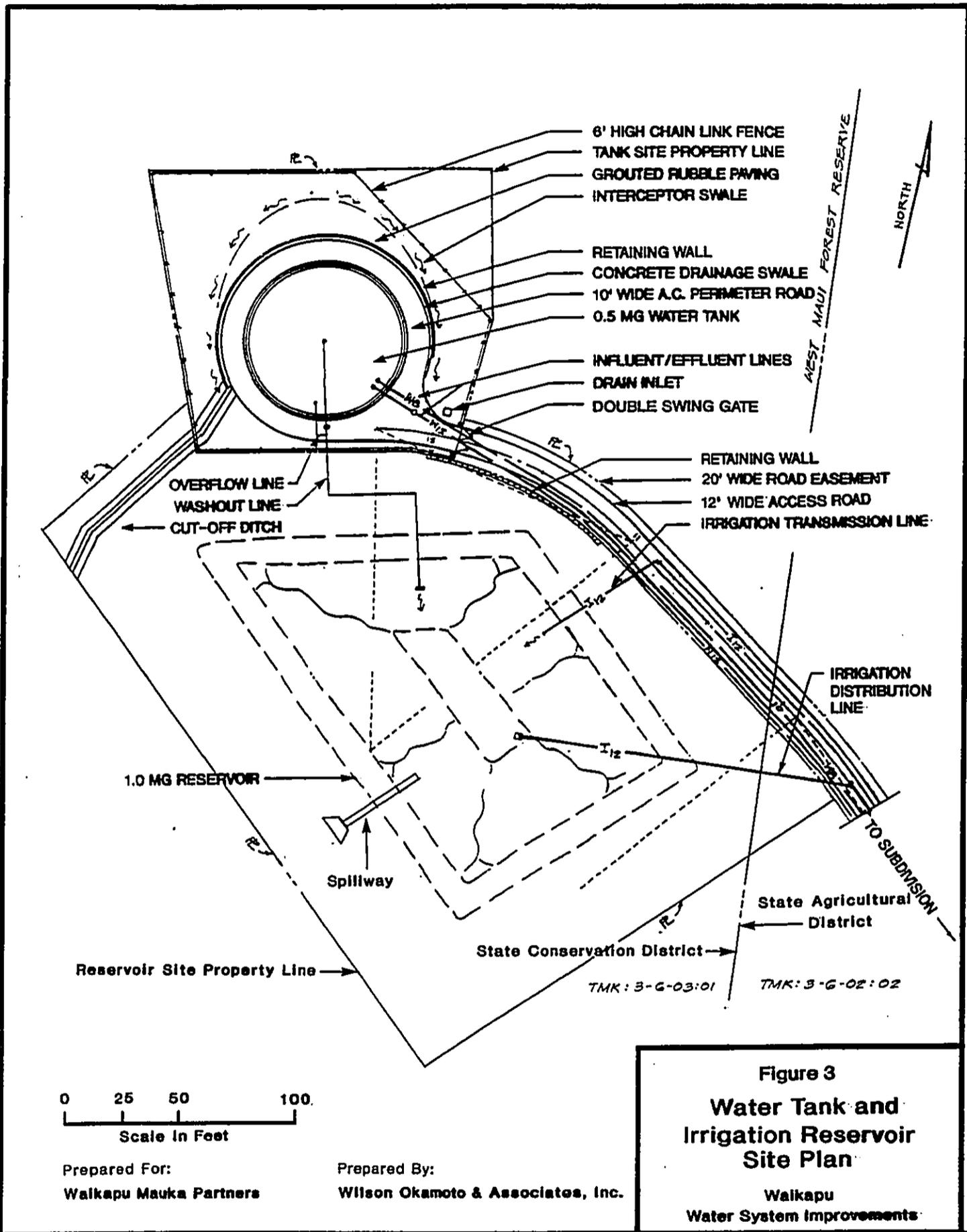
B. Purpose and Need

The proposed 0.5 MG water storage tank is intended to provide domestic and fire protection service to the proposed Waikapu Mauka Subdivision, the two Waikapu Mauka Golf Course clubhouses and associated facilities, and the proposed residential development where no water conveyance system presently exists. The proposed 1.0 MG irrigation reservoir will provide irrigation water for the Waikapu Mauka Subdivision which will consist of approximately 88 lots situated on about 213 acres and the proposed residential development which will be situated on approximately 70 acres. The Waikapu Mauka Subdivision and golf course clubhouses and associated facilities to be serviced by the proposed project are part of the entire Waikapu Mauka development which encompasses approximately 552 acres.

When fully implemented and integrated with the existing County water system, the proposed improvements will provide further assurance of adequate water supply for increased domestic needs and fire protection throughout the entire system. Reservoir storage minimizes fluctuations in water pressure, provides water for emergencies, and helps to meet peak consumption demand. Reservoir facilities also allow water supply to proceed at stabilized rates rather than in response to consumption demand. Water stored during periods of low demand may then be utilized during peak demand anywhere in the system.

C. Location and Ownership

The project site lies in the rural and thinly populated Waikapu District on the west side of the Central Maui Valley. It is approximately 1.2 miles west of Honoapiilani Highway and 1.6 miles southwest of the town of Waikapu. The project site occupies a portion of Tax Map Keys 3-6-03: 1 and 3-6-02: 2. The



majority of the project site is owned in fee by Wailuku Agribusiness Company, Inc. (TMKs: 3-6-03: portion of 1 and 3-6-02: portion of 2), except for approximately 300 feet of the easternmost portion of the access easement which is owned in fee by Waikapu Mauka Partners (TMK: 3-6-02: portion of 2).

D. Existing and Surrounding Uses

The project area is currently undeveloped and is underlain by Rough broken land soil. The area vegetation consists primarily of koa-haole with an understory of vegetative mixed grasses common to climates in Central Maui. West of the project site, surrounding the water tank and irrigation reservoir boundaries, is the West Maui Forest Reserve. East of the project site are the two recently developed Waikapu Golf Courses, the proposed 88-lot Waikapu Mauka Subdivision, and Maui Tropical Plantation. Further east of the golf courses, the land is cultivated for agricultural production by Wailuku Agribusiness Company, Inc.

III. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. Geology and Hydrology

The island of Maui is composed of two volcanic mountains; the older West Maui Volcano, and the younger Haleakala Volcano. These two dormant shield volcanoes are linked by a broad plain which formed when lava flows from Mount Haleakala joined the West Maui Mountains landmass. The project site is situated just above this broad plain near the foot of the West Maui Mountains, on lavas of the Wailuku volcanic series. The plain below the project site is composed primarily of older alluvium which was deposited during a series of fluctuations in sea level. It has been eroded in places by stream action which has deposited sand, silt, and gravel at the bases of the alluvial fans.

The four principal groundwater sources on Maui are fresh basal water, brackish basal water, dike-confined water, and perched water. The Central Maui area is supplied basal groundwater from the Iao aquifer system, one of four systems which comprise the Wailuku aquifer sector. None of the other systems, including the Waikapu aquifer system which encompasses the project area, presently have developed water sources. The entire Wailuku/Waikapu area is currently served by the Iao aquifer system through four water sources; the Mokuahau wells, Waiehu wells, Iao Intake Tunnel and Kepaniwai wells, and the Central Maui Joint Venture wells.

B. Climate

Maui's climate varies according to altitude with climatic conditions influenced by leeward/windward locations. Lowland areas tend to have a semi-tropical climate, while higher elevations are characterized by temperate climates. The climate of the Waikapu area is typically sunny and dry. Mean annual rainfall ranges between 10 and 30 inches for elevations up to 750 feet above sea level. Prevailing winds are the northeasterly tradewinds which generally blow between 13 to 24 miles per hour. Temperatures average about 70°F in the coolest month and 78°F in the warmest month, depending on elevation.

C. Soils and Agricultural Productivity

The Land Study Bureau of the University of Hawaii classifies soil on the property as E98, or soil which is well-drained, rocky, and unsuitable for agricultural tilling. The U.S. Department of Agriculture Soil Conservation Service's "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai" identifies the soil on the property as Rough broken land (rRR). Soil of this type consists of very steep land on mountainsides which is broken by numerous

intermittent drainage channels. Slope is generally 40 to 70 percent. Runoff is rapid and geologic erosion is active. Soils vary between 20 and 60 inches in depth over soft weathered rock. In most places some weathered rock fragments are mixed with the soil material. Small areas of rock outcrop, stones, and soil slips are common. This land type is typically used for watershed and wildlife habitat, or for pasture and woodland in places.

D. Flora and Fauna

A botanical study of the project area was undertaken by Botanical Consultants in May 1991. The study is included as Appendix A and is summarized below.

Two vegetation types are present along the proposed road easement and on the proposed tank site; wiliwili/mixed introduced trees, and koa-haole/mixed grasses. Along most of the access easement the vegetation is of the first type, consisting of about sixty percent native wiliwili trees and forty percent planted silk oaks, ironwoods, and kiawe trees. The ground layer here is mostly four o'clock plants and vegetative grasses.

After this point, the big trees drop out and vegetation at the tank and reservoir site becomes a closed canopy of koa-haole/mixed grasses. Sourgrass (*Digitaria insularis*) encompasses about half of the understory vegetation, with a vegetative species of *Panicum* comprising the rest. Other common grass species are hairy abutilon (*Abutilon grandifolia*) and sacramento bur (*Triumfetta semitriloba*). None of the plants identified during the survey is a proposed or listed threatened or endangered species:

An ornithological survey of the project area was also conducted in conjunction with the botanical survey (see Appendix A). Seven species of birds were found along the proposed access easement and on the proposed tank and reservoir site. They included the Japanese white eye (*Zosterops japonicus*), house sparrow (*Passer domesticus*), Eurasian skylark (*Alauda arvensis*), warbling silverbill (*Lonchura malabarica*), house finch (*Carpodacus mexicanus*), and spotted dove (*Streptopelia chinensis*). No threatened or endangered species were found during the survey.

E. Archaeological and Historical Resources

An inventory survey and subsurface archaeological testing of the project area was conducted by Archaeological Consultants of Hawaii in June 1991 and September 1991. A total of four archaeological features were identified within the project site during the survey. The archaeological study is included as Appendix B and is summarized below.

The archaeological survey revealed one multicomponent residential feature within the central portion of the project site. The feature (Feature A) consists of an upper level of a flat soil surface partially surrounded by a box C-shape, and a lower level surrounded by an enclosure. The enclosure is characterized by stonefilled walls sufficiently wide to have provided living or working space. The lower enclosure area is connected to the upper C-shape area by what appears to be a deteriorated ramp or stair. The appearance of two unaligned wall faces along the upslope inner wall of the enclosure suggests a break in this wall which may have been created to facilitate movement between the enclosure and the C-shape. A test unit placed in the platform surface of the northern enclosure wall yielded charcoal, kukui (carbonized and uncarbonized), coral, and a scant amount of shell, all within a soil/rockmatrix which extended from 25 cm below the surface of the unit to a depth of 80 cm below datum. Below this point, excavation to 103 cm below datum revealed no cultural material. The box C-shape is characterized by an 80 cm wide corefill wall abutted against a large boulder on the south end. The north end of the C-shape consists of inner and outer walls ranging in height from 41 to 54 cm on the outside and 80 to 85 cm on the inside. No surface artifacts were located, although surface coral was present. In addition, a test unit placed in the northwest corner of the C-shape yielded charcoal, coral, kukui, and a single piece of cowrie shell.

The residential feature is consistent with the type of feature and component groupings previously found at Waikapu during archaeological surveys by Kennedy (1990) and Haun (1989). Residential groupings in these studies were generally comprised of an enclosure/C-shape cluster with associated agricultural features. The residential feature is significant for its information value, and continued excavation at this site in the form of data recovery will be necessary to further establish function and define unique characteristics beyond the preliminary interpretations suggested by morphology and test excavations. The presence of upright stones and coral may indicate religious associations with this feature.

The archaeological survey also revealed three dispersed groupings of agricultural features. One feature (Feature B) located at the northern portion of the project site was identified as a 2-meter long agricultural terrace consisting of a soil-backed, single course stone alignment found in association with four small clearing mounds. The agricultural feature was in fair condition. Another agricultural feature (Feature D) was located 18 meters east of Feature A and consisted of two small mounds constructed from 5 to 21 cm wide angular stones stacked 2 to 3 feet high, to an average height of 40 cm above ground. Another agricultural feature (Feature E) consisted of a 225 square meter modified rubble field located 50 meters east and 13 meters south of Feature A. This feature may have provided building materials, or when modified, sheltered agricultural space. Feature E is comprised of rounded stones 40 to 60 cm wide, with

boulders up to 1 meter wide. Roughly circular soil floored areas are scattered throughout the rubble within an approximately 1.5 meter wide area.

The agricultural features are most likely associated with dryland farming, with their sparse occurrence suggesting that the majority of dryland agricultural practices at Waikapu were limited to the lower elevations. The agricultural features are significant for their information value; however, no further work is recommended for these features.

F. Air and Noise Quality

The ambient noise and air quality in the region is excellent due to the distance from highway traffic and agricultural/industrial uses, and due to the prevailing northeasterly tradewinds.

G. Population

The island of Maui is the third most populous in the State with a population of 88,100 in 1989. According to the Hawaii Department of Business and Economic Development (DBED) economic and demographic projections, Maui County's resident population is expected to increase by 50 percent to 145,200 by the year 2010, twice as fast as Oahu's 26 percent.

The Wailuku District of Maui County has experienced substantial growth since 1970, when resident population was 22,219. The population increased by 44.5 percent to 32,111 in 1980, and another 40.1 percent to 45,000 in 1989.

H. Economy

Maui County's economy is based on tourism and the construction and agricultural industries. In 1990, Maui County began planning infrastructure developments in response to increased urbanization and population growth which has occurred over the past several years. In real estate, Maui has the tightest condominium and the second tightest single-family home markets in the state. The County also had a persistent labor shortage in 1990.

In 1990, the visitor industry experienced a drop in visitors. The westbound visitor count through May 1990 decreased by 9 percent to 809,700 visitors. Eastbound visitors totaled 105,970 for the same period, leaving the County with a larger eastbound market than the Big Island or Kauai, but still a distant second to Oahu. Through May 1990, Maui's hotel occupancy rate was down marginally to 73 percent.

The construction industry experienced robust growth in 1990. Construction put-in-place rose by 46 percent to \$99 million through May. Private permits authorized through the same period decreased by 19 percent to \$117 million, and public contracts awarded through the same period were ahead by 35 percent to \$36 million.

Competition and late planting affected Maui's pineapple and sugar industries in 1989, but diversified agriculture has done well in the up-country area, particularly grape production.

I. Scenic Views

The project area as viewed from Honoapiilani Highway is dominated by the distant West Maui mountain range and expansive Central Maui valley. The project area itself is situated on a densely vegetated ridge of the West Maui mountain range and is visible from Honoapiilani Highway.

J. Roadways

Honoapiilani Highway, a two-lane highway, provides the major transit route through the Central Maui area. From Kahului, the Central Maui area is also accessed via Kuihelani Highway and Waiko Road which runs in an east to west direction.

Access to the project site is currently via a foot trail which extends from the mauka end of the proposed access road in the Waikapu Mauka Subdivision.

K. Drainage

According to the Detailed Land Classification--Island of Maui, soils on the project site are well-drained, with a slope of about 20 percent. The project site is located on a mountainside which is broken by several intermittent drainage channels which are directed through the Waikapu Mauka Golf Course for a series of water features. According to the Flood Insurance Rate Map prepared by the Federal Emergency Management Agency, the property is within Zone C, determined to be "Areas of minimal flooding."

L. Water

Water for the proposed 0.5 MG water tank will come from the Wailuku Aquifer Sector which is comprised of four aquifer systems identified as the Iao, Kahakuloa, Waihee, and Waikapu aquifer systems. Of these aquifer systems, only the Iao aquifer system has developed groundwater sources, although future

wells are planned in the Waihee Aquifer System. The County groundwater sources in the Iao Aquifer System are listed below.

TABLE 1

IAO AQUIFER SYSTEM GROUNDWATER WITHDRAWALS
(Part of the Wailuku Aquifer Sector)

	24-Hour Pumping Capacity (MGD)	Average Daily Withdrawals (MGD)	1987 Total Withdrawals (MG)
Mokuhau Wells	14.0	5.8	2,116.9
Waiehu Wells	3.6	0.3	116.6
Iao Intake Tunnel Kepaniwai Wells	3.1	1.4	489.7
Central Maui Joint Venture Wells (Waihee Wells)	<u>13.4</u>	<u>7.6</u>	<u>2,791.8</u>
Totals	34.1	15.1	5,515.0

SOURCE: Technical Report Water Use and Development Plan, County of Maui, March 1990

Water for the proposed 0.5 MG storage tank will be provided by the Mokuhau wells located at elevation 358 feet. Water is currently piped through a system of 18- and 24-inch transmission lines to a 3.0 MG concrete tank located at Waiale Road at elevation 292 feet. The 3.0 MG tank provides service to Kahului and is the principal water source for the Wailuku Heights development and the Waikapu area. Water from the 3.0 MG tank is pumped up to a 0.3 MG tank located northeast of the project site which serves the Wailuku Heights Subdivision. A proposed 12-inch transmission main will connect to an existing 8-inch water line in the Wailuku Heights Subdivision to convey water approximately 10,900 feet, through the proposed Waikapu Mauka Subdivision's roadways, to the proposed 0.5 MG water tank.

Water for the 1.0 MG irrigation reservoir will be drawn from Waihee Ditch located immediately east of the Waikapu Golf Courses and will be transported via a 12-inch transmission main. Waihee Ditch has a carrying capacity of approximately 20.0 MGD. The separate system for irrigation water supply will minimize the need for potable water from the County system.

IV. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

A. State Land Use Districts

Pursuant to Chapter 205, Hawaii Revised Statutes (HRS), all lands in the State of Hawaii are classified into one of four land use designations: Urban, Rural, Agricultural, and Conservation. The major portion of the proposed water system improvements, including the water tank and reservoir site and portion of the access easement, are located within land designated Conservation with a subzone designation of "Resource" (see Figures 4 and 5). The Resource subzone includes land valued for one or another type of resource, whether or not it is currently being used. Included are parklands, areas deemed suitable for logging, recreational sites, and submerged lands not in any other subzone. The proposed use is considered a "conditional use", as it is not permitted in this subzone, and therefore requires a Conservation District Use Permit from the Board of Land and Natural Resources. The remainder of the reservoir site (approximately 0.02 acre) and approximately 1,000 feet of the access easement are located within land designated Agricultural.

B. Maui County General Plan

The Maui County General Plan is a narrative document which sets forth strategies to shape the County's physical, social and economic environments. These strategies are expressed as statements of objectives and policies which are used by the county in decision-making and in developing and implementing plans and programs.

The following objective and policy(ies) concern(s) water supply within the County:

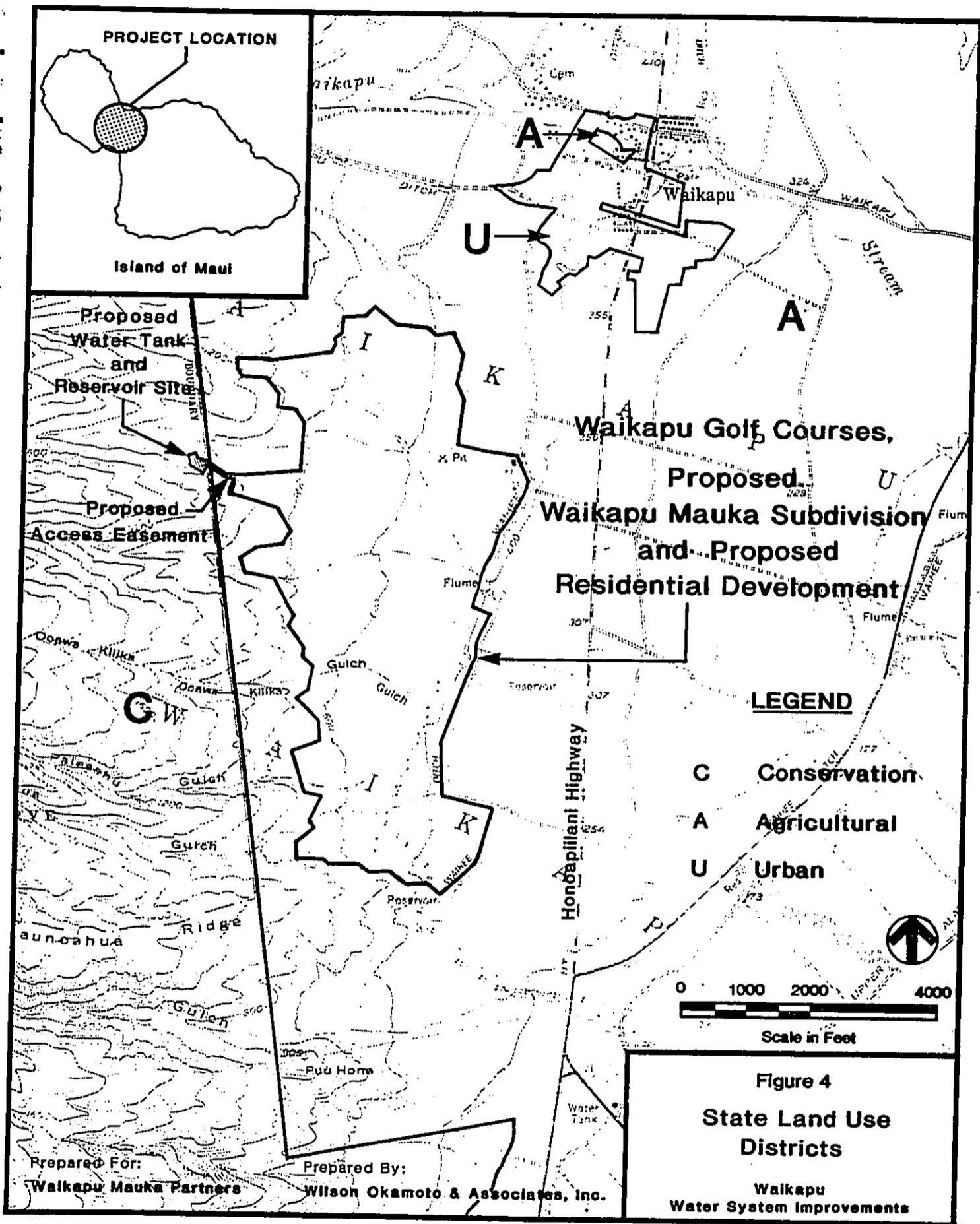
OBJECTIVE:

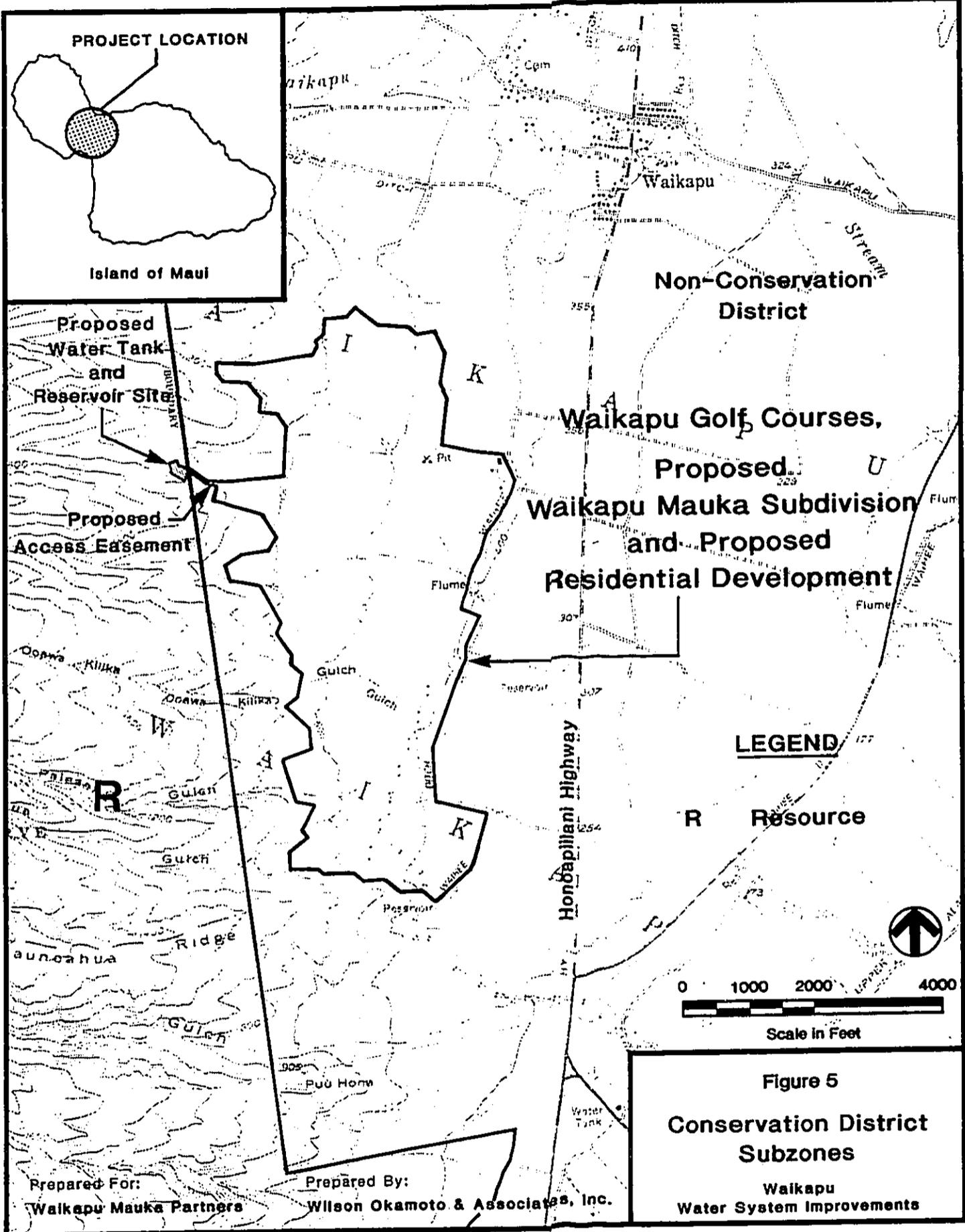
- (1). To provide an adequate supply of domestic and irrigation water to meet the needs of our people.

POLICIES:

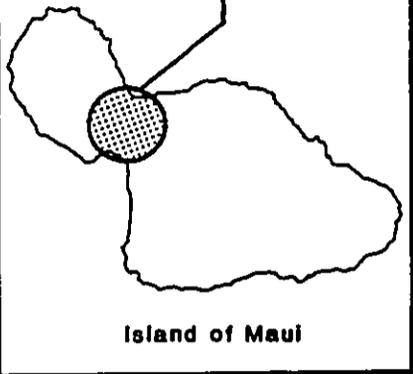
- (7). Encourage cost sharing programs with private developers in the expansion of our water supply.

The proposed Waikapu water system improvements will serve the domestic, irrigation, and fire protection needs of the Waikapu Mauka Subdivision and the proposed residential development. The proposed improvements will be privately





PROJECT LOCATION



Island of Maui

Proposed
Water Tank
and
Reservoir Site

Proposed
Access Easement

Non-Conservation
District

Waikapu Golf Courses,

Proposed
Waikapu Mauka Subdivision
and Proposed
Residential Development

LEGEND

R Resource



Figure 5

**Conservation District
Subzones**

Waikapu
Water System Improvements

Prepared For:
Waikapu Mauka Partners

Prepared By:
Wilson Okamoto & Associates, Inc.

funded and dedicated to the County's Department of Water Supply upon completion.

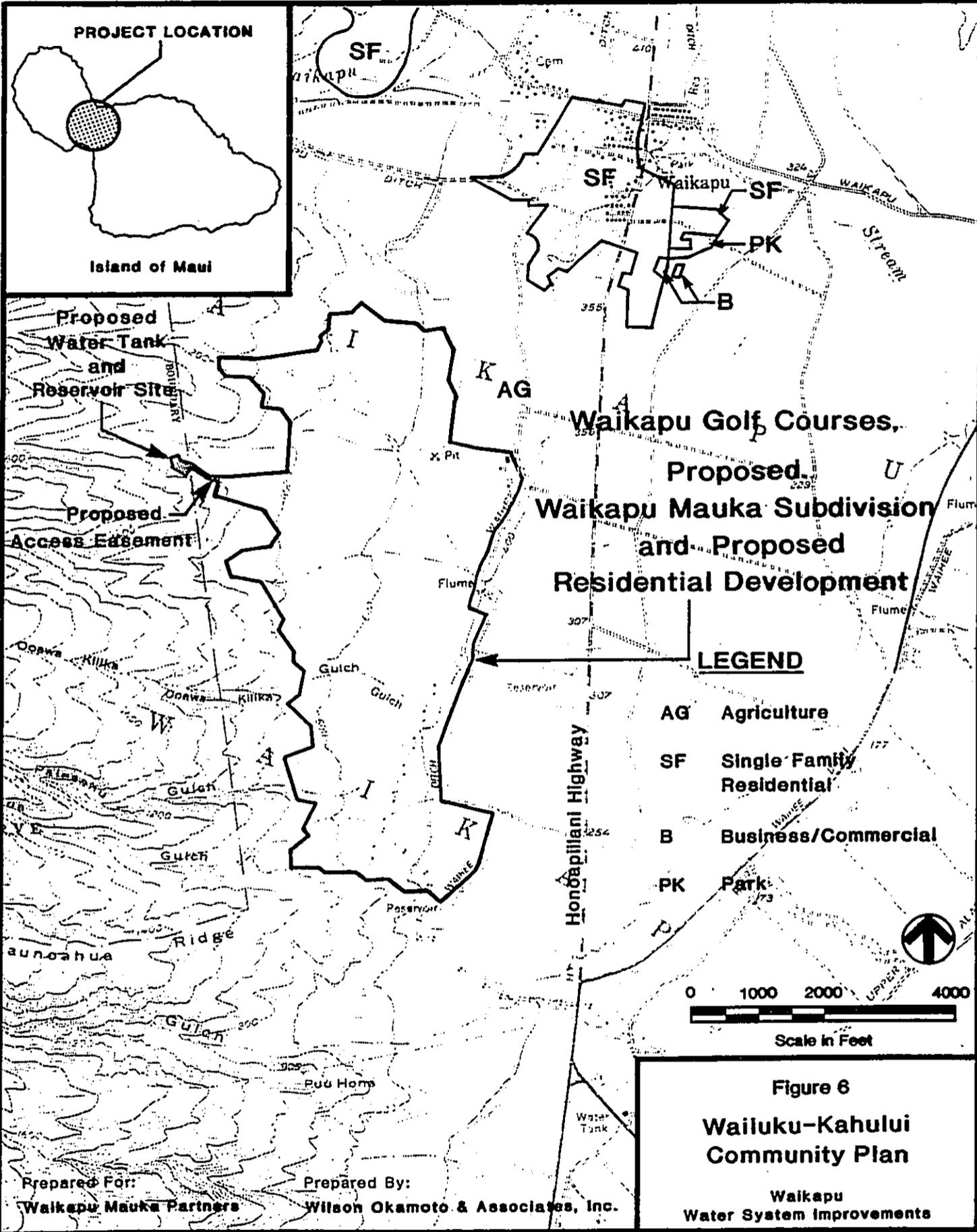
C. Wailuku-Kahului Community Plan

The Wailuku-Kahului Community Plan, adopted in October 1981, is the primary decision making tool used by the County for implementing the County General Plan. The Wailuku-Kahului Community Plan land use map designates the project site as Agriculture (see Figure 6). This use indicates areas for agricultural activity which would be in keeping with the economic base of the County.

The plan elements are organized according to the objectives and policies outlined in the General Plan and contain summary discussions and recommendations. In the Wailuku-Kahului Community Plan, under Support Systems: Transportation & Utilities, the following recommendation is made regarding water distribution:

"Coordinate water system improvement plans with growth areas to ensure adequate supply and a program to replace deteriorating portions of the distribution system. Future growth should be phased to be in concert with the service capacity of the water system".

The proposed water system improvements are being implemented as part of the proposed Waikapu Mauka Subdivision, the two Waikapu Golf Course clubhouses and associated golf course facilities, and the proposed residential development in order to ensure an adequate supply of potable and irrigation water for these developments.



V. POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

A. Short-Term Construction Related Impacts

Short-term impacts are those associated with construction activities such as removing vegetation, grading and excavating, and actual construction. Short-term impacts associated with these construction activities include potential impacts on water quality, flora and fauna, archaeological resources, noise, air quality, and traffic.

1. Water Quality

Clearing and grading operations at the project site will temporarily expose the underlying soil to rain until the water tank and irrigation reservoir are built and landscaping is planted. Groundcover will be planted for erosion control as soon as possible after grading. The required County grading standards will be complied with to minimize erosion potential during construction of the water tank, irrigation reservoir, and access road.

2. Flora and Fauna

Earthwork operations will remove vegetative cover consisting mostly of introduced plants. These include eucalyptus, silk oak ironwoods, and kiawe trees in the high canopy, and a ground layer of mostly four o'clock plants and vegetative grasses. Pockets of native wiliwili trees are also present at the project site. There are no known rare or endangered species of flora or fauna located in the immediate vicinity of the water tank and reservoir site (see Appendix A).

3. Archaeology

The inventory survey and subsurface archaeological testing of the project site noted the presence of one multicomponent residential feature and three dispersed groupings of agricultural features. It was recommended for the residential feature that continued excavation at this site in the form of data recovery will be necessary to further establish function and define unique characteristics. The agricultural features are significant for their information value, however, no further work was recommended for these features. The State Historic Preservation Office will be consulted to determine that sufficient information on the project site has been collected and recorded to allow the project to proceed in this area (see Appendix B).

4. Noise

A temporary increase in local noise levels can be anticipated during construction of the facilities. Sources of noise will include construction vehicles and equipment operating to, from and on site. Noise impacts will be mitigated to the greatest extent possible through the use of mufflers on construction equipment and daytime construction periods.

Adequate distance separates the proposed water tank and reservoir site from the nearest noise sensitive neighbors. The nearest residences are located approximately 1.6 miles northeast of the site.

5. Air Quality

Ambient air quality is expected to temporarily decline in the immediate vicinity during construction due to dust and erosion from construction vehicles and equipment. Dust control measures such as water sprinkling and spraying will be implemented if necessary.

6. Traffic

Impacts of construction upon traffic are not anticipated to be significant. Construction equipment will enter and exit the site via a construction access road traversing through the Waikapu Golf Course site and proposed Waikapu Mauka Subdivision from Honoapiilani Highway.

B. Potential Long-Term Impacts

Once the water system improvements have been constructed, long-term impacts are those associated with the operation and maintenance of the facilities. They include impacts on water quality, flora and fauna, noise, scenic resources, traffic, and the local economy.

1. Water Quality

The proposed water system improvements are anticipated to increase rainfall runoff very slightly by increasing the building area and pavement. Runoff from the site will be accommodated by sheetflow patterns.

2. Flora and Fauna

The water system improvements will displace existing flora and fauna, but landscaping will restore some of the vegetative cover and naturally

occurring flora will rejuvenate. There are no threatened or endangered species in the area.

3. Noise

Long-term noise quality will not be significantly impacted by the proposed water tank and reservoir. No adverse impacts are anticipated on any current or future noise-sensitive uses.

4. Air Quality

Long-term air quality will not be affected by the proposed water tank and reservoir.

5. Visual

Minimal visual impacts may result from the construction of the 21-foot high water tank. From Honoapiilani Highway, the view will primarily encompass the two Waikapu golf courses and, once developed, the Waikapu Mauka Subdivision residences between this green-belt and the ridges of the West Maui mountains. The water tank may slightly impact the mauka view from some residences, but the landscaping and natural plant growth following construction will obscure the water tank from view.

6. Traffic

Traffic will not be affected by the proposed improvements. The water tank and reservoir should largely be self-sustaining, with the exception of the need for personnel to make periodic checks of water levels and water quality, and perform routine groundskeeping and maintenance work.

7. Economy

Maintenance of the water tank and reservoir will increase manpower requirements in the long run.

VI. ALTERNATIVES TO THE PROPOSED ACTION

Potential alternatives to the proposed action include direct distribution of water from the existing 0.3 MG water tank in the Wailuku Heights Subdivision to the Waikapu Mauka Subdivision, the Waikapu Golf Course clubhouses and associated facilities, and the proposed residential development; utilizing domestic water for irrigation purposes; utilizing a pressurized line from Waihee Ditch to transport irrigation water directly to the Waikapu Mauka Subdivision and the proposed residential development; and the "no action" alternative.

Under the first alternative, domestic water would be gravity fed from the existing 0.3 MG tank in the Wailuku Heights Subdivision directly to the Waikapu Mauka Subdivision, the Waikapu Golf Course clubhouses and associated facilities, and the proposed residential development. As the proposed 0.5 MG water storage tank would not be constructed, this option would not require a Conservation District Use Permit for the tank. This alternative, however, will result in inadequate supplies of water for fire protection and peak consumption demand. It would also result in a less reliable water source in the event of failure of the transmission waterline.

An alternative to the proposed 1.0 MG irrigation reservoir is to use water from the proposed 0.5 MG water tank for irrigation purposes. As the proposed 1.0 MG irrigation reservoir would not be constructed, this alternative would not require a Conservation District Use Permit for the reservoir. This alternative, however, is not favored by the County Department of Water Supply due to using potable water for irrigation purposes.

Another alternative to the proposed 1.0 MG irrigation reservoir is to utilize a pressurized line from Waihee Ditch to transport irrigation water directly to the Waikapu Mauka non-potable water transmission system. As the proposed 1.0 MG irrigation reservoir would not be constructed, this alternative would not require a Conservation District Use Permit for the reservoir. This alternative, however, is not favored because of the lack of reliability due to its dependence on mechanical devices which are prone to failure.

The "no action" alternative would result in no new water tank or irrigation reservoir. Under this alternative, the objective of supplying domestic and irrigation water to the proposed Waikapu Mauka Subdivision, the Waikapu Golf Course clubhouses and associated facilities, and the proposed residential development would not be achieved. The no action alternative is not a feasible option to the development of the proposed project.

REFERENCES

- Aotani & Associates, Inc. Wailuku-Kahului Community Plan. Prepared for the County of Maui. October 1981.
- Archaeological Consultants of Hawaii. Archaeological Inventory Report for the Proposed Waikapu Mauka Water Tank and Access Road Located at Waikapu, Island of Maui. July 1991, with Addendum November 1991.
- First Hawaiian Bank, Research Department. Economic Indicators--Maui County in 1990. July/August 1990.
- Funk, Evangeline J., Ph.D. Biological Survey Report for the Proposed Waikapu Mauka Water Tank Site and Access Road, Waikapu, Maui. May 1991.
- The General Plan of the County of Maui. June 24, 1980.
- Land Study Bureau, University of Hawaii. Detailed Land Classification -Island of Maui. L.S.B. Bulletin No. 7. May 1967.
- Stearns, Harold T. Geology of the State of Hawaii, Second Edition, Pacific Books, Publishers, Palo Alto California, 1966.
- State of Hawaii Department of Business and Economic Development. The State of Hawaii Data Book. November 1990.
- Technical Report - Water Use and Development Plan - County of Maui. 1989.
- United States Department of Agriculture, Soil Conservation Service. Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. University of Hawaii Agricultural Experiment Station, 1972.
- Wilson Okamoto & Associates, Inc. Conservation District Use Application, Namahana Farms Water System Improvements, Kilauea, Kauai. February 1991.
- Wilson Okamoto & Associates, Inc. Waikapu Heights Development Study, Waikapu, Maui, Hawaii. Prepared for H. Hamamoto. August 1988.
- Wilson Okamoto & Associates, Inc. Waikapu-Wailuku Water Study. May 1991, as supplemented September 1991.

APPENDIX A
BIOLOGICAL SURVEY REPORT

BIOLOGICAL SURVEY REPORT FOR THE PROPOSED WAIKAPU MAUKA WATER TANK
SITE AND ACCESS ROAD, WAIKAPU, MAUI

for
Wilson Okamoto and Associates
1150 South King Street
Honolulu, Hawaii 96814

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

May 1991

TABLE OF CONTENTS

BOTANICAL REPORT

	Page
Introduction.....	1
Methods.....	1
Vegetation types.....	1
Figure 1. Approximate Location of the Study Site	2
Native Plants.....	3
Endangered Species.....	3
Recommendations and Conclusions.....	3
Species List.....	4
Bibliography.....	7

ORNITHOLOGICAL REPORT

Introduction.....	8
Methods.....	8
Avain Habitats.....	8
Anotated Species List.....	9
Bibliography.....	11

INTRODUCTION

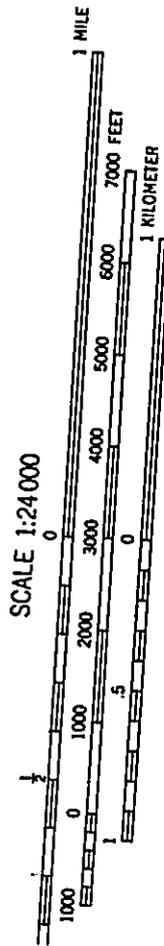
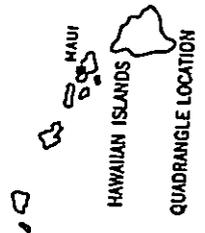
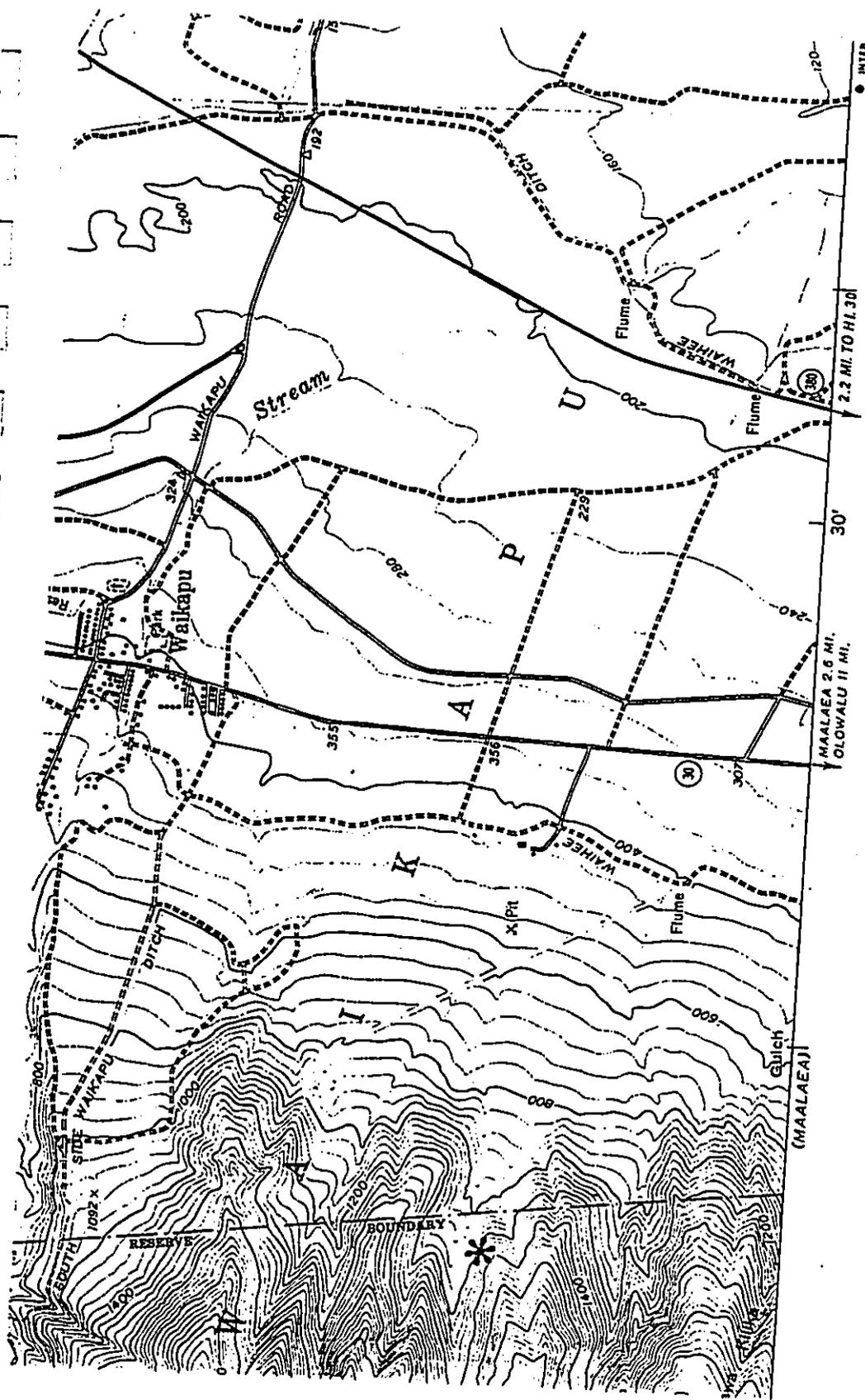
The proposed water storage tank site access road easement for the Waikapu Mauka Subdivision and Golf Course are located on the lower southeastern slopes of the West Maui Mountains (Figure 1). This part of the island was classed as Lower Forest Zone by Hillebrand (1888) and the B or Xerophytic Zone by Ripperton and Hosaka (1942). In more recent years, Gagne' and Cuddhy (1990) included the area in their Lowland Mesic Forest Zone where annual rainfall averages between 1,200 to 3,000 mm. Before the introduction of grazing animals, this area was probably covered with wiliwili trees and other summer deciduous plants. Today, May 1991, the vegetation of this part of the lowlands is mostly introduced.

METHODS

The walk through method was used to collect data on the existing vegetation of the site, to ascertain if endangered species are found in the area and to describe the present vegetation. A two man team of investigators covered the entire study site.

VEGETATION TYPES

Two vegetation types are present along the proposed road easement and on the proposed tank site. For the first 500 m of the road easement the vegetation is Wiliwili/Mixed Introduced Trees. The high canopy, 10 to 15 m, is about sixty percent native wiliwili trees (*Erythrina sandwicensis* Deg.) and the remaining forty percent is composed of planted *Eucalyptus* sp., silk oak (*Grevillea robusta* A. Cunn. ex R. Br.), ironwoods (*Casuarina equisetifolia* L.) and kiawe trees (*Prosopis pallida* Kunth). For the most part there is no subcanopy and the ground layer is mostly four o'clock plants (*Mirabilis jalapa* L.) and vegetative grasses.



CONTOUR INTERVAL 40 FEET
 DASHED LINES REPRESENT 20-FOOT CONTOURS
 DATUM IS MEAN SEA LEVEL
 DEPTH CURVES IN FEET - DATUM IS MEAN LOWER LOW WATER
 SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
 THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
 THE AVERAGE RANGE OF TIDE IS APPROXIMATELY 2 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
 BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
 A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Figure 1. Approximate Location of the Study Site.

In the last 250 m of the road easement the big trees drop out and the vegetation becomes a closed canopy of Koa-haole/Mixed Grasses from there to and including the proposed tank site. The koa-haole (*Leucaena leucocephala* (Lam.) de Wit) is 4 to 5 m in height and the understory is a dense mat of vegetative, mixed grasses. Sourgrass (*Digitaria insularis* (L.) Mez ex Ekman) made up about half of the understory vegetation and a vegetative species of *Panicum* made up most of the rest. Hairy abutilon (*Abutilon grandifolia* Willd.) and Sacramento bur (*Triumfetta semitriloba* Jacq.) were also common.

NATIVE PLANTS

Only the wiliwili trees are native to the Hawaiian Islands. Both 'Ilie'e (*Plumbago zeylanica* L.) and the kukui trees (*Aleurites moluccana* (L.) Willd) are indigenous i.e. found naturally in Hawaii and in other places. The remaining vegetation is all introduced.

ENDANGERED SPECIES

No Category 1, proposed or listed threatened or endangered species of plants were found either along the proposed road easement or the proposed tank site (USFWS 1991, DLNR 1986).

RECOMMENDATIONS AND CONCLUSIONS

Every effort should be made to save as many of the wiliwili trees as possible. Wiliwili trees are very drought resistant, very colorful when in flower, and are highly favored by native Hawaiians. Therefore, using them in landscaping the area would both save irrigation water and be helpful in saving this component of the local flora.

Because the flora of the site is made up almost entirely of introduced plants there is no botanical reason why this project should not proceed.

SPECIES LIST

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

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

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

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

Common - a plant considered an important part of the vegetation

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

This species list is the result of an extensive survey of this site at the end of the rainy season (May 1991) and it reflects the vegetative composition of the flora during a single season. Minor changes in the vegetation will occur due to introductions and losses and a slightly different species list would result from a survey conducted during a different growing season.

CHECKLIST OF ALL PLANTS FOUND ON THE WEST LOCH BLUFFS STUDY SITE

Scientific Name	Common Name	Abundance
MONOCOTYLEDONES		
GRAMINEAE - Grass Family		
* <i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	Common
* <i>Panicum maximum</i> Jacq.	Guinea grass	Common
* <i>Rhynchelytrum repens</i> C.E.Hubb	Natal redtop	Common
* <i>Tricachne insularis</i> (L.) Ness	Sourgrass	Occasional
DICOTYLEDONES		
ACANTHACEAE - Acanthus Family		
* <i>Asystasia gangetica</i> (L.) T. Anders	Chinese violet	Common
AMARANTHACEAE - Amaranth Family		
* <i>Amaranthus spinosus</i> L.	Spiny amaranth	Common
ANACARDIACEAE - Mango Family		
* <i>Schinus terebinthifolius</i> Raddi	Christmas berry	Occasional
CASUARINACEAE - She-oak Family		
* <i>Casuarina equisetifolia</i> L.	Common iron wood	Occasional
COMPOSITAE - Sunflower Family		
* <i>Ageratum conyzoides</i> L.	Ageratum	Common
* <i>Calyptocarpus vialis</i> Less.		Occasional
* <i>Conyza canadensis</i> Cronq.	Canadian fleabane	Occasional
* <i>Emilia sonchifolia</i> (L.) DC	Lalac puale	Common
* <i>Erechtites hieracifolia</i> (L.) Raf	Fireweed	Occasional
* <i>Galinsoga parviflora</i> Cav.	Galinsoga	Common
* <i>Montanoa hibiscifolia</i> Benth.	Tree dasiy	Occasional
* <i>Pluchea odorata</i> (L.) Cass.	Pluchea	Common
* <i>Sonchus olerarceus</i> L.	Pualele	Occasional
* <i>Synedrella nodiflora</i> (L.) Gaertn.	Synedrella	Locally abundant
* <i>Tridax procumbens</i> L.	Coat buttons	Locally abundant
* <i>Xanthium saccharatum</i> Wallr.	Cocklebur	Uncommon
CONVOLVULACEAE - Moringglory Family		
* <i>Ipomoea obscura</i> (L.) Ker-Gawl		Occasional

Scientific Name	Common Name	Abundance
CUCURBITACEAE - Cucumber Family		
* <i>Momordica charantia</i> Crantz	Balsam apple	Common
EUPHORBIACEAE - Spurge Family		
<i>Aleurites moluccana</i> (L.) Willd	Kukui	Occasional
* <i>Ricinus communis</i> L.	Castor bean	Occasional
LABIATAE - Mint Family		
* <i>Leonotis nepetaefolia</i> Ait	Lion's-ear	Common
* <i>Ocimum gratissimum</i> L.	Wild basal	Common
LEGUMINOSAE - Bean Family		
* <i>Acacia farnesiana</i> L.	Klu	Occasional
* <i>Cassia leschenaultiana</i> DC.	Japanese tea	Locally abundant
* <i>Crotalaria mucronata</i> L.	Smooth rattle-pod	Common
* <i>Desmanthus virgatus</i> Willd.	Virgate mimosa	Occasional
<i>Erythrina sandwicensis</i> Deg.	Wiliwili	Common
* <i>Glycine wightii</i> Wight & Arnott		Locally abundant
* <i>Indigofera suffruticosa</i> Mill.	Indigo	Occasional
* <i>Leucaena leucocephala</i> deWit	Koa-haole	Common
* <i>Macroptilium coccineus</i> L.	Scarlet runner	Common
* <i>Prosopis pallida</i> HBK	Kiawe, algaroba	Occasional
MALVACEAE - Hibiscus Family		
* <i>Abutilon molle</i> Sweet	Hairy abutilon	Uncommon
* <i>Malvastrum coromandelianum</i> Garcke	False marrow	Common
* <i>Sida fallax</i> Walp.	'Ilima	Common
MYRTACEAE - Myrtle Family		
* <i>Eucalyptus</i> sp.	Java plum	Common
NYCTAGINACEAE - Four o'clock Family		
<i>Mirabilis jalapa</i> L.	Common four o'clock	Common
PASSIFLORACEAE - Passionflower Family		
* <i>Passiflora edulis</i> Sims	Liliko'i	Uncommon
* <i>Passiflora foetida</i> L.	Love-in-a-mist	Occasional
* <i>Passiflora suberosa</i> L.	Huehue haole	Occasional

Family	Scientific Name	Common Name	Abundance
PLUMBAGINACEAE - Plumbago Family			
	<i>Plumbago zeylanica</i> L.	'Ilie'e	Common
SOLANACEAE - Tomato Family			
	* <i>Solanum americanum</i> Mill.		Uncommon
STERCULIACEAE - Stink tree Family			
	* <i>Waltheria indica</i> L.	Hi'aloa, uha-loa	Locally abundant
TILIACEAE - Linden Family			
	* <i>Triumfetta semitriloba</i> Jacq.	Sacramento bur	Common
VERBENACEAE - Verbena Family			
	* <i>Stachytarpheta jamaicensis</i> Vahl.	Vervain	Common
	* <i>Verbena litoralis</i> HBK	Weed verbena	Uncommon

BIBLIOGRAPHY

- DLNR. 1986. Hawaii Administrative Rules. Title 13. Part 2 Wildlife.
- Gagne', W. C. and L. W. Cuddihy. 1990. Vegetation. (In) Wagner, W. L., D. R. Herbst, and S. H. Sohmer. Manual of the Flowering Plants of Hawaii. Vol. 1. University of Hawaii Press.
- Hillebrand, W. 1888. Flora of the Hawaiian Islands. Hafner Publishing Co. NY.
- Ripperton, J. C. and E. Y. Hosaka. 1942. Vegetation Zones of Hawaii. Hawaii Agricultural Bulletin Number 89. University of Hawaii
- St. John, H. 1973. List and Summary of the Flowering Plants in the Hawaiian Islands. Pacific Tropical Botanical Garden. Memoir 1. Lawai, Hawaii.
- USFWS. 1991. Endangered and Threatened wildlife and plants. US Government Printing Office. Wash. DC
- Wagner, W. L., D. R. Herbst and S. H. Sohmer. 1990. Manual of the Flowering Plants of Hawaii. University of Hawaii Press.

ORNITHOLOGICAL SURVEY REPORT

INTRODUCTION

An ornithological survey of the proposed water tank site and access road easement of the Waikapu Mauka Subdivision, Waikapu, Maui was conducted on May 8, 1991. The results of that survey are reported here.

METHODS

Bird species densities at the study site were determined by a walk-through survey of the site with periodic 10 minute listening stops. The survey was begun in the early morning to take advantage of the higher bird activity at that time. Bird identifications were verified using available guides (Pratt et al 1987, Hawaii Audubon Society 1988).

AVIAN HABITATS

Two habitat types were found in the study site, but because the entire site has been extensively modified from its original state, it has almost no value as native bird habitat. However, it does support a variety of non-native species. The two bird habitats in the study area are as follows:

A. Forested Road Easement. The road easement which was surveyed was approximately 14 m wide and 750 m long. For the first 500 m northward from the edge of the golf course, the study area is covered by a high canopy of trees. These trees are of mixed origin. More than 60% of the canopy is made up of native Hawaiian wiliwili trees 10 to 15 m in height. The remaining 40% of the canopy is composed of introduced eucalyptus, silk oak, ironwood and kiawe trees. In this part of the site the most commonly seen birds were the northern cardinal and the japanese white eye.

B. Koa haole/Mixed grass. In the last 500 m of the road easement the big trees drop out, and on this section of the road and on the tank site the

vegetation is made up almost exclusively of a closed canopy of koa haole trees 4 to 5 m in height with a dense understory of mixed, vegetative grasses. Here too the japanese white eye was common as was the warbling silver bill.

Seven species of birds were found along the proposed road easement and on the proposed tank site. No threatened or endangered species were found. The annotated checklist follows the nomenclature of Pratt, Bruner and Berrett (1987).

ANNOTATED SPECIES LIST

Family Zosteropidae: White-eyes

Zosterops japonicus

White-eyes are one of the most widespread introduced bird species in Hawaii. Although their preferred habitats are wetter than the study area, they were found in both the road and tank site vegetation in large numbers. There were also many nests.

Family Passeridae: Old World Sparrows

Passer domesticus (House sparrow)

House sparrows are sometimes called feathered mice. These streaky brown and gray birds are a familiar commensal species and were found in low numbers along the road easement. Their round domed nests were also common. Because house sparrows are usually associated with house sites it was a little surprising to find them in this setting.

Family Alaudidae: Larks

Alauda arvensis (Eurasian skylark)

A single skylark was seen hovering at the beginning of the study site near the golf course. Skylarks are medium sized birds - 18 to 20 cm long.

They are streaky, brown grey in color and often sing in a high pitched voice while in flight.

Family Estildidae: Waxbills, Mannikins and Parrotfinches

Lonchura malabarica (Warbling silverbill)

Warbling silverbills were seen and heard in all parts of the study site. They are tiny, sand colored birds that seem to congregate in small flocks. They are most easily spotted by their dark tail and rump feathers.

Family Fringillidae: Cardueline Finches

Carpodacus mexicanus (House finch)

The house finch is a small, sparrowlike bird with a streaked appearance. The head, throat and breast of male birds may vary from dull yellow to bright red. The females and the bodies of males are similar with gray to black streaks of color.

Introduced into Hawaii during the last century, the house finch has adapted and is now widespread throughout the islands. Pairs of birds were seen in the wiliwili trees near the golf course.

Family Columbidae: Pigeons and Doves

Streptopelia chinensis (Spotted Dove)

The spotted dove is a large bird which is grayish brown with rosy blushed breast feathers. At the sides and back of the neck is a patch of black with white spots. The low, repetitive cooing of the spotted dove was heard near the golf course. Many pairs and individuals were spotted and are an important part of the bird community of the area.

Geopelia striata (Zebra Dove)

This ground dwelling, seed eating dove is smaller and even more abundant than the spotted dove. Zebra doves were found in similar densities as the

spotted dove in the open weedy places, but were more common in the open area near the golf course.

LITERATURE CITED

- Berger, A . J. 1981 Hawaiian Birdlife. (2nd. Ed.) Univ. Press. Honolulu.
Hawaii Audubon Society. 1988. Hawaii's Birds. Hawaii Audubon Society.
Munro, G. C. 1955. Birds of Hawaii. (3rd.Ed.) Bridgeway Press, Rutland, Vt.
Pratt, H. D., P. L. Bruner & D. G. Berrett. 1987. The Birds of Hawaii and the Tropical Pacific. Princeton Univ. Press.

APPENDIX B
ARCHAEOLOGICAL INVENTORY SURVEY

**ARCHAEOLOGICAL INVENTORY REPORT
FOR THE PROPOSED WAIKAPU MAUKA
WATER TANK AND ACCESS ROAD
LOCATED AT WAIKAPU, ISLAND OF MAUI
TMK 3-6-03:PORTION OF 1 &
TMK 3-6-02:PORTION OF 2
JULY 1991
WITH ADDENDUM NOVEMBER 1991**

**Prepared For: Waikapu Mauka Partners
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TABLE OF CONTENTS

Comprehensive Summary.....	1
Physical Setting.....	3
Land Use History.....	3
Previous Archaeological Work.....	5
Survey and Test Excavation Methods.....	7
Survey and Test Excavation Findings.....	9
Midden Analysis Key.....	14
Midden Analysis.....	15
Addendum.....	16
Summary.....	16
Survey Area.....	17
Survey Method.....	17
Survey Findings.....	17
Conclusions.....	19
Significance Evaluation Criteria.....	20
References Cited.....	21
Shell Taxonomy.....	Appendix A

LIST OF ILLUSTRATIONS

Location of Subject Property Map.....	2
Map of Previous Archaeological Work in the area.....	6
Map of Proposed Water Tank Site (Site #1 and Site #2)....	8
Top Plan: Feature A.....	9
Top View and Profile: Test Unit 1.....	10
Top View: Test Unit 2.....	12
Profile: Test Unit 2 - South Wall.....	13
Top Plans: Feature D and Feature E.....	18

**RESULTS OF SURFACE SURVEY AND SUBSURFACE TESTING FOR THE
PROPOSED WAIKAPU MAUKA WATER TANK SITE AND ACCESS ROAD
LOCATED AT WAIKAPU, ISLAND OF MAUI. TMK:3-6-03:PORTION OF 1**

COMPREHENSIVE SUMMARY

Under the direction of Joseph Kennedy, M.A., the principal investigator of Archaeological Consultants of Hawaii, Inc. (ACH), an inventory survey with subsurface testing was conducted at the proposed water tank site and access road, property described as TMK: 3-6-03:Portion of 1. This survey was conducted by a two member team, a field supervisor, MaryAnne B. Maigret, M.A. and field archaeologist, Tim Gerbracht, B.A. The work took place over a three day period in late June, 1991. A residential complex was identified with two attendant agricultural features. Subsurface testing within the residential site produced supporting evidence that Hawaiians lived at the site as there was presence of household goods within test excavation units.

Subsequent to this first survey, ACH was contracted to conduct a similar inventory survey and subsurface testing at a revised water tank site. The revised area consists of a portion of the previously surveyed 1.4 acre parcel with an additional 1.2 acres. The project area is further described as TMK: 3-6-02:Portion of 2. The revised water tank survey was conducted in September of 1991 by field supervisor MaryAnne B. Maigret and field archaeologist Kevin Donald, M.A.

At the conclusion of both surveys, a total of five archaeological features had been identified within the boundaries of the proposed water tank sites. Three features were identified in the first survey and two additional sites were found in the second survey.

The five archaeological features identified within the project areas for the two proposed water tank sites are referred to as map features A through E of temporary site #1 (T-1). (See map on page #8) This temporary site number shall serve until a permanent state site number is assigned.

Inventory and subsurface testing results are presented first for T-1, features A, B, and C. Inventory results for the additional land area surveyed will follow as an addendum and includes the features D and E. A summary of all five site features identified is presented at the conclusion of this report along with a table which provides an assessment of each feature's function, condition, significance, and recommendation for further work.

PHYSICAL SETTING

The project area lies in the ahupua'a of Waikapu, district of Wailuku, on the lower slopes of the West Maui Mountains just south of Waikapu Valley. The proposed water tank site is situated on a sloping interface between two deeply incised stream channels, at 1070 to 1100 feet above sea level. A portion of the surveyed area lies within the State Forest Reserve. Several caves are visible on the near vertical slope across the stream channel which lay to the south; these caves are located well outside of the study area. Vegetation consists primarily of haole koa, (Leucaena glauca (L.)), occasional ilima (Sida fallax) and a variety of grasses. Wiliwili (Erythrina sandwicensis) is common in the lower valley area as one approaches the proposed water tank area, but none were observed within the boundaries of the subject property. A grove of ironwood (Casuarina equisetifolia) dominates the area just upslope from the proposed site. No cultigens were observed.

The project area encompasses an approximately 1.4 acre parcel, [250 feet on each side], and a 40 foot wide access corridor extending from a proposed housing area which was the object of a previous archaeological inventory report by Archaeological Consultants of Hawaii in 1990.

LAND USE HISTORY

The ahupua'a of Waikapu is referred to by Handy and Handy (1972:496) as part of the old 'okona, or land division, of Na Wai Eha, or "the four streams". Na Wai Eha is composed of four great stream valleys: Waihee, Waiehu, Wailuku and Waikapu. Waikapu is described as the only land bound member of these four streams, whose use prior to being used for irrigating sugarcane was diverted into lo'i. Its overflow dissipating only in the dry plains of the isthmus between east and west Maui. Extensive wet taro planting is described to have extended to the north and south below the mouth of the valley, only later to have been obliterated by sugarcane cultivation. (ibid:497)

The name "Waikapu" has been explained to mean "sacred water", "forbidden water" (Smith in Brisbin et. al. 1991:A1), or as "water of the conch". The latter explanation is derived from a story about a dog, Puapualenalena, that stole a great conch shell from a cave on the south side of Waikapu Stream, about a mile inland.

The earliest historical account of the Waikapu area is most likely from Fornander's account of the battle of Waikapu Commons or the "Ahulau ka piipii i Kakanilua" which took place in 1776.

This particular battle, between the invading forces of Kalaniopuu and those of Kahekili, featured the death of 798 warriors from Hawaii island, at Waikapu, in a single afternoon. There was no mention of how many of Kahekili's men also perished.

Waikapu is also associated with the battle of Kapaniwai which was one of the many encounters leading to the great Battle of Iao Valley. Penhallow, in a 1926 article in the Maui News, mentioned that "Grim reminders of this first visit to Waikapu are still to be found in the shifting sands below the foothills where Kamehameha first assembled his army."

A few references have been made to religious sites in the area. Smith 1991 sites the observation of heiau by Ashdown (1971) and Thrum (1917). Waikapu is mentioned as having "many temples and sites", the only specific reference made to one large and one small heiau located "below the catholic church". The names of these heiau have been forgotten. Portions of the larger were said to have been still visible in 1917, but the smaller one had been destroyed.

Cattle production and sugarcane cultivation were introduced sometime after 1823, by James Louzada of Waimea, Hawaii.

Cane production intensified following the construction of a steam driven mill in 1862. Horse racing became a popular activity with a flourishing cattle industry. (Smith, in Brisbin, Haun & Jensen 1991)

G. W. Bates mentioned that Waikapu contained a population of "about 500" in 1854 and we know that roughly ten years later sugarcane as well as taro were under cultivation by this population for there were reports of drought affecting these two crops at Waikapu.

It is known that the United States Army was present in the Waikapu area in the 1940's during WWII. According to Wong Smith in her appendix to the March 1990 Rosendahl report concerning Waikapu, a live grenade course, a 50 caliber machine-gun range and two anti-tank ranges were present near the study area.

From WWII to the present, the general area has been used for the cultivation of sugarcane and pineapple. Obviously, the subject property has not been affected by plantation activities as evidenced by the rather large number of extant, precontact sites remaining on this land.

There are no Land Commission Awards for TMK:3-6-02:2 (por).

PREVIOUS ARCHAEOLOGICAL WORK

The proposed water tank site and access road have not been previously surveyed. Extensive archaeological examinations have been carried out, however, directly east and south of this project area. These examinations include a "variable coverage, high intensity surface inventory-level survey" of the area now under golf course construction, which stretches over approximately 600 acres of land, and includes areas between the 400 and 600 foot contour. In this study, Haun (1989) identified a total of nine sites, each encompassing numerous features. With the exception of two sites which appeared to have functioned as historic era water diversion walls and ditches, sites were determined to have been related to agriculture and temporary habitation.

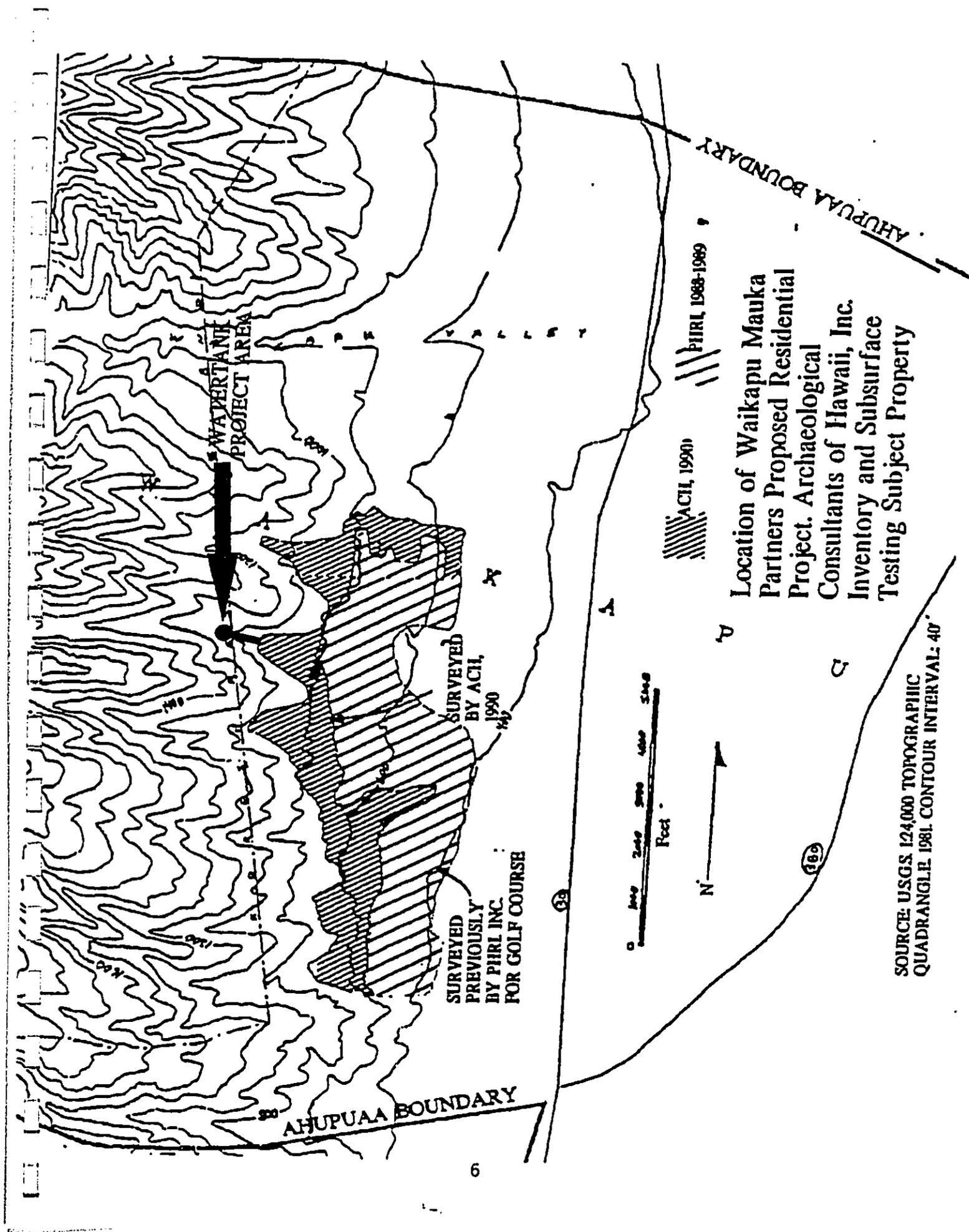
Twenty individual features were test excavated, including enclosures, C-shapes, a platform, terraces, an isolated hearth, and a garden plot. Evidence for both historic and prehistoric use was discovered.

Midden yield was sparse and it was suggested that initial habitation at Waikapu involved a small population for short periods of time, and that during these periods of time, activity was focused on labor outlay in the agricultural areas.

A relatively low number of indigenous artifacts were recovered, and were limited to basalt cores and flakes, or flakes of volcanic glass (93%), four adze fragments or preforms, a utilized basalt flake, a unifacially worked flake of basalt, a polished basalt whetstone, and an ulu maika made of coral.

Non-indigenous artifacts were more numerous and included glass shards, plastic, and metal. It is suggested that the occurrence of these historic-era items in the upper levels of deposits indicates historic-era use of the area during the late 19th century to early 20th century, but not necessarily historic-era construction.

Radiocarbon dating from charcoal deposits suggests occupation of the subject area shortly after AD 1500, with occupation into the historic-era. These early dates were found to be distributed among six widely dispersed site components. This early occupation episode appears to have ended around the middle of the 17th century. The area appears to have been reoccupied sometime around the early 19th century, when short term reoccupation of habitation features would have occurred.



Location of Waikapu Mauka
Partners Proposed Residential
Project. Archaeological
Consultants of Hawaii, Inc.
Inventory and Subsurface
Testing Subject Property

SOURCE: USGS 1:24,000 TOPOGRAPHIC
QUADRANGLE 1981. CONTOUR INTERVAL: 40'

Kennedy (1991) surveyed an approximately 212 acre parcel west of, and contiguous with the area examined by Haun in 1989. The surveyed area lay primarily within five mauka-extending sections; roughly half of the area within the upland areas. Kennedy's 1991 study, in which field work occurred from 1989 to 1990, resulted in the identification of 11 site complexes incorporating 74 related features and subfeatures, as well as 7 additional single feature sites.

While the majority of sites identified appear to be agricultural in nature, there are also preliminary indications that habitation, religious and burial features are present as well. There can be little doubt that these represents a continuation of the site complexes identified by Haun (1989) and Brisbin, Haun and Jensen (1991).

SURVEY AND TEST EXCAVATION METHODS.

The proposed water tank site was systematically swept by the field crew by making a series of east/west sweeps across the subject property. Crew members were spaced 5 to 10 meters apart depending on thickness of vegetation. All features within this area were marked and mapped. The 40 foot wide access road was examined by two individuals walking the length of the proposed road spaced 40 feet apart surveying a corridor 80 feet wide. No sites were encountered in the access road. There was a 100% coverage of the proposed water tank site and access road.

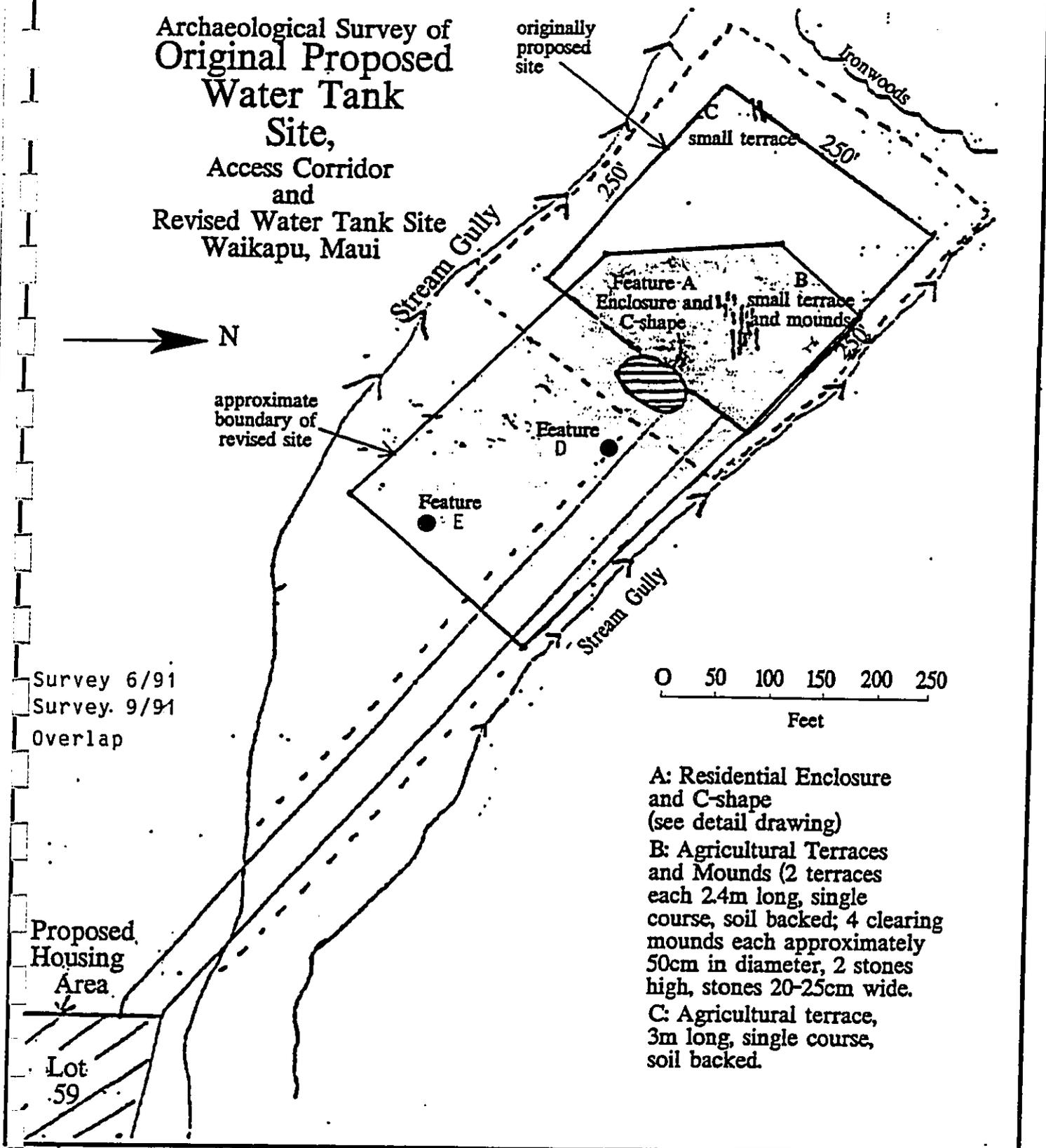
The proposed water tank project area boundaries were not determined via stable surveyed control. Instead, the project area was delineated by surveyors.

The boundaries were marked with a series of highly visible flagging tapes. The flagged area includes the 250 foot by 250 foot proposed water tank area, the access road corridor, and a buffer zone around the project area. Without stable control at the corner points, i.e. 1/2 inch pipe markers, it was not possible to determine exactly the width of the buffer zone. However, it appears to have included approximately fifty feet on the west and east ends, and slightly less on the south and north sides; the 250 foot width is constricted by two stream incisions which lay to the south and north of the project area. The entire area, including the buffer zone, had 100% survey coverage.

Test excavations were carried out through shovel testing. The unit was emptied of its contents to a sterile surface; every third shovel full was passed through 1/4 inch and 1/8 inch screen to recover any cultural material. Where pockets of cultural material were encountered in situ during

Archaeological Consultants of Hawaii, Inc.

Archaeological Survey of
Original Proposed
Water Tank
Site,
Access Corridor
and
Revised Water Tank Site
Waikapu, Maui



Survey 6/91
Survey 9/91
Overlap

Proposed
Housing
Area
Lot
59

0 50 100 150 200 250
Feet

- A: Residential Enclosure and C-shape (see detail drawing)
- B: Agricultural Terraces and Mounds (2 terraces each 2.4m long, single course, soil backed; 4 clearing mounds each approximately 50cm in diameter, 2 stones high, stones 20-25cm wide.
- C: Agricultural terrace, 3m long, single course, soil backed.

the shoveling process, their location was noted and recorded. Cultural material was bagged for laboratory analysis.

SURVEY AND TEST EXCAVATION FINDINGS

The map found on page #8 (portion colored in yellow shows the project area for the first survey - portion colored in green, the second survey - overlapping area is yellow/green) depicts the distribution of archaeological features within the project area. One probable habitation feature (Feature A) and dispersed groupings of agricultural features are present.

Agricultural features: These features (two, 2 meter long terraces) consist of soil-backed, single course stone alignments found in association with four, small clearing mounds.

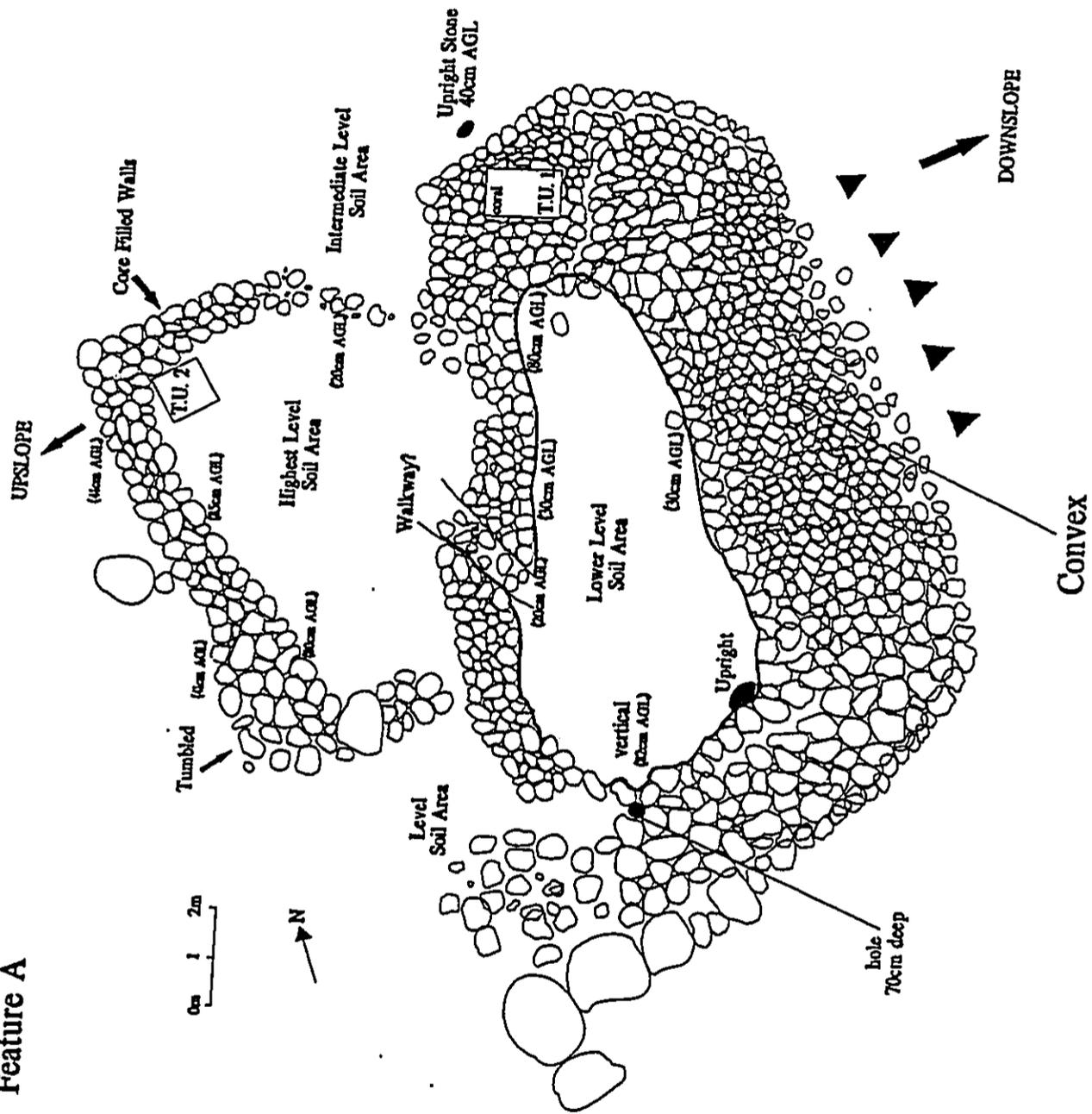
The arrangement of these components appears random and are quite sparse in comparison with those located within the previously surveyed area nearby (Kennedy, 1990), where similar features were more densely packed and continuous. These features are in fair condition, and may yield important scientific information.

Residential features: One multicomponent residential feature was identified in the easternmost section of the project area. This feature has two levels: on its west or upslope end, there is an upper level where a flat soil surface is partially surrounded by a box C-shape; on its east or downslope end is a lower level, which is surrounded by an enclosure. This enclosure is characterized by stonefilled walls which are sufficiently wide to have provided living or working space, particularly on its north end, where the wall is four meters wide, and flattened on top to resemble a platform. An upright stone lies just outside the outer edge of this "platform", and coral was found on its surface.

The downslope and south ends of the enclosure have convex, sloping outer walls. Only the south end of the enclosure exhibits a clean, vertical inner wall, reaching a height of 80 centimeters; the remaining walls may have collapsed. An upright slab leans against the south, inner wall of the enclosure.

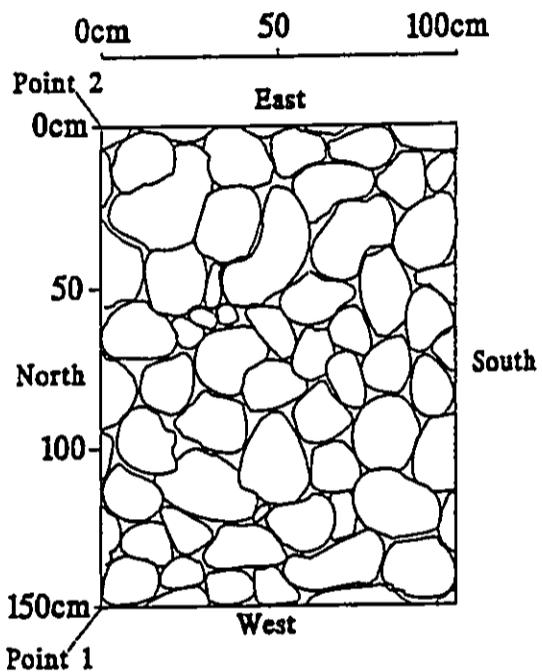
The lower enclosure area is connected to the upper C-shape area by what appears to be a deteriorated ramp, or stair. Neither paving stones or stepping stones are visible on the surface, but the appearance of two unaligned wall faces along the upslope inner wall of the enclosure suggests that a purposeful break in this wall was created to facilitate movement between the enclosure and C-shape. A chunk of coral was present on the surface at this apparent opening.

WAIKAPU WATERTANK
Feature A

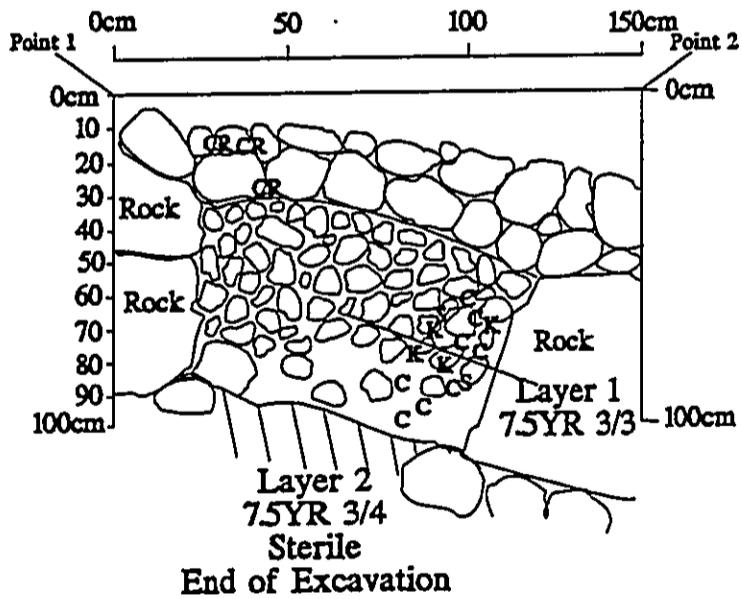


Waikapu Watertank

Test Unit 1 Top View

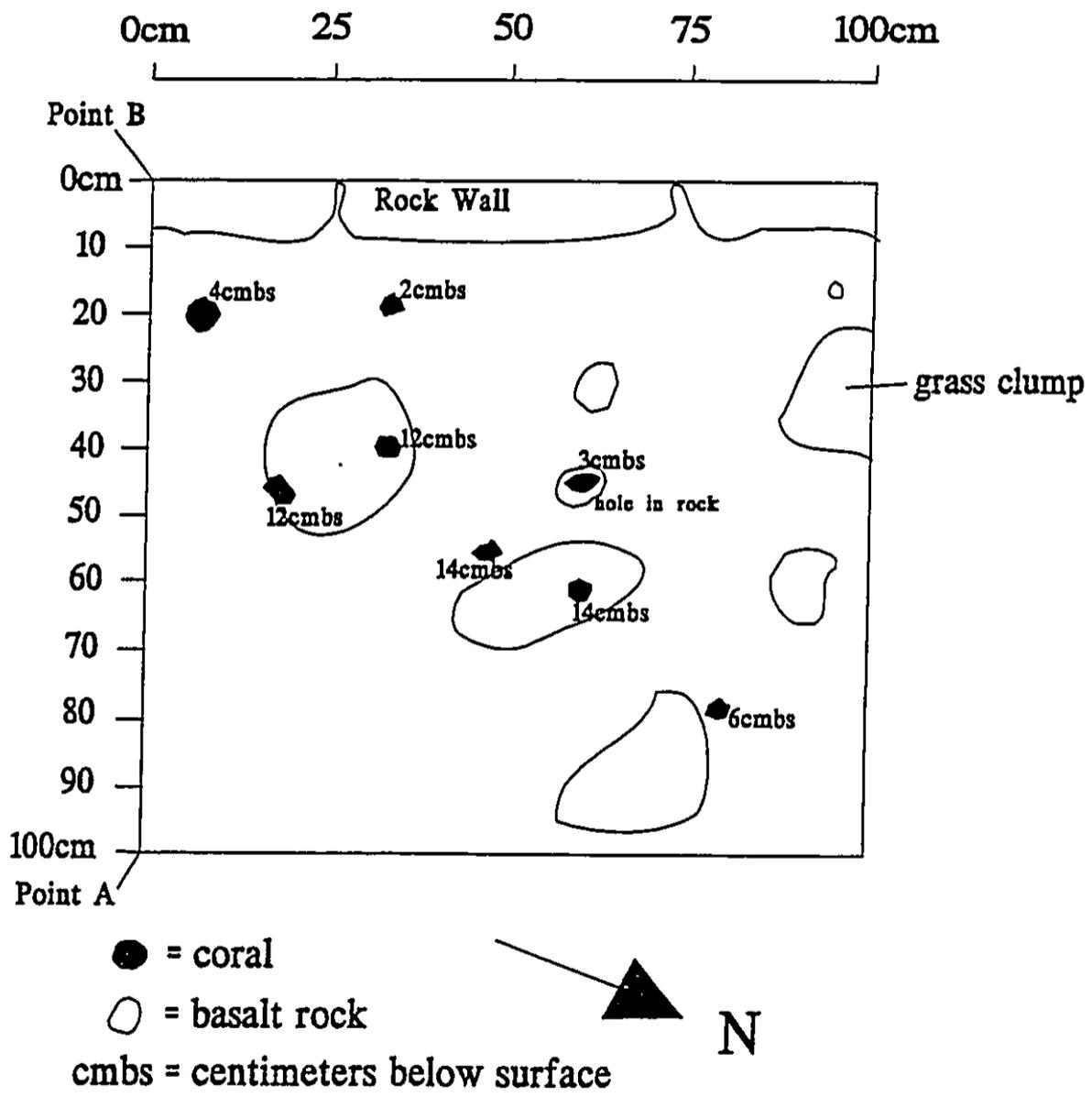


Test Unit 1 Profile North Face



- C = charcoal
- K = kukui
- S = shell
- CR = coral

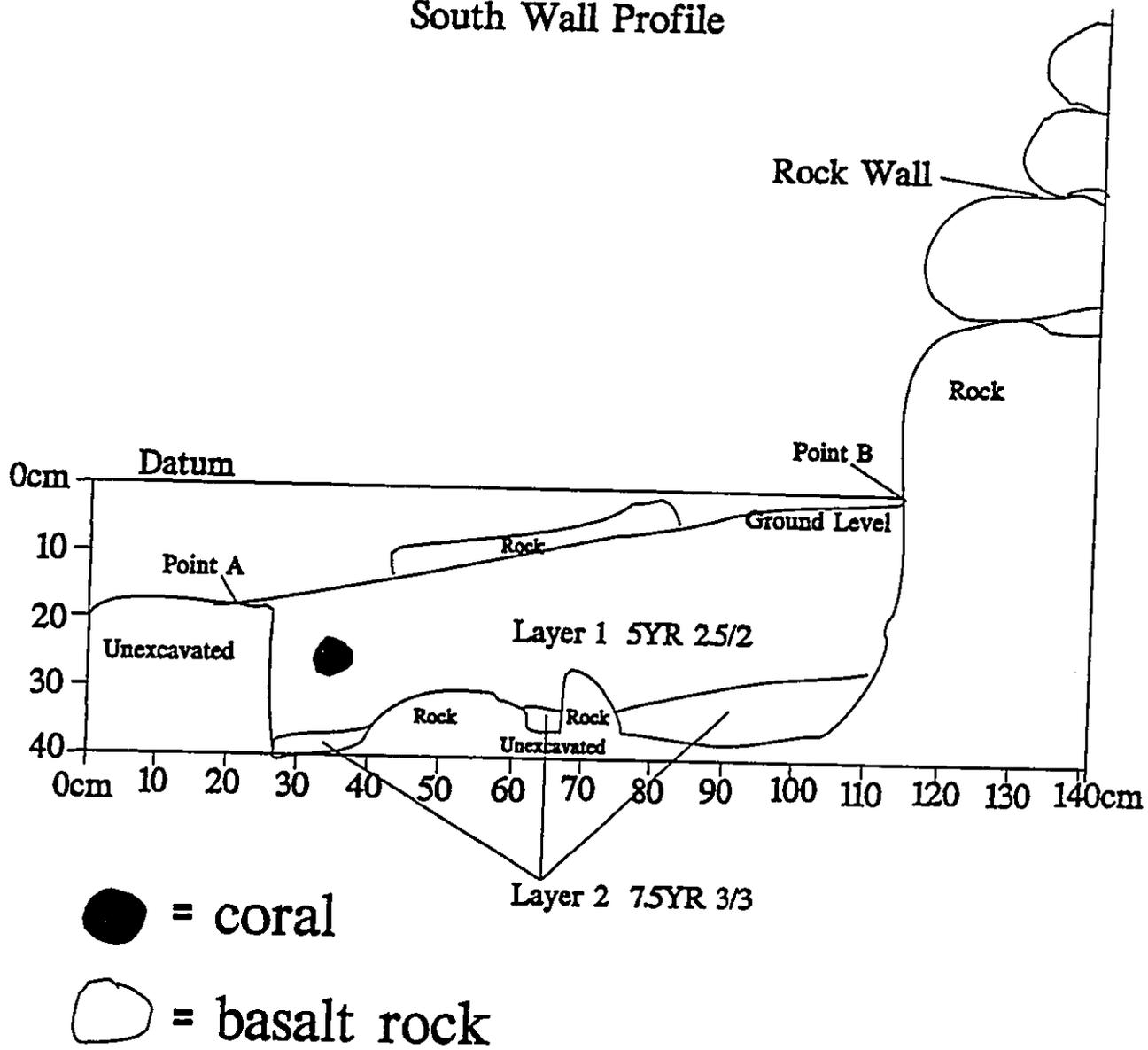
Test Unit 2
Top View



Waikapu Watertank

Test Unit 2

South Wall Profile



MIDDEN ANALYSIS KEY

E.U. = excavation unit; test units excavated in each site.
Example - TU1 = Test Unit One

Sample = Individual samples collected from within the test
unit. Soil samples collected are designated by
layer. Example: layer one = L1

Cypraea = Genus of marine mollusks identified. For taxonomy
refer to Shell Taxonomy Appendix.

Bone = all animal remains collected.

Charcoal = burnt wood, kukui, etc. obtained from fire pits or
hearths.

Coral = coral and coral pieces not naturally deposited.

Kukui = whole or broken kukui nut shells.

Volcanic Glass = fragment of obsidian.

Soil Sample = soil collected from test units.

All data is displayed in grams of material
identified unless otherwise stated.

Waikapu Watertank

E.U.	SAMPLE	CYPRAEA	BONE	CHARCOAL	CORAL	KUKUI	SOIL	SAMPLE	VOLCANIC	GLASS
TU 1	A(25cm)									
TU 1	B				21.5					
TU 1	C	2			0.5					
TU 1	D									
TU 1	E				124					
TU 1	F			1.5						
TU 1	G			7		11				
TU 1	L-1									
TU 1	L-2								182	
									125	
PE 2	A									
PE 2	B	1				3.5				
PE 2	C									
PE 2	D				40					
PE 2	E				7					
PE 2	F(sift)				54					
PE 2	G(sift)		2.5							
PE 2	H			23.5						
PE 2	L-1									
PE 2	L-2								377.5	1
									270.5	

A 1 meter by 1.5 meter test unit (TU1) was placed in the "platform" surface of the northern enclosure wall. This location was selected because of the presence of surface coral, and its likelihood as having been utilized as living and/or working space. The possibility of a burial was also considered. The unit yielded charcoal, kukui (carbonized and uncarbonized), coral, and a scant amount of shell, all of which occurred within a soil/rock matrix which extended from 25 centimeters below the surface of the unit to a depth of 80 centimeters below datum. Below this point, excavation to 103 centimeters below datum yielded no cultural material, and the excavation was completed. No osteological material was present. The test unit was backfilled.

The box C-shape which occupies the uppermost level of the feature is characterized by a 80 centimeter wide corefill wall which, on the south end, has been abutted against a large boulder. At the north end of the C-shape, both the inner and outer walls are vertical, and range in height from 41 to 54 centimeters on the outside, and 80 to 85 centimeters on the inside. No surface artifacts were located, although surface coral was present.

A 1 meter by 1 meter test unit (TU2) was placed in the northwest corner of the C-shape. This unit yielded charcoal, coral, kukui, and a single piece cowrie shell. Shovel testing reached a depth of forty centimeters below datum, where a compact, culturally sterile soil layer was encountered. Test excavation was concluded at this depth.

ADDENDUM

ADDITIONAL SURVEYED LANDS ASSOCIATED WITH THE PROPOSED
WAIKAPU MAUKA WATER TANK AND ACCESS ROAD
LOCATED AT WAIKAPU, ISLAND OF MAUI
TMK: 3-6-02: PORTION OF 2

SUMMARY

The results of the surface inventory findings for a revised water tank site, consisting of a portion of the previously surveyed 1.4 acre area, with approximately 1.2 acres added onto its east side are presented here. As mentioned previously, this survey was conducted in September 1991 by a two member team, MaryAnne B. Maigret B.A. and Kevin Donald M.A., under the direction of Joseph Kennedy, M.A. A total of four archaeological features were located within the revised water tank site area: Feature A and Feature B, both previously identified within the original 1.4 acre water tank site, and Features D and E, now identified within the revised water tank area. Because of the nature of features D and E it was unnecessary to test excavate to determine function or age of these features.

SURVEY AREA

The accompanying site location map depicts the original 1.4 acre survey area and the approximately 2.5 acre revised water tank site. An approximately 0.6 acre portion of the original proposed site is included within the approximately 2.5 acre revised area, and has been previously surveyed. The terrain and vegetation within the new survey area is consistent with the physical setting described for the original tank site. As was also described earlier, a stream channel constricts the survey area on the south side. According to a topographic map provided by Wilson Okamoto Associates, the revised tank site extends from approximately 1020 feet to 1118 feet above sea level.

SURVEY METHOD

The perimeter of the original survey area had previously been delineated with flagging tape. The revised survey area was laid out by extending the south boundary an additional 100 meters in an easterly direction. This south boundary is constricted by the same stream gully which had defined the south boundary of the original parcel. The north boundary was delineated in the same manner. The area within was then systematically swept by the two team members in a north-south direction. All cultural features were marked with tape and a metal tag bearing the feature identification number.

SURVEY FINDINGS

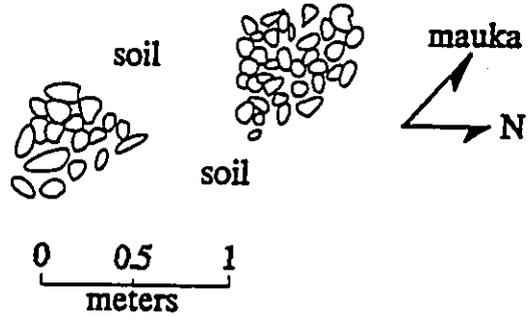
Feature A, a residential enclosure/C-shape, and Feature B, agricultural terraces and mounds, were reidentified within the area where the original and revised water tank sites overlap; the detailed descriptions of these features are found in on pages 8 and 9 of this report. Feature C, a previously identified agricultural terrace, lies outside of the revised site boundaries. Two new features, probably related to agricultural practices, were identified within the revised water tank site:

Feature D consists of two small mounds, located 18m east of Feature A. These mounds are constructed from 5-21 centimeter wide angular stones, stacked two to three high, to an average height of 40cm above the ground.

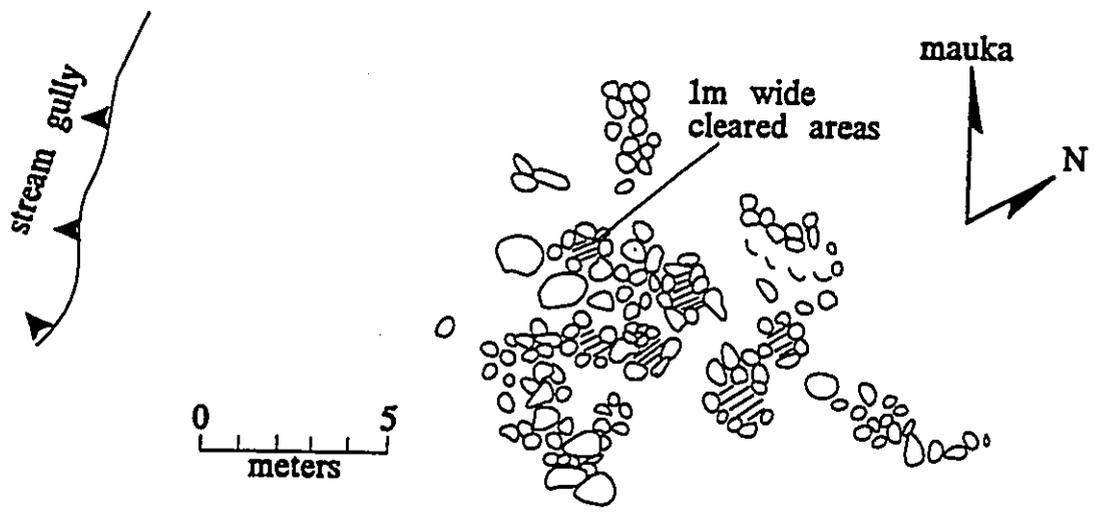
Feature E is a 225 square meter modified rubble field, located 50m east and 13m south of Feature A. Boulder/rubble areas similar to this feature have been found within the Proposed Residential Housing area nearby; these areas may at one time have provided building materials, or, when modified, sheltered agricultural space. Feature E is comprised of 40

**WAIKAPU REVISED WATER TANK SITE
INVENTORY SURVEY**

Feature D
Mound



Feature E
Modified Rubble Area



to 60 centimeter wide rounded stones, with some boulders of up to a meter wide. Approximately 1.5 meter wide, roughly circular soil floored areas are scattered throughout the rubble; the stacked stones present near the edge of these soil areas suggests that the stones were removed from the interior of these spaces.

CONCLUSIONS

The archaeological features recorded within this 1.4 acre water tank site and buffer area resemble the habitation and agricultural features documented in 1990 by Archaeological Consultants of Hawaii, for the Waikapu Mauka Partners Proposed Residential Development.

The agricultural features are most likely associated with dryland farming; their sparse occurrence within this project area suggests that the majority of dryland agricultural practices at Waikapu were limited to the lower elevations, where dense conglomerations of agricultural features are found.

The residential feature is consistent with the type of feature and component groupings found at Waikapu by Kennedy (1990) and Haun (1989). Residential groupings in these studies were generally comprised of an enclosure/C-shape cluster, with associated agricultural features. The absence of four-sided platforms, along with scant midden at tested residential features within these previously recorded features is also consistent with these preliminary test excavations.

While the enclosure/C-shape cluster would appear to be a common feature of the Waikapu area, the residential feature located within this project area has a distinctly massive, convex outer wall which is not characteristic of other features described in previous surveys - in fact, the width of the enclosure wall at its north end exceeds the width of the entire inner area. Slope gradient is fairly gentle at this feature and would not seem to have been the reason for such massive construction.

The presence of upright stones is also of interest and may suggest the presence of religious components, possibly related to a men's house. Continued excavation at this site in the form of data recovery will be necessary to further establish function and define unique characteristics beyond the preliminary interpretations suggested by morphology and test excavations.

No radioisotope dates were collected as extensive dating has taken place in nearby excavations. From these data we assume that this site dates to the mid 1500's A.D.

As was stated in the conclusions for the original 1.4 acre water tank site, Feature A appears to be the only site requiring further mitigation. The agricultural features (B, D, and E,) consisting of mounds, mounds with small single course terraces, and modified rubble are significant for their information value (Criteria D) however it is our opinion that the impact to these agricultural sites will be mitigated by the production of this report; we find them unlikely to yield scientific data significantly different from that collected by Kennedy (1990) or Haun (1989) from similar, if not better examples in this area. In addition, a data recovery project is forthcoming for this general area which should include investigations of like structures.

Feature A which has been described, mapped and tested is significant for its information value under Criteria D, but unlike the other features in the survey area, Feature A is recommended for further work. The presence of upright stones and coral may indicate religious associations with this structure.

SIGNIFICANCE EVALUATION CRITERIA

SITE #	FUNCTION	CONDITION	NATL REG	FURTHER WORK
T-1				
Features found on map page #8				
Feature A	Hab/Ag	Good/Fair	D	YES
Feature B	Ag	Fair	D	No
Feature C	Ag	Fair	D	No
Feature D	Ag	Fair	D	No
Feature E	Ag	Fair	D	No

REFERENCES CITED

- Armstrong, R.W.
(ed.)
1983
Atlas of Hawaii.
University of Hawaii Press. Honolulu
(Second edition)
- Brisbin, J.
Haun, A.E.
Jensen, P.M.
(1991)
Archaeological Data Recovery Excavations
Waikapu Mauka Partners
Golf Resort Project Area.
PHRI. Hilo, Hawaii
- Foote, D.E.,
Hill, E.L.,
Nakamura, S.,
Stephens, F.
(1972)
Soil Survey of the Islands of Kauai,
Oahu, Maui, Molokai and Lanai.
State of Hawaii.
U.S. Government Printing Office.
Washington, D.C.
- Kennedy, J.
(1991)
Inventory and Subsurface Testing Results
For Waikapu Mauka Partners Proposed
Residential Project. Waikapu, Island of
Maui. ACH, Haleiwa.
- Kirch, P.V.
(1985)
Feathered Gods and Fishhooks: An
Introduction to Hawaiian Archaeology.
University of Hawaii Press. Honolulu
- Klein, J.,
Lerman, J.C.,
Damon, P.E.,
Ralph, E.K.
"Calibration of Radiocarbon Dates"
Radiocarbon, Vol. 24, No. 2
- Smith, H.W.
1991
"Limited Historical Documentary Research"
(in) Archaeological Data Recovery
Excavations, Waikapu Mauka Partners,
Golf Resort Project Area
PHRI. Hilo, Hawaii

Shell Taxonomy

Phylum Mollusca
Class Gastropoda
Subclass Prosobranchia
Order Mesogastropoda

Superfamily Cypraeacea
Family Cypraeidae

Cypraea spp. (Linnaeus, 1758)

NATIVE HABITAT: The cowrie are among the best known of all mollusks, their highly polished, elaborately patterned shells long prized in collections. In habitat cowries range from the intertidal to depths of about 100m. The most common species in the genus in the Hawaiian Islands are found in shallow water under loose rocks and boulders along the shoreline and in crevices at the seaward edge of solution benches and fringing reefs. Samples have been reported from Pleistocene fossil deposits on Oahu.

NATIVE USE AND NOMENCLATURE: This shell group was of major importance in the Hawaiian economy as food, ornaments, tools, and octopus fishing lures. Leho is the general name for the family Cypraeidae while poleholeho refers to the smaller species. To prepare leho for consumption, the shells were broken open, the meat removed then removed and worked with salt. The flesh was wrapped in ti leaves and cooked over coals. Some people merely boiled the shell and then removed the meat. On Kauai, leho were either boiled as the only method of cooking or eaten raw. Poleholeho were not eaten. Small yellow and white leho were reserved for the ali'i to use as ornaments and were occasionally used as a currency. Larger shells were used to make scrapers for removing the skin from cooked taro and breadfruit and for grating coconut. Cowrie scrapers with a sharp, serrated edge were also used to incise wauke bark to remove it from the plant. The mauritius and sometimes the tiger cowries were used as lures in fishing for octopus.

BIBLIOGRAPHY

"Hawaiian Marine Shells"; E. Alison Kay, Bishop Museum Special Publication 64(4), Bishop Museum Press, 1979.

"Native Use of Marine Invertebrates in Old Hawaii"; Margaret Titcomb, Pacific Science(1978), vol. 32, no. 4; The University Press of Hawaii, 1979.



INFORMATION REQUIRED FOR ALL USES
INFORMATION REQUIRED FOR CONDITIONAL USE ONLY

INFORMATION REQUIRED FOR ALL USES

I. Description of Parcel

A. Existing Structures/Use

The proposed 0.5 MG water storage tank, 1.0 MG irrigation reservoir, and 1,200 feet of access easement are to be located within a portion of property identified as TMK: 3-6-03: 1 which contains approximately 3,425 acres, and TMK: 3-6-02: 2 which contains about 961.3 acres (see Exhibit A). The majority of the project site is owned in fee by Wailuku Agribusiness Company, Inc. (TMKs: 3-6-03: 1 and 3-6-02: portion of 2), except for about 300 feet of the easternmost portion of the access easement which is owned in fee by Waikapu Mauka Partners (TMK: 3-6-02: portion of 2). The parcel identified as TMK: 3-6-03: 1 is vacant, undeveloped, and overgrown with vegetation including wiliwili trees, koa-haole and mixed grasses. The western portion of the parcel identified as TMK: 3-6-02: 2 is mostly vacant and overgrown with vegetation consisting of koa-haole and mixed grasses. The remainder of the parcel is primarily occupied by the Waikapu Golf Course development.

B. Existing Utilities

There are no water, sewerage, or storm drainage systems in the immediate vicinity of the proposed water storage tank, reservoir, and access easement.

C. Existing Access

A foot trail extends approximately 900 feet from the mauka end of the proposed access road in the Waikapu Mauka Subdivision to the project site. The area of the existing foot trail is overgrown with vegetation.

D. Vegetation

According to the Botanical Survey Report conducted by Botanical Consultants in May 1991 for the proposed project, vegetation in the area consists primarily of wiliwili trees, koa-haole, kiawe trees, and mixed grasses. None of the plants found are listed as threatened or endangered species.

Detailed findings of the Botanical Survey are contained in Appendix A.

E. Topography

The project site is located mauka of Honoapiilani Highway where the slope varies between 5 and 25 percent. According to topographic maps, the tank and reservoir site is located in an area where slopes are approximately 20 percent.

F. Shoreline

At its closest point, the shoreline is located approximately 3.4 miles away at Maalaea Bay.

G. Existing Covenants, Easements, Restrictions

None.

H. Historic Sites Affected

An archaeological inventory survey of the project site was conducted by Archaeological Consultants of Hawaii in June 1991 and September 1991. The survey revealed one multicomponent residential feature (Feature A) and three separate agricultural features within the project site. The residential feature consists of an upper level of a flat soil surface partially surrounded by a box C-shape, and a lower level surrounded by an enclosure. Continued excavation at this site in the form of data recovery will be necessary to further establish function and define unique characteristics.

The agricultural features identified included one feature (Feature B) consisting of a 2 meter long agricultural terrace with four small clearing mounds. Another agricultural feature (Feature D) consisted of two small mounds constructed from stones. The third agricultural feature (Feature E) consisted of a modified rubble field. The agricultural features are significant for their information value; however, no further work is recommended for these features. See Appendix B.

II. Description

The proposed action involves the construction of a 0.5 MG water storage tank, a 1.0 MG irrigation reservoir, and a 1,200-foot long paved access easement to the site. Refer to Figure 2 in the EA. The 0.5 MG reinforced concrete tank will be situated at about the 1,077-foot elevation and will be 21 feet high and 70 feet in diameter. A proposed 12-inch transmission main will connect to an existing 8-inch water line in the Wailuku Heights Subdivision to convey water approximately 10,900 feet to the proposed 0.5 MG water tank. The water will serve the proposed Waikapu Mauka Subdivision, the two Waikapu Golf Course clubhouses and associated golf course facilities, and a proposed residential development. A 12-foot wide paved access easement will be constructed to the tank site. A 10-foot wide perimeter road around the water tank will be constructed for maintenance vehicles and personnel. The water tank site will be surrounded by a 6-foot high chain link fence secured by a double-swing gate. Landscaping will be provided around the site for erosion control purposes.

The 1.0 MG irrigation reservoir will be an open, lined pond located at the 1,030-foot base elevation on the southeast side of the proposed 0.5 MG water storage tank. Water for the reservoir will come from Waihee Ditch located approximately 1 mile east, and will be transported to the reservoir via a 12-inch transmission main. Water from the reservoir will serve the irrigation requirements of the Waikapu Mauka Subdivision and the proposed residential development. A 24-inch spillway will be constructed within the southwest portion of the reservoir to direct any potential overflow of water into natural drainage courses. Landscaping will be provided around the reservoir for erosion control purposes.

The project area consists of the water tank, irrigation reservoir, and an access easement for a total of approximately 2.5 acres. Most of the 2.5-acre project site is in the State Conservation District, except for approximately 0.02 acre of the reservoir site and 1,000 feet of the access easement which are located in the State Agricultural District. The project site is to be subdivided from the larger parcels (TMKs: 3-6-03: 1 and 3-6-02: 2) prior to dedication of the water system improvements to the County Department of Water Supply.

III. Commencement Date: Following the receipt of appropriate permits and approvals.

Completion Date: September 1993

IV. Type of Use Requested

Conditional Use: Subzone R.

Area of Proposed Used:

A 2-acre area consisting of the water tank and irrigation reservoir site, and 200 feet of access easement.

Name and Distance of Nearest Town:

The fringe of Waikapu town and Honoapiilani Highway lie approximately 1.6 and 1.2 miles northeast and east, respectively, of the proposed project site. The proposed Waikapu Mauka Subdivision and Waikapu Golf Course developments lie immediately makai of the project site.

Conservation District Subzone: Resource

County Development Plan Designation: No Designation

V. Filing Fee

A filing fee of \$50.00 is remitted, together with a public hearing fee of \$50.00, for a total remittance of \$100.00.

INFORMATION REQUIRED FOR CONDITIONAL USE ONLY

I. Plans

A. Area Plan: The proposed water tank and reservoir site is vacant and undeveloped. The parcel is owned by Wailuku Agribusiness Company, Inc. West of the project site is the West Maui Forest Reserve. East of the project site are the recently developed Waikapu Golf Courses and Maui Tropical Plantation. Refer to Figure 1 in the EA.

B. Site Plan: Refer to Figure 2 in the EA.

- C. Construction Plan: Refer to Figure 3 in the EA.
- D. Maintenance Plan: The 12-foot wide paved access road to the water tank and reservoir site and the 10-foot wide perimeter road around the water tank will be constructed for maintenance vehicles and personnel who will conduct chart recording, groundskeeping, and landscaping maintenance work.
- E. Management Plan: No animal, plant, or mineral resources are used or proposed for usage.
- F. Historical or Archaeological Site Plan: The project site contains no historic or archaeological sites on the State or Federal Register (see Appendix B).

II. Subzone Objective:

The objective of the Resource Subzone is to "*develop, with proper management, areas to ensure sustained use of the natural resources of those areas.*" (Section 13-2-13 Administrative Rules of the Department of Land and Natural Resources).

The proposed water storage tank, irrigation reservoir, access easement, and subdivision of the project site required for dedication to the County are requested as a Conditional Use of the Resource Subzone. The tank, reservoir and access easement will utilize approximately 2 acres within the 3,425 acre parcel, which is a relatively small area in relation to the surrounding open space. The tank and reservoir should not significantly detract from the sustained use value of the area.

EXHIBIT A
PHOTOGRAPHS OF PROJECT SITE
TMK MAP



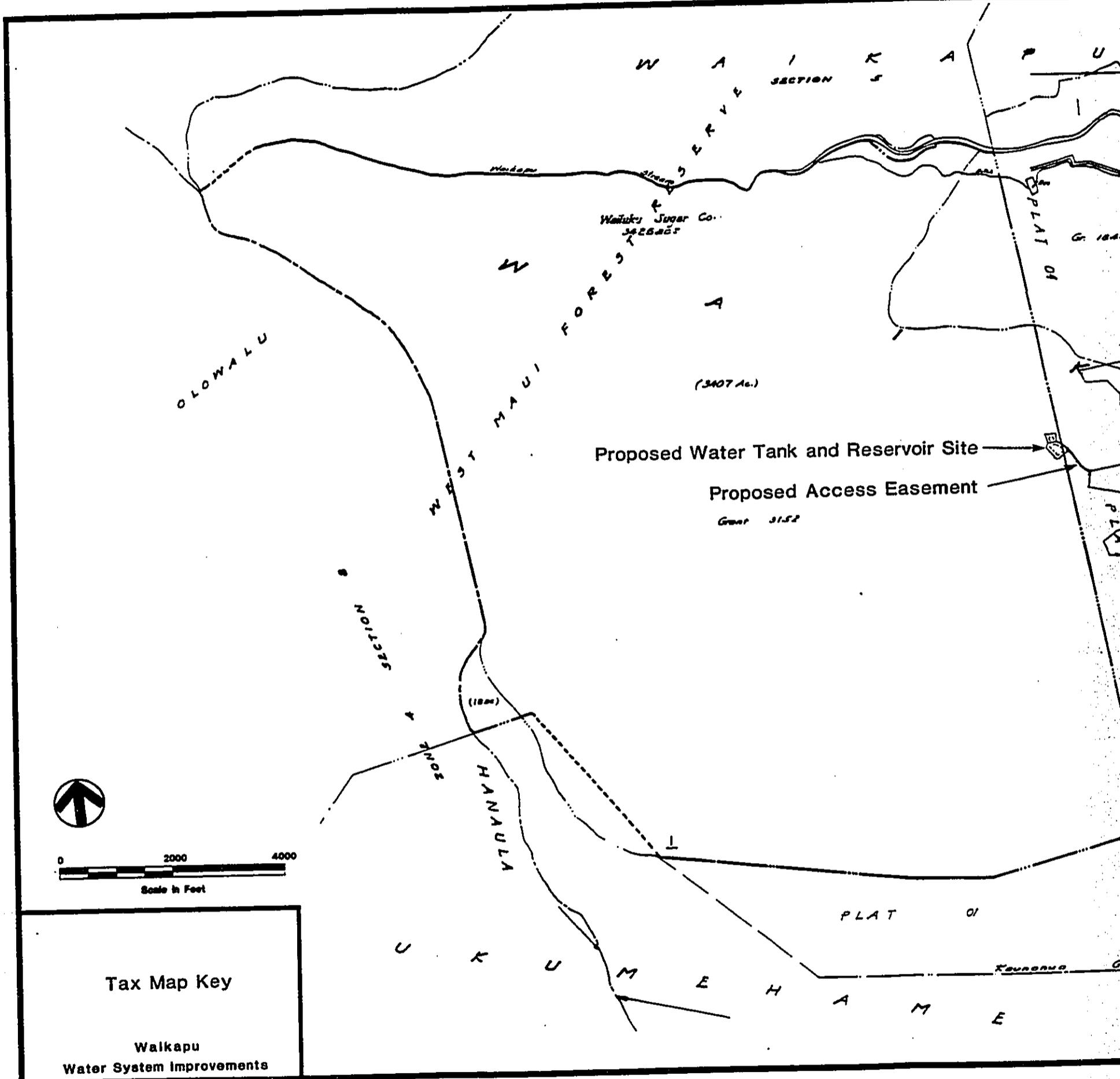
View of the project site looking northwest.

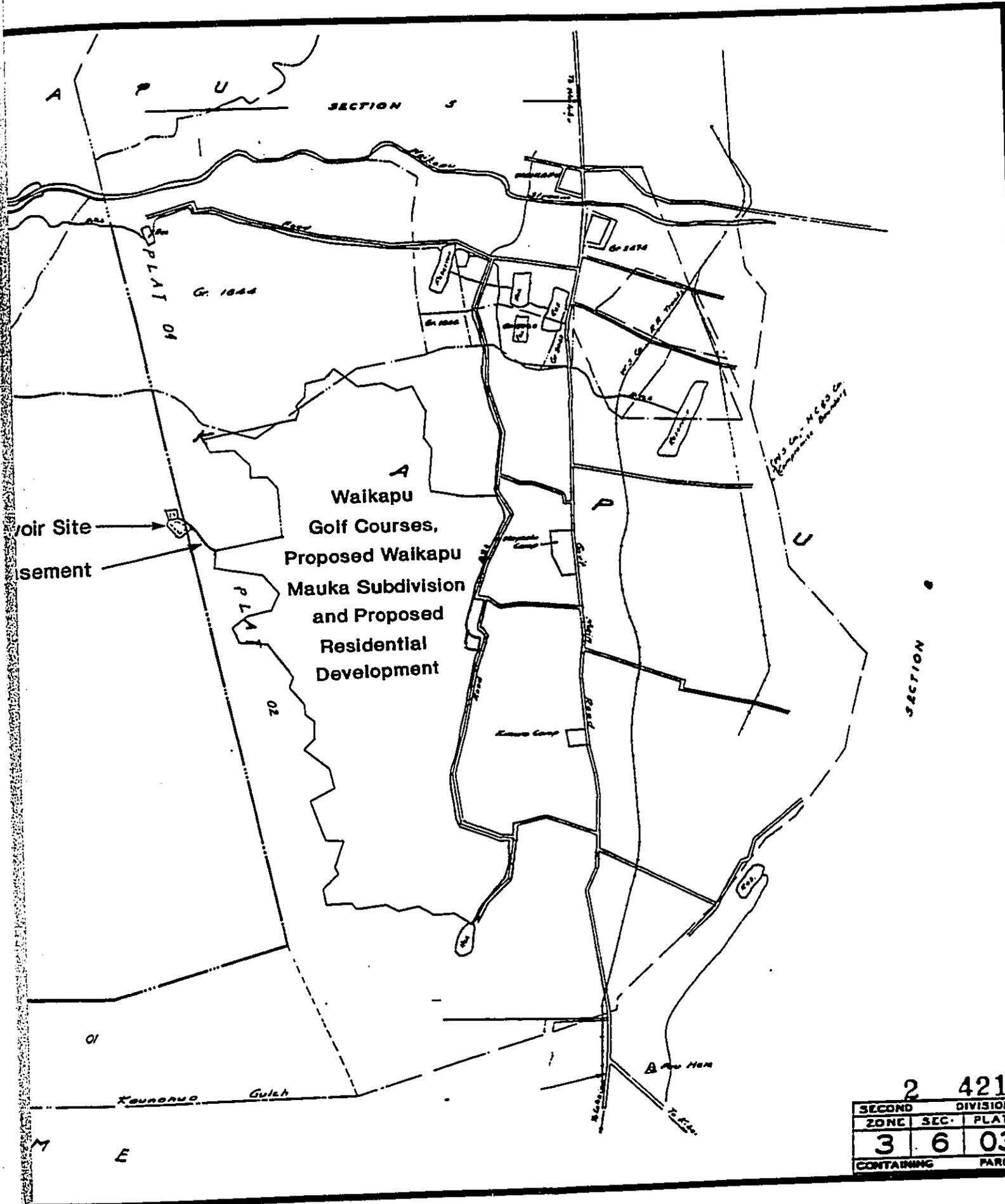


View of the project site looking northeast.



View of the project site looking south.





Wetland Site
 Assessment

A
 Waikapu
 Golf Courses,
 Proposed Waikapu
 Mauka Subdivision
 and Proposed
 Residential
 Development

2		421	
SECOND	DIVISION		
ZONE	SEC.	PLAT	
3	6	03	
CONTAINING		PARCELS	