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OFC. OF ENVIRONMENTAL
QUALITY CONTROL

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

March 10, 1994

Mr. Brian J. J. Choy
Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Choy:

Subject: WAIHE'E WELLS AND TRANSMISSION SYSTEM

In accordance with the requirements of Chapter 343, Hawaii Revised Statutes, and Chapter 200 of Title 11, Administrative Rules, a Final Environmental Assessment has been prepared for the subject project.

Notice of availability of the Draft Environmental Assessment for the project was published in the August 23, 1993 OEQC Bulletin.

As the proposing agency, we are forwarding herewith one copy of the OEQC Bulletin Publication Form, and four copies of the Final Environmental Assessment. We have determined that there will be no significant impacts as a result of the project and, therefore are filing the Final Environmental Assessment as a negative declaration. We respectfully request that the notice of Final Environmental Assessment be published in the OEQC Bulletin.

Sincerely,

David R. Craddick
Director

/sc

Enclosures

WAIHEE WELLS AND TRANSMISSION SYSTEM

Final Environmental Assessment

Prepared for:

County of Maui
Department of Water Supply

March 1994

Michael T. Munekiyo Consulting, Inc.

WAIHEE WELLS AND TRANSMISSION SYSTEM

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Preface

The County of Maui, Department of Water Supply (DWS), in coordination with C. Brewer Homes Inc. (CBH), proposes to construct a new water supply and transmission system from the North Waihee area to an existing 1.0 million gallon DWS water tank located in Waiehu, Maui, Hawaii. Pursuant to Chapter 343, Hawaii Revised Statutes, and Chapter 200, of Title 11, Administrative Rules, Environmental Impact Statement Rules, this Final Environmental Assessment documents the project's technical characteristics and environmental impacts, and advances findings and conclusions relative to the significance of the project.

Summary

Proposing Agency and Landowners

The County of Maui, Department of Water Supply (DWS), in coordination with C. Brewer Homes Inc. (CBH), proposes water system improvements at Waihee, Maui, Hawaii. The affected landowners are Wailuku Agribusiness Co., Inc., the County of Maui and the State of Hawaii.

Contact Person

For further information, contact David Craddick, Director, Department of Water Supply, 200 South High Street, Wailuku, Hawaii 96793, or at telephone 243-7816.

Property Location and Description

The proposed Waihee Wells and Transmission System Project involves lands in the Waihee and Waiehu regions of the island. The transmission system extends from the vicinity of the Waihee Stream area to the existing 1.0 million gallon DWS water tank south of Malaihi Road in Waiehu.

The proposed project will traverse lands in a variety of land uses including vacant lands, roadways, and agricultural uses.

Proposed Action

The proposed project involves the installation of production pumps and appurtenant facilities at the existing Waihee Well Site Nos. 1 and 2. The project also involves drilling of two new wells, installation of production pumps, and appurtenant facilities at Waihee Well Site Nos. 3 and 4. A new 500,000 gallon water tank along with two booster pumps and appurtenant equipment are also proposed. The transmission system consists of approximately 22,500 feet or 4.26 miles of underground waterline.

The existing Waihee Well Site Nos. 1 and 2 are located in the Lower Kanoa Ridge area approximately 2,000 feet to the west of the Kahekili Highway bridge over Waihee

Stream. The wells were drilled in 1981 for C. Brewer Properties, Inc., but were not fitted with pumps and have remained idle. Pump installation permits were granted, with conditions, by the Commission on Water Resource Management on March 25, 1993.

At the Waihee Well Site Nos. 1 and 2, the proposed project would involve the installation of two 1,400 gallons per minute (gpm) capacity production pumps, (one of the pumps shall serve as a standby pump), installation of a standby generator, motor control center, and chlorination equipment. The pumps and equipment would be housed adjacent to the existing well sites. Chlorination equipment would be secured within a structure, while the generator may be covered with a roof but open on the sides to allow ventilation.

Waihee Well Site Nos. 3 and 4 are located to the north of the Well Site Nos. 1 and 2. Well Site Nos. 3 and 4 involve the drilling and construction of both wells, as well as the installation of production pumps and appurtenant facilities similar to Well Site Nos. 1 and 2.

The project involves the construction of a 16-inch waterline from the Waihee Well Site Nos. 1 and 2 which extends approximately 1,000 feet in a generally east-northeasterly or makai direction to the new 500,000 gallon water tank at the 410 foot elevation. A 16-inch waterline would also be extended approximately 1,000 feet from Waihee Well Site Nos. 3 and 4, which are located to the north of the proposed water tank. A 24-inch waterline would then extend in a makai direction approximately 1,100 feet from the water tank to Kahekili Highway.

From its intersection with Kahekili Highway, the 24-inch waterline would then extend approximately 7,500 feet in a generally south-southeasterly direction within the Kahekili Highway right-of-way to Kuhinia Street. At Kuhinia Street, the 24-inch waterline extends approximately 1,200 feet in a generally west-southwesterly or mauka direction. Then, the waterline would follow the existing dirt roads extending approximately 1,500

feet in a south-southwesterly direction and then 800 feet in a west-southwesterly or mauka direction. The waterline then extends approximately 4,900 feet in a south-southeasterly direction and generally follows the Spreckels Ditch alignment to Malaihi Road. The 24-inch waterline then extends approximately 3,500 feet in a southerly direction to the existing 1.0 million gallon water tank in Waiehu. At the Waihee Stream and North Waiehu Stream crossing, the waterline will be placed in a concrete jacket under the existing stream channel.

Determination

Construction of the proposed project will involve short-term environmental impacts typically associated with construction activities. These include air quality and noise impacts. Dust control measures such as watering and sprinkling will be implemented as needed to minimize wind-blown emissions, particularly close to residential areas. Construction activities are also anticipated to be limited to daylight hours only. Construction of the waterline involves work within the Kahekili Highway, Kuhinia Street and Malaihi Road rights-of-way. Traffic monitoring and coordination is anticipated to minimize inconveniences normally associated with construction. At least one lane of traffic is expected to remain open at all times during construction. Impacts generated from construction activities are not considered adverse.

From a long-term perspective, the proposed project is not anticipated to result in adverse environmental impacts. Portions of the waterline are located on undeveloped or uncultivated lands. The waterline will also cross Waihee Stream and North Waiehu Stream. None of the plants found in these areas are listed as threatened and endangered species. Construction of the project is intended to avoid those archaeological sites which are significant or suspected to be significant. If remains are encountered during construction, then the project will comply with all applicable procedures of Chapter 6E, HRS. Withdrawal of groundwater from the well sites are not anticipated to adversely affect Waihee Stream flow. The water table is at 10 to 11 feet above sea level while the channel of the stream opposite the wells is 200 feet above

sea level. A small depression in the water table caused by pumping will not influence Waihee Stream flow mauka of the wells. It is also not likely that the stream will be affected makai of the wells because of the high invert of the channel compared to the position of the water table. Since the project also involves traversing Waihee and North Waiehu Streams, the project is subject to a number of governmental permits and will comply with all applicable provisions. In the long-term, adverse air quality and noise conditions are not anticipated as a result of the project.

Impacts to the local economy are anticipated to be positive involving support for construction-related employment in the short-term. The project provides the source and transmission system which would allow connection to the existing Central Maui water system providing an additional supply of water and flexibility regarding the withdrawal of water from the Iao Aquifer.

The proposed project would not generate permanent employment to maintain and service the waterline and tank. Thus, there are no significant project associated impacts upon public service needs, such as police and fire protection, medical facilities, recreational facilities and schools.

It is anticipated that the total average pumpage from the four wells would be 4 mgd or less. For existing Waihee Well Site Nos. 1 and 2 and Waihee Well Site Nos. 3 and 4, all applicable requirements for bringing the wells into operation will be met, including permits for well construction and pump installation for Site Nos. 3 and 4, and water quality analyses. The project is not anticipated to have a significant impact upon other infrastructure systems.

In light of the foregoing findings, it is concluded that the proposed action will not result in any significant environmental effects.

Chapter I

Project Overview

I. PROJECT OVERVIEW

A. PROPERTY LOCATION, EXISTING USE, AND LANDOWNERSHIP

The County of Maui, Department of Water Supply (DWS), in coordination with C. Brewer Homes Inc. (CBH), proposes to construct the Waihee Wells and Transmission System Project in Waihee, Maui, Hawaii. See Figure 1.

The proposed project will traverse lands in a variety of land uses including vacant lands, roadways, and agricultural uses.

There are various landowners affected by the subject property, including Wailuku Agribusiness Co., Inc., the County of Maui and the State of Hawaii.

B. PROPOSED ACTION

1. Project Need

The proposed project would provide additional supplies of water and an appurtenant transmission system linking with the existing DWS Central Maui Water System.

The Central Maui Water System services the communities of Waihee, Waiehu, Wailuku, Kahului, Paia, Maalaea, Kihei and Makena. Virtually all of the water to supply the Central Maui Water System is withdrawn from the Iao Aquifer in the vicinity of Iao Stream and Waiehu Stream. However, source limits are being approached for the Iao Aquifer. The sustainable yield for the aquifer is estimated at 20 million gallons per day (mgd). Recent estimates place the monthly average withdrawal from the aquifer at 18 mgd.

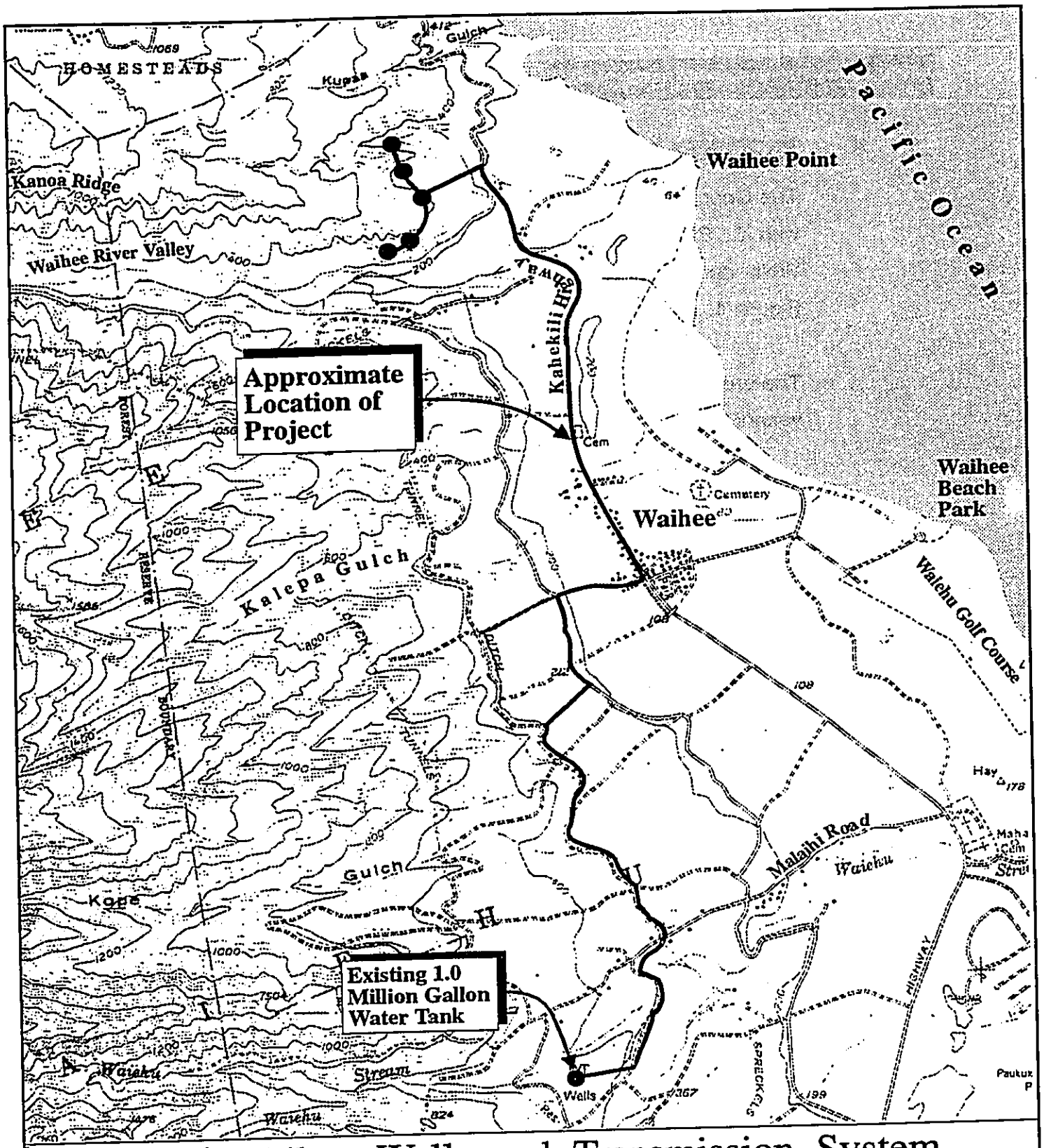

Figure 1 Waihee Wells and Transmission System

Regional Location Map

1000 0 2000 4000 Feet

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Prepared for: County of Maui, Dept. of Water Supply

Waihee Well Site Nos. 1-4 would tap the Waihee Aquifer. Currently, there is virtually no pumpage from this aquifer which has an estimated sustainable yield of 8-10 mgd. (Mink and Yuen, 1989). Thus, the project would provide added supplies to the Central Maui Water System and flexibility regarding the withdrawal of water from the Iao Aquifer.

2. ***Proposed Improvements***

The proposed project involves the installation of production pumps and appurtenant facilities at the existing Waihee Well Site Nos. 1 and 2. The project also involves drilling of two new wells, installation of production pumps, and appurtenant facilities at Waihee Well Site Nos. 3 and 4. A new 500,000 gallon water tank along with two booster pumps and appurtenant equipment are also proposed. The transmission system consists of approximately 22,500 feet or 4.26 miles of underground waterline. See Figure 2.

The existing Waihee Well Site Nos. 1 and 2 are located in the Lower Kanoa Ridge area approximately 2,000 feet to the west of the Kahekili Highway bridge over Waihee Stream. The wells were drilled in 1981 for C. Brewer Properties, Inc., but were not fitted with pumps and have remained idle. Pump installation permits were granted, with conditions, by the Commission on Water Resource Management on March 25, 1993.

At the Waihee Well Site Nos. 1 and 2, the proposed project would involve the installation of two 1,400 gallons per minute (gpm) capacity production pumps (one of the pumps shall serve as a standby pump), installation of a standby generator, motor control center, and chlorination equipment. The pumps and equipment

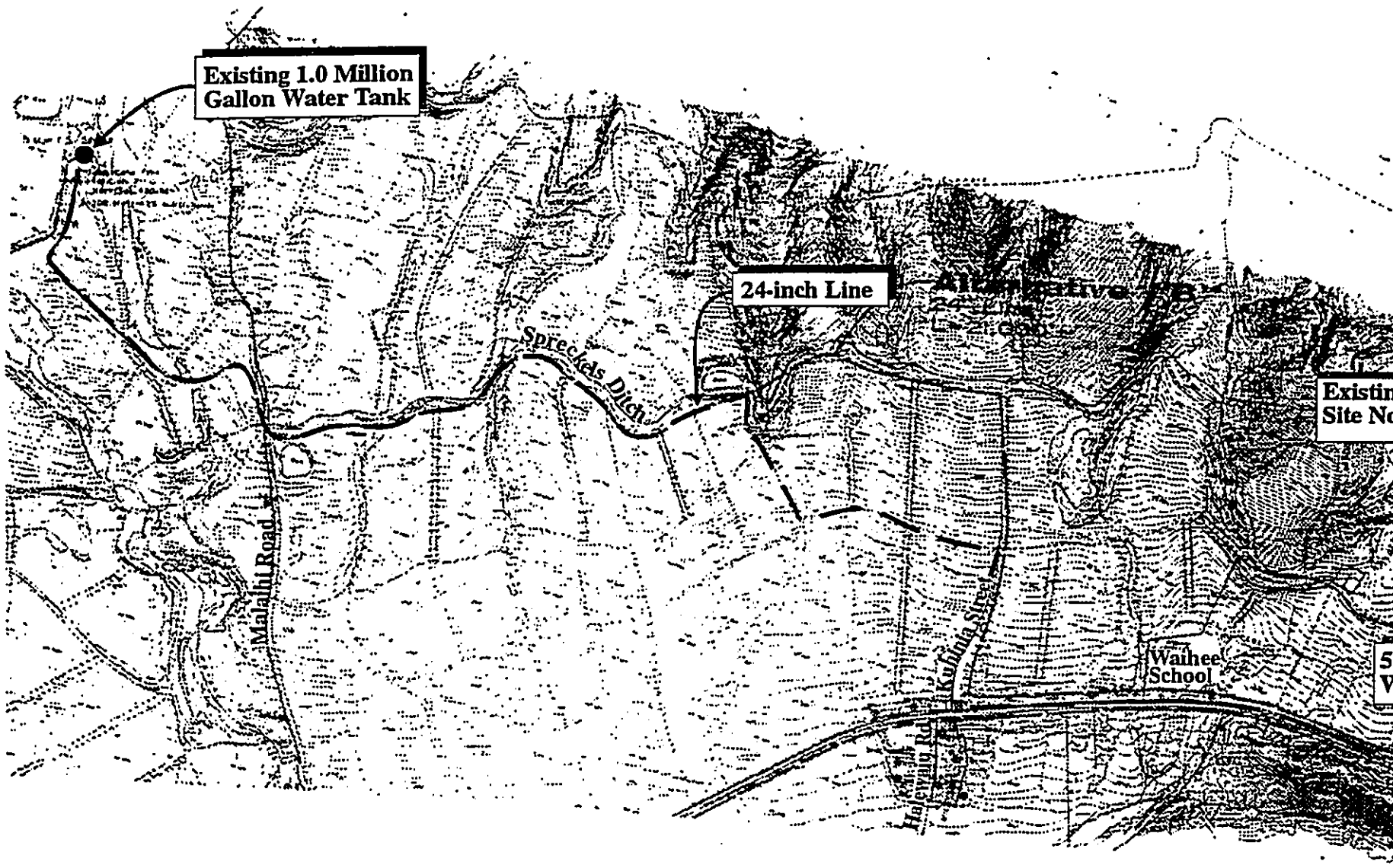

Figure 2

Waihee Wells and Transmission System
Location Map

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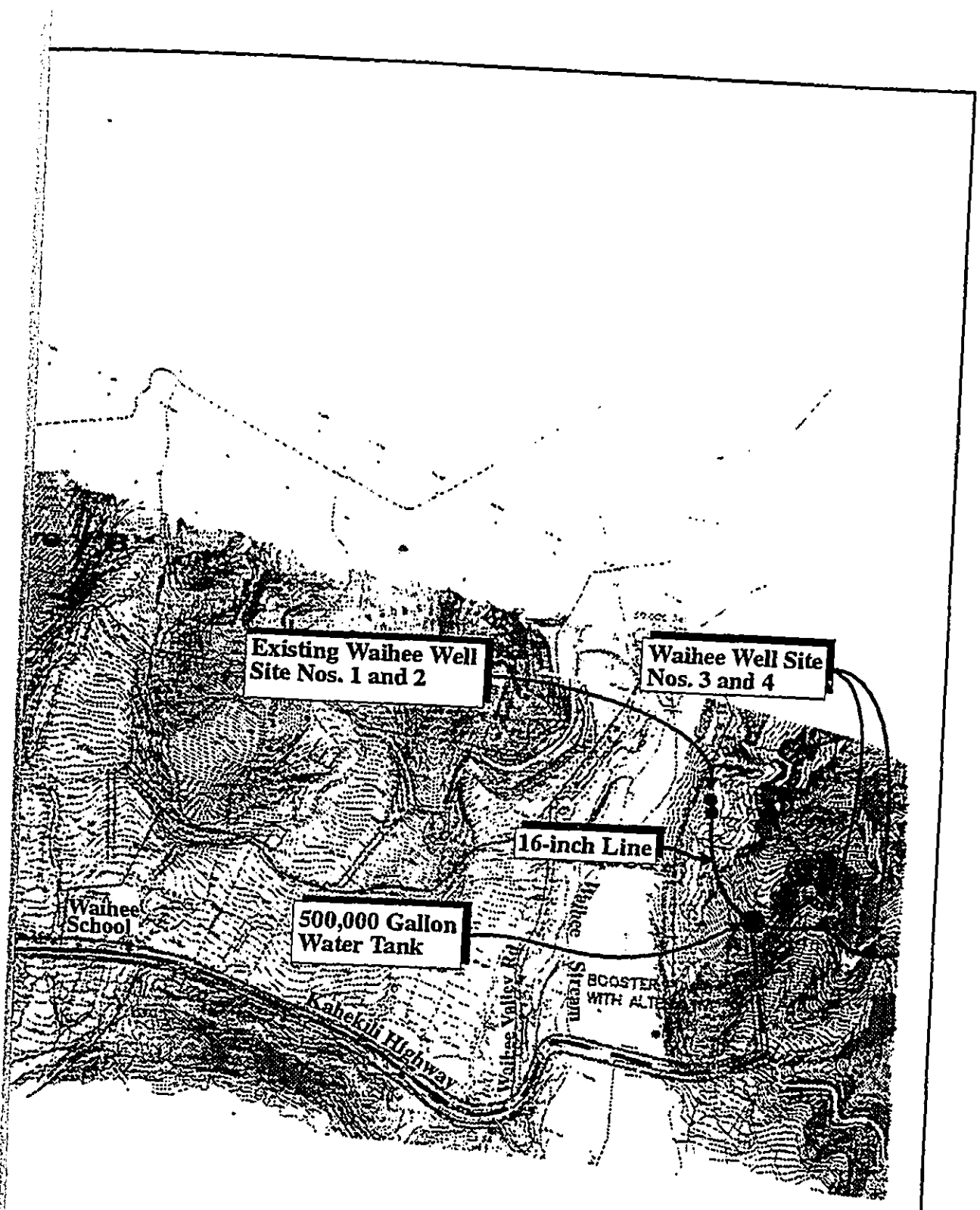

mission System
p

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would be housed adjacent to the existing well sites. Chlorination equipment would be secured within a structure, while the generator may be covered with a roof but open on the sides to allow ventilation.

Waihee Well Site Nos. 3 and 4 are located to the north of Waihee Well Site Nos. 1 and 2. Well Site Nos. 3 and 4 involve the drilling and construction of both wells, as well as the installation of production pumps and appurtenant facilities similar to Well Site Nos. 1 and 2.

The project involves the construction of a 16-inch waterline from Waihee Well Site Nos. 1 and 2 which extends approximately 1,000 feet in a generally east-northeasterly or makai direction to the new 500,000 gallon water tank at the 410 foot elevation. A 16-inch waterline would also be extended approximately 1,000 feet from Waihee Well Site Nos. 3 and 4, which are located to the north of the proposed water tank. A 24-inch waterline would then extend in a makai direction approximately 1,100 feet from the water tank to Kahekili Highway.

From its intersection with Kahekili Highway, the 24-inch waterline would then extend approximately 7,500 feet in a generally south-southeasterly direction within the Kahekili Highway right-of-way to Kuhinia Street. At Kuhinia Street, the 24-inch waterline extends approximately 1,200 feet in a generally west-southwesterly or mauka direction. Then the waterline is proposed to follow existing dirt roads extending approximately 1,500 feet in a south-southeasterly direction and then 800 feet in a west-southwesterly or mauka direction. The waterline then extends approximately

4,900 feet in a south-southeasterly direction and generally follows the Spreckels Ditch alignment to Malaihi Road. The 24-inch waterline then extends approximately 3,500 feet in a southerly direction to the existing 1.0 million gallon water tank in Waiehu. At the Waihee Stream and North Waiehu Stream crossing, the waterline will be buried in a concrete jacket across of the stream.

The project is divided into three phases. Phase I involves construction of the waterline within the Kahekili Highway right-of-way, except for the portion which crosses the Waihee Stream. Phase II involves construction of improvements at Waihee Well Site Nos. 1 and 2, drilling and appurtenant improvements at Waihee Well Site No. 3, and construction of the 500,000 gallon water tank. Waterline construction in Phase II includes segments from Well Site Nos. 1-3 to the new water tank and extending to Kahekili Highway, the segment crossing Waihee Stream, and the entire southern portion of the waterline from the intersection of Kahekili Highway and Kuhinia Street to the existing 1 million gallon water tank in Waiehu. Phase III involves drilling and appurtenant improvements at Waihee Well Site No. 4. This phase also includes construction of the waterline segment to link with Waihee Well Site No. 3.

In the long term, additional well development and appurtenant pumping and transmission facilities are contemplated for the northern portions of the Waihee Aquifer. Development of the aquifer may include a Kupaa Well as well as three (3) Maluhia Exploratory Wells. See Figure 3. Development of this future increment as well as the exact location of the wells and extent of pumpage depends on the effect which Waihee Well Nos. 1-4 may

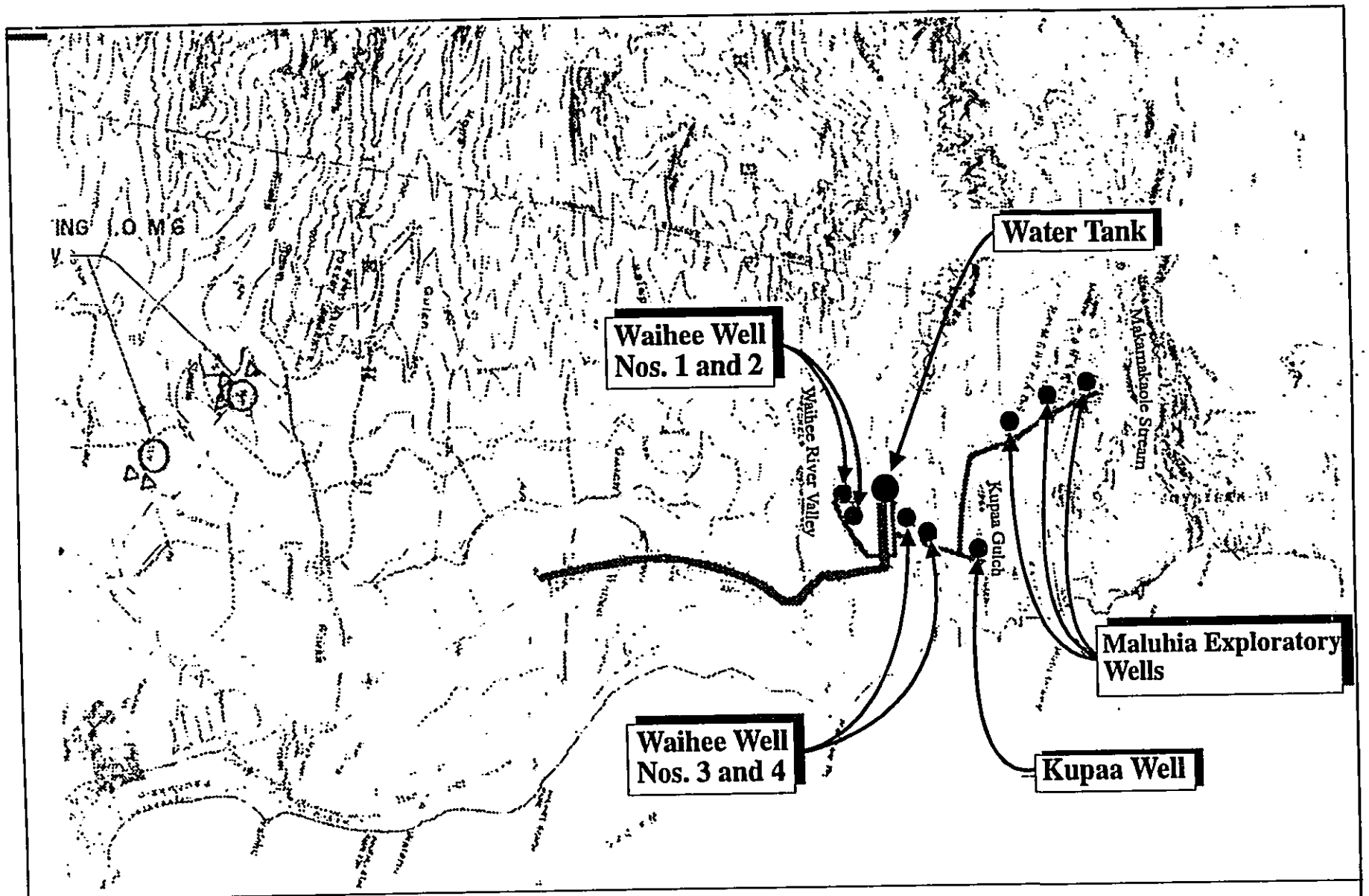

Figure 3 Waihee Wells and Transmission System
Schematic Plan for Kupaa & Maluhia Wells

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Prepared for: County of Maui, Dept. of Water Supply

have on the Waihee Aquifer. Waihee Well Nos. 1-4 will be monitored for purposes of assessing future source development opportunities. After operation of the first set of wells, a monitoring period of at least 3 years is anticipated in order to accumulate and assess aquifer data.

It currently appears that there are additional increments of several mgd between Kupaa and Makamakaole. However, any well development north of Kupaa will likely result in increased cost of development and transmission construction because of the rugged terrain.

Since sufficient information is not available for the development of Kupaa and Maluhia Exploratory Wells at this time, this future increment is not within the scope of this Environmental Assessment.

Chapter II

Description of the Existing Environment

II. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. PHYSICAL ENVIRONMENT

1. Surrounding Land Uses

The proposed project occupies a narrow corridor and extends approximately 22,500 feet or 4.26 miles in the Waihee-Waiehu section of the island.

The segment of the proposed project from the well sites and 500,000 gallon water tank extending makai to Kahekili Highway, is located in the Lower Kanoa Ridge area. This area is generally vacant with scattered residences in an open space setting.

The proposed waterline then extends within the Kahekili Highway right-of-way approximately 7,500 feet in a south-southeasterly direction to Waihee Town. There are several single family residences in the area around Waihee Stream and Waihee Valley Road. Moving towards Waihee Town, lands on the mauka side of Kahekili are primarily macadamia nut orchards and existing dirt roads with a few residences. Land on the makai side of the highway contains a cemetery, but is mostly vacant. Waihee Town contains primarily single family residential use. However, Waihee Elementary School and a neighborhood store are also located along Kahekili Highway.

The waterline alignment then extends mauka along Kuhinia Street. Lands abutting Kuhinia Street are mostly in single family residential use with a notable exception being St. Ann's Church. The improved roadway extends approximately 500 feet from its intersection with Kahekili Highway. Further mauka, the waterline

alignment traverses macadamia nut orchards and existing dirt roads until it intersects with Spreckels Ditch.

Along the Spreckels Ditch area, the waterline alignment extends in a generally south-southeasterly direction and also traverses macadamia nut orchards. The waterline alignment generally follows an existing dirt road abutting the Ditch.

From Malaihi Road, the waterline alignment extends through scattered residential uses, macadamia nut orchards and vacant lands containing the North Waiehu Stream to the existing 1 million gallon DWS water tank in Waiehu.

2. *Climate*

Like most areas of Hawaii, Maui's climate is relatively uniform year-round. Characteristic of Hawaii's climate, the project site experiences mild and uniform temperatures year round, moderate humidity and a relatively consistent northeasterly tradewind. Variation in climate on the island is largely left to local terrain.

Average temperatures at the project site (based on temperatures recorded at Kahului Airport) range from lows in the 60's to highs in the 80's. August is historically the warmest month, while January and February are the coolest.

Rainfall in the Waihee-Waiehu area ranges from 30 to 40 inches per year. Winds in the region are predominantly out of the north-northeast and northeast.

3. ***Topography and Soil Characteristics***

The project site is located northwest of the Wailuku-Kahului region of the island along the foothills of the West Maui Mountains.

The existing Waihee Well Site Nos. 1 and 2 are located at an elevation of approximately 283 feet above sea level. The new 500,000 gallon water tank is located at approximately 410 feet above sea level. Waihee Well Site Nos. 3 and 4 would be located at approximately 400 and 350 feet above sea level, respectively.

The wells and water tank would be located in a relatively sloping area makai of Kanoa Ridge. From Waihee Well Site Nos. 1 and 2, the waterline extends upslope at an approximately 12 percent gradient to the proposed water tank. From Waihee Well Site Nos. 3 and 4, the waterline extends upslope at an approximately 6 percent gradient to the proposed water tank. The average slope from the proposed water tank extending to Kahekili Highway is approximately 18 percent.

The waterline alignment within the Kahekili Highway right-of-way is relatively level. From its northernmost portion along Kahekili Highway, the waterline alignment is at an elevation of 210 feet above sea level and extends approximately 7,500 feet generally parallel to the shoreline. At its intersection with Kuhinia Street, the elevation is at approximately 125 feet above sea level. The average slope along this portion of the waterline is approximately 1 percent.

The waterline then extends mauka approximately 1,200 feet along Kuhinia Street and through macadamia nut orchards to its

intersection with an existing dirt road at an elevation of approximately 220 feet above sea level. The average slope along this waterline segment is approximately 8 percent.

The waterline then extends approximately 1,500 feet in a south-southeasterly direction. This segment has a gradient of approximately 1 percent. The waterline then extends mauka approximately 800 feet to the area around Spreckels Ditch. The average slope along this segment is approximately 8 percent.

The waterline alignment then generally follows Spreckels Ditch to its intersection with Malaihi Road. This segment of the waterline alignment is essentially level.

From Malaihi Road, the waterline alignment winds its way upslope to the existing water tank at an elevation of 490 feet. The average slope for this segment of the waterline is approximately 5 percent.

Soil types occurring in the area of the well sites, the 500,000 gallon water tank, and the waterline alignment to its intersection with Kahekili Highway include: Rough Mountainous Land (rRT); Rough Broken Land (rRR); Naiwa silty clay loam, 3 to 20 percent slopes (NAC); and Wailuku cobbly silty clay, 7 to 15 percent slopes (WwC). See Figure 4.

Rough mountainous land (rRT) and Rough broken land (rRR), which occurs near the well sites, consist of very steep land broken by intermittent drainage channels. In most places, Rough mountainous land is not stony and the soil mantle is very thin. Rough broken land (rRR) is characterized by rapid runoff and

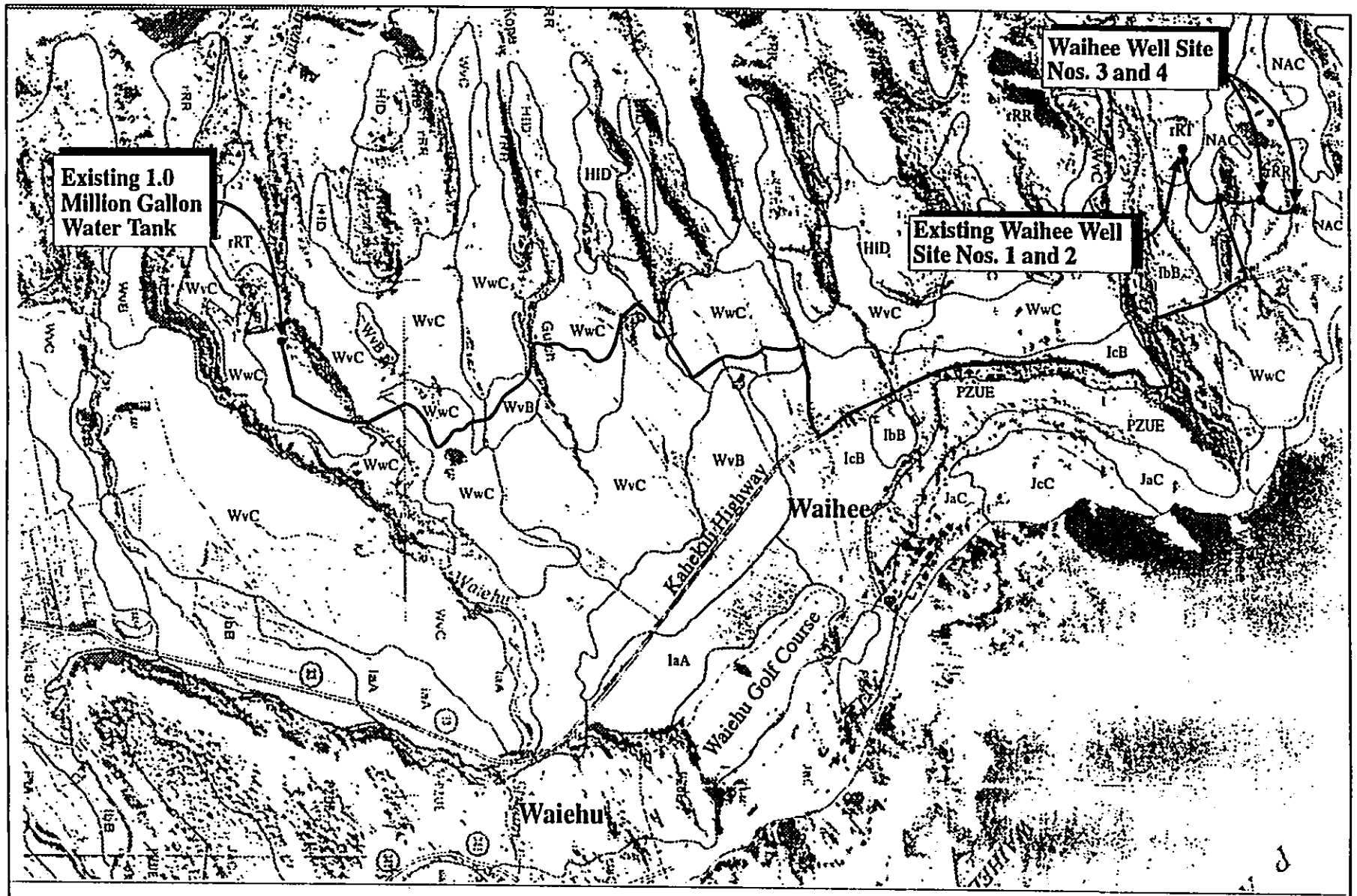

Figure 4 Waihee Wells and Transmission System

Soil Classifications

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active geologic erosion. Soils range from 20 inches to more than 60 inches deep over soft, weathered rock.

Naiwa silty clay loam (NAC) which occurs on land proposed for the water tank, is on smooth side slopes and intermediate slopes in the uplands. Permeability is moderately rapid. Runoff is medium and the erosion hazard is moderate to severe.

Wailuku cobbly silty clay (WwC), located on lower portions near Kahekili Highway, consists of well-drained soils derived from basic igneous rock. This particular soil is cobbly in the surface layer compared to other soils in the Wailuku Series.

For the segment of waterline along Kahekili Highway to Kuhinia Street, soil types include Wailuku cobbly silty clay, 7 to 15 percent slopes (WwC); Iao cobbly silty clay, 3 to 7 percent slopes (IbB); and Iao clay, 3 to 7 percent slopes (IcB).

Iao clay (IcB) is found on smooth alluvial fans and valley fill. In a representative profile, the surface layer is dark-brown clay approximately 15 inches thick. Permeability is moderately slow, runoff is medium and the erosion hazard is slight to moderate. Iao cobbly silty clay (IbB) is similar to Iao clay (IcB) except for the texture of the surface layer and the content of cobblestones.

For the segment of the waterline extending along Kuhinia Street to Spreckels Ditch, soil types include Iao clay, 3 to 7 percent slopes (IcB), Wailuku cobbly silty clay, 7 to 15 percent slopes (WwC) and Wailuku silty clay, 7 to 15 percent slopes (WvC).

Wailuku silty clay, 7 to 15 percent slopes (WvC), are on smooth alluvial fans. In a representative profile, the surface layer is dark reddish brown silty clay that has a subangular blocky structure. Permeability is moderate. Runoff is slow to medium and the erosion hazard is slight to moderate.

For the segment of the waterline extending along the Spreckels Ditch to the existing 1 million gallon water tank, soil types include Wailuku cobbly silty clay, 7 to 15 percent slopes (WwC), Wailuku silty clay, 7 to 15 percent slopes (WvC); and Wailuku silty clay, 3 to 7 percent slopes (WvB).

Wailuku silty clay, 3 to 7 percent slopes (WvB) is similar to Wailuku silty clay 7 to 15 percent slopes (WvC). Runoff is slow, and the erosion hazard is slight.

4. *Flood and Tsunami Hazard*

The northern portion of the project from the well sites to Waihee Stream is designated as Zone C, areas of minimal flooding by the Flood Insurance Rate Map. The area around Waihee Stream is designated as Zone A5, areas of the 100-year flood, within a base flood elevation of 104 feet above mean sea level. See Figure 5.

Extending further south approximately 3,500 feet along Kahekili Highway are areas designated as Zone C, areas of minimal flooding; and Zone B, areas inundated by the 500-year flood. Then approximately 700 feet of lands along the Kahekili Highway right-of-way near the Kalepa Gulch area are designated as Zone A, areas of the 100-year flood, base flood elevations and flood hazard factors not determined; and Zone A2, areas of the 100-year flood,

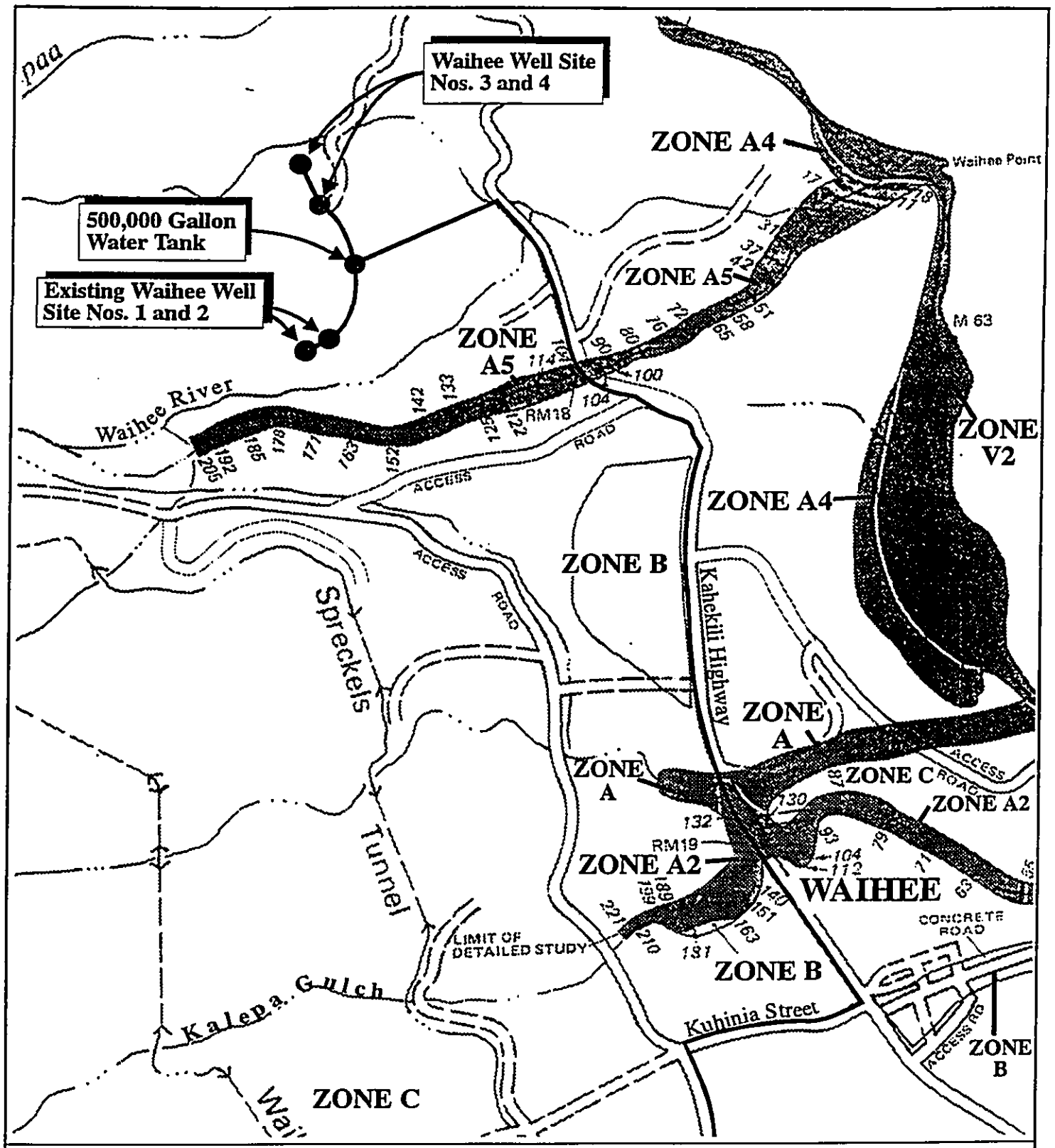

Figure 5 Waihee Wells and Transmission System
Flood Insurance Rate Map
(In Vicinity of Kahekili Highway)

0 500 1000 2000 Feet

Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Water Supply

with base flood elevations of 112, 130 and 132 feet above mean sea level. The waterline alignment then continues in a southerly direction along Kahekili Highway until it extends mauka along Kuhinia Street which is designated as Zone C.

The segment of the waterline alignment which extends through macadamia nut orchards and along Spreckels Ditch past Malaihi Road to the water tank is designated as Zone C. See Figure 6 and Figure 7.

5. *Flora and Fauna*

The proposed project for the most part, follows existing roads and traverses macadamia nut fields. Portions of the project are located on undeveloped or uncultivated lands. In addition, the waterline will cross Waihee Stream. A botanical survey was done for three portions of the alignment: (1) the Lower Kanoa Ridge area where the well sites and new water tank are located; (2) the Waihee Stream crossing; and (3) the North Waiehu Stream crossing which is a heavily vegetated gully between two macadamia nut fields near Malaihi Road. See Appendix A.

Vegetation in the Lower Kanoa Ridge area includes Java plum trees, strawberry guava, and yellow strawberry guava located in small gulches and swales. Ironwood trees are found along the tops of the ridges. Grasses include Bermuda grass, golden beardgrass, Natal redtop, West Indian dropseed, and yellow foxtail. Spanish clover and puahilahila are also common. Lantana are especially abundant in the area of the future water tank.

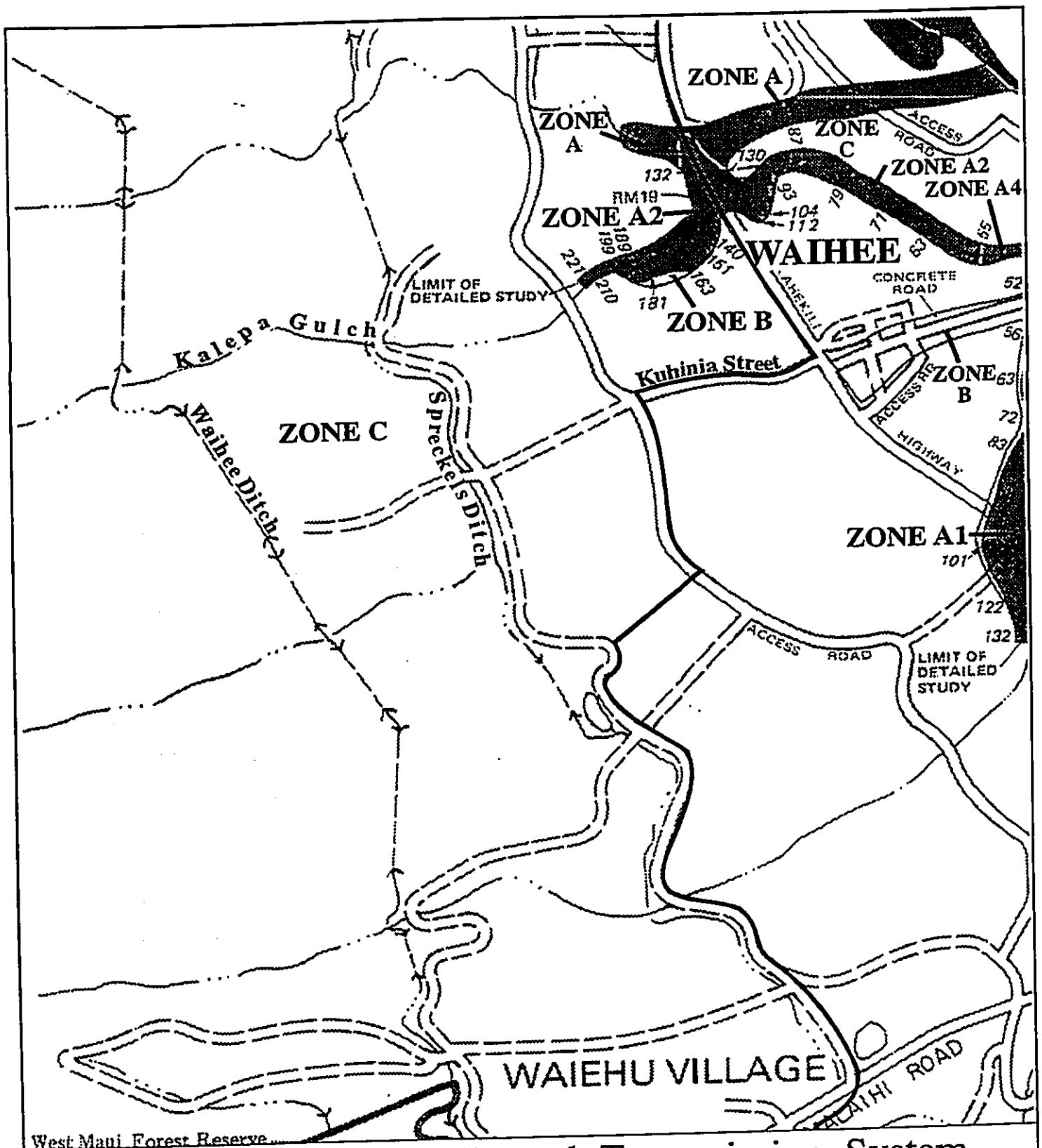

Figure 6 Waihee Wells and Transmission System

Flood Insurance Rate Map
(Near Spreckels Ditch)

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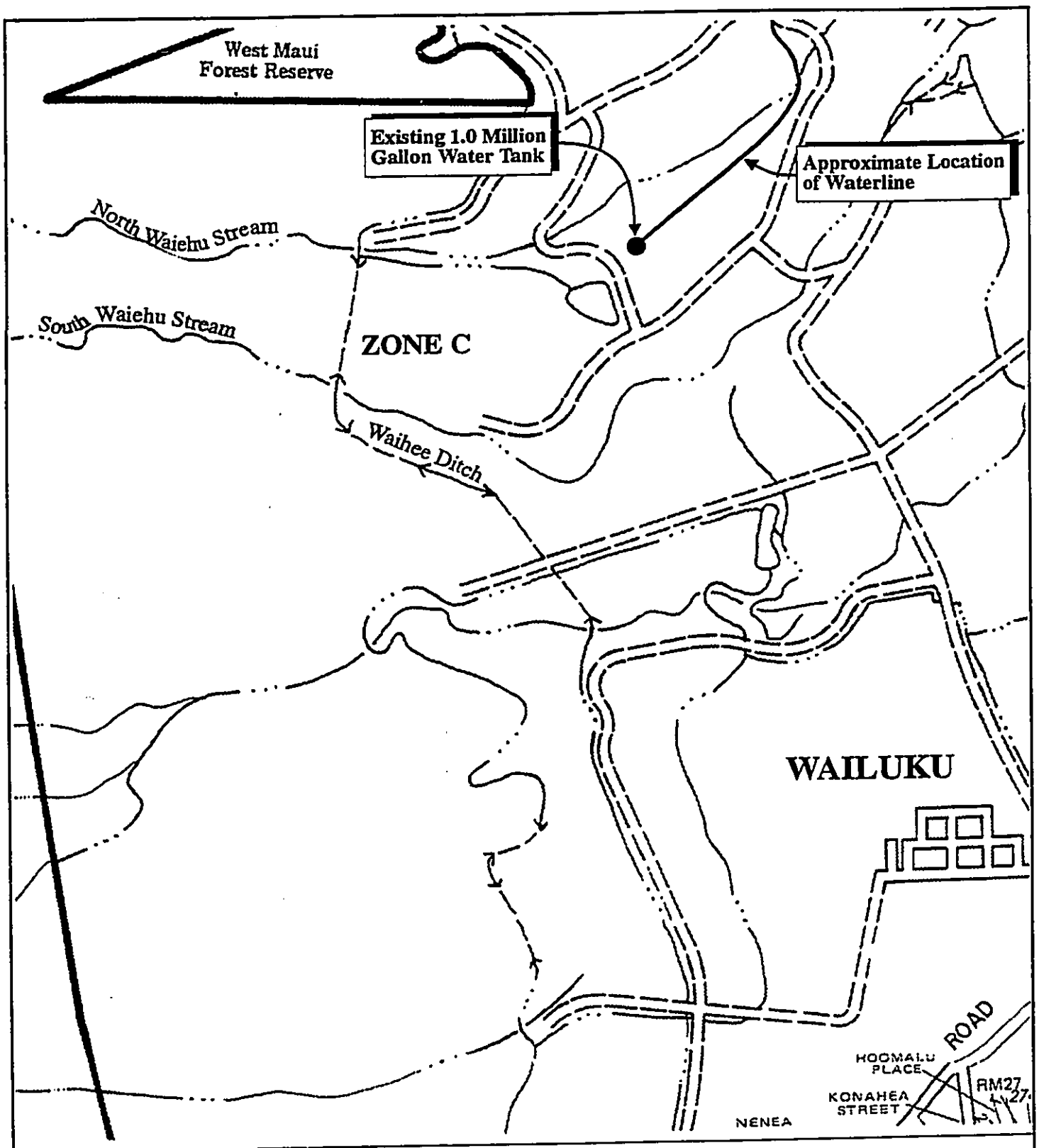

Figure 7 Waihee Wells and Transmission System
Flood Insurance Rate Map
(Near Existing Water Tank)

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Prepared for: County of Maui, Dept. of Water Supply

There are several native plants scattered along the slopes. These include 'Akia, a low, rounded shrub and 'Ulei, a member of the rose family. Other native plants include the pala'a fern and golden beardgrass.

Along the lower slopes of the ridge, near Waihee Well Site Nos. 1 and 2, are dense tall clumps of elephant or Napier grass. Vining legumes form tangled mats throughout the elephant grass. Other vegetation include Java plum, silk oak, albizia, strawberry guava, waiawi, Christmas berry and Surinam cherry.

At the Waihee Stream crossing, vegetation includes elephant grass and koa haole on the mauka side of the bridge. The makai side includes Java plum trees, mango trees, Spanish clover, Hilo grass, hairy sword fern, lauwa'e fern, and taro vine.

At the North Waiehu Stream gully between the macadamia nut fields, the waterline alignment crosses very dense elephant grass, Java plum, kukui and banana plants.

6. ***Archaeological Resources***

An inventory-level archaeological survey was conducted for the subject project. See Appendix B. The survey included (1) a systematic pedestrian survey of the waterline right-of-way; (2) mapping and field assessment of the surface remains; and (3) subsurface, backhoe-assisted testing of areas likely to contain cultural materials.

After the archaelogical inventory survey was done, a segment of the waterline alignment mauka of Waihee Town was shifted. The

original alignment involved proceeding approximately 2,500 feet mauka along Kuhinia Street and through macadamia nut orchards to its intersection with Spreckels Ditch. The original alignment then proceeded along a dirt road adjacent to Spreckels Ditch.

The new alignment proceeds approximately 1,200 feet mauka along Kuhinia Street and through macadamia nut orchards. Then the waterline would follow existing dirt roads through macadamia nut orchards approximately 1,500 feet in a south-southeasterly direction and then 800 feet in a mauka direction to the dirt road adjacent to Spreckels Ditch. The alignment was shifted since it requires a lesser amount of waterline and utilizes existing field roads resulting in relative ease of construction.

In order to consider archaeological concerns for the new segment of the alignment, a supplemental systematic walk-through survey was also done. See Appendix B.

Findings of the archaeological inventory survey and supplemental walk-through survey are summarized as follows:

In the Lower Kanoa Ridge vicinity, one archaeological feature was found along the transect from Waihee Well Site Nos. 3 and 4 to the proposed 500,000 gallon water tank. The feature is a poorly-stacked stone alignment 71 feet long and 2 feet high.

A well-preserved terrace segment was found on the makai side of the Waihee Stream crossing. The 23 foot long terrace is constructed of well-stacked rounded boulders. The alignment parallels the stream terrace and appears to be associated with

numerous and visible terraces along the flat stream terraces located to the east. No archaeological sites were located on the mauka side of the Waihee Stream crossing.

Along Kahekili Highway, there is a wall segment on the mauka side of the highway. The wall begins just north of Waihee Elementary School and extends 1,750 feet parallel to the highway. The wall representing a honua, or place of refuge at the time of Ka'ahumanu, was inspected and found to be in poor condition. The better preserved wall sections are composed of stacked 2-3 course, flat, boulder-size rock from 8-28 inches in height. Wall widths appear to be consistent at approximately 3.3 feet. The remaining sections of the wall are alternately covered with vegetation and sand, present as low remnants, or completely missing.

Waihee Town is included in a historical district, comprising 20 acres. St. Ann's Church, located on Kuhinia Street, has been recently nominated to the State Register of Historic Places.

Two surface scatters were discovered on the south side of the dirt road which proceeds mauka from the paved portion of Kuhinia Street to Spreckels Ditch. One scatter consisted of a polished stone adze or gouge fragment, small amounts of clam shell, and a possible ulu maika stone. This was discovered 436 feet from the macadamia orchard gate located at the end of the paved portion of Kuhinia Street. A second scatter of similar proportions of shell, and a stone tool was observed 138 feet upslope from the first scatter. Two trenches were excavated in the area of the surface scatters.

No archaeological remains associated with indigenous Hawaiian occupation were discovered.

The supplemental walk through survey did not uncover any surface archaeological remains along the realigned corridor segment mauka of Waihe'e Town.

Along the length of the proposed waterline alignment generally parallel to Spreckels Ditch, one surface scatter was found consisting of a light accumulation of coral fragments and scattered ili'ili stones. The scatter is located 138 feet southeast of a reservoir bordering a steep ridge. A trench was excavated parallel to the east side of the road. The resulting trench profiles revealed natural colluvial sediments common to upland slopes. No cultural materials were observed in the excavation.

No archaeological or historic remains were observed for the portion of the proposed waterline alignment from Malaihi Road to the existing 1 million gallon water tank in Waiehu.

7. ***Air Quality***

Air quality in the region is considered good as point sources (e.g., Maui Electric Power Plant, HC&S Mill) and non-point sources (e.g., automobile emissions) of emission are not significant to generate high concentration of pollutants. A portion of the proposed waterline extends within and close to areas utilized for the growing of macadamia nuts and pineapple. As such, the area is subject to dust and equipment emissions associated with agricultural activities. The relatively high quality of air can also be attributed to

the region's constant exposure to winds which quickly disperse concentrations of emissions.

8. *Noise Characteristics*

Traffic noise is the predominant source of background noise in the vicinity of the project. The proposed project extends along Kahekili Highway, Kuhinia Street, and Malaihi Road. Portions of the proposed project near the well sites are open, undeveloped lands. Other portions of the waterline traverse agricultural lands which may involve intermittent noise from agricultural activities.

9. *Visual Resources*

The West Maui Mountains, located to the west of the proposed project, form the backdrop for the project. The Waihee coastline is located to the east of the project site. The waterline also crosses Waihee Stream at Kahekili Highway as well as Waihee Town.

B. *SOCIO-ECONOMIC ENVIRONMENT*

1. *Population*

The population of the County of Maui has exhibited relatively strong growth over the past decade with the 1990 population estimated at 100,374, a 41.7% increase over the 1980 population of 70,847. Growth in the County is expected to continue, with resident population projections to the years 2000 and 2010, estimated to be 123,900 and 145,200, respectively (DBED, 1990).

The Wailuku-Kahului Community Plan region follows the Countywide pattern of population growth, with the region's 1990 population of 32,816 expected to rise to 40,119 by the year 2000

and to 47,597 by the year 2010 (Community Resources, Inc., 1992).

2. *Economy*

The Kahului region is the Island's center of commerce. Combined with neighboring Wailuku, the region's economic character encompasses a broad range of commercial, service, and governmental activities. In addition, the region is surrounded by significant agricultural acreages which include sugar cane fields, pineapple fields, and macadamia nut orchards. The vast expanse of agricultural land, managed by Hawaiian Commercial & Sugar (HC&S) and Wailuku Agribusiness Company, is considered a key component of the local economy.

C. *PUBLIC SERVICES*

1. *Recreational Facilities*

The Wailuku-Kahului region encompasses a full range of recreational opportunities, including Waihee Beach Park, Waiehu Golf Course, Maui Zoological and Botanical Gardens, as well as shoreline and boating activities at the Kahului Harbor and adjoining beach parks. There are also individual and organized athletic activities offered at numerous County parks and the War Memorial Complex.

2. *Police and Fire Protection*

Police protection for the Wailuku-Kahului region is provided by the County Police Department headquartered at the Wailuku Station. The distance from the Wailuku Station to the closest portion of the waterline at the intersection of Malaihi Road and Spreckels Ditch,

is approximately 3.8 miles. The region is served by the Department's Central Maui patrol.

Fire prevention, suppression, and protection services for the Wailuku-Kahului region is provided by the County Department of Fire Control's Wailuku Station, located in Wailuku Town, approximately 3.4 miles from the closest portion of the site on Malaihi Road. In addition, the Department has constructed a new Kahului Station (located on Dairy Road) which provides secondary support to the area.

3. ***Solid Waste***

Single-family residential solid waste collection service is provided by the County of Maui on a once-a-week basis. Residential solid waste collected by County crews are disposed at the County's 55-acre Central Maui Landfill, located four miles southeast of the Kahului Airport. In addition to County-collected refuse, the Central Maui Landfill accepts commercial waste from private collection companies.

4. ***Health Care***

Maui Memorial Hospital, the only major medical facility on the Island, services the Wailuku-Kahului region. Acute, general and emergency care services are provided by the 145-bed facility. In addition, numerous privately operated medical/dental clinics and offices are located in the area to serve the region's residents.

5. ***Schools***

The Wailuku-Kahului region is served by the State Department of Education's public school system as well as several privately

operated schools accommodating elementary, intermediate and high school students. Department of Education facilities in the Kahului area include Lihikai and Kahului Elementary Schools (Grades K to 6), Maui Waena Intermediate School (Grades 7 to 8), and Maui High School (Grades 9 to 12). Existing facilities in the Wailuku area include Wailuku and Waihee Elementary Schools (Grades K to 5), Iao Intermediate School (Grades 6 to 8), and Baldwin High School (Grades 9 to 12). Maui Community College, a branch of the University of Hawaii, serves as the Island's only Community College.

D. INFRASTRUCTURE

1. Roadways

The Wailuku-Kahului region is served by a roadway network which includes arterial, collector and local roads. Major roadways include Kaahumanu Avenue, the principal linkage between Wailuku and Kahului, Lower Main/Kahului Beach Road, Hana Highway, and Puunene Avenue.

Kahekili Highway is the main access roadway from Waihee Town to Wailuku. Waiehu Beach Road also provides a link from Kahekili Highway to the Lower Main/Kahului Beach Road area.

2. Wastewater

Domestic wastewater generated in the Wailuku-Kahului region is conveyed to the County's Wailuku-Kahului Wastewater Reclamation Facility located one-half mile south of Kahului Harbor. The design capacity of the facility is 7.9 million gallons per day (MGD). Average daily flow currently processed through the plant is approximately 5.3 MGD.

3. ***Water***

The Wailuku-Kahului region is served by the Board of Water Supply's (BWS) domestic water system. Water drawn from the Iao Aquifer System is conveyed to this region for distribution and consumption. The Iao Aquifer, which serves the Central Maui region, has an estimated sustainable yield of 20 MGD. Recent estimates place the monthly average withdrawal from the aquifer at over 18 MGD.

4. ***Drainage***

Runoff from the proposed project area drains generally in a mauka to makai direction. The Waihee River, Kalepa Gulch, Kope Gulch, and North Waiehu Stream establish the natural drainageways in the area of the project. The northern portion of the project near the well sites is currently unimproved. Kahekili Highway passes drainage through to more makai areas. Other areas of the waterline extend primarily through macadamia nut fields which provide opportunities for percolation.

Chapter III

Potential Impacts and Mitigation Measures

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. PHYSICAL ENVIRONMENT

1. Surrounding Uses

The proposed project involves improvements which would be largely placed underground. However, production pumps, a standby generator, a motor control center, and chlorination equipment would be housed in an approximately 20 foot by 14 foot above ground structure adjacent to Waihee Well Site Nos. 1 and 2. A similar structure is expected to be erected adjacent to Waihee Well Site Nos. 3 and 4. The 500,000 gallon water tank located at the 410 foot elevation near the Kanoa Ridge area is also above ground. The project is located in a rural setting which includes single family residential uses, agricultural uses and open space. The project is compatible with uses in the area.

2. Topography/Landform

The proposed project will involve drilling of Waihee Well Site Nos. 3 and 4, erection of a structure housing the control center and appurtenant facilities, erection of a new water tank and appurtenant facilities, and trenching for the waterline along its approximately 4.26 mile route. The finished contours will follow existing grades to minimize earthwork costs and maintain existing drainage patterns which tie into immediate surrounding lands. The project will not disturb the slopes characteristic of the foothill region of the West Maui Mountains.

3. Flora and Fauna

Introduced or alien plant species are the dominant components within the three undeveloped areas affected by the project.

However, there are a number of native species, such as the 'akia, golden crownbeard, 'uhaloa, pala'a, and 'ulei which are found in the Lower Kanoa Ridge area. In the other two areas, the Waihee Stream and North Waiehu Stream crossing, introduced species make up the bulk of the vegetation. Two plants of early Polynesian introduction, the kukui and banana, are also found in the vicinity of the North Waiehu Stream crossing.

None of the plants found on the three areas are listed as threatened and endangered species, nor are any proposed or candidates for such status. None of the plants are considered rare or vulnerable. No significant negative impacts to the vegetation as a result of the project are expected.

4. ***Archaeological Resources***

The archaeological inventory survey and supplemental walk-through survey of the project have resulted in the evaluation of 5 previously-known areas of archaeological and historic sensitivity, and identification of 4 additional areas. The proposed project would involve the following actions regarding archaeological sites:

1. The feature found in the Lower Kanoa Ridge area may represent a ceremonial or religious function due to its unusual location and isolation. The intent is to avoid disturbing this feature.

2. The terrace feature located near the Waihee Stream crossing is undoubtedly a component of a known agricultural complex (Site 50-50-03-3501). The intent also is to avoid this feature.

3. All 3 artifact scatters have been investigated by subsurface mechanical testing. The negative results of this testing strongly suggest that the artifacts are

ephemeral objects displaced by sugar cane and macadamia nut cultivation. No further work is recommended for these areas.

4. The intent of pipeline construction would be to avoid road sections parallel to the Spreckels Ditch which could impact this historic property.

5. The poor structural integrity of the wall described as a honua associated with Ka'ahumanu and Kamamalu, mitigates against its inclusion as a significant site. Further archival and oral documentation is needed to assess its true purpose and function, if possible. In view of the uncertainty associated with this feature, the intent is to either avoid this feature, or preserve less disturbed sections, for the time being.

6. The 20-acre historic district of Waihee Town includes buildings along the right-of-way. Pipeline construction will be routed to avoid any buildings now existing in Waihee Town.

7. Over 100 sites have been recorded from dune areas on the coastal side of Kahekili Highway. Due to the high likelihood of encountering human burials and additional sites, these dune localities will be avoided, to the greatest extent practicable. Archaeological monitoring of any construction is intended if subsurface disturbance cannot be avoided.

8. The project intends to have archaeological monitoring of the construction areas near the Waihee Stream crossing and along Kahekili Highway, due to the high predictability of archaeological and historic properties occurring in these areas.

Should construction of the project encounter burials, deposits or other subsurface remains, applicable procedures to ensure compliance with Chapter 6E, HRS, will be followed.

5. ***Streams***

The proposed project will involve traversing Waihee Stream and North Waiehu Stream. The waterline is proposed to be placed in a concrete jacket under the existing depth of the streams. Construction is anticipated to be done for approximately 50 percent of the stream width at one time. Metal sheathing is anticipated to be used to temporarily divert waters to the remaining half of the existing stream width while construction work proceeds on the first 50 percent. When construction work on the first 50 percent of the stream width is completed, then stream waters would be diverted to the completed side and work on the remaining portion of the stream would commence. During the entire construction process, a temporary filter berm or siltation net will be placed downstream to minimize dirt, silt, rocks and other materials from reaching further downstream. After completion of construction, the width and depth of the streams' conditions will be restored to pre-construction. The construction time frame for each waterline stream crossing is anticipated to be two to three weeks.

It should also be noted that the withdrawal of groundwater from the well sites are not anticipated to adversely affect Waihee Stream flow. For example, the water table at the Waihee Well Site Nos. 1 and 2 lies at 10 to 11 feet above sea level while the channel of the stream opposite the wells is 200 feet above sea level. A pump test conducted in May, 1989 showed that the aquifer is extensive and potentially very productive. After 96 hours of continuous pumping, recovery was virtually instantaneous. Thus, the pumping of groundwater from the subject project will not influence Waihee Stream mauka of the wells. Moreover, the project is not likely to significantly affect Waihee Stream on the makai side because of

the high invert of the channel compared to the position of the water table.

The proposed project is subject to a number of governmental permits or requirements, such as the Department of the Army Permit, Section 401 Water Quality Certification, Coastal Zone Management Consistency and Stream Channel Alteration Permit. The project will comply with all applicable provisions.

6. ***Air Quality***

Air quality impacts attributed to the project will include dust generated by short-term, construction-related activities. Trenching for waterline construction, for example, will generate airborne particulates. Dust control measures such as watering and sprinkling will be implemented as needed to minimize wind-blown emissions, particularly close to residential areas.

Similarly, noise will be generated from construction equipment associated with trenching activities. Construction equipment such as materials-carrying trucks will also need to traverse the Waihee-Waiehu area. To aid in the mitigation of construction noise impacts upon surrounding uses, construction activities are anticipated to be conducted during the daylight hours only.

On a long-term basis, the project will not generate adverse air quality or noise conditions.

7. ***Visual Resources***

The project would involve the construction of a one-story structure containing pumps and accessory equipment approximately 20 feet

by 14 feet in area at Well Site Nos. 1 and 2 with another structure of similar size at Well Site Nos. 3 and 4. The project also involves the construction of a 500,000 gallon water tank at the 410 foot elevation in the Lower Kanoa Ridge area. Areas near the well sites and the water tank are heavily vegetated and form a natural landscape buffer. The proposed waterline would be located underground and would have no effect upon visual resources. The proposed project is not anticipated to adversely impact the open space and scenic character of the area.

B. IMPACTS TO COMMUNITY SETTING

1. Population and Local Economy

On a short-term basis, the project will support construction and construction-related employment.

Long-term projected growth in population in the Central Maui region is expected with economic development attributed to new residential and commercial development. Growth in the service sector is expected to continue to meet this growing residential population.

The project provides the source and transmission system which would allow connection to the existing water system servicing the Central and South Maui area. With the pumping of the Iao Aquifer near its estimated sustainable yield, the proposed project provides flexibility for future development since additional supplies of water would be available for use from the Waihee Aquifer.

2. ***Agriculture***

The southern portion of the waterline extends through existing macadamia nut orchards. The project involves a narrow construction corridor approximately 6 feet wide for an underground 24-inch line which will be routed to minimize impacts upon existing agricultural operations. It is not anticipated that there are any adverse impacts to agriculture as a result of the project.

3. ***Public Services***

The proposed project is not anticipated to directly generate new permanent employment requirements in the region. As such, there are no anticipated project associated impacts upon public service needs, such as police and fire protection, medical facilities, recreational facilities and schools.

C. *IMPACTS TO WATER SYSTEMS*

The proposed project would provide additional water supplies for use in the Central and South Maui regions. With the monthly average withdrawal from the Iao Aquifer at approximately 90 percent of estimated sustainable yield, the proposed project provides much needed flexibility in the use of water.

The 4 well sites are located over the Waihee Aquifer. This aquifer appears to be poorly connected to the Iao Aquifer so as to be virtually independent of it. The northward extent toward Kahakuloa is uncertain but the aquifer likely extends beyond Makamakaole.

The conclusions of a pump test report for Waihee Well Site Nos. 1 and 2 conducted in May, 1989 noted that the North Waihee Aquifer is highly permeable, enjoys a high static level, and is extensive. The pump test

notes that wells yielding a total average of 4 mgd in the region between Waihee Valley and the land boundary just north of Kupaa Gulch may be allowed. The report notes that 4 wells can be located in this area. Although each well can be equipped with a 2 mgd (1,400 gpm) pump, the report recommends that an average output of the aquifer should not exceed 4 mgd on an annual basis. The full capacity of the wells (8 mgd) can be used temporarily in high demand periods, but an annual average of 4 mgd should be maintained.

It should also be noted that the estimated sustainable yield of the Waihee Aquifer, in the 3.5 mile distance from Waihee to Kahakuloa, is at least 10 mgd and may be 12 to 15 mgd. See Appendix C.

Pump installation permits have been granted by the Commission on Water Resource Management for Waihee Well Site Nos. 1 and 2 on March 25, 1993. The permits are for the installation of up to a 1,400 gpm capacity pump in each well with total pumpage from the wells averaging 2 mgd or less.

It is anticipated that the pumpage from Waihee Well Site Nos. 3 and 4 will also average 2 mgd or less. Thus, the total average pumpage from the four well sites is anticipated to be 4 mgd or less.

For the existing Waihee Well Site Nos. 1 and 2, and Waihee Well Site Nos. 3 and 4, all applicable requirements for bringing the wells into operation will be met, including application for the well construction permit and pump installation permit from the Commission on Water Resource Management for Well Site Nos. 3 and 4, and water quality analyses reviewed by the Department of Health.

D. IMPACTS TO OTHER INFRASTRUCTURE SYSTEMS

1. Roadways

Construction traffic will require access on Kahekili Highway. Northern portions of the project near the well sites would require access through an existing dirt road which connects with Kahekili Highway north of Waihee Stream. Southern portions of the waterline will also require access through Malaihi Road.

Construction of the waterline would also take place within the Kahekili Highway right-of-way. The waterline alignment would pass the Waihee Elementary School and Waihee Town areas. Traffic monitoring and coordination, particularly in these two areas, is anticipated to maintain public safety and to minimize inconveniences normally associated with construction. At least one lane of traffic is expected to remain open at all times during construction. The construction plan approval will be coordinated with the Department of Transportation and Department of Public Works and Waste Management.

After completion of construction, the project will not affect existing pavement or right-of-way widths.

The project is not anticipated to create adverse impacts upon roadways.

2. Drainage and Erosion Control

A total of two (2) small concrete pads of approximately 20 feet by 14 feet are proposed at the well sites. The proposed water tank is also expected to add to the extent of impervious surface.

However, these improvements would add a relatively insignificant amount of impermeable surface in the region.

The project would also involve the laying of underground pipes. Construction of the water line involves the excavation of a relatively short stretch of trench at any one time. Typically, no more than 200 feet of trenching would be open at any one time. Trenching would be approximately 3 feet wide. As typical 18-20 foot sections of pipe are laid underground, the completed portions would be covered and new sections of trench would be excavated. Within the Kahekili Highway, Kuhinia Street and Malaihi Road rights-of-way, newly completed portions of the project would be replanted with grass. Finish grades will match existing grades. Runoff in the area is not anticipated to be affected to any significant degree due to the project.

The project will comply with all applicable National Pollutant Discharge Elimination System (NPDES) requirements relating to storm water discharge, construction dewatering, and hydrotesting of new waterlines.

Chapter IV

Relationship to Governmental Plans, Policies and Controls

IV. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES AND CONTROLS

A. STATE LAND USE DISTRICTS

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission, establishes the four major land use districts in which all lands in the State are placed. These districts are designated "Urban", "Rural", "Agricultural", and "Conservation".

The proposed project traverses the "Urban", "Rural" and "Agricultural" Districts. See Figure 8. The proposed project is consistent with district provisions.

B. MAUI COUNTY GENERAL PLAN

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help guide the long-range development of the County. As stated in the Maui County Charter, "The purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and the development of the County and the social, economic and environmental effects of such development and set forth the desired sequence, patterns and characteristics of future development".

The proposed action is in keeping with the following General Plan objective and policy:

Objective:

To provide an adequate supply of potable and irrigation water to meet the needs of Maui County's residents.

Policy:

Support the improvement of water transmission systems to those areas which historically experience critical water supply problems provided the improvements are consistent with the water priorities and the County's Water Use Development Plan provisions for the applicable community plan area.

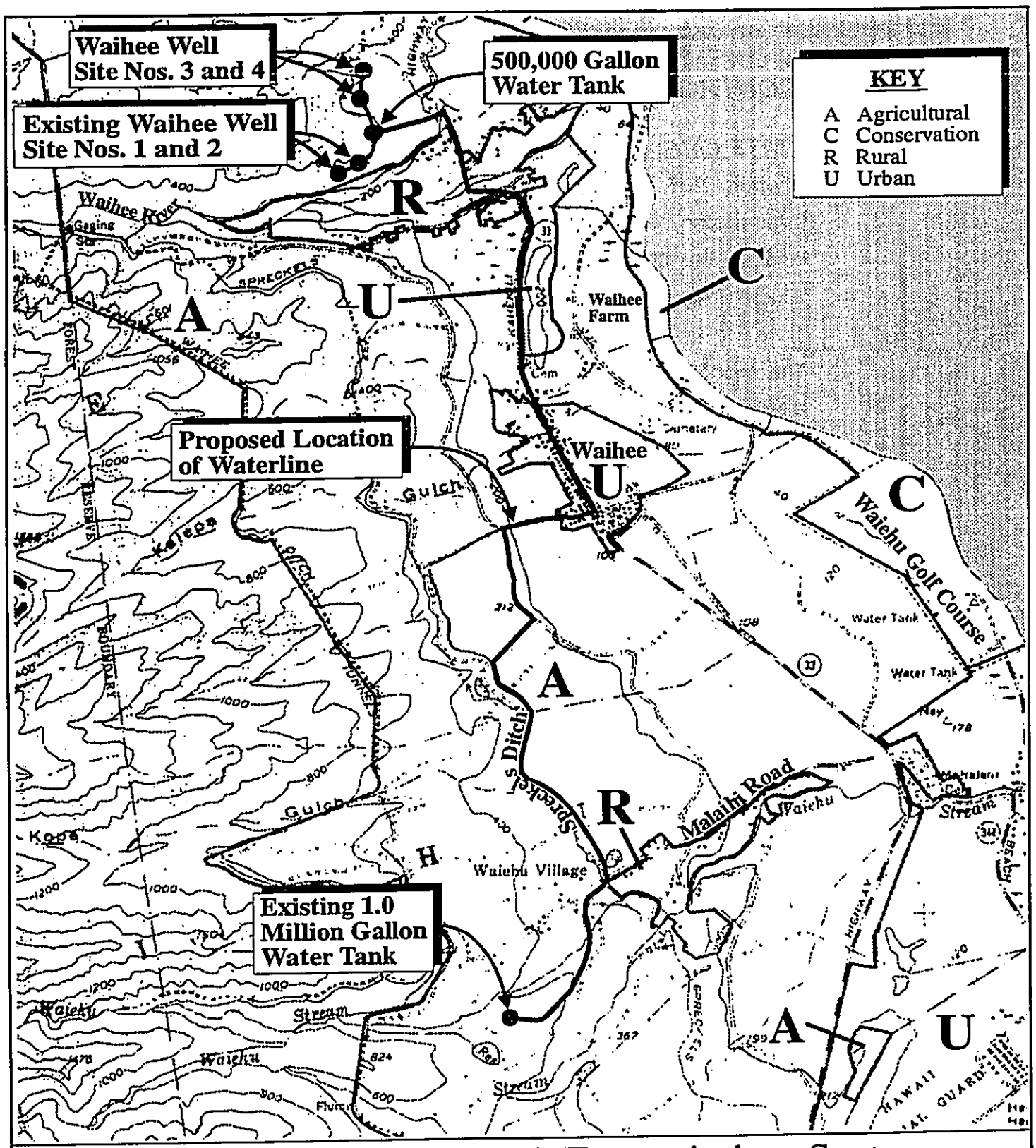


Figure 8 Waihee Wells and Transmission System

State Land Use District Classifications

Michael T. Munekiyo Consulting, Inc.

Prepared for: County of Maui, Dept. of Water Supply

C. ***WAILUKU-KAHULUI COMMUNITY PLAN***

The subject parcel is located in the Wailuku-Kahului Community Plan region which is one of nine Community Plan regions established in the County of Maui. Planning for each region is guided by the respective Community Plans, which are designed to implement the Maui County General Plan. Each Community Plan contains recommendations and standards which guide the sequencing, patterns and characteristics of future development in the region.

Land use guidelines are set forth by the Wailuku-Kahului Community Plan Land Use Map. See Figure 9. The proposed waterline traverses a number of varying community plan designations. Areas adjacent to the well sites are designated Agriculture. Land immediately adjacent to Waihee Stream is in Open Space. Lands extending from the stream and Waihee Valley Road are in the Rural designation. Further south along Kahekili Highway, lands are in the Agriculture designation mauka of the road. Makai of the highway, lands are designated as Project District No. 4.

Waihee Town contains a number of designations such as Single-Family, Public, Business and Park.

The remainder of the waterline alignment is designated as Agriculture, with the exception of lands immediately adjacent to Kope Gulch and North Waiehu Stream which are in Open Space.

The proposed project is consistent with the Wailuku-Kahului Community Plan.

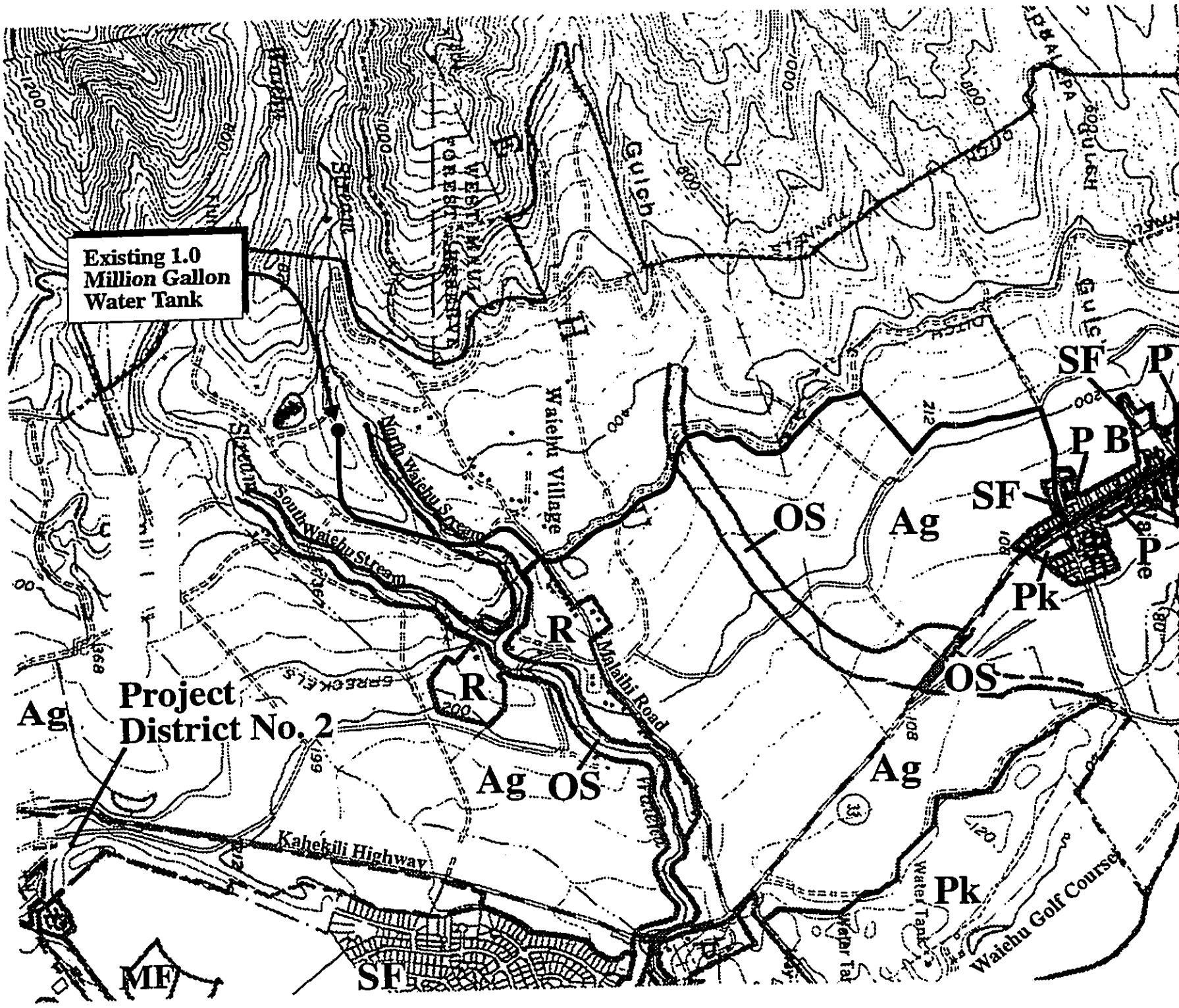
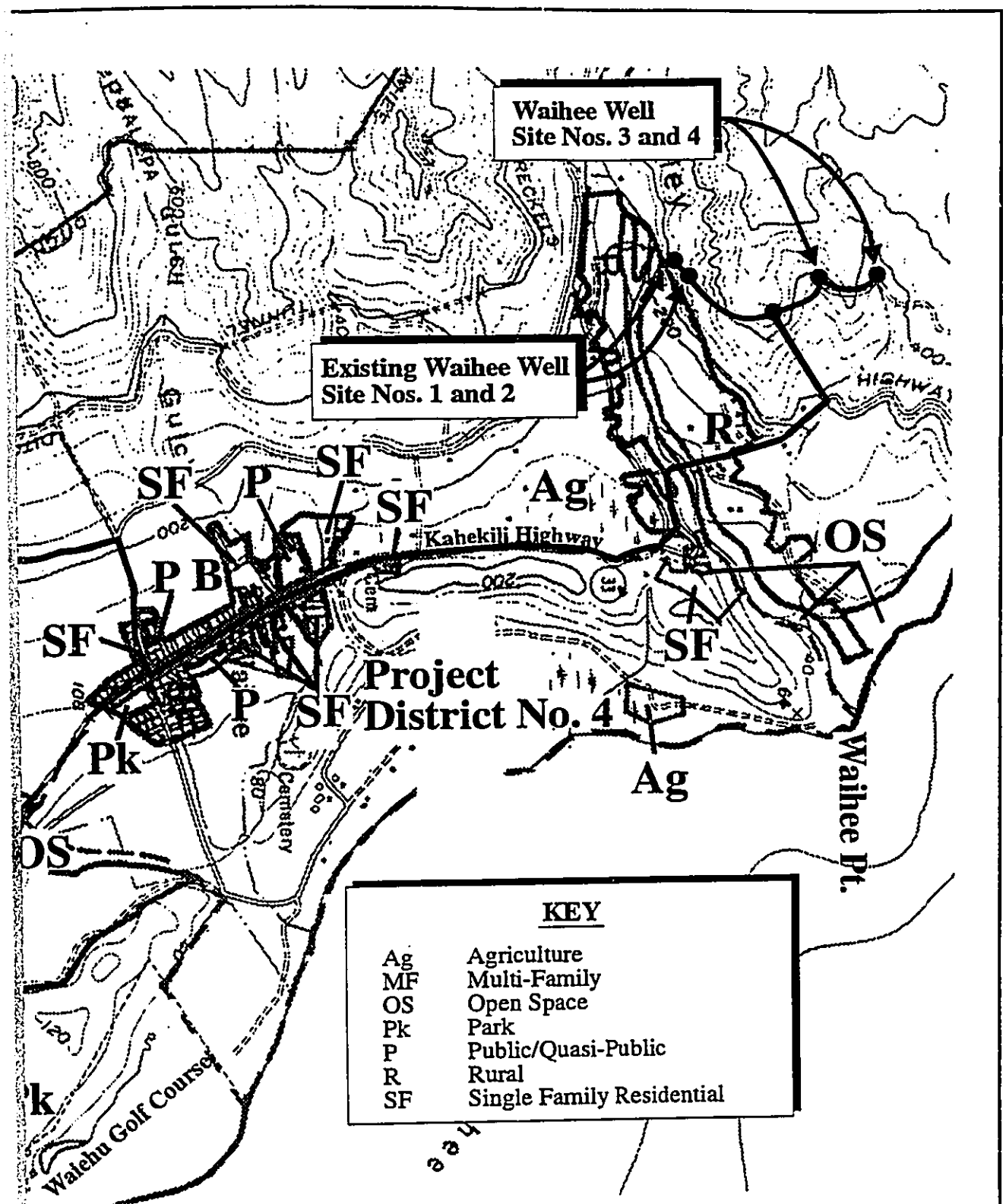


Figure 9

Waihee Wells and Transmission Syster
Community Plan Land Use Designations

NOT TO SCALE



nission System
Designations

Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Water Supply

Chapter V

Findings and Conclusion

V. FINDINGS AND CONCLUSION

Construction of the proposed project will involve short-term environmental impacts typically associated with construction activities. These include air quality and noise impacts. Dust control measures such as watering and sprinkling will be implemented as needed to minimize wind-blown emissions, particularly close to residential areas. Construction activities are also anticipated to be limited to daylight hours only. Construction of the waterline involves work within the Kahekili Highway, Kuhinia Street and Malaihi Road rights-of-way. Traffic monitoring and coordination is anticipated to minimize inconveniences normally associated with construction. At least one lane of traffic is expected to remain open at all times during construction. Impacts generated from construction activities are not considered adverse.

From a long-term perspective, the proposed project is not anticipated to result in adverse environmental impacts. Portions of the waterline are located on undeveloped or uncultivated lands, and the waterline will also cross Waihee Stream. None of the plants found in these areas are listed as threatened and endangered species. Construction of the project is intended to avoid those archaeological sites which are significant or suspected to be significant. If remains are encountered during construction, then the project will comply with all applicable procedures of Chapter 6E, HRS. Withdrawal of groundwater from the well sites are not anticipated to adversely affect Waihee Stream flow. The water table is at 10 to 11 feet above sea level while the channel of the stream opposite the wells is 200 feet above sea level. A small depression in the water table caused by pumping will not influence Waihee Stream flow mauka of the wells. It is also not likely that the Stream will be affected makai of the wells because of the high invert of the channel compared to the position of the water table. Since the project also involves traversing Waihee and North Waiehu Streams, the project is subject to a number of governmental permits and will

comply with all applicable provisions. In the long-term, adverse air quality and noise conditions are not anticipated as a result of the project.

Impacts to the local economy are anticipated to be positive involving support for construction-related employment in the short-term. The project provides the source and transmission system which would allow connection to the existing Central Maui water system providing an additional supply of water and flexibility regarding the withdrawal of water from the Iao Aquifer.

The proposed project would not generate permanent employment to maintain and service the waterline and tank. Thus, there are no significant project associated impacts upon public service needs, such as police and fire protection, medical facilities, recreational facilities and schools.

It is anticipated that total average pumpage from the 4 wells would be 4 mgd or less. For the existing Waihee Well Site Nos. 1 and 2 and Waihee Well Site Nos. 3 and 4, all applicable requirements for bringing the wells into operation will be met, including permits for well construction and pump installation for Site Nos. 3 and 4, and water quality analyses. The project is not anticipated to have a significant impact upon infrastructure systems.

In light of the foregoing findings, it is concluded that the proposed action will not result in any significant environmental effects.

Chapter VI

Agencies Contacted in the Preparation of the Draft Environmental Assessment and Responses Received

VI. AGENCIES CONTACTED IN THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT AND RESPONSES RECEIVED

1. U. S. Army Corps of Engineers
Pacific Ocean Division
Building 230
Fort Shafter, Hawaii 96858

2. Mr. Neal Fujiwara
U.S. Department of Agriculture
Soil Conservation Service
70 S. High Street, Room 215
Wailuku, Hawaii 96793

3. Mr. David Nakagawa, Chief
Sanitarian
Department of Health
54 High Street
Wailuku, Hawaii 96793

4. Mr. Tom Arisumi, Division Chief
Department of Health
Environmental Management
Division
Five Waterfront Plaza, Suite 250
500 Ala Moana Boulevard
Honolulu, Hawaii 96813

5. Mr. Denis Lau, Chief
Department of Health
Clean Water Branch
P. O. Box 3378
Honolulu, Hawaii 96801

6. Mr. Robert Siarot, Maui District
Engineer
Department of Transportation
650 Palapala Drive
Kahului, Hawaii 96732

7. Mr. Don Hibbard, Administrator
Department of Land and Natural
Resources
State Historic Preservation
Division
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

8. Department of Land and Natural
Resources
Water Resources Management
Division
P. O. Box 621
Honolulu, Hawaii 96809

9. Department of Land and Natural
Resources
Aquatic Resources Division
70 S. High Street
Wailuku, Hawaii 96793

10. Mr. Doug Tom
Office of State Planning
Coastal Zone Management
Program
P. O. Box 3540
Honolulu, Hawaii 96811-3540

11. Mr. Brian Miskae, Director
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

12. Mr. George Kaya, Director
Department of Public Works
and Waste Management
200 South High Street
Wailuku, HI 96793

13. Mr. Milton Lai
Waihee Community Association
R.R. 1, Box 88
Wailuku, Hawaii 96793

JUL 1 1993

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

June 30, 1993

REPLY TO ATTENTION OF
Planning Division

Mr. Milton Arakawa
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, Maui, Hawaii 96793

Dear Mr. Arakawa:

Thank you for the opportunity to review and comment on the Proposed North Waihee Wells Transmission System, Maui. The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. A DA permit will be required for work performed in streams. Please contact our Operations Division at 438-9258 for further information regarding permit requirements and refer to file NW93-041.

b. According to the enclosed Federal Emergency Management Agency's Flood Insurance Rate Maps, panels 150003-0160-B (June 1, 1981) and 150003-0170-B (June 1, 1981), the project site is located in the following flood zones:

(1) New Water Tank and 16-Inch Line: Zone C (areas of minimal flooding).

(2) 24-Inch Line: Zone C (areas of minimal flooding); Zone A (areas of the 100-year flood where base flood elevations and flood hazard factors have not been determined); Zone B (areas inundated by the 500-year flood); Zone A5 (areas inundated by the 100-year flood with a base flood elevation of 104 feet above mean sea level); and, Zone A2 (areas inundated by the 100-year flood with base flood elevations of 112-, 130-, and 132 feet above mean sea level). Please note that the entire 24-inch line is in Zone C with the exception of the portions which cross Waihee River and Kalepa and Kope Gulches.

Sincerely,

Kisuk Cheung, P.E.
Director of Engineering

Enclosure

KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	ZONE A1-A30 DATE / ZONE AO DATE
Zone Designations* With Date of Identification e.g., 12/2/74	
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Coastline Mile	•M 20

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MAUI COUNTY, HAWAII

PANEL 160 OF 400
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
150003 0160 B
EFFECTIVE DATE:
JUNE 1, 1981

federal emergency management agency
federal insurance administration

CUSTOMER COPY

KEY TO MAP

100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Zone Designations* With Date of Identification e.g., 12/2/74	ZONE A1 DATE / ZONE A5 DATE
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Coastline Mile	•M 20

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*EXPLANATION OF ZONE DESIGNATIONS

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AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

NATIONAL FLOOD INSURANCE PROGRAM

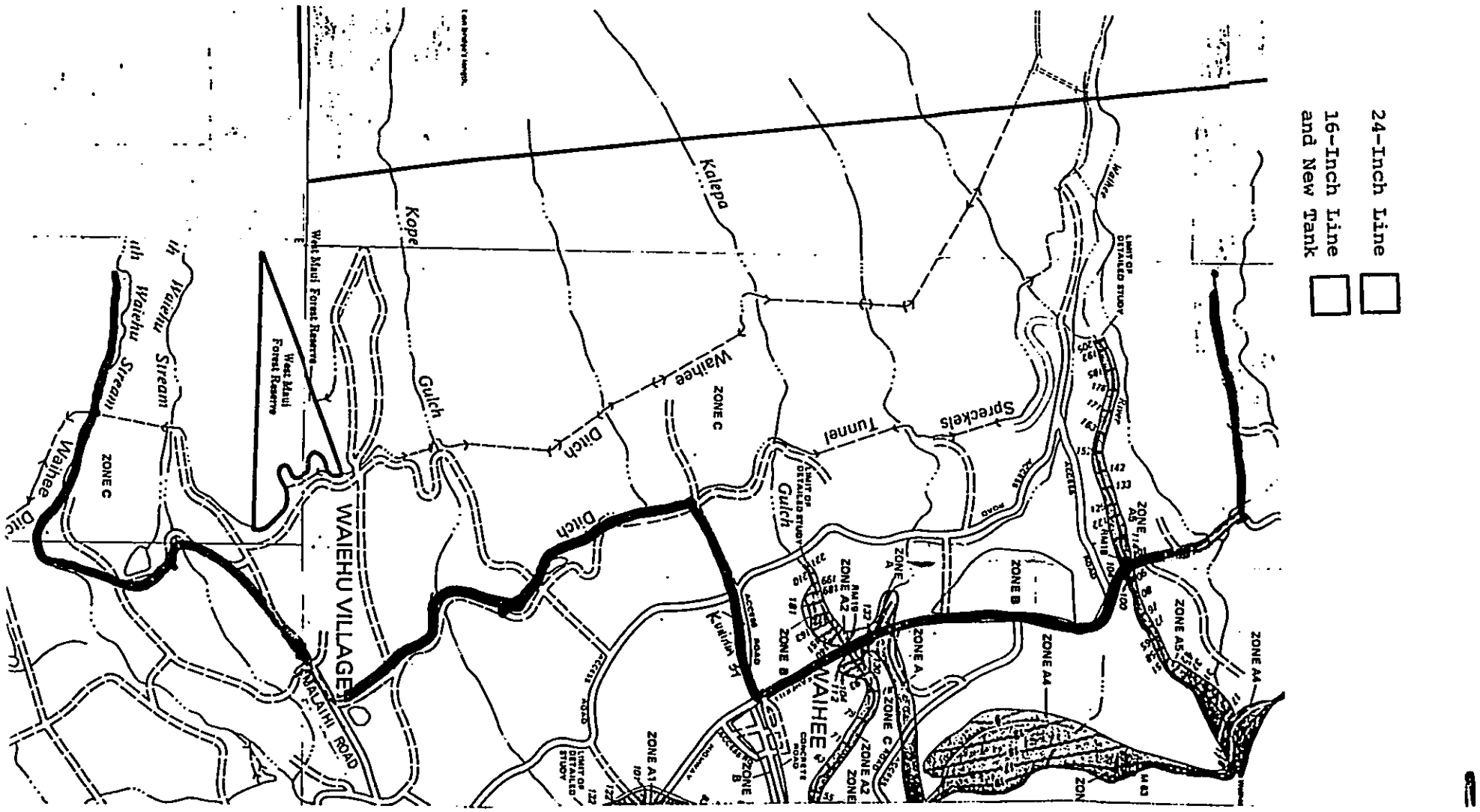
FIRM
FLOOD INSURANCE RATE MAP

MAUI COUNTY, HAWAII

PANEL 170 OF 400
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
150003 0170 B
EFFECTIVE DATE:
JUNE 1, 1981

federal emergency management agency
federal insurance administration



JUN 2 2 1993

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
70 S. HIGH STREET, RM. 215
WAILUKU, HAWAII
96793

Date: June 21, 1993

Mr. Milton Arakawa
Michael T. Munekiyo Consulting, Inc.
1823 Wells St., Suite 3
Wailuku, Hawaii 96793

Dear Mr. Arakawa,

RE: North Waihee Wells Transmission System

Have alternative routes of the proposed pipeline alignment been considered? Hopefully an alignment which will bypass Kahekili Highway as much as possible.

Sincerely,

Neal S. Fujiwara

Neal S. Fujiwara
District Conservationist

JOHN WAIHEE
GOVERNOR OF HAWAII

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

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
EMD / SDWB

June 22, 1993

Mr. Milton Arakawa
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, Hawaii 96793

Dear Mr. Arakawa:

SUBJECT: YOUR LETTER DATED JUNE 14, 1993, ON THE NORTH WAIHEE WELLS TRANSMISSION SYSTEM

We have the following comments on the proposed project:

1. An engineering report must be prepared, submitted to, and approved by the Department of Health (DOH) as required by Hawaii Administrative Rules, section 11-20-29, "Use of new sources of raw water for public water systems." This engineering report is required for CBP's two North Waihee Wells and the DWS Waihee Wells No. 2 and 3. While we will accept one engineering report addressing all four wells, water quality analyses will be required for each individual well.

2. Hawaii Administrative Rules, section 11-20-30, "New and modified public water systems," requires DOH approval except where the modifications will be reviewed and approved by a county department of water supply. Because the proposed modifications will be dedicated to DWS, no further action is required by the DOH.

3. The guidelines for preparing an engineering report and the list of inorganic and organic parameters to be analyzed for each well are enclosed. Additional analyses must be performed for total coliform and radionuclides (gross alpha (excluding radon and uranium); radium 226 and radium 228 (combined); gross beta and photon emitters). There is no current requirement for asbestos.

If you have any questions, please contact Larry Whang in Honolulu at 586-4258, or call toll free from the neighbor islands at 1-800-468-4644, ext. 64258.

Sincerely,

Stuart Yamada

FOR WILLIAM WONG, P.E., Chief
Safe Drinking Water Branch
Environmental Management Division

LW:la

Enclosure

c: David R. Craddick (w/incoming letter)
Chief Sanitarian, Maui District Health Office
Gordon Muraoka, SDWB Sanitarian, Maui (w/incoming letter)

JUL 1 3 1993

JOHN WAIHEE
GOVERNOR OF HAWAII

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File: EMD / CWB

July 6, 1993

P0706DN

Mr. Milton Arakawa
Michael T. Munekiyo
Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, HI 96793

Dear Mr. Arakawa:

Subject: North Waihee Wells Transmission System
Maui, Hawaii

We have reviewed the subject document dated June 14, 1993, and have the following comments:

Water Quality Certification

A Section 401 Water Quality Certification (WQC) is required for "Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable water..", pursuant to Section 401 (a) of the Federal Water Pollution Act (commonly known as the "Clean Water Act (CWA)").

The Department of Health is requesting that the applicant contact the Army Corps of Engineers (COE) to identify whether a Federal permit (including a Department of Army (DA) permit) is required for their project. A Section 401 WQC is required when a Federal permit is required for the project.

Storm Water Discharge

A storm water National Pollutant Discharge Elimination System (NPDES) permit is required for construction activities which involve the clearing, grading, and excavation of equal to or greater than five (5) acres of total land area. This application should be submitted to the Director of Health at least 90 days before the date on which construction is to commence.

DEPARTMENT OF HEALTH
DRINKING WATER PROGRAM

GUIDELINES FOR PREPARATION OF PRELIMINARY ENGINEERING REPORTS FOR NEW POTABLE WATER SOURCES

1. General

Unless otherwise directed by the Department, a comprehensive engineering report of the proposed water works project shall be prepared and sealed by a registered Engineer and submitted to the Department of Health.

The report shall be typewritten reproductions on bond paper, 8-1/2" x 11", and firmly bound between appropriate covers. Preliminary drawings, diagrams, brochures, and other pertinent information to be used shall be incorporated within the report. The engineer's report shall include, as a minimum, the following information as applicable to the proposed improvements:

2. General Information

   a. Brief description of project and location, including phasing schedule, persons served by new water source and/or service connections.....
   b. Name of owner or official custodian,
   c. Site plan with contours, and drawn to a scale suitable for the use intended.

3. Physical and Hydrological Characteristics of Area

   a. Location,
   b. Climate,
   c. Topography including detailed study of project site,
   d. Geology and foundation conditions,
   e. Earthquake considerations and design parameters,
   f. Groundwater conditions,

PRELIMINARY
Subject To Change

051684

g. Flood problems including tsunami inundation zones and preventive measures that may be used,

h. Information confirming the conformance with local land use planning and zoning regulations,

i. Discussion of water rights and future uses by others.

4. Extent of Waterworks System

a. Description of the nature and extent of the existing area and future area to be served,

b. Description of population served, land use, and consumption data, including the forecasting of water demands,

c. Appraisal of the future requirements for service, including existing and potential industrial, commercial, institutional and other water supply needs,

d. Provisions for extending water works system to include consideration of additional area required, easements, and right-of-way acquisition for facilities and utilities,

e. Required capacity to meet fire protection and pressure requirements,

f. Alternate solutions considered and supporting data for recommended plan,

g. Environmental and economic impact.

5. Potential Sources of Contamination

a. Description of well site:

1) coordinates (latitude, longitude),

2) land surface elevation, topographic map of well site,

3) size and topography of catchment area, slope of ground surface,

4) general summary of soil and substrata,

5) anticipated well depth and depth to groundwater;

b. Design well draft;

c. Water quality data on any existing wells in the area;

d. Land use classification of surrounding area;

e. Existing or potential sources of contamination in recharge area:

1) extent of recharge area likely to contribute water to supply including its population,

2) type of contaminants,

3) distance to proposed well,

4) method of disposal, i.e., surface, subsurface - above groundwater table, subsurface - in water table,

5) depth from base of contaminant source to groundwater table;

Sources of contamination include but are not limited to:

*urban development,

*agricultural areas,

*pasture lands, feedlots,

*sanitary landfills, dumps,

*subsurface disposal units;

f. Approximate groundwater contours.

6. Sources of Water Supply

a. Nature of soil and stratum within and overlaying the water source, with special emphasis on identification of fissures and faults as it relates to the natural purification or treatment of percolating fluids from existing or future activities,

b. The probability and effect of surface drainage or contaminated underground water entering the subject water source,

c. Depth to water table, location and lay of wells in vicinity in use and/or abandoned,

d. Slope of water table, preferably as determined from observation wells, or studies of wells in the area,

e. Site data relating to potential flooding and/or earthquake risk,

f. Data relating to quality and quantity of the source waters under normal conditions and during stress periods of drought or heavy precipitation, as determined by field and laboratory analyses and investigations of available records; if records are not available or are inadequate to determine source quality under stress conditions, an estimate of expected quality and quantity during stress conditions should be established and related to the hydrologic budget to the aquifer or isopiestic area. Water quality parameters of concern are those specified in the Primary Drinking Water Regulations,

g. Identification of all significant factors having potential for contaminating or reducing the quality of the water source or which could cause the quality of water delivered to users of the system to be in violation of any state primary drinking water regulation,

h. For each present and projected potential source of contamination, identification and evaluation of alternative control measures which could be implemented to reduce or eliminate the potential for contamination of the water source, including treatment of the water source if subject to contamination, and evaluation of the physical, economic and social effects of implementing such control measures,

i. A summary section indicating how the proposed development and improvements will provide reasonable assurance that the new water source is not subject to actual or potential contamination such as may result in the water not complying with any state primary drinking water regulation or as may otherwise adversely affect the health of persons.

7. Proposed Treatment Works

In addition to information required under sections 2 through 4, the preliminary engineering report shall include the items below. Pilot studies may also be required.

a. Summary description of proposed processes and unit parameters for treating the specific water under consideration. Include pertinent information on built up and packaged plant systems;

b. Site: Discuss various sites available indicating proximity to developed areas, availability of utilities, and accessibility of plant site. Show on a topographic map the treatment plant and arrangement of present and proposed treatment facilities;

c. For plant modifications: Describe the existing facilities, and discuss plant limitations that required additions, modifications, or expansions;

d. Basis of Design:

1) Design period,

2) Design population and flow demand data,

3) Nature and characteristics of flow,

4) Design flow rate for plant,

5) Reserve capacity,

6) Treatment processes and unit parameters including calculations for design of units. Include description of equipment, capacities, size, operational factors, and plant hydraulics,

7) If components are to be modified in stages, discuss staging sequence and future changes as required;

e. Waste disposal: Discuss various wastes from the water treatment plant, their volume, proposed treatment and disposal, and points of discharge;

f. Operation and maintenance: Provide general information operation and maintenance requirements, automatic equipment, and justification for system proposed.

8. Pumping Facilities

In addition to information required under sections 2 through 4, the following information should be provided in the preliminary engineering report:

a. Purpose of service,

b. Pumping layout and sizing of force main,

c. Design flow requirements including maximum, average, minimum, variations in demand, and effect of storage,

d. Liquid characteristics,

e. Electric power available,

f. Pumping arrangement,

g. Pump selection including system and characteristic curves,

h. Proposed buildings and other structural improvements,

i. Water hammer consideration,

j. Descriptions of essential features of construction and operation, including staging sequence if applicable,

k. Electrical system including provisions in the event of power failure, and telemetering and supervisory control systems.

9. Finished Water Storage

Describes location, type and sizing of storage facilities. Include discussion on drains, overflows, telemetering and supervisory controls, painting and protective coating and other important and pertinent considerations.

10. Water Distribution Systems:

a. Provide general layout of the system,

b. Indicate, materials, valves, hydrants, meters, etc.,

c. Proximity of other utilities,

d. Include effects of incremental or phased construction, possibilities of future developments as applicable,

e. Provide information, profiles or sections showing pipe cover, location, groundwater conditions and other important data affecting installation of the distribution system.

11. Financing

Provide information on estimated costs of installation, phasing, operation and maintenance and other related information.

(b) The following are the MCLs for inorganic chemicals other than fluoride:

Contaminant	Level Milligrams Per Liter (mg/l)	Chemical Abstract Source Registry Number (CAS #)
Arsenic	0.05	7440-38-2
Asbestos	7 million fibers/ liter (longer than 10 μm)	
Barium	2	7440-39-3
Cadmium	0.005	7440-43-9
Chromium	0.1	7440-47-3
Lead	0.05	7439-92-1
Mercury	0.002	7439-97-6
Nitrate	10 (as Nitrogen)	14797-55-8
Nitrite	1 (as Nitrogen)	
Total Nitrate and Nitrite	10 (as Nitrogen)	
Selenium	0.05	7882-49-2

(c) When the annual average of the maximum daily air temperatures for the location in which the community water system is situated is the following, the MCLs for fluoride (CAS #16984-48-8) are:

Temperature, Degrees Fahrenheit	Celsius	Level, Milligrams Per Liter (mg/l)
53.7 and below	12.0 and below	2.4
53.8 to 58.3	12.1 to 14.6	2.2
58.4 to 63.8	14.7 to 17.6	2.0
63.9 to 70.6	17.7 to 21.4	1.8
70.7 to 79.2	21.5 to 26.2	1.6
79.3 to 90.5	26.3 to 32.5	1.4

Fluoride at optimum levels in drinking water has been shown to have beneficial effects in reducing the occurrence of tooth decay.

(d) At the discretion of the director, nitrate levels not to exceed twenty mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the director that:

(1) Such water will not be available to children under six months of age;

(2) There will be continuous posting of the fact that nitrate levels exceed ten mg/l and the potential health effects of exposure;

(3) Local and state public health authorities will be

notified annually of nitrate levels that exceed ten mg/l; and

(4) No adverse health effects shall result.

(e) The best available technologies (BATs) for treating inorganic chemicals to achieve compliance with their MCLs are found in 40 C.F.R. §141.62(c). [Eff. 12/26/81; am and comp 3/7/92; am and comp JAN 02 1993] (Auth: HRS §§340E-2, 340E-9) (Imp: HRS §§340E-2, 340E-9; 42 U.S.C. §§300g-1, 300g-2; 40 C.F.R. Parts 141, 142, §141.11, §141.62, §142.10)

§11-20-4 Maximum contaminant levels for organic chemicals. The following are the MCLs for organic chemicals. The MCLs for organic chemicals in subsection (a) apply to all community water systems. Compliance with the MCL in subsection (a) is calculated pursuant to §11-20-12. The MCL for total trihalomethanes in subsection (c) applies only to community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process. Compliance with the MCL for total trihalomethanes is calculated pursuant to §11-20-45.

	Contaminant	Level, Milligrams Per Liter (mg/L)	CAS No.
(a)	Chlorinated hydrocarbons: Endrin (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4, 4a,5,6,7,8,81-octahydro-1,4-endo, endo-5,8-dime thano naphthalene)	0.0002	72-20-8
(b)	(Reserved)		
(c)	Total trihalomethanes (the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform)	0.10	

TRIHALOMETHANES (THMs) ARE PRODUCED DURING CHLORINATION OF WATER.

1593

(d) The following MCLs for organic contaminants apply to community and non-transient, non-community water systems.

(1)	Vinyl chloride	0.002	75-01-4
(2)	Benzene	0.005	71-43-2
(3)	Carbon tetrachloride	0.005	56-23-5
(4)	1,2-Dichloroethane	0.005	107-06-2
(5)	Trichloroethylene	0.005	79-01-6
(6)	para-Dichlorobenzene	0.075	106-46-7
(7)	1,1-Dichloroethylene	0.007	75-35-4
(8)	1,1,1-Trichloroethane	0.2	71-55-6
(9)	cis-1,2-Dichloroethylene	0.07	156-59-2
(10)	1,2-Dichloropropane (DCP)	0.005	78-87-5
(11)	Ethylbenzene	0.7	100-41-4
(12)	Monochlorobenzene	0.1	108-90-7
(13)	o-Dichlorobenzene	0.6	95-50-1
(14)	Styrene	0.1	100-42-5
(15)	Tetrachloroethylene	0.005	127-18-4
(16)	Toluene	1	108-88-3
(17)	trans-1,2-Dichloroethylene	0.1	156-60-5
(18)	Xylenes (total)	10	1330-20-7

(e) The following MCLs for organic contaminants apply to community and non-transient, non-community water systems.

(1)	Alachlor	0.002	15972-60-8
(2)	(Reserved)		
(3)	(Reserved)		
(4)	(Reserved)		
(5)	Atrazine	0.003	1912-24-9
(6)	Carbofuran	0.04	1563-66-2
(7)	Chlordane	0.002	57-74-9
(8)	Dibromochloropropane (DBCP)	0.00004	96-12-8
(9)	2,4-D	0.07	94-75-7
(10)	Ethylene dibromide (EDB)	0.00004	106-93-4
(11)	Heptachlor	0.0004	76-44-8
(12)	Heptachlor epoxide	0.0002	1024-57-3
(13)	Lindane	0.0002	58-89-9
(14)	Methoxychlor	0.04	72-43-5
(15)	Polychlorinated biphenyls (PCB)	0.0005	1336-36-3
(16)	Pentachlorophenol	0.001	87-86-5
(17)	Toxaphene	0.003	8001-35-2
(18)	2,4,5-TP (Silvex)	0.05	93-72-1
(19)	1,2,3-Trichloropropane (TCP)	0.0008	96-18-4

(f) The best available technologies (BATs), treatment techniques, or other means available for achieving compliance with the organic contaminant MCLs are identified as either granular activated carbon (GAC), packed tower aeration (PTA), or both, in

JOHN WAIHEE
GOVERNOR

REX D. JOHNSON
DIRECTOR

DEPUTY DIRECTORS
JOYCE T. OMINE
AL PANG
JEANNE K. SCHULTZ
CALVIN M. TSUDA

IN REPLY REFER TO:

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MAUI DISTRICT
650 PALAPALA DRIVE
KAHULUI, HAWAII 96732

HWY-M 2.332-93

July 10, 1993

Mr. Michael T. Munekiyo, A.I.C.P.
Michael T. Munekiyo Consulting, Inc.
1823 Wells St.
Suite 3
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: NORTH WAIHEE WELLS TRANSMISSION SYSTEM

Construction of the proposed water transmission line may impact our upcoming resurfacing project. We will require these impacts to be mitigated through our construction plan approval process.

The anticipated construction starting time of October 1993 will minimize these impacts. To meet this schedule, construction plans need to be submitted immediately for our review and approval.

Construction schedule and project coordination will be discussed in our July 22nd meeting with C. Brewer Properties, consultant and the County of Maui.

Thank you for the opportunity to comment on the project summary.

Very truly yours,

Robert O. Siarot
District Engineer, Maui

/fmc

JUL 2 8 1993

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P. O. BOX 621
HONOLULU, HAWAII 96809

JUL 27 1993

KEITH W. AHUE
CHAIRPERSON

JOHN C. LEWIN, M.D.
ROBERT S. NAKATA
RICHARD H. COX, P.E.
GUY K. FUJIMURA
J. DOUGLAS ING, ESQ.

RAE M. LOUI, P.E.
DEPUTY

Mr. Milton Arakawa
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, HI 96793

Dear Mr. Arakawa:

North Waihee Wells Transmission System

Thank you for requesting our comments on your proposed Waihee water transmission project.

Please be informed that the installation of the 24-inch waterline beneath Waihee Stream would require your obtaining a stream channel alteration permit from our Commission on Water Resource Management. Project activities covering other streams that may be similarly altered would also require similar permits. Application forms for this purpose are enclosed.

We apologize for the belated response to your request.

Sincerely,

RAE M. LOUI
Deputy Director

GM:ky
enclosure

LINDA CROCKETT LINGLE
Mayor

GEORGE N. KAYA
Director

CHARLES JENCKS
Deputy Director

AARON SHINMOTO, P.E.
Chief Staff Engineer

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

EASSIE MILLER, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

DAVID WISSMAR, P.E.
Solid Waste Division

BRIAN HASHIRO, P.E.
Highways Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

July 1, 1993

Mr. Michael T. Munekiyo
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, Hawaii 96793

SUBJECT: NORTH WAIHEE WELLS WATER TRANSMISSION SYSTEM

Dear Mr. Munekiyo:

The proposed main water transmission line along Kahekili Highway and Waihee Valley Road would have some impacts during the construction phase. We will require these impacts to be mitigated through our construction plan approval process.

Please note that the State Department of Transportation, Highways Division has taken over maintenance of Kahekili Highway in the areas of your proposed waterline. Please ensure their requirements are incorporated on the construction plans.

Very truly yours,

George Kaya

GEORGE N. KAYA
Director of Public Works

LL:ch(ED93-680)
Nwaihee.wu

xc: LUCA
Highways Division
State DOT, Highways Maui District

Chapter VII

Letter Received During Public Comment Period and Proposing Agency Response

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
LAND USE AND CODES ADMINISTRATION
250 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

August 2, 1993

MEMO TO: Brian W. Miskae, Planning Director

F R O M: George N. Kaya, Director of Public Works

SUBJECT: Preliminary Environmental Assessment
NORTH WAIHEE WELLS TRANSMISSION SYSTEM

We reviewed the subject application and have the following comments:

1. Comments from the Engineering Division:

   a. The applicant is requested to contact the Engineering Division at 243-7745 for information.

2. Comments from the Wastewater Reclamation Division:

   a. No comments.

3. Comments from the Solid Waste Division:

   a. Alternative means of disposal of grubbed material and rock shall be utilized other than disposed of at the County landfills.

   The applicant is requested to contact the Solid Waste Division at 243-7875 for additional information.

4. Comments from the Land Use and Codes Administration:

   a. The portion of waterline crossing the Waihee Stream is within the Flood Hazard Area, therefore, is subject to Chapter 19.62 of the Maui County Code.

   b. The access and site plans for the 1.0 million gallons resevoir be submitted for review to determine if a subdivision will be required.

c. A detailed drainage and erosion control plan, to include, but not limited to, hydrologic and hydraulic calculations and scheme for controlling erosion and disposal of runoff water is required, and an analysis of the soil loss using the HESL erosion formula, must be submitted for our review and approval. The plan should provide verification that the grading and runoff water generated by the project will not have an adverse effect on the adjacent and downstream properties.

The applicant is requested to contact the Land Use and Codes Administration at 243-7250 for additional information.

RMN:ey
1293f:Page 88-89

xc: L.U.C.A.
Engineering Division
Solid Waste Division
Wastewater Reclamation Division

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

March 10, 1994

Mr. George Kaya, Director
Department of Public Works
and Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Kaya:

Subject: WAIHEE WELLS AND TRANSMISSION SYSTEM
DRAFT ENVIRONMENTAL ASSESSMENT

Your memorandum of August 2, 1993 to the Planning Department concerning the subject project was referred to us. Our responses to your comments are as follows:

1. We will be contacting the Engineering Division for information regarding applicable requirements for the subject project.

2. Disposal of grubbed material and rock is intended to be done by the contractor. It is intended that the contract specifications will prohibit disposal into the County landfill.

3. We acknowledge that the proposed waterline crossing at Waihee Stream is subject to Chapter 19.62 of the Maui County Code. We intend to comply with all applicable requirements.

4. Access and site plans for the proposed water tank will be submitted to the Land Use and Codes Administration for review. Our intent is to comply with all applicable requirements.

5. We will coordinate any drainage and erosion control requirements with the Department. A drainage and erosion control plan will be submitted, as appropriate.

Thank you for your comments on the Draft Environmental Assessment. If you have any questions, please feel free to call me.

Sincerely,

David R. Craddick
Director

/sc

Chapter VIII

Letter Received After Public Comment Period and Proposing Agency Response

ISAAC DAVIS HALL
ATTORNEY AT LAW
2087 WELLS STREET
WAILUKU, MAUI, HAWAII 96793
(808) 244-9017
FAX (808) 244-6775

OF COUNSEL:
G. RICHARD GESCH

September 27, 1993

Mr. David Craddick
Dept. of Water Supply
County of Maui
200 S. High St.
Wailuku, HI 96793

Michael T. Munekiyo Consulting, Inc.
1823 Wells St., Suite 3
Wailuku, HI 96793

Re: Draft Environmental Assessment for Waihe'e Wells and Transmission System

Dear David Craddick and Michael T. Munekiyo:

This letter is written on behalf of Maui Malama Pono, Inc., a group concerned with the Waihe'e area, the Waihe'e Stream, sane dune and wetlands area. We have the following comments and objections to the Draft Environmental Assessment ("DEA") prepared for the Waihe'e Wells and Transmission System.

1. Violation of the procedural requirements of Chapter 343.

The DEA admits a procedural violation of Chapter 343. Pump installation permits for Wells 1 and 2 were applied for and granted prior to the completion of the environmental process required by Chapter 343.

2. Impact on stream flow

The DEA assumes that there will be no impact of groundwater pumping on stream flow in the Waihe'e Stream. This assumption is not documented and is probably false.

3. Transmission to Central Maui

No authority for transmitting water outside the aquifer of origin to Central Maui and beyond is established.

4. Impact on water quality

No real discussion of water quality issues is contained.

5. Impact on ocean resources

There is no real discussion of the impact on ocean resources of groundwater pumping.

6. Findings

The findings made in the DEA cannot be supported as a matter of fact or law.

Thank you for the opportunity to comment on the DEA.

Sincerely yours,

Isaac Hall

IH/jp
cc: Maui Malama Pono

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

March 10, 1994

Mr. Isaac Davis Hall
Attorney at Law
2087 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Hall:

Subject: WAIHE'E WELLS AND TRANSMISSION SYSTEM
DRAFT ENVIRONMENTAL ASSESSMENT

Thank you for your letter of September 27, 1993 regarding the subject project. Although your letter was dated and received after the conclusion of the 30-day public review period of the Draft Environmental Assessment (EA), we would like to provide a response to your comments.

1. Violation of Procedural Requirements of Chapter 343.

We can see no procedural violation of Chapter 343, HRS. It is noted that Waihe'e Well Nos. 1 and 2 were drilled and tested in 1981 by C. Brewer Properties, Inc. (CBP), corporate predecessor of C. Brewer Homes, Inc. (CBH). The wells were tested again in 1989 by CBP. The applications for pump installation permits were submitted to the Commission on Water Resource Management on September 17, 1992 by CBP and approved by the Commission on March 3, 1993. All work on Waihe'e Wells Nos. 1 and 2 was done as a private action involving no State or County lands or funds. There were no circumstances which prompted an environmental review in accordance with Chapter 343, HRS. Thus, no EA was done prior to the application and approval of the pump installation permits for Waihe'e Well Nos. 1 and 2.

At its meeting of March 16, 1993, the County Board of Water Supply approved, in concept, a joint venture between C. Brewer Properties, Inc. and the County. This occurred after action was taken on C. Brewer's pump installation permits.

2. Impact on Stream Flow.

Regarding your comment on Waihe'e Stream flow, we have attached a letter dated February 12, 1993 from John Mink on this subject. The letter pertains to findings from a May 1989 pump test on Waihe'e Well No. 2. During the discussion on the pump installation permit application before the Commission on Water Resource Management, a concern on Waihe'e Stream flow was raised. We believe that Mr. Mink has adequately addressed these concerns on stream flow.

3. Transmission to Central Maui.

Regarding your concern as to the authority for transmission of water from the Waihe'e Aquifer to Central Maui, we note that groundwater has been withdrawn from the Iao Aquifer and transmitted to areas outside of the aquifer of origin for a number of years. Groundwater withdrawn from the Iao Aquifer is transmitted to Paia as well as the Maalaea-Kihei-Makena region.

4. Impact on Water Quality.

Regarding water quality from the two wells, it is noted that the May 1989 pump test included measurements for salinity. It was found to be constant at less than 20 mg/l of chloride.

It should be noted that prior to use of the wells for drinking water purposes, we are required to comply with all applicable Department of Health regulations including water quality analyses noted in section 11-20-19, Hawaii Administrative Rules. There are a number of tests for the possible presence of organic and inorganic chemicals which must be performed prior to its use for drinking water purposes.

5. Impact on Ocean Resources.

Mitigative measures are proposed to ensure that there is no significant impact upon stream water quality as well as ocean resources. The project involves a waterline crossing of Waihe'e and North Waiehu Streams. Metal sheathing is anticipated to be used to temporarily divert waters to the remaining 50 percent of the stream width while construction proceeds on the waterline. The waterline is anticipated to be placed within a concrete jacket and covered with rocks and gravel to minimize subsequent erosion. During the entire construction process, a temporary filter berm or siltation net will be placed downstream to minimize dirt, silt, rocks and other materials from reaching further downstream. The

construction time frame for each waterline stream crossing is anticipated to be two to three weeks. See Final Environmental Assessment.

The project must comply with a number of permits and requirements which affect stream water quality and ocean resources, including the U.S. Army Corps of Engineers Permit, Section 401 Water Quality Certification, Coastal Zone Management Consistency, and Steam Channel Alteration Permit. The project is not anticipated to cause a significant adverse impact to stream water quality or ocean resources.

6. Findings.

Regarding the findings of the Final Environmental Assessment, we stand by the conclusions of the document and believe that the conclusions can be supported.

We hope that we have been able to clarify the issues and questions you have raised.

Sincerely,

David R. Craddick
Director

/sc

L. Tink & Yuen, Inc.

100 N. Beretania Street • Suite 303 • Honolulu, Hawaii 96817 • Telephone: (808) 536-0081 • Fax: (808) 536-0082

February 12, 1993

David Blane
C. Brewer Properties, Inc.
PO Box 1437
Wailuku, HI 96793

Dear David:

Subject: Effect of North Waihee Wells 1 and 2 pumpage on Waihee Stream flow.

I understand that C. Brewer Properties, Inc. application for pump installation permits to install a 1400 gpm pump in each of the North Waihee wells (nos. 1 and 2) was delayed because a point was raised concerning the possible effect pumping the wells might have on Waihee Stream flow. This is an exaggerated concern in view of the position of the water level in the aquifer with respect to the channel invert of Waihee Stream.

The water table in the North Waihee wells lies at 10 to 11 feet above sea level while the channel of the stream opposite the wells is 200 feet above sea level (see attached location map). A small depression in the water table caused by pumping will not influence Waihee upstream of the wells. Nor is it likely that the stream will suffer in the downstream direction because of the high invert of the channel compared to the position of the water table.

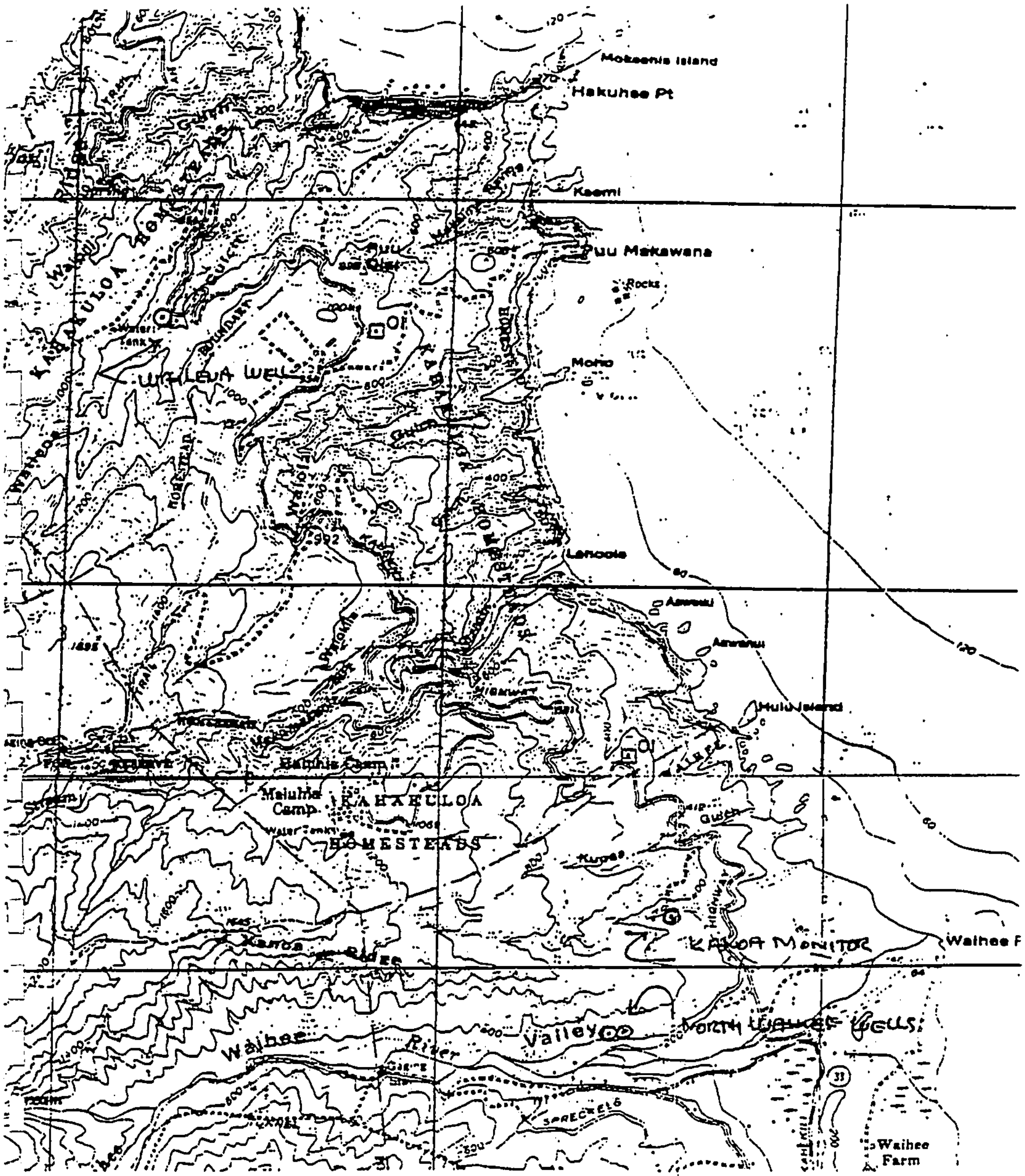
A pump test conducted between May 15 and May 19, 1989, using Well 2 as the pumping well and Well 1 along with a specially drilled boring at Kanoa (see map) as observation wells, showed that the aquifer is extensive and potentially very productive. Well 2 was pumped at 2480 gpm (3.57 mgd) and experienced drawdown of just 5 feet. Recovery was virtually instantaneous following 96 hours of continuous pumping. The salinity of the water was constant at less than 20 mg/l chloride.

Although each well will be fitted with a 1400 gpm pump (2 mgd) to give a total capacity of 4 mgd, during normal operations only 2 mgd will be pumped, and annually the

average will be 2 mgd. Eventually additional wells may be drilled in the aquifer about half a mile north of the existing wells to allow total average pumpage of 4 mgd.

Sincerely,

John F. Mink


Mokeehia Island
Hakuhee Pt
Kaemi
Puu Makawana
Rocks
Moho
WAILEUA WELL
KAHAKULOA
Lanoole
Aawaiwai
Hulu Island
Malulua Camp
KAHAKULOA
HOMESTEADS
Water Tank
Kanoa Ridge
KAHOA MONITOR
Waihee
Waihee River
Valley
NORTH WAIHEE WELLS
SPRECKELS
Waihee Farm

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County of Maui, The General Plan of the County of Maui, 1990 Update.

County of Maui, Wailuku-Kahului Community Plan, 1987.

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Appendices

Appendix A

Botanical Survey

BOTANICAL ASSESSMENT SURVEY
NORTH WAIHE'E WELLS TRANSMISSION SYSTEM
WAILUKU DISTRICT, ISLAND OF MAUI

by

Winona P. Char

CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: MICHAEL T. MUNEKIYO CONSULTING, INC.

July 1993

BOTANICAL ASSESSMENT SURVEY
NORTH WAIHE'E WELLS TRANSMISSION SYSTEM
WAILUKU DISTRICT, ISLAND OF MAUI

INTRODUCTION

The North Waihe'e Wells Transmission System project is being undertaken by C. Brewer Properties, Inc., in coordination with the County of Maui, Department of Water Supply. Water from the four Waihe'e well sites would be collected and transmitted by a pipeline to an existing water tank located south of Malaihi Road, at about the 500-foot elevation contour. The waterline, for the most part, follows along existing roads and through macadamia nut fields. Portions of the waterline are located on undeveloped or uncultivated lands, and the waterline will also cross the Waihe'e Stream.

A botanical assessment survey was made on 01 July 1993 for these undeveloped lands and the Waihe'e Stream crossing. The primary objectives of the field survey were to search for threatened and endangered plant species, as well as rare and vulnerable plants, on these undeveloped lands and stream crossing; and to describe the vegetation on these areas. The findings from the botanical assessment report will be incorporated into an Environmental Assessment (EA) document.

DESCRIPTION OF THE VEGETATION

Three sections of the proposed transmission system required a botanical assessment survey. These were 1) the lower Kainoa Ridge

area where the well sites and new water tank are located; 2) the Waihe'e Stream crossing; and 3) a heavily vegetated gully between two macadamia nut fields.

A walk-through reconnaissance was made. The proposed alignment and well sites were flagged prior to our field study. For the waterline, a corridor 50 feet wide, that is, 25 feet on each side of the flagged line was surveyed. For the well sites, an area 100 feet square was surveyed around each of the wells. Around the new water tank site, an area of about 500 feet square was inspected. Both the alignments, upstream (mauka) and downstream (makai) of the Waihe'e Bridge were surveyed. Notes were made on plant distributions and associations, substrate types, topography, past disturbances, etc.

A more detailed description of the vegetation found on the three survey areas is presented below. The scientific names used in the report follow Wagner et al. (1990) for the flowering plants and Lamoureux (1984) for the ferns.

Lower Kainoa Ridge Area

This area is used for pasture land. Small gulches and swales support stands of Java plum trees (Syzygium cumini) and shrubs of strawberry guava (Psidium cattleianum) and yellow strawberry guava or waiawi (Psidium cattleianum var. littorale). Scattered, tall clumps of ironwood trees (Casuarina equisetifolia) are found along the tops of the ridges. Filling in the matrix between the stands of trees, is a mixture of grasses, herbs, and shrubs which form a low, open cover. The more frequently observed grasses include Bermuda grass or manienie (Cynodon dactylon), golden beardgrass or manienie 'ula (Chrysopogon aciculatus), Natal redtop (Rhynchelytrum repens), West Indian dropseed (Sporobolus indicus), and yellow foxtail (Setaria gracilis). Low, creeping

legumes such as Spanish clover or ka'imi (Desmodium incanum) and puahilahila or sensitive plant (Mimosa pudica) are common. Lantana shrubs (Lantana camara), 2 to 3 feet tall, form prickly patches here and there, but are especially abundant in the area of the future water tank.

Two native shrubs can be found scattered along the slopes in this area. 'Akia (Wikstroemia cf. uva-ursi) is common; this low, rounded shrub has bluish-green, rounded leaves and small, yellow flowers. 'Ulei (Osteomeles anthyllidifolia), a member of the rose family with clusters of white flowers and small, white, apple-like fruits, is less common in the area; it is frequently browsed by the cattle. Other natives are the pala'a fern (Sphenomeris chinensis) and golden beardgrass, which is a common component of the vegetation.

Along the lower slopes of the ridge, in Waihe'e Valley, the two well sites are surrounded by dense, tall clumps of elephant or Napier grass (Pennisetum purpureum), 7 to 8 feet tall. Two vining legumes, maunaloa (Canavalia cathartica) and Glycine wightii, form tangled mats throughout the elephant grass. These lower slopes also support a somewhat dense Java plum forest with very scattered trees of silk oak (Grevillea robusta) and albizia (Paraserianthes falcataria). Shrubs of strawberry guava, waiawi, Christmas berry (Schinus terebinthifolius), and, in some places, Surinam cherry (Eugenia uniflora) are common.

Waihe'e Stream Crossing

The bottom of Waihe'e Stream is rocky and strewn with very large boulders. Along the stream by the bridge, the vegetation consists primarily of elephant grass. Mauka of the bridge, on the higher banks, koa-haole (Leucaena leucocephala) forms a narrow band. Homes and landscape plantings are found on this side of the

bridge. On the makai side of the bridge, tall Java plum trees, 40 to 50 feet high, form a closed canopy forest on the higher banks. A few large old mango trees (Mangifera indica) also occur here. Ground cover consists of scattered patches of Spanish clover, Hilo grass (Paspalum conjugatum), hairy sword fern (Nephrolepis multiflora), lauwa'e fern (Phymatosorus scolopendria), and seedlings of Java plum. Taro vine or pothos (Epipremnum pinnatum) is especially dense, climbing up the trunks of the Java plum trees. Remnants of an old agricultural terrace system are found on this makai portion.

Gully Between Macadamia Nut Fields

The proposed waterline, at one point, will cross Malaihi Road and a small irrigation ditch, and then onto actively cultivated macadamia nut (Macadamia integrifolia) fields. At about the 325-foot elevation, the waterline crosses a small gully which is heavily overgrown. An intermittent stream, probably dry during most times of the year, runs down the center of the gully. A concrete slab or revetment is found within the waterline corridor where it crosses this small gully.

Very tall, 8 to 10 feet, and very dense elephant grass lines the sides of the gully. On the makai side of the corridor is a stand of Java plum and kukui (Aleurites moluccana) trees, while on the mauka side there is a patch of tall banana plants (Musa X paradisiaca) with green fruits.

DISCUSSION

Introduced or alien plant species are the dominant components within the three undeveloped areas through which the waterline crosses. Introduced species are all those plants brought to the Hawaiian Islands, intentionally or accidentally, after Western

contact, that is, after Cook's discovery of the islands in 1778. Around the Kainoa Ridge area, the waterline, well sites, and a proposed new water tank are found on pasture lands. There are a few native species here; these are the 'akia (Wikstroemia cf. uva-ursi), golden crownbeard (Chrysopogon aciculatus), 'uhaloa (Waltheria indica), pala'a (Sphenomeris chinensis), and 'ulei (Osteomeles anthyllidifolia). The 'akia is endemic, that is, it is native only to the Hawaiian Islands, and the others are indigenous, that is, they are native to the islands and also elsewhere throughout the Pacific. On the other two areas, the Waihe'e Stream crossing and the small gully, introduced species make up the bulk of the vegetation. Two plants originally of early Polynesian introduction, the kukui and banana or mai'a, are also found here.

None of the plants found on the three areas are listed threatened and endangered species (U.S. Fish and Wildlife Service 1989); nor are any proposed or candidate for such status (U.S. Fish and Wildlife Service 1990, 1992). None of the plants are considered rare or vulnerable (Wagner et al. 1990).

Given the findings above, and the limited nature of the project, no significant negative impacts to the vegetation are expected. There are no botanical reasons to impose any restrictions, conditions, or impediments to the proposed North Waihe'e wells transmission system project. Of some concern, is the Waihe'e Stream crossing. The waterline is anticipated to be placed in a concrete jacket and buried at the stream crossing. Permits from the U.S. Army Corps of Engineers (COE) and the State Department of Health may be required. A COE approved wetland delineation will need to be conducted for the stream area.

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Appendix B

Archaeological Inventory Summary and Supplemental Surface Survey

CULTURAL RESOURCE MANAGEMENT
AKI SINOTO CONSULTING 2333 Kapiolani Blvd. No.2704 Honolulu, Hawaii 96826 Tel/Fax (808) 941-9538

July 6, 1993

Milton Arakawa
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, HI 96793

SUBJECT: Summary and results of archaeological investigations along the pipeline corridor of the North Waihee Wells Transmission Project.

Dear Mr. Arakawa:

Between June 28 and July 3, 1993 Aki Sinoto Consulting conducted an inventory-level archaeological survey of approximately five miles of pipeline right-of-way in the lands of Waihe'e and Wai'ehu, Maui. The project area extends from Malaihi Road in the south to Kupa'a Gulch to the north. Kahekili Highway forms the east boundary, while Spreckels Ditch parallels the western boundary. The goals of the survey consisted of 1) a systematic pedestrian survey of the pipeline right-of-way, 2) mapping and field assessment of any surface remains, and 3) subsurface, backhoe-assisted testing of areas likely to contain cultural materials. These areas were indicated by the presence of artifact scatters. All fieldwork was performed by a two-person crew consisting of Bruce A. Jones, M.A. (Project Director) and Ron Holt.

A previous assessment by Aki Sinoto and Jeffrey Pantaleo, found significant portions of the project area had been disturbed by intensive agriculture such as sugarcane, pineapple, and macadamia nut. Many areas along Kahekili Highway have also been impacted by road and residential construction. The few relatively undisturbed portions of the project area include small patches of wooded areas north of Waihee Stream and the Waihee Stream Bridge, but these localities have also been disturbed to some degree by livestock, flooding, and deforestation. Accordingly, many of the archaeological and historic properties remaining are present as fairly recent features such as the Spreckels Ditch, Waihee Town Historic District, and the existing stone wall fronting Kahekili Highway possibly associated with Ka'ahumanu and Kamamalu. Other known areas of archaeological sensitivity are the Kapahukawila Agricultural Complex at the Waihee Stream crossing, and the extensive sand dunes bordering the eastern edge of Kahekili Highway. Consideration of these facts suggest that few archaeological features remain in the project area. Determination of the presence/absence of artifact scatters and/or features within the right-of-way was, therefore, the primary goal of the current inventory-level survey.

Survey Results

The survey areas were arbitrarily divided into eight sectors, or transects. Transects A, B, C, and D are located in the northern section of the project area (Figure 1). Transect A is a ca. 300 m/1000 ft-long

alignment extending from a large pasture area (450 ft/137 m AMSL) due n well sites 2 and 3. The transect traverses rugged gullies and a steep slope populated by ironwood trees. There is an archaeological feature (A-1) located at the junction of the slope with the upper pasture area. This terrace is a poorly-stacked stone alignment 21.5 m/71 ft long and about 60 cm/2ft high. The feature is oriented in a generally east-west direction. A slight depression occurs to the rear (south) of the feature. No artifacts or additional features were associated with this alignment.

Transect B is a 300 m/1000 ft-long alignment extending upslope from the intersection of a corral and access road to the previously described upland pasture area. The transect is oriented in a southwesterly pattern, an generally traverses a moderate-to-steep ridge dominated by exposed bedrock with ironwood and 'ohia trees. Nothing of archaeological or historical value was observed in this transect.

Transect C connects the existing CBF wells with the proposed 500,000 gal. tank site located in the previously-discussed upland pasture area, comprising the terminus for Transects A and B, as well. Transect C is a 300 m/1000 ft-long corridor which begins in a low, slightly swampy area covered with dense elephant grass. The right-of-way continues through high grass for a brief distance and rapidly ascends the ridge to the northeast. The major portion of the transect follows this steep ridge contour and cliff face, gradually proceeding upwards to end at the open pasture area. Although numerous cliff faces and outcrops provided possible shelter areas for archaeological sites, nothing of cultural significance was observed by the survey crew.

Transect D comprises both sides of the Waihee Stream crossing including areas occupied by both the previous and existing bridges. The west side of the crossing is composed of steep banks modified by the concrete abutments of the old bridge and by landscaping associated with current residences on either side of the stream. Detritus resulting from flooding has obscured much of the remaining natural embankment. The north bank on the east side of the crossing is occupied by a series of low, stacked stone terraces representing lo'i, or taro gardens. A well-preserved terrace segment was discovered about 5m/16 ft from the road berm in a heavily wooded area. This 7m/23 ft-long terrace is constructed of well-stacked rounded boulders. The alignment parallels the stream terrace and appears to be associated with numerous and visible terraces along the flat stream terrace to the east (Kapahukawila Complex-Site 50-50-03-3501). Nothing was located along the steep slope on the opposite side of the stream.

The central portion of the project area includes Waihee Town, cultivated macadamia orchard roads (Transect E), the Spreckels Ditch (Transect F), and a major portion of the Kahekili Highway corridor (Transect G)(Figure 2). Transect E is a 2000 ft/610 m-long dirt road beginning at the juncture of Kuhaia (?) Street near St. Ann's Church in Waihee Town, and extending in a generally westerly direction through the macadamia orchard to the intersectio of a road parallel to Spreckels Ditch. Two surface scatters of artifactual material were discovered on the south edge of the road. 133 m/436 ft (190 ft/ 58 m AMSL) from the orchard gate. This scatter consisted of a polished stone adz or gouge fragment, small amounts of clam shell, and a possible ula maika stone. A scatter with similar proportions of shell, and a stone tool

was observed 42 m/138 ft upslope on the south side of the road. These t clusters were designated as Area I.

Artifact scatters generally provide good indicators of additional buried materials, and on this basis, two trenches were excavated in Area I Trench 1 was located in the area of the scatter first encountered. The 5m 16 ft-long trench was parallel to the road and ranged from 1-1.5 m/3-4 ft i depth. No cultural material was revealed by the excavation. Sediments consisted of a homogeneous clay-loam resulting from years of irrigation.

Trench 2, of similar proportions as the previous excavation, was placed in the area of the second artifact cluster. This trench was excavated perpendicular to the road immediately west of the archaeological remains. Th trench profile revealed a clay-loam stratum in the southern half of the trench, however, the northern section overlapping the road displayed a volcanic ash layer and a small pit (probably once a tree) which had been filled with a sand and gravel mixture. A glass fragment was present at the base of the pit. No archaeological remains associated with indigenous Hawaiian occupation were discovered in Trench 2.

The pedestrian survey of the remainder of Transect E failed to locate additional surface artifacts, however, occassional fragments of historic whiteware ceramics were observed along the road upslope of Area I.

Transect F extended from the juncture of the road (Transect E) with the Spreckels Ditch to the reservoir at Malaihi Road. Only one surface scatter suggesting a buried site was located along this 6000 ft/1829 m-long alignment. Area II is located 42 m/138 ft southeast of a reservoir bordering a steep ridge. The scatter consisted of a light accumulation of coral fragments and scattered ili'ili stones. Trench 3 was excavated parallel to the east side of the road. The resulting trench profiles revealed natural colluvial sediments common to upland slopes. No cultural materials were observed in the excavation.

Areas of Transect G (Kahekili Highway) within the central project area included the wall segment on the west side of the highway, Waihee Historical District, and dune areas on the east side of the road. The wall representing a honua, or place of refuge in the time of Ka'ahumanu, was inspected and found to be in poor condition. The wall begins just north of the Waihee School, paralleling the road for 1750 ft/533 m. The better preserved wall portions from the south end extending for 570 ft/175 m, are composed of stacked 2-3 course, flat, boulder-size rock from 20-70 cm/8-28 in. in height. Wall widths appeared to be consistent at about 1 m/3.3 ft. The remaining sections of the wall are alternately covered with vegetation and sand, present as low remants, or completely missing.

Waihee Town is included in a historical district (50-50-04-1501) comprising 20 acres. It appears as if all buildings except the Waihee School are included within this locality. St. Ann's Church has been recently nominated to the State Register of Historic Places. Further information on specific buildings and properties within the proposed right-of-way could not be accessed during this phase of the project.

The southern portion of the project area (Figure 3) includes the

remainder of Transects F and G, and Transect H. The portion of Kahekili Highway from Waihee Town to the end of the right-of-way, 11,000 ft/3354 m to the south, is dominated by massive dune areas, particularly in the region south of Malaihi Road on the seaward side of the highway. Numerous sites, often associated with significant numbers of human burials, have been encountered in these localities. The Department of Land and Natural Resources (DLNR)-Historic Sites Section is currently monitoring quarrying operations in the dunes bordering Kahekili Highway.

Transect H follows the proposed alignment from Malaihi Road southwest of the reservoir to the existing water tank located near the ridge summit- a distance of 3250 ft/991 m. The right-of-way loops through macadamia orchards and a narrow stream proceeding upslope through additional orchards to the tank junction. No archaeological or historic remains were observed during the survey of this area.

Recommendations

Draft rules and regulations of the Historic Sites Section, Department of Land and Natural Resources (May 1989), provide the framework for evaluation of historical significance and research value. These are defined according to criteria of structural integrity, association with people, events, ethnic groups, and/or broad patterns of historical events in the past. Criterion D specifies significance for sites with potential for yielding information contributing to prehistoric/historic research. This stipulation is most often invoked when pre-historic properties are involved.

The archaeological inventory survey of the Waihee Wells Waterline Project has resulted in the evaluation of five previously-known areas of archaeological and historic sensitivity, and identification of four additional areas. The following recommendations are offered below:

1. The feature referred to as Feature A-1 (Transect A), may represent a ceremonial or religious function due to its unusual location and isolation, and should be avoided by construction related to the waterline project.

2. The terrace feature located near the Waihee Stream crossing (Transect D) is undoubtedly a component of the agricultural complex documented as Site 50-50-03-3501, and should be avoided.

3. All three artifact scatters in Transect E (Area I) and Transect F (Area II) have been investigated by subsurface mechanical testing. The negative results of this testing strongly suggest the artifacts are ephemeral objects displaced by sugarcane and macadamia field disturbances. No further work is recommended for these areas.

4. Pipeline construction should avoid road sections parallel to the Spreckels Ditch which could impact this historic property.

5. The poor structural integrity of the wall described as a honua associated with Ka'ahumanu and Kamamalu, mitigates against its inclusion as a significant site. Further archival and oral

documentation is needed to assess its true purpose and functic if possible. In view of the uncertainty associated with this feature, we recommend avoidance, or preservation of less disturk sections, for the time being.

6. The 20-acre historic district of Waihee Town obviously includes buildings within the right-of-way. Pipeline construction will be routed to avoid any buildings now existing in Waihee Town (D. Hibbard:personal comm.,.

7. Over 100 sites have been recorded from dune areas on the coastal side of Kahekili Highway. Due to the high liklihood of encountering human burials and additional sites, these dune localities should be avoided. Archaeological monitoring of any construction should be considered if subsurface disturbance cannot be avoided.

8. In addition to these suggestions, we recommend archaeological monitoring of the construction areas near Waihee Stream crossing and along Kahekili Highway, due to the high predictibility of archaeological and historic properties occurring in these areas.

We hope these recommendations will be useful to you as part of the project planning phase. In the interim prior to production of a more thorough draft report, please address any questions or comments to Aki Sinoto (808) 941-9538.

Regards,

Bruce A. Jones
Project Director

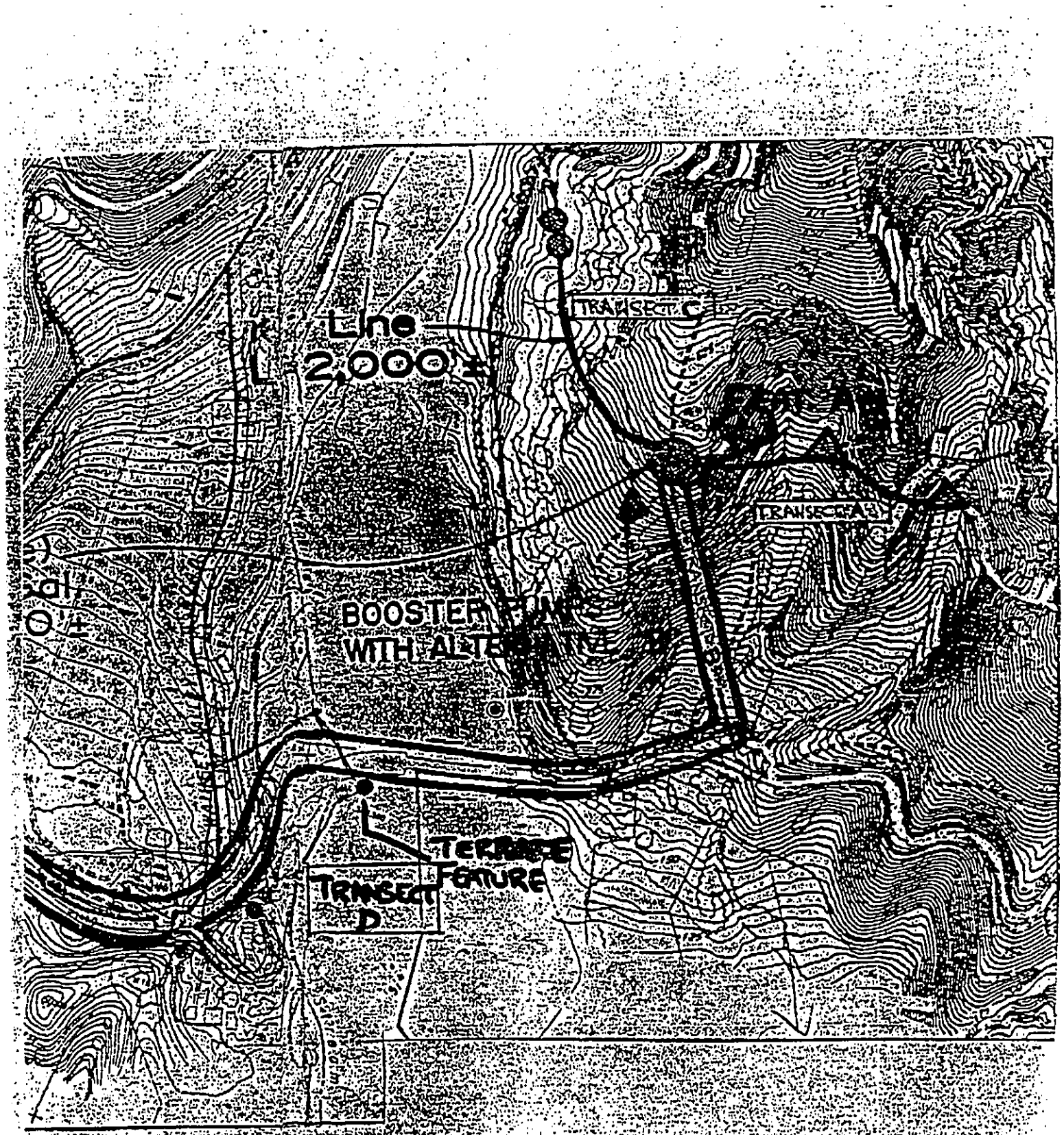

Figure 1. Map of Northern Portion of Project Area.

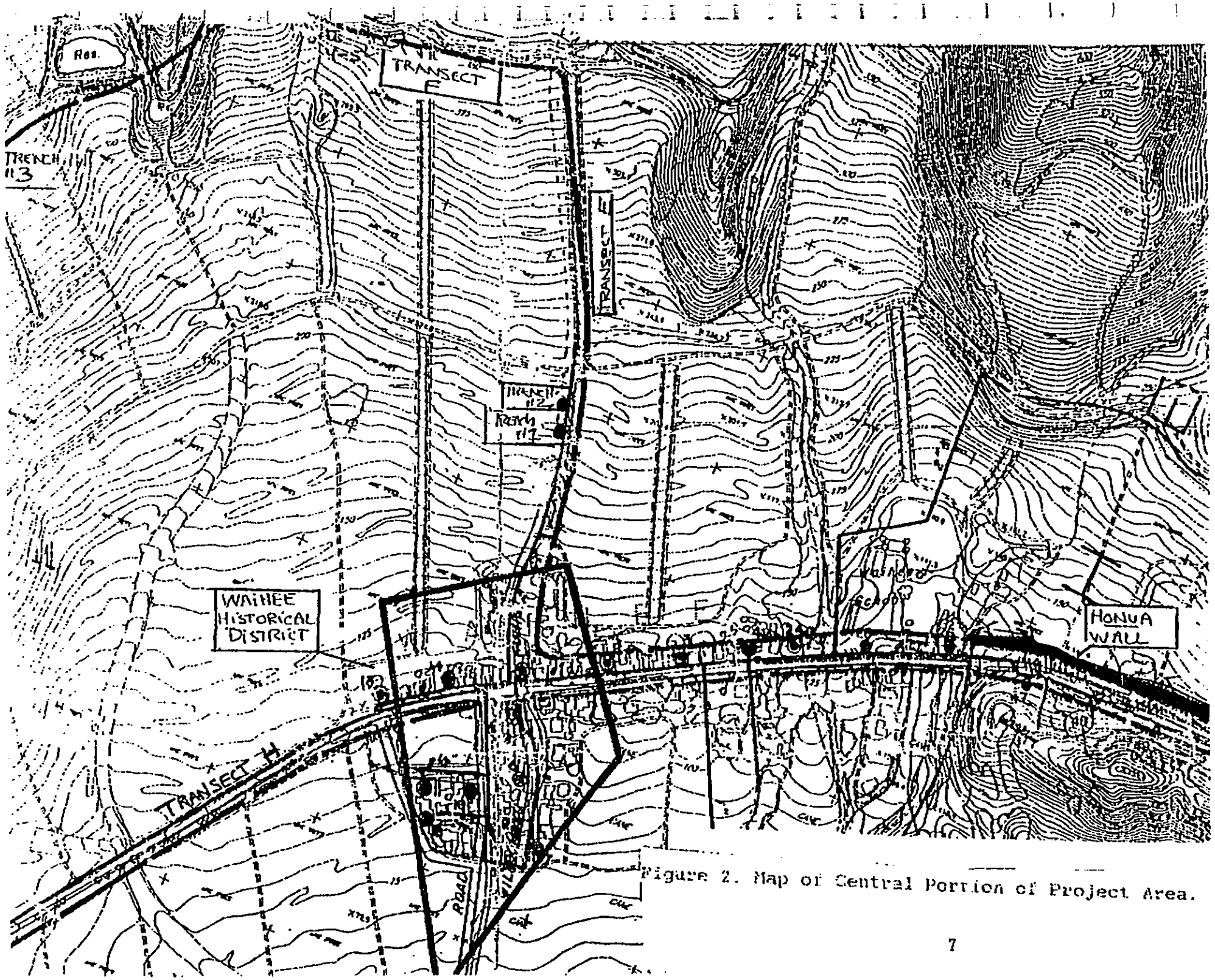

Figure 2. Map of Central Portion of Project Area.

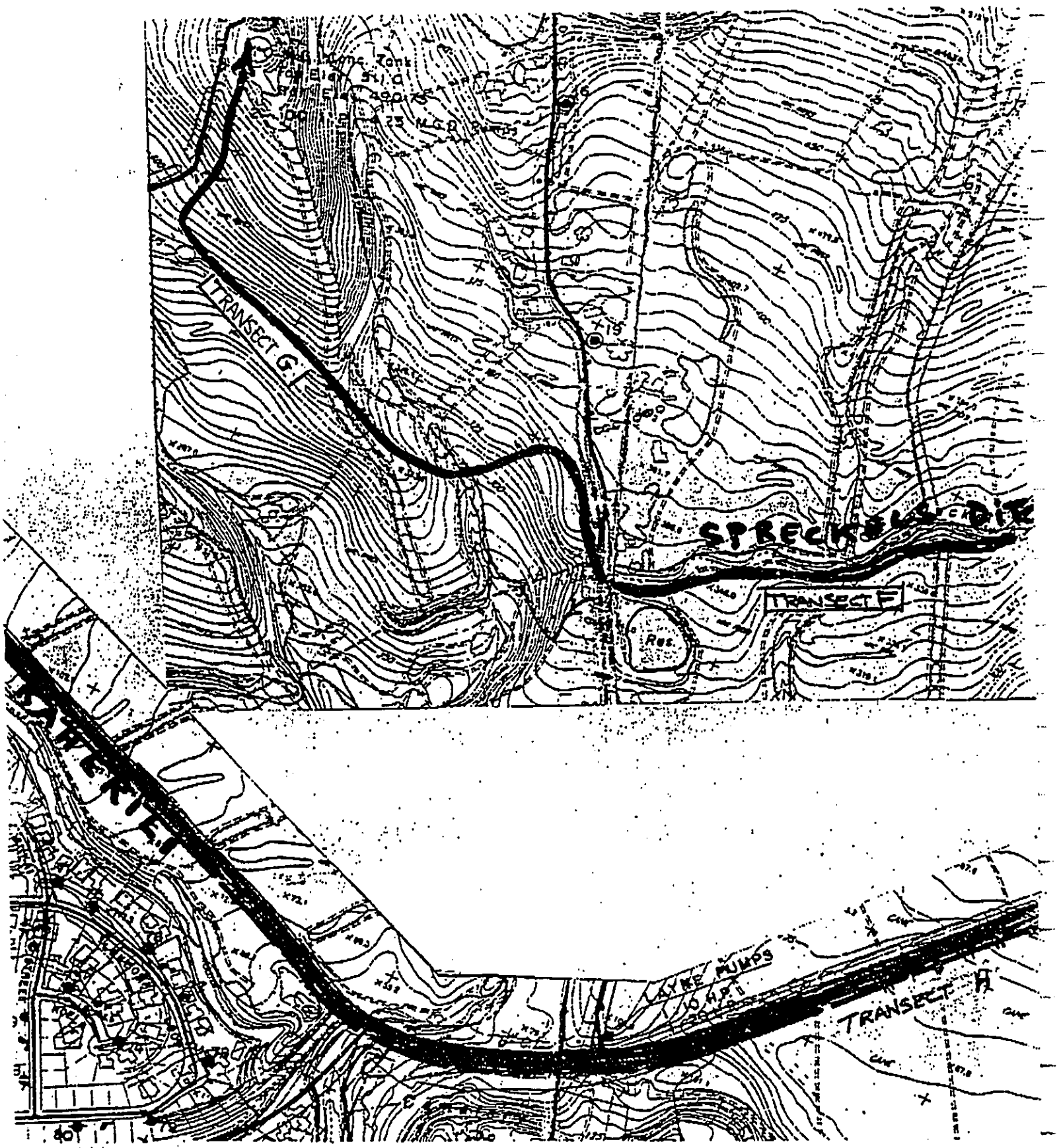

Figure 3. Map of Southern Portion of Project Area

CULTURAL RESOURCE MANAGEMENT
AKI SINOTO CONSULTING 2333 Kapiolani Blvd. No.2704 Honolulu, Hawai'i 96826 Tel/Fax (808) 941-9536

March 2, 1994

Mr. Milton Arakawa
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, HI 96793

SUBJECT: Post-field Summary for the Supplemental Archaeological Surface Survey of the Realigned Corridor Segment, North Waihee Wells Transmission Project.

Dear Mr. Arakawa:

The supplemental surface survey of the realigned corridor segment for the North Waihee Wells Transmission System Project was completed today. The roughly 3000 ft. corridor segment deviates from Transect E designated by our previous inventory survey conducted this past June. From the gate at the *mauka* end of Kuhinia Street to the junction with the intermediate cane haul road, the corridor alignment did not change its westerly orientation. However, at the junction, instead of continuing westward, the new alignment turns southward and follows the existing road for approximately 1500 feet. Past two rows of windbreak trees, the alignment follows a macademia orchard road southwestward for approximately another 1000 feet. The corridor then trends south and west following the southern edge of a ridgeline protruding into the macademia orchard for roughly another 500 feet and meets the roadway paralleling the Spreckels Ditch. From this point at the north end of the existing reservoir and the south portal of the tunneled segment of the ditch, the corridor continues southward on its original alignment along Transect F.

Since Features 1 and 2 of Site 50-50-04-3197, the surface scatters of artifacts and midden located during our previous inventory survey, ocurred near the northern end of the realigned segment, particular attention was given to this area. However, no surface archaeological remains were encountered in this locale or anywhere along the whole route of the realigned corridor. Thus, no changes to the original recommendations as presented in our post-field summary letter of July 6, 1993 will be necessitated.

The final report incorporating the current supplemental work is currently in preparation and will be submitted early next week. Should you have any questions or comments, please contact me at the above number by phone or facsimile.

Sincerely,

Aki Sinoto

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

CULTURAL RESOURCE MANAGEMENT
AKI SINOTO CONSULTING 2333 Kapiolani Blvd. No.2704 Honolulu, Hawai'i 96826 Tel/Fax (808) 941-9538

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Appendix C

Excerpts from Central Maui Water Source Development, Norman Saito Engineering Consultants, Inc. and John F. Mink

Source Area 1: Waihee Aquifer System (Waihee to Kahakuloa)

The region between Waihee Valley and Kahakuloa Valley embraces about 12 square miles of humid, mountainous terrain where rainfall varies from an annual average of 40 inches at the coast to more that 300 inches at the headwaters of Waihee Stream. The combination of moderate to very high rainfall with geology featuring both poorly permeable and highly permeable rocks has created a complex suite of water resources. The major streams of Waihee, Makamakaole and Kahakuloa are perennial while lesser ones are not. Marshes form the headwaters of streams, and groundwater occurs in high level as well as basal aquifers.

Waihee Stream is one of the largest water courses in the State, discharging an average of 55 mgd and never experiencing a low of less than 14 mgd. The minimum flow of record (approximately 7 years) was 14.2 mgd in early 1985 following the most severe drought of the century. Below the USGS gaging station the river is diverted into the Waihee Ditch, and still further downstream into the Spreckels Ditch. The average combined flow of these ditches is 37 mgd on a 24 hour basis, placing Waihee among the most prolific sources of ditch water in the State.

The large base flow of Waihee is sustained principally by seepage from high level dike water and secondarily by headwater marshes. The low flow of Makamakaole, on the other hand, originates entirely in marshes and the perched aquifers that sustain them. Kahakuloa receives about equal volumes of low flow from perched water marshes and dike aquifers. Wailena is perennial at its origin where it is fed by perched water, but low flows are quickly lost by infiltration in the mid and lower reaches of the stream.

In contrast to the extraordinary discharges of Waihee Stream, those in Kahakuloa and Makamakaole are modest. The average flow at 330 feet elevation in Kahakuloa as measured at the USGS gage

station is 10 mgd, and the base flow, which is exceeded more than 90 percent of the time, is 3.5 mgd. For the Left Branch of Makamakaole at elevation 1500 feet the average is 1.9 mgd and the base flow is about 0.6 mgd. The large base flow of Waihee, about 20 to 25 mgd, and the smaller yet significant base flow of Kahakuloa are manifestation of the presence of voluminous dike impounded groundwater resources in the region. Nearer the coast basal aquifers occur.

Hydrogeology and Groundwater Occurrence

The primary geological formation underlying the entire region is basaltic lava of the Wailuku volcanic series. All major aquifers, both high level dike and basal, occur in this formation. The Wailuku series is analogous to the Honomanu series in East Maui and the Koolau series in Oahu, and like these formations it is extremely permeable. To the south the productive Iao aquifer consists of Wailuku basalt.

Over much of the region the Wailuku series is covered by the much paler Honolua formation. Composed of andesite and trachyte, the Honolua is normally dense, massive and light gray in contrast to the dark, more broken lavas of the Wailuku formation. Its permeability is significantly lower than that of the older basalt. It does not constitute major aquifers but carries the perched water that sustains marshes.

The Honolua formation forms a blanket, hundreds of feet thick at times, reaching from Eke to the coast. Its characteristics are most strikingly illustrated in the resistant trachyte dome of Puu Olai on the coast between Wailena and Waiolai Gulches. Other prominent trachyte domes are Eke, Puu Koae and Puu Olelo.

In the reach between Waihee and Makamakaole the Honolua may behave as a caprock on the Wailuku basalt aquifer, creating high heads a short distance inland. The head no more than 2000 feet

from the coast is 10 feet, which would be impossible in an unconfined basal aquifer. An alternative explanation for the high head is that groundwater flow is controlled by dikes.

Striking northerly from the original volcanic caldera in upper Iao Valley is a rift zone which passes through the Waihee Aquifer System, especially its northern part. The dikes trend from NNW to N to NNE but appear to favor the NNE strike. The rift formed during extrusion of the Wailuku formation, but dikes of the later Honolua series also follow the trend. The Wailuku dikes are normally one to two feet thick and black in fresh exposures. The Honolua dikes, which occur much less frequently, tend to be thicker and lighter in color.

The trachyte domes at Puu Koae and Puu Olai are contemporaneous with Puu Eke, which suggests that Honolua dikes cut through the region and may control groundwater movement even toward the coast. A large trachyte dike is exposed at the ditch intake on Waihee Stream, and its projected trace lies between Makamakaole and Waihee. Whether of not it affects groundwater behavior will be determined when a Makamakaole exploratory well is finally drilled.

As far as is known from experience elsewhere in West Maui, high level dike water is restricted to basalts of the Wailuku volcanic series and is far more voluminous than perched water in Honolua andesites. The seaward boundary of the high level aquifers by coincidence is about along the Forest Reserve line. In Kahakuloa a major spring (Kapuna Spring) overflows from a dike compartment where the stream leaves the Forest Reserve, and in Waihee the first visible dike spring cascades from the valley wall about two miles inland of the line. High level groundwater, however, seeps into the stream channel for a considerable distance downstream of this first dramatic canyon wall spring.

One or more basal aquifers exist seaward of the rift zone but are not hydraulically connected all the way from Waihee to Kahakuloa. These aquifers between Waihee and Makamakaole are probably confined at the coast, but beyond Makamakaole toward Wailena they are likely to be unconfined because the Honolua formation pinches out.

Groundwater Development

Aside from diversions to Waihee and Spreckels Ditches, only a small quantity of groundwater is being developed at this time, but not by wells, galleries or other common extraction techniques. Groundwater that collects as seepage in streams is withdrawn either at the source or, more often, downstream by users. The total volume taken is negligible, no more than thousands of gallons per day on the average.

Two successful wells were drilled on the north bank of Waihee in 1981 by C. Brewer Co. but have not yet been connected to a distribution system. These wells penetrated an aquifer of Wailuku basalt and produced low salinity (less than 50 mg/1 chlorides) water at rates to 1700 gpm during the initial testing. In May of this year a more comprehensive test was conducted using one well for pumping while the other served as an observation well. Also used as an observation well was the monitor boring drilled at Kanoa during the field phase of the investigation. The recent test confirmed the earlier indications of the presence of a sizeable aquifer capable of being developed with high capacity pumps.

Pump Test Results

The test was conducted uninterruptedly between 12 noon May 15 and 12 noon May 19, a total of 96 hours. North Waihee Well 2 (makai well) was pumped at an average rate of 2450 gpm (3.5 mgd). North Waihee Well 1 (mauka well) and Kanoa served as principal observation wells. Each was equipped with a continuous water level recorder. A recorder was also placed on an unused well in Wailena

Gulch, and tape measurements of water levels were made in boring A-1 in the Iao basal aquifer. Neither the Wailena well nor A-1 exhibited fluctuations induced by pumping. Both are too far away from the North Waihee wells, and in the case of A-1 an effective barrier consisting of the Waihee Valley fill and possibly dikes separate the Iao aquifer from North Waihee.

Maximum drawdown at the pumping well was 6.85 feet when the rate was temporarily at 2900 gpm; at the steady rate of 2450 gpm it was stable at 5.1 feet. These were expected values on the basis of the original step drawdown test in 1981. When the pump was turned off, recovery to within a few tenths of a foot of the original static level was instantaneous.

The curve of drawdown at observation wells as a function of time at constant pumping rate yields fundamental information about aquifer characteristics. Data from observation wells are uncluttered by perturbations except for the harmonic tidal swing. Analyses of drawdown at both observation wells give an aquifer transmissivity of 320,000 sq.ft./day and storativity in the range of .05 to .30. Transmissivity is the measure of how easily water moves through an aquifer; the results indicate a highly permeable aquifer comparable in properties to the Iao and Lahaina aquifers. A further calculation gives hydraulic conductivity of approximately 2000 ft./day, which is capable of handling high capacity pumps. Storativity is equivalent to effective porosity, or the pore volume which gives up water to pumping. The high value is typical of unconfined conditions. The aquifer sector between the North Waihee wells and the Kanoa boring is not confined, but near the coast the cap of Honolua trachyte covering the Wailuku formation may be a confining stratum.

If aquifer barriers are encountered during a pump test, the drawdown curve will deflect so that the rate of drawdown will increase. No such deflections occur in the data from either North

Waihee 1 or Kanoa. Evidently potential impediments to groundwater flow, such as dikes, do not behave as barriers but are subsumed in the aquifer's global characteristics. This means that groundwater moves freely in the reach between North Waihee and Kanoa and for a considerable distance beyond. Application of groundwater hydraulics equations to the data suggest that the minimum distance to an effective barrier is more than a mile away.

Salinity of the pumped water was very low, less than 30 mg/1 chloride, and did not vary over the period of the test. The low and invariant salinity in view of the high pump rate suggests that the fresh water portion of the aquifer is poorly connected to sea water.

The test was highly successful in providing fundamental information about aquifer characteristics as well as extent and exploitability.

Potential Development and Sustainable Yield

The North Waihee aquifer is highly permeable, enjoys a high static water level, and is extensive. It has never been forcibly drafted for municipal or irrigation needs. It presents an opportunity to add a significant increment of new water to the Central Maui Water System.

The recommended first phase in development of the aquifer is to drill two new wells to add to the already existing two North Waihee wells. The new wells will be in the reach between North Waihee and Kupaa Gulch. Access is easy and pipeline layout and construction should not pose unusual problems. Each well can be equipped with a 2 mgd (1400 gpm) pump, providing a total installed capacity of 8 mgd. However, average output of the aquifer on an annual basis must not exceed 4 mgd. The full capacity of the wells could be used temporarily during high demand periods as long as the annual average is held.

Another increment of several mgd is likely to be developable between Kupaa and Makamakaole, and several more beyond. Beyond Kupaa the cost of development and transmission construction will increase sharply because of the inhospitable terrain. The expectable sustainable yield in the 3.5 mile distance from Waihee to Kahakuloa is at least 10 mgd and may be 12 to 15 mgd. Not all of it may be feasibly developable, but in the next few years it should not be difficult to add an average of 4 mgd to the Central Maui network.