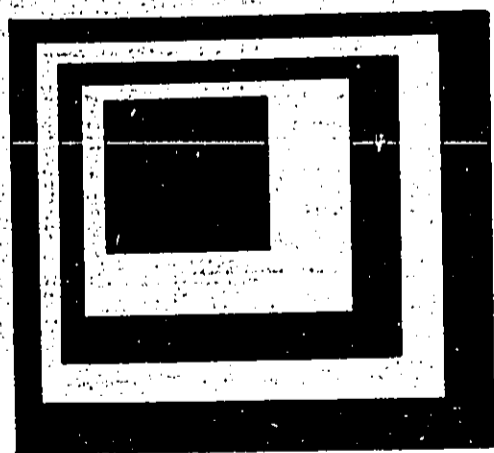


**OEQC LIBRARY**

Office Of Environmental Quality Control  
Office Of The Governor  
550 Halekiauwilla Street  
Tani Office Building, Third Floor  
Honolulu, Hawaii 96813

**environmental impact  
statement revised**

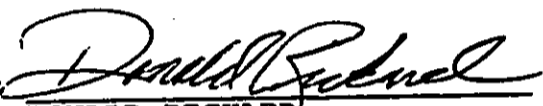


**CENTRAL MAUI  
WATER  
TRANSMISSION  
SYSTEM**


Office of Environmental Quality Control  
Office of the Governor  
550 Halekiauwilla Street  
Tani Office Building, Third Floor  
Honolulu, Hawaii 96813

BOARD OF WATER SUPPLY  
COUNTY OF MAUI

REVISED  
ENVIRONMENTAL IMPACT STATEMENT  
FOR  
CENTRAL MAUI WATER TRANSMISSION SYSTEM  
WAIEHU TO MAKENA, MAUI, HAWAII

Submitted by: 

DONALD RICKARD  
CHAIRMAN  
BOARD OF WATER SUPPLY  
COUNTY OF MAUI

  
SHIGETO MUBAYAMA  
DIRECTOR  
DEPARTMENT OF WATER SUPPLY

Prepared by: ENVIRONMENT IMPACT STUDY  
CORPORATION

NORMAN SAITO ENGINEERING  
CONSULTANTS, INC.  
AND  
THE DEPARTMENT OF WATER  
SUPPLY  
COUNTY OF MAUI

For: THE BOARD OF WATER SUPPLY  
COUNTY OF MAUI

SEPTEMBER, 1976

ERRATA

The following errors and the appropriate corrections should be noted in the Revised Environmental Impact Statement:

Page 4-16: Top of page.

Figure 4-3 should be Figure 4-2

Page 4-26: Middle of page.

The following sentence should be deleted:

This may represent a trend away from the predominance of Hawaiians and Portuguese reported in the 1970 census, a trend that may possibly become characteristic of future growth throughout this area.

Page R-7: Top of page.

The author of the first two citations should be: Alexander, Henry.

SUMMARY

CENTRAL MAUI WATER TRANSMISSION SYSTEM  
WAIEHU-MAKENA, MAUI, HAWAII

PROPOSED PROJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
PROPOSING AGENCY: DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI  
ACCEPTING AUTHORITY: GOVERNOR  
STATE OF HAWAII

---

I. PROPOSED ACTION

The proposed project will consist of the construction and installation of a water transmission system beginning in Waiehu in northwest Maui and crossing the central isthmus to Makena in south Maui. The pipeline will vary between 12 to 42 inches in size. Water will be supplied to Wailuku-Kahului, Paia, Kuau on to Hookipa, Waikapu, Waiehu-Waihee, and Maalaea-Kihei-Makena.

II. DESCRIPTION OF THE PROJECT AREA

The project area encompasses large portions of Central Maui. The pipeline alignment will pass through urban, agriculture, and rural areas.

III. RELATIONSHIP OF THE PROPOSED PROJECT TO LAND USE PLANS, POLICIES AND CONTROLS

The proposed project is one of a series of public actions which will accommodate orderly growth in the Maalaea-Kihei-Makena and Wailuku-Kahului communities pursuant to the General Plans of the two communities.

IV. ANTICIPATED ENVIRONMENTAL IMPACTS

The proposed project will generate short-term construction related impacts affecting air quality, noise



levels, soil regimes, and flora and fauna. Traffic disruptions will occur in certain urban areas. These impacts will be mitigated by the application of appropriate measures related to the impact.

Long-term impacts generated by planned development include an expansion of Maui's economic sectors, an increase in housing stock, alterations of the physical environment, and population increases within the confines of the various general plans.

V. ADVERSE IMPACTS WHICH CANNOT BE AVOIDED

Construction activities will create short-term inconveniences such as dust, noise, and traffic disruptions. Land alteration will disturb existing soil regimes and remove existing vegetation.

VI. ALTERNATIVES TO THE PROPOSED ACTION

Alternatives to the proposed action include: (1) No Action, (2) Alternative Pipeline Alignment, and (3) Alternative Pipeline Size.

VII. RELATIONSHIP BETWEEN LOCAL SHORT TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The installation of the proposed transmission line will increase the quantities of water available to the Central Maui area. It is one of a series of public actions which will accommodate the controlled growth and development of Central Maui. Increased development will lead to an expansion in the overall housing stock of Maui, provide additional job opportunities, and expand the County's tax base.

VIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Labor, capital, energy, and raw materials will be committed to the project. These will be, for the most part, irreversibly and irretrievably committed. Water used from the source could be a commitment of a resource.

PURPOSE

The purpose of this Environmental Impact Statement is to assist the Maui County Board of Water Supply, State, County, and Federal agencies, Maui residents, and others in evaluating the proposed Central Maui Water Transmission System. This EIS was prepared pursuant to the requirements of Chapter 343, Hawaii Revised Statutes and the Environmental Quality Commission's Rules and Regulations.

TABLE OF CONTENTS

	<u>Page</u>
<u>SUMMARY</u> . . . . .	i
<u>PURPOSE</u> . . . . .	iv
<u>SECTION 1</u> <u>DESCRIPTION OF THE PROPOSED PROJECT.</u> . . . .	1-1
I.   Background. . . . .	1-1
II.   Project Objectives. . . . .	1-6
III.   Project Scope . . . . .	1-6
IV.   Project Funding and Phasing . . . . .	1-7
V.    Water Source . . . . .	1-8
VI.   Pipeline Route. . . . .	1-9
VII.   Use of Public Lands . . . . .	1-11
<u>SECTION 2</u> <u>DESCRIPTION OF THE EXISTING ENVIRONMENT.</u> . . . .	2-1
<u>NATURAL ENVIRONMENT.</u> . . . . .	2-1
I.   Topography and Land Use . . . . .	2-1
II.   Climate . . . . .	2-4
III.   Geology . . . . .	2-7
IV.   Soils . . . . .	2-8
V    Floods and Tsunamis . . . . .	2-13
A.   Floods from Storm Runoff . . . . .	2-13
B.   Floods from Wave Action and/or Tsunami. . . . .	2-15
VI.   Air Quality . . . . .	2-16
VII.   Ambient Noise Levels. . . . .	2-20
VIII.   Flora and Fauna . . . . .	2-20
A.   Flora . . . . .	2-21
B.   Wildlife . . . . .	2-24
IX.   Archaeological/Historic Sites . . . . .	2-32
<u>URBAN ENVIRONMENT.</u> . . . . .	2-34
X.   Social Characteristics. . . . .	2-34
XI.   Economic Characteristics. . . . .	2-38
A.   Population and Employment. . . . .	2-39
B.   Existing Visitor Conditions. . . . .	2-43
XII.   Urban Infrastructure. . . . .	2-44
A.   Water Supply, Distribution, and Storage Reservoirs . . . . .	2-44
B.   Wastewater . . . . .	2-45
C.   Roads . . . . .	2-46
D.   Power . . . . .	2-47
E.   Communication. . . . .	2-48

	<u>Page</u>
XIII. Public Facilities . . . . .	2-48
A. Schools . . . . .	2-48
B. Parks, Beach Parks, Recreational Facilities . . . . .	2-49
XIV. Public Services . . . . .	2-50
A. Fire . . . . .	2-50
B. Police . . . . .	2-51
C. Refuse . . . . .	2-52
D. Health Services . . . . .	2-52

SECTION 3

<u>RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS POLICIES, AND CONTROLS FOR THE AFFECTED AREA. . . . .</u>	3-1
--	-----

SECTION 4

<u>ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATIVE MEASURES TO MINIMIZE THEIR IMPACT . . . . .</u>	4-1
---	-----

PRIMARY IMPACTS. . . . . 4-2

I. Air Quality . . . . .	4-2
II. Noise . . . . .	4-3
III. Traffic . . . . .	4-5
IV. Alteration of Landform. . . . .	4-6
V. Land Use. . . . .	4-6
VI. Flora and Fauna . . . . .	4-6
VII. Archaeological Sites. . . . .	4-7
VIII. Urban Infrastructure. . . . .	4-8
A. Water Supply . . . . .	4-8
B. Wastewater . . . . .	4-8
C. Power . . . . .	4-8
D. Communication . . . . .	4-8
IX. Public Facilities . . . . .	4-8
X. Public Services . . . . .	4-8
XI. Economic. . . . .	4-9
Summary . . . . .	4-10

SECONDARY IMPACTS. . . . . 4-11

XII. Economic. . . . .	4-11
A. Population Projections . . . . .	4-11
B. Employment Projections . . . . .	4-16
C. Development of Visitor Facilities. . . . .	4-18
D. Projected Employment in Construc- tion and Visitor Industries. . . . .	4-19
E. Projected Property Tax Revenues. . . . .	4-24
XIII. Social . . . . .	4-24
A. Demographic Characteristics. . . . .	4-25
B. Reduced Unemployment . . . . .	4-27
C. Increased Socio-Economic Status. . . . .	4-28
D. Alteration of Traditional Family Roles. . . . .	4-29
E. Social Welfare and Other Services. . . . .	4-30

	<u>Page</u>
XIV. Air Quality . . . . .	4-30
XV. Noise Levels. . . . .	4-31
XVI. Alteration of Landform. . . . .	4-32
XVII. Off-Shore Water Quality . . . . .	4-33
XVIII. Flora/Fauna . . . . .	4-34
XIX. Land Use. . . . .	4-34
XX. Urban Infrastructure. . . . .	4-35
A. Highways . . . . .	4-35
B. Wastewater . . . . .	4-36
C. Power. . . . .	4-37
D. Communication. . . . .	4-37
XXI. Public Facilities . . . . .	4-37
A. Schools. . . . .	4-37
B. Parks and Recreation Facilities. . . . .	4-38
XXII. Public Services . . . . .	4-39
A. Police and Fire. . . . .	4-39
B. Refuse . . . . .	4-40
Summary . . . . .	4-40

<u>SECTION 5</u>	<u>PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED.</u> . . . . .	5-1
------------------	--	-----

<u>SECTION 6</u>	<u>ALTERNATIVES TO THE PROPOSED ACTION.</u> . . . . .	6-1
	I. No Action . . . . .	6-1
	II. Alternative Alignment . . . . .	6-1
	III. Alternative Pipeline Size . . . . .	6-3

<u>SECTION 7</u>	<u>THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY</u> . . . . .	7-1
------------------	--	-----

<u>SECTION 8</u>	<u>IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES</u> . . . . .	8-1
------------------	--	-----

<u>SECTION 9</u>	<u>SUMMARY OF UNRESOLVED ISSUES</u> . . . . .	9-1
------------------	---	-----

<u>SECTION 10</u>	<u>LIST OF NECESSARY APPROVALS</u> . . . . .	10-1
-------------------	--	------

<u>SECTION 11</u>	<u>ORGANIZATIONS AND PERSONS CONSULTED.</u> . . . . .	11-1
-------------------	---	------

<u>SECTION 12</u>	<u>RESPONSES RECEIVED DURING THE CONSULTATION PERIOD</u> . . . . .	12-1
-------------------	--	------

<u>SECTION 13</u>	<u>RESPONSES AND COMMENTS TO THE EIS.</u> . . . . .	13-1
-------------------	---	------

APPENDICES

	<u>Page</u>
A. Water Source for the Central Maui Water Transmission System . . . . .	A-1
B. Methodology of Flora and Fauna Survey . . . . .	B-1
C. Summary of Plants Noted . . . . .	C-1
D. Summary of Animals Present or Probably Present . . . . .	D-1

REFERENCES

General. . . . .	R-1
Economic . . . . .	R-4
Flora and Fauna. . . . .	R-5
Social . . . . .	R-7

LIST OF TABLES

<u>TABLE</u>	<u>TITLE</u>	<u>Page</u>
2-1	Tsunami Data	2-18
2-2	Population of the Island of Maui	2-40
2-3	Job Distribution by Industry	2-41
2-4	Tourism Growth - Maui County	2-43
2-5	Planned Hotel Construction	2-44
4-1	Percentage Distribution of Intended Visits	4-12
4-2	Visitor Facility Projections	4-20
4-3	Estimated Construction Expenditures	4-22



LIST OF FIGURES

<u>FIGURE</u>	<u>TITLE</u>	<u>PAGE</u>
1-1	Service Areas and Maximum Day Demands	1-5
1-2	Proposed Transmission Alignment	1-13
2-1	Location Map	2-2
2-2	Rainfall Map	2-6
2-3	Soil Orders	2-10
2-4	Soil Associations	2-11
2-5	Flood, Tsunami, and Drainage	2-17
2-6	Vegetation, Wildlife, and Archaeological Sites	2-31
2-7	Public Facilities and Infrastructure	2-53
3-1	General Plan - Land Use	3-6
4-1	Construction Equipment Noise Ranges	4-4
4-2	Labor Force Projections	4-17

## SECTION 1

### DESCRIPTION OF THE PROJECT

#### I. BACKGROUND

The Central Maui Water Transmission System presently serves three water service areas: (1) the Wailuku area, including Wailuku Heights, Waikapu, and Waiehu-Waihee; (2) the Kahului area, including the airport, Sprecklesville, and Paia-Kuau; and (3) the Maalaea-Kihei-Makena area. The primary source of water for the entire water system is the Mokuhau Wells in Iao Valley which have a drawing capacity of approximately 10 million gallons per day (mgd). In addition, the Iao Tunnel source and Kepaniwai Well, which have a combined average drawing capacity of 1 mgd, supply a portion of the Wailuku water service area.

Water demands in the Central Maui area have been increasing at a rate of 8-10 percent per year over the past five years. As a result, the pumping capacity of the Mokuhau Wells and the transmitting capacity of the existing transmission system are approaching their safe operating limits. From time to time the system has not been able to meet peak consumption demands, particularly during the dry summer months, creating water shortages periodically throughout the distribution system. The most recent shortage of severe proportions occurred during the summer of 1973. It is anticipated that the period of water shortage will lengthen with higher usage unless improvements to the transmission

system are made and new water sources developed.

Several studies have been conducted on the water quantities which may be required to meet future water needs for the three water service areas and the areas with potential for new water source development. The first study, Water for Kihei-Makena was prepared by the State of Hawaii Department of Land and Natural Resources (DLNR) in November, 1970. The study projected water demand by multiplying a standard rate of water consumption per capita with population projections for Wailuku-Kahului and Maalaea-Kihei-Makena. Population projections for Wailuku-Kahului were derived from the State of Hawaii General Plan Revision Program, 1967 (as amended in 1969) and projections for Maalaea-Kihei-Makena from the Kihei Civic Development Plan. The DLNR study projected maximum day demand\* for the Wailuku-Kahului area at 6.9 mgd for 1980 and 7.8 mgd for 1990. Maximum day demand for Maalaea-Kihei-Makena was projected at 6.22 mgd for 1980 and 11.89 mgd for 1990.

The DLNR study recommended two alternative plans for supplying water to the Maalaea-Kihei-Makena area. The preferred alternative was to utilize potential water sources in Upper Kihei as the primary source of supply and augmented by water from the Wailuku area. However, test drilling in the upper Kihei area indicated that an adequate source of

---

\*"Maximum day demand" is defined in the DLNR report as the mean daily value of the highest 5-day consecutive production at the Mokuhou Wells source or a factor of 1.6 times average daily demand.

water was not available. The other alternative was to develop additional wells in Waikapu, Iao Valley, or Waiehu. The report also recommended drilling an exploratory well near Kepaniwai Park to ascertain the site's potential as a supply source for the Wailuku water service area.

A second study, the Water Master Plan for the County of Maui, was prepared by R. M. Towill in 1971. This study projected average daily demand for the Maalaea-Kihei-Makena area at 6.2 mgd for 1980, 12.3 mgd for 1990, and 17.5 mgd for 2000. Average daily demand for the Wailuku-Kahului area was projected at 8.4 mgd for 1980, and 12.3 for 1990.

In addition, the Towill study projected maximum day demand\* for the Maalaea-Kihei-Makena area to be 9.24 mgd for 1980, and 18.48 mgd for 1990. Maximum day demand for Wailuku-Kahului was projected at 10.79 mgd for 1980, and 15.41 mgd for 1990.

The Towill study associated water demand with different land uses delineated in County approved general plans for each water study area. By using a standard rate of water demand per acre for each type of land use, the report was able to project the amount of water required based on a percentage of the ultimate land use for the year considered.

For Maalaea-Kihei-Makena, Towill recommended development of additional water sources in North Kihei and Waikapu

---

\*"Maximum day demand" is defined in the Towill and Saito reports as the high average water consumption over a 7 to 11 day period or a factor of 1.5 times the average day consumption rate.

to supply all the water for the Maalaea-Kihei-Makena region. The study recommended boosting the pumping capability of the Mokuahu Wells, and the development of additional water sources at Kepaniwai and Iao Valley to supply Wailuku-Kahului and the surrounding region.

With the exception of the recently developed water source at Kepaniwai, exploratory drillings in Iao Valley and Waikapu have shown that these areas have limited additional water source potential. This leaves Waiehu-Waihee as the remaining area for water source exploration and development.

In 1974, another study was undertaken to refine Towill's water projections. The study, the Central Maui Water Study for the Development of Sources, Transmission Lines and Storage Reservoirs, was prepared by Norman Saito Engineering Consultants, Inc., CH<sub>2</sub>M Hill, Inc., and Dr. Harold T. Stearns. As shown in Figure 1-1, the study projected maximum day demand for the Wailuku-Kahului and Paia areas to be 12.60 mgd for 1980, 18.95 mgd for 1990, and 25.30 mgd for 2000. Maximum day demand for Kihei-Makena was projected at 9.25 mgd for 1980, 18.48 mgd for 1990, and 26.39 mgd for 2000. In total, the maximum day demand for Central Maui in 1980, based on 35 percent development, would be 21.85 mgd. By 1990, based on 70 percent development, the maximum day demand will have increased to 37.43 mgd, and by the year 2000 to 51.69 mgd.

In order to alleviate present periodic water shortages and to accommodate future water demands, the study recommended new water source development in the Waiehu area and the

**proposed project 1**

**DVERSCIZED**

**DRAWING #**

**94\_001**

construction of a new water transmission line to Maalaea-Kihei-Makena and to Wailuku-Kahului.

Despite differences in projected water needs, all three reports indicate that severe water shortages can be anticipated throughout Central Maui unless appropriate measures are instituted to remedy the problem.

The proposed water transmission line is sized to meet the maximum day demands projected by the Saito study to ensure continuous water flows to users, and fire flows when maximum demands are placed on the transmission system.

## II. PROJECT OBJECTIVES

The Central Maui Water Transmission System has been proposed to meet the above needs. Specifically, it is designed to:

1. Provide a reliable water delivery system that will meet the projected needs of Central Maui.
2. Upgrade and allow more flexibility to the existing water transmission system.

## III. PROJECT SCOPE

The proposed project will consist of the construction and installation of a water transmission system beginning from Waiehu in northwest Maui and crossing the central isthmus to Makena in south Maui. The pipeline, varying in size between 12 to 42 inches, will be connected to new well sources which will be developed by private funds on private land in Waiehu. Water will be supplied to the service areas previously described.



#### IV. PROJECT FUNDING AND PHASING

The construction costs of the proposed water transmission line will be shared by a joint venture consisting of the Board of Water Supply of the County of Maui (hereafter Board of Water Supply), the Wailea Development Company, and the Seibu Real Estate Company, Ltd. The Central Maui Water Study (Saito, 1974) estimated project costs to be \$11.3 million in 1974 dollars. Of the total project costs, the Board of Water Supply's share will not exceed \$4 million. Wailea and Seibu will share the remainder of the project costs and in any cost increases exceeding the original \$11.3 million estimate.

The joint venture also has agreed to make improvements to the existing water transmission system. These improvements include the installation of a booster pump station near the Waiale irrigation reservoir, and the installation of a 24-inch water transmission line along Kahawai Street in the Happy Valley area of Wailuku. The Kahawai Street project will complete the last link in the Board of Water Supply's plans for obtaining optimum use of the Mokuahau Wells and Pump Station. A negative declaration of environmental impact has been filed for the Kahawai Street project. Although these two projects are part of the joint venture agreement, they are separate actions from the proposed Central Maui Water Transmission System.

Upon completion of the proposed project, the water transmission line will be dedicated to the Board of Water

#### IV. PROJECT FUNDING AND PHASING

The construction costs of the proposed water transmission line will be shared by a joint venture consisting of the Board of Water Supply of the County of Maui (hereafter Board of Water Supply), the Wailea Development Company, and the Seibu Real Estate Company, Ltd. The Central Maui Water Study (Saito, 1974) estimated project costs to be \$11.3 million in 1974 dollars. Of the total project costs, the Board of Water Supply's share will not exceed \$4 million. Wailea and Seibu will share the remainder of the project costs and in any cost increases exceeding the original \$11.3 million estimate.

The joint venture also has agreed to make improvements to the existing water transmission system. These improvements include the installation of a booster pump station near the Waiale irrigation reservoir, and the installation of a 24-inch water transmission line along Kahawai Street in the Happy Valley area of Wailuku. The Kahawai Street project will complete the last link in the Board of Water Supply's plans for obtaining optimum use of the Mokuahau Wells and Pump Station. A negative declaration of environmental impact has been filed for the Kahawai Street project. Although these two projects are part of the joint venture agreement, they are separate actions from the proposed Central Maui Water Transmission System.

Upon completion of the proposed project, the water transmission line will be dedicated to the Board of Water

Supply, which will then be responsible for the line's operation and maintenance. The private developers will be reimbursed by the Board of Water Supply for their capital outlay, without interest, through a refund of eligible revenues received from water sales and service charges from the Maalaea-Kihei-Makena water service area (referred to as the refund area) in accordance with the Board's rules and regulations. The Board of Water Supply will reimburse 70 percent of the revenues received from new water users in the refund area hooked up after January 1, 1976 to the private developers after the date of acceptance of the waterline. If sufficient revenues are not received to repay the capital costs within a fifteen year period, the Board of Water Supply will have no further responsibility to reimburse the private developers. Construction of the transmission pipeline will commence in 1976 and is anticipated to take 18 to 24 months.

V. WATER SOURCE

The new sources of water to meet the needs of the Central Maui area are located on the upper slopes of the West Maui Mountains between the urbanized area of Waiehu and Puuohala. A private joint venture consisting of Seibu Real Estate Company, Ltd., Wailea Development Company, A & B Properties, Inc., and Hawaiiana Investment Company, Inc., will develop the sources up to a maximum of 19 mgd. No Federal, State, or County lands or funds will be used. Upon its completion and approval based on the Board of Water Supply's standards,

it will be dedicated to the Maui County Board of Water Supply.

The objective of the first increment of source development is 10 mgd. The well will be located approximately 500 feet above mean sea level. The results of exploratory test wells located 750 feet from the proposed well site indicate the surface of the Ghyben-Herzberg lens to be 16 feet above mean sea level. Another test well, approximately three and one-half miles northwest of the proposed well site and a production well one mile away near Puuhala, also indicate the Ghyben-Herzberg lens to be 16 feet above mean sea level. The results from the exploratory test wells and existing sources indicate the presence of a basal water source which has the potential for supplying water to meet the projected water needs of the Central Maui water service areas.

This source may not lie only in one compartment as the source may be divided by dikes. If a division exists, all of the wells will not be located at one site, and additional wells will be situated along the foothills for each compartment. Additional information on the water source is found in Appendix A.

#### VI. PIPELINE ROUTE

The proposed Central Maui Water Transmission System will span a distance of approximately 23 miles from the well site to a termination point in Makena, as shown in Figure 1-2.

Beginning from the selected well site in Waiehu, a 42-inch transmission line connects with a 36-inch line at a point near Kahekili Highway. From this point, the pipeline alignment continues in a southwesterly direction across agricultural lands, the Iao Stream, lands to the southwest of the Wailuku Sugar Mill, and along the eastern edge of Wailuku to Lower Main Street. From Lower Main Street, the alignment continues in a southerly direction along the cane haul road under the Kaahumanu Bridge, follows Waiale Drive to the west, and turns in an easterly direction at Waiinu Road (Sector B-C).

The pipeline alignment then proceeds due east, passes the Waiale Reservoirs to the north where it makes a southeasterly turn onto a dirt road, and then proceeds southeasterly through arid kiawe land along an existing irrigation pipeline. The route passes to the west of an area presently under passion fruit cultivation and then proceeds south, crosses Waikapu Road and closely parallels the Waihee Ditch before turning in a southeasterly direction toward old Village Six (Sector C-D).

The pipeline alignment continues in a southeasterly direction through sugar fields to Upper Maalaea Road where it then proceeds south, along Lower Maalaea Road to the west of Puunene Airport. The route continues adjacent to Mokulele Highway and then proceeds in a southeasterly direction through pasture and isolated fields under sugar cultivation before again turning south (Sector D-E-F).

The pipeline alignment then proceeds in a south-south-easterly direction through undeveloped pasture land above Waiakoa Beach Lots, Waiohuli-Keokea Beach Lots, and Kamaole Homesteads and follows the north-south Wailuku-Makawao District Boundaries. The route continues to Keonekai Road where it proceeds south until it meets the northern boundary of the Wailea development (Sector F-G-H).

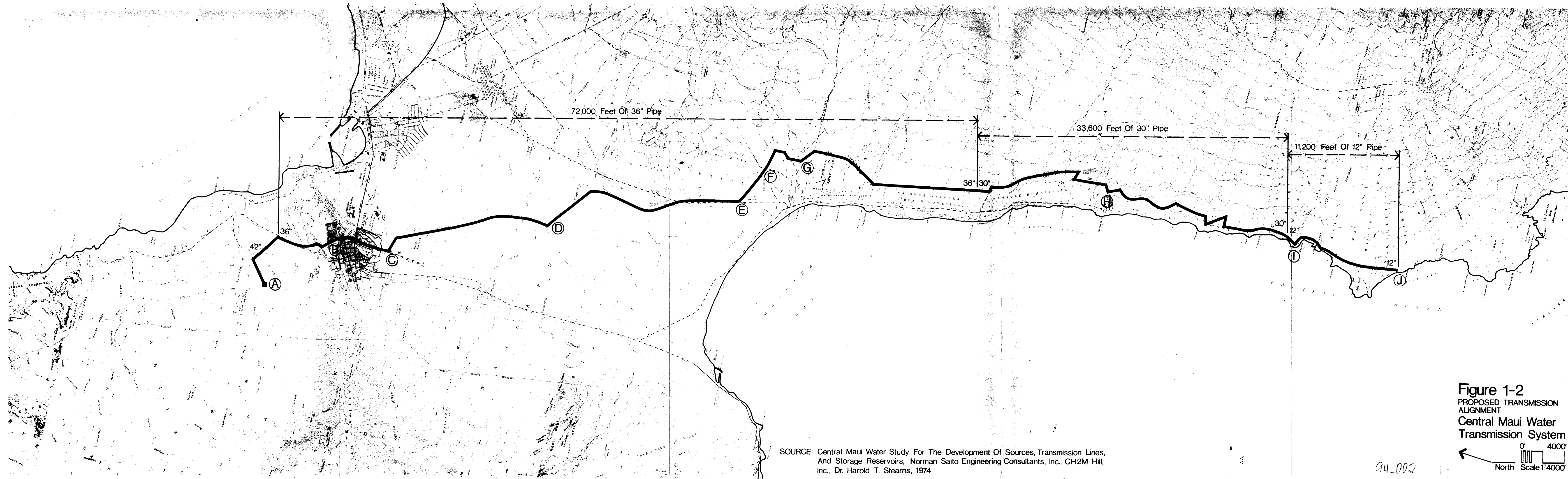
The pipeline route through the Wailea Development generally follows the development's major traffic circulation system alignment southward, to a point midway between Wailea and Halo Point where it proceeds west until it intersects Kihei Road. From this intersection, the route proceeds south, and follows the general alignment of the existing dirt road (Kihei Road) to the northern boundary of the proposed Seibu development at Makena (Sector H-I). The alignment then proceeds through heavily wooded and undeveloped lands along Kihei Road to a termination point just south of Puu Olai (Sector I-J).

#### VII. USE OF PUBLIC LANDS

The County of Maui will commit public lands within existing public road rights-of-way or public easements to the project. The pipeline will traverse approximately 2 to 3 miles of public lands. The remaining 19 to 20 miles of the transmission route is on privately owned land. The pipeline will be constructed within permanent easements to be granted to the County or within proposed public road rights-of-way

or existing road easements as shown below:

<u>OWNER</u>	<u>DISTANCE</u>	<u>WIDTH OF EASEMENT</u>
Wailuku Sugar Co.	17,900±	25'
Alexander & Baldwin, Inc.	30,700	25'
Roy K.P. Chong Charles C. Krumbhar et. al.	1,200	25'
Haleakala Ranch	18,000	25'
Kaonoulu Ranch	3,400	25'
Maui Land Investors, Inc.	2,000	Within proposed 44' right-of-way
Wailea Development Company	6,700 800 1,700 700 3,700	Within proposed 44' right-of-way 30' 25' 20' 10'
Ulupalakua Ranch	17,700	Within proposed 40'-60' road easement



SOURCE: Central Maui Water Study For The Development Of Sources, Transmission Lines, And Storage Reservoirs, Norman Saito Engineering Consultants, Inc., CH2M Hill, Inc., Dr. Harold T. Stearns, 1974

**Figure 1-2**  
 PROPOSED TRANSMISSION ALIGNMENT  
 Central Maui Water Transmission System

0' 4000'  
 North Scale 1":4000'



**existing environment 2**

## SECTION 2

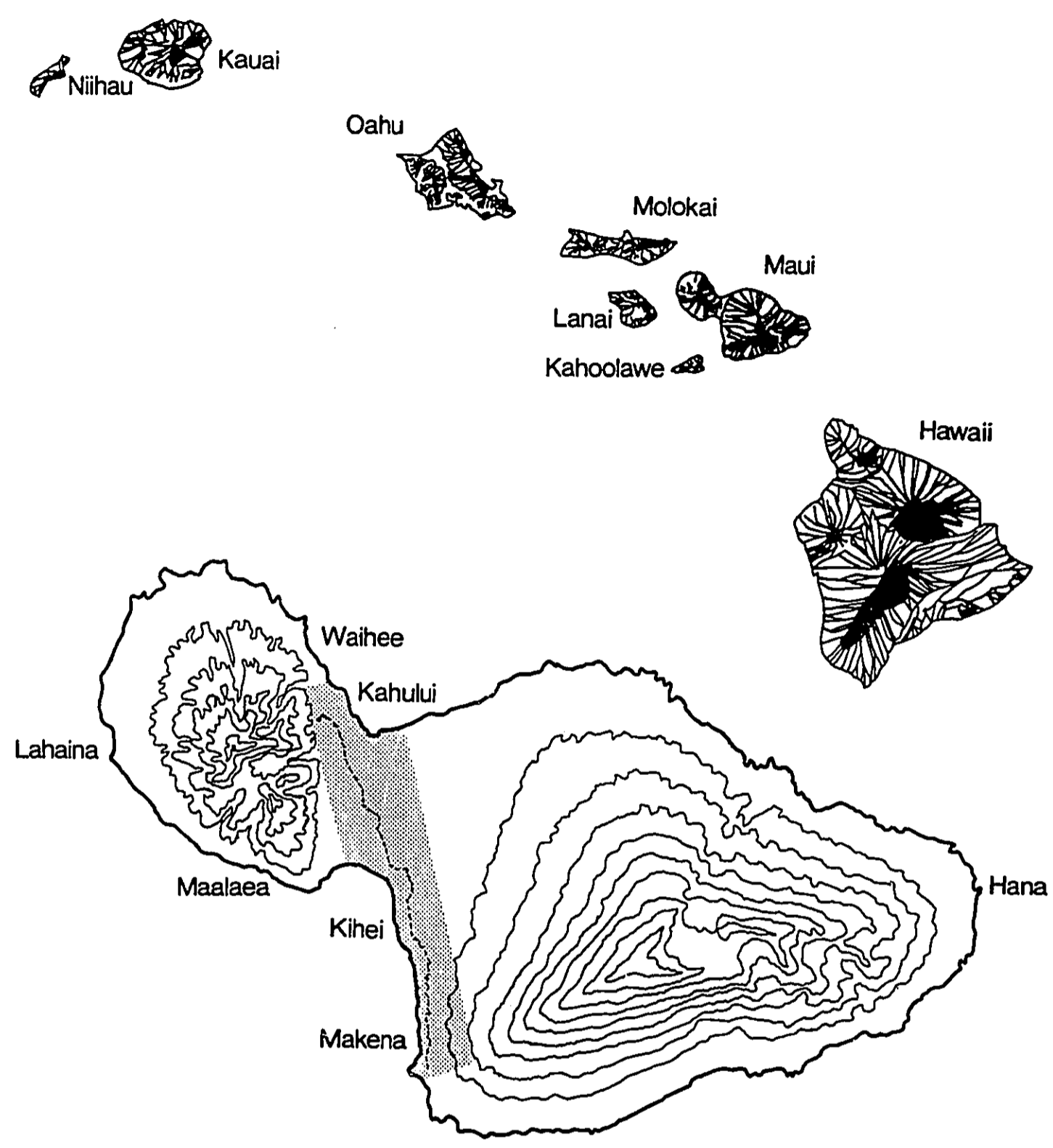
### DESCRIPTION OF THE EXISTING ENVIRONMENT

#### NATURAL ENVIRONMENT

The island of Maui comprises a land area of 728 square miles, measuring approximately 33 miles at the widest point in a north-south direction and 58 miles in a east-west direction. The island can be divided into three main geographical areas: West Maui, East Maui and Central Maui. Haleakala, an inactive volcano rising to an elevation of 10,025 feet, is the dominant feature of East Maui, and a deeply dissected volcano rising to an elevation of 5,788 feet at Puu Kukui forms West Maui. Central Maui, an area of 270 square miles, is the flat isthmus between the East and West Maui land masses. As described in this statement and as shown in Figure 2-1, the project area encompasses the coastal region along the lower leeward slopes of Haleakala, the northeastern portion of the West Maui mountains, and the fertile plains of the isthmus.

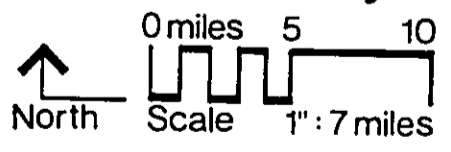
#### I. TOPOGRAPHY AND LAND USE

There are flatlands and gentle slopes along the northern coastline of the project area. The flatlands extend inland for 1 to 1½ miles where it meets the steep slopes (exceeding 25 percent) of the West Maui land mass. Terrain in the central portion of the isthmus is relatively flat, only 100 feet above sea level at its highest point. The southern portion of the project area is relatively flat along the



 Project Area

**Figure 2-1**  
**LOCATION MAP**  
 Central Maui Water  
 Transmission System



coast, rising gently upward toward the slopes of Haleakala. Slopes in this area range from 2.5 percent to 10 percent depending on elevation. Generally, the steeper slopes are found between the 800-2000 foot elevation in the southern portions of this area.

The Central Maui isthmus provides lands excellent for intensive agricultural usage because of its accessibility, soil conditions, availability of water, and climate. The principal industry of this region is sugar cane with some 34,000 acres currently under cultivation. Pasture lands are located throughout the project area and occupy substantial portions of Haleakala's lee slopes.

At the northern portion of the project area is Wailuku-Kahului, the largest urban center on Maui. Wailuku is the county seat and financial center of Maui, and the island's only deep draft harbor and major air terminal are located in Kahului. The area is the site of major commercial shopping centers, educational facilities, and a large proportion of the island's professional offices.

Surrounding Wailuku and Kahului are several rural towns and villages. The town of Paia with its adjacent residential communities of Kuau and Sprecklesville is located northeast of Kahului along Maui's northern shore. West of Wailuku is the area of Waiehu-Waihee. Both Waiehu and Waihee are small villages surrounded by land under extensive sugar cane cultivation. South of Wailuku is the residential area of Waikapu which is also surrounded by sugarcane.

The small coastal communities of Maalaea, Kihei, and Makena are located along the leeward slopes of Haleakala.

## II. CLIMATE

Central Maui's climate varies by geographic location. The windward portions are uniformly sunny and pleasantly mild, being cooled by the northeast tradewinds. Leeward coastal areas are sunny, warm, and much drier than windward areas. The outstanding climatic features of this region are marked differences in rainfall, mild temperatures, and wind conditions.

### Rainfall

Rainfall intensity, except for winter storms, is almost exclusively a function of topography. Heavy precipitation is brought to the upper volcanic slopes of East and West Maui by the north Pacific trade. The rapid cooling of warm moist air as it is swept upward over the cooler interior land masses produces orographic conditions. As a result, West Maui's windward slopes receive as much as 400 inches of rain a year in the upper portions of Iao Valley. Similarly, East Maui's windward slopes receive 200 to 300 inches of rain a year along a belt between elevations 2,000 and 4,000 feet. In complete contrast, the upper Maui isthmus receives about 20 to 30 inches of rain a year. The coastal area from Kihei to Makena is among the driest region receiving less than 20

inches of rainfall annually. The average annual rainfall in Central Maui is 36 inches per year. Rainfall data is shown in Figure 2-2.

In addition to orographic rainfall, widespread heavy rains are brought by major storms usually during winter months when winds are light and variable or when there are gentle southerly winds. Major storms include winter storms, Kona storms, and hurricanes or tropical storms. Kona storms are characterized by southerly winds and widespread heavy rainfall. Hurricanes are very rare in Hawaii, but those passing close by cause heavy rains, high winds, and high surf.

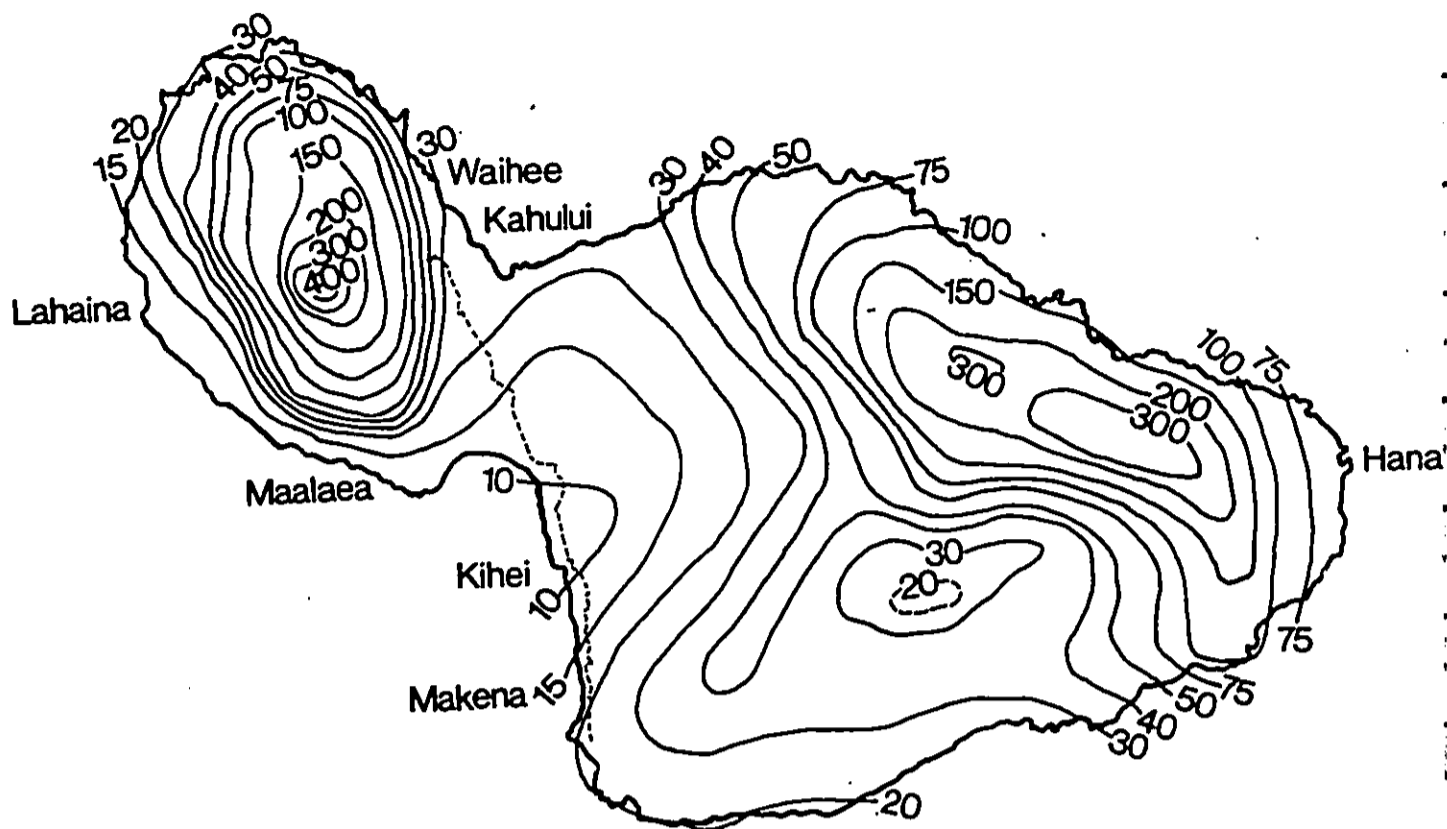
#### Temperature

At Kahului Airport, the average annual high temperature is 83°F and the low 67°F. July, August and September are the warmest months; January, February and March the coolest. The highest recorded temperature at Kahului was 95°F and the lowest 48°F.

The leeward coastal areas are drier and warmer than windward areas. At Kihei, the average annual high temperature is 86°F and the low 63°F. June through August are the warmest months with average high temperatures of 90°F. The coolest months are January to March with average low temperatures of 60°F. The highest recorded temperature was 98°F and the lowest 49°F.

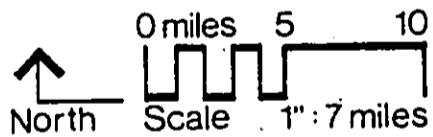
#### Winds

Cool, northeasterly trade winds blow between 8 and 18



10: ~~~~~ 10 Isohyetal Line (inches)  
 ---20--- Estimated Isohyetal Line  
 Isohyets based on values from 100  
 gages for period 1933-1957

**Figure 2-2**  
**RAINFALL**  
 Central Maui Water  
 Transmission System



SOURCE: National Weather Service Pacific Region, 1974

miles per hour over northern sections of Central Maui. The trades, which prevail from spring to fall and are accentuated by the funneling effect between Haleakala and the West Maui mountains, provide a pleasant and comfortable daily breeze. A localized wind caused by nighttime temperature variations along the slopes of Haleakala gives the area gentle southeasterly evening breezes.

The Maalaea-Kihei region is subject to peculiar wind conditions due to specific terrain conditions. The Maalaea sector lies at the base of the central isthmus flanked by two mountain masses, and is subject to a wind tunnel effect. As the wind squeezes between the mountain masses, its force becomes compressed and as a result, velocity may increase to more than 50 percent above the normal velocity in the Wailuku area. The wind fans out over Maalaea Bay, retaining the added velocity, with the inshore segment blowing parallel to the Kihei coast. Along the shore, it meets the eddy current of the trades deflected along the southeast slopes of Haleakala. The resultant phenomenon is a system of unpredictable local winds from Kalama Park to Cape Kinau.

### III. GEOLOGY

The underlying geology of the eastern portion of the project area include lava flows and pyroclastic deposits of three major volcanic sequences of Haleakala: the Honomanu, the Kula, and the Hana Volcanic Series (Stearns and Macdonald, 1942). Lava flows of the Honomanu Volcanic Series first



built a primitive shield volcano, which reached a height of approximately 8,500 feet above present sea level. The shield was totally capped and buried by rocks of the Kula Volcanic Series, which include andesite, andesitic, and picritic basalts. The Kula is at least 2,500 feet thick near the summit of Haleakala but only 50 to 200 feet thick along coastal areas. The last sequence of volcanic rocks, the Hana Volcanic Series, is composed of andesitic, picritic, and olivine basalts.

The underlying geology of the western portion of the project area is comprised of lava flows from the Wailuku and Honolua Volcanic series. Lava flows of the Wailuku series form the underlying basaltic mass. These basalts are almost completely veneered by oligoclase andesites and stiff trachyte of the Honolua Volcanic series.

Calcareous dune sands compose most of the surface area in the isthmus, along the north shore, and along the southwest shore between Kihei and Makena. The dunes were probably formed when sea level stood at about 40 feet above the present level (DLNR, 1970).

#### IV. SOILS

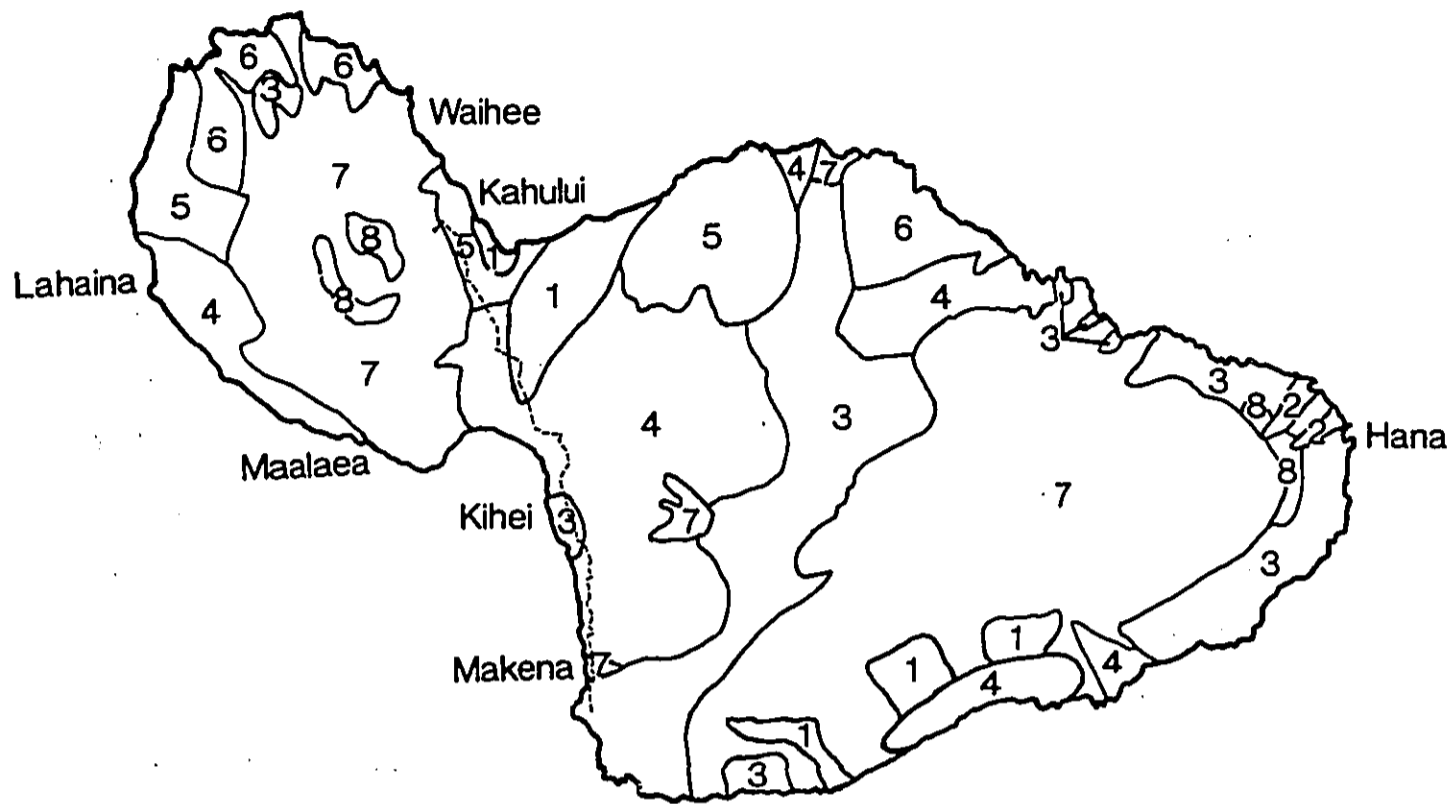
General soil patterns which occur within the island of Maui have been categorized into eleven soil associations. The soils of each association have similar properties and characteristics and are usually named for the major soil series the association contains. According to the National Cooperative Soil Survey Classification of 1967 there are seven soil orders found on Maui: Entisols, Histosols,

Inceptisols, Mollisols, Oxisols, Ultisols, and Miscellaneous Land Types. The proposed transmission system will traverse five soil orders as indicated by Figure 2-3, and include Oxisols, Entisols, Mollisols, Inceptisols and Miscellaneous Land Types.

Soil associations found within the transmission route, as indicated by Figure 2-4, include the Pulehu-Ewa-Jaucas Association, the Waiakoa-Keahua-Molokai Association, and the Keawakapu-Makena Association. The following description of these soil associations is from Soil Survey Interpretations, Island of Maui (1972).

#### Pulehu-Ewa-Jaucas Association

This association consists of well-drained and excessively drained, medium-textured, moderately fine-textured, and coarse-textured soils on alluvial fans and in basins on the Island of Maui, mainly Central Maui. Pulehu soils make up about 40% of the association, Ewa soils about 15%, and Jaucas soils 10%. Alae, Iao, Kealia, and Puuone soils make up the rest. Pulehu soils have a surface layer of dark-brown, friable silt loam. Their substratum is dark-brown and dark yellowish-brown alluvium weathered from basic igneous rock. Ewa soils have a surface layer and subsoil of dark reddish-brown, friable silty clay loam. Their substratum is alluvium weathered from basic igneous rock. Jaucas soils have a pale-brown, calcareous, sand surface

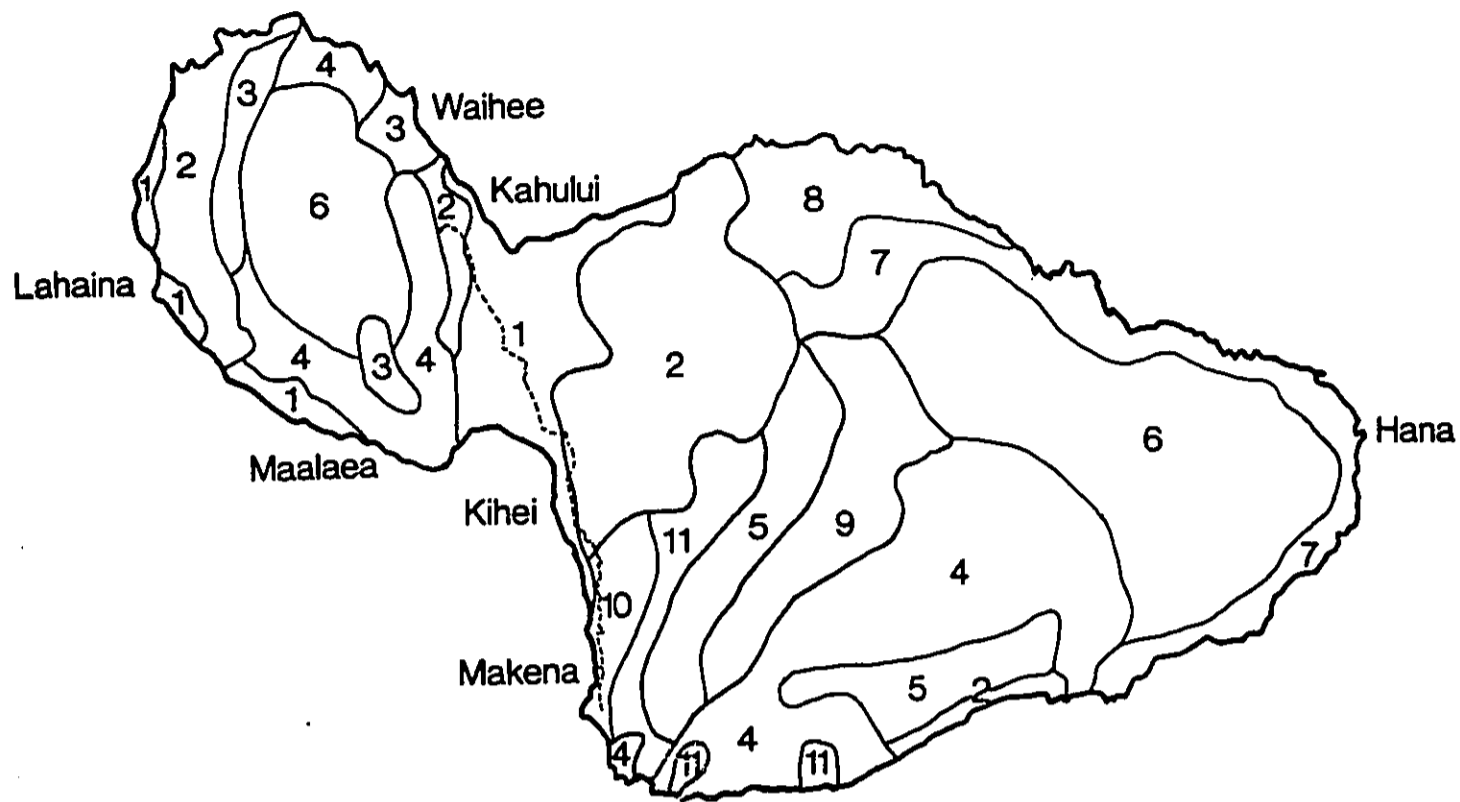


- 1 Entisols
- 2 Histosols
- 3 Inceptisols
- 4 Mollisols
- 5 Oxisols
- 6 Ultisols
- 7 Miscellaneous land types
- 8 Inceptisols/Misc. land types

Figure 2-3  
**SOIL ORDERS**  
 Central Maui Water  
 Transmission System



SOURCE Atlas of Hawaii, by Department of Geography, Univ. of Hawaii 1973, & U.S. Soil Conservation Service & Department of Agronomy and Soil Science, U.H.



- 1 **Puhihale-Juice association:** Deep, nearly level to moderately sloping, well-drained and excessively drained soils that have a moderately fine textured or coarse-textured subsoil or underlain material; on alluvial fans and in basins.
- 2 **Makaha-Makaha-Makaha association:** Moderately deep and deep, nearly level to moderately steep, well-drained soils that have a moderately fine textured subsoil; on low uplands.
- 3 **Honolua-Olele association:** Deep, gently sloping to moderately steep, well-drained soils that have a fine-textured subsoil; on intermediate uplands.
- 4 **Rock land-Rough mountainous land association:** Very shallow, steep and very steep, rock land and rough mountain land.
- 5 **Puu Pa-Kula-Puu association:** Deep, nearly sloping to steep, well-drained soils that have a medium-textured or moderately fine textured subsoil or underlain material; on intermediate and high uplands.
- 6 **Huanihuanui-Trochodendron association:** Gently sloping to steep, well-drained to overly drained soils that have a moderately fine textured or fine textured subsoil; on intermediate and high uplands.
- 7 **Hana-Makaha-Makaha association:** Moderately deep and deep, gently sloping to steep, well-drained soils that have a moderately fine textured or fine-textured subsoil or underlain material; on intermediate uplands.
- 8 **Puuhihale-Makaha association:** Deep, gently sloping to moderately steep, well-drained soils that have a fine-textured subsoil; on low uplands.
- 9 **Lualaba-Kaiponi-Olele association:** Deep, gently sloping to very steep, well-drained soils that have a moderately fine textured or medium-textured subsoil; on intermediate and high uplands.
- 10 **Kaunohiwi-Makaha association:** Gently sloping to moderately steep, well-drained soils that have a fine textured to medium-textured subsoil and are shallow to deep over fragmental lava; on low uplands.
- 11 **Hana-Makaha-Makaha association:** Gently sloping to moderately steep, well-drained, very steep and extremely steep soils that have a fine-textured or medium-textured subsoil and are shallow to deep over fragmental lava; on low and extreme uplands.

**Figure 2-4**  
**SOIL ASSOCIATIONS**  
 Central Maui Water  
 Transmission System



**SOURCE** Soil Survey Interpretations, Island of Maui, Report 45, by Soil Conservation Service, & Division of Water and Land Development 1972

layer. Their substratum is yellowish-brown sand weathered from coral and seashells.

Waiakoa-Keahua-Molokai Association

This association consists of well-drained, moderately fine-textured soils on the low uplands of Central Maui. Waiakoa soils make up about 30% of the association, Keahua soils about 20%, and Molokai soils about 10%. The rest of the association consists of Alaeloa, Haliimaile, Kahana, Koele, Lahaina, Paia, Wahikuli, Wailuku, and Wainee soils. Waiakoa soils have a surface layer of dark reddish-brown, friable silty clay loam. Their subsoil is dark reddish-brown and very dark grayish-brown, friable silty clay loam. They have a substratum of hard, basic igneous rock at a depth of 20 to 40 inches. Keahua soils have a surface layer of dark reddish-brown, friable silty clay loam. Their subsoil is dark reddish-brown, firm silty clay loam. The substratum is soft, weathered basic igneous rock. Molokai soils have a surface layer of dark reddish-brown, friable silty clay loam. Their subsoil is dark-red, and dusky-red, friable silty clay loam and clay loam. The substratum is soft, weathered basic igneous rock.

Keawakapu-Makena Association

This association consists of well-drained, medium-textured soils on the low uplands of East Maui. Keawakapu soils make up about 60% of the association, and Makena about 40%. Keawakapu soils have a surface layer of dark reddish-brown, very friable, extremely stony silty loam. The

SOURCE: Soil Survey of the State of Hawaii, Department of Agriculture, 1952. Revised by the Soil Conservation Service & Division of Water and Land Development, 1957. 2-12

subsoil is dark reddish-brown, friable, silty clay loam and silty clay. The substratum is cobblestone-and stone-size fragmental aa lava. It is at a depth of 12 to 30 inches. Makena soils have a surface layer of very dark-brown, very friable loam. The subsoil is very dark grayish-brown and yellowish-brown, very friable silt loam. The substratum is cobblestone-and stone-size fragmental aa lava. It is found at a depth of 40 to 60 inches.

V. FLOODS AND TSUNAMIS

Flood problems in certain areas of Central Maui are due to 1) storm runoff which exceeds the physical limits of a channel and/or stream, and 2) high surf conditions and tsunami near coastal areas.

A. Floods From Storm Runoff

1. Wailuku

Portions of Wailuku are situated within the drainage basin of Iao Stream and these portions are frequently troubled by flooding. Since the early 1900's the flooding of Iao Stream has caused loss of life and property damages.

In order to mitigate flooding problems in this area, channel improvements consisting of stream widening, construction of levees and retaining walls were initiated by the County between 1951-1955. In addition, the Corps of Engineers in 1954 undertook a project to clear and remove accumulated debris, and to straighten the Iao

channel to facilitate stream flow.

A flood control project for channel improvements consisting of additional levees, slope protection, channel lining realignment, and debris basins will be undertaken shortly by the Corps of Engineers to further protect the area from flooding. Flood prone areas and boundaries are shown in Figure 2-5.

2. Kahului

Portions of Kahului are subject to inundation from sheetflow runoff. Flooding occurs at the low area along Puunene Avenue adjacent to the Kahului Shopping Center, and along Hana Highway east of Kahului and south of Kanaha Pond.

A recently completed drainage channel adjacent to Kanaha Pond will alleviate some of the flooding originating from sheetflow. Flood prone areas and boundaries are shown in Figure 2-5.

3. Kihei

The Kihei flood plain extends approximately four miles along the coast and about one-fourth to three-fourths of a mile inland. The contributing watershed is approximately 54 square miles and lies along the western slopes of Haleakala.

The region between the Mokulele Highway and Kalama Park have been flooded over the years.

Major flood problems arise when storm runoff exceeds the channel capacities of the four intermittent streams (Waipuilani, Keokea, Waiakoa, and Kulanihakoe) and when the sand dunes along the shoreline block the outlets to the sea. Prior to the annual rainy season, the County and State clear the channels to the sea to minimize back-water flooding of low-lying areas. Flood prone areas and boundaries are shown in Figure 2-5.

B. Floods From Wave Action and/or Tsunami

1. Wailuku

Paukukalo has been affected by unusual surf conditions and by tsunami.

2. Kahului

This community has been affected by unusual surf conditions and by tsunami. The tsunamis of April 1, 1946, and May 23, 1960 caused damages not only to Kahului but to the Spreckelsville and Paia areas (Flood Hazard Information, Island of Maui, 1971). The 1960 tsunami waves washed inland approximately 3,000 feet into Kahului to a ground elevation of about 6 feet and inundated residential and commercial areas. Compared to the 1960 tsunami damages, the 1946 damages to Kahului were minor. It should be noted that major damage occurred from water damages rather than from the



major destruction of buildings. Tsunami inundation areas are shown in Figure 2-5 and tsunami data in Table 2-1.

### 3. Kihei

The tsunami of May 23, 1960 also inundated portions of the Kihei area, causing minor damage.

In addition, portions of the Kihei area are sometimes inundated during high or heavy surf conditions. Heavy surf conditions during January 1959 and 1963 resulted in minor flooding and beach erosion of beach front properties. Tsunami in-

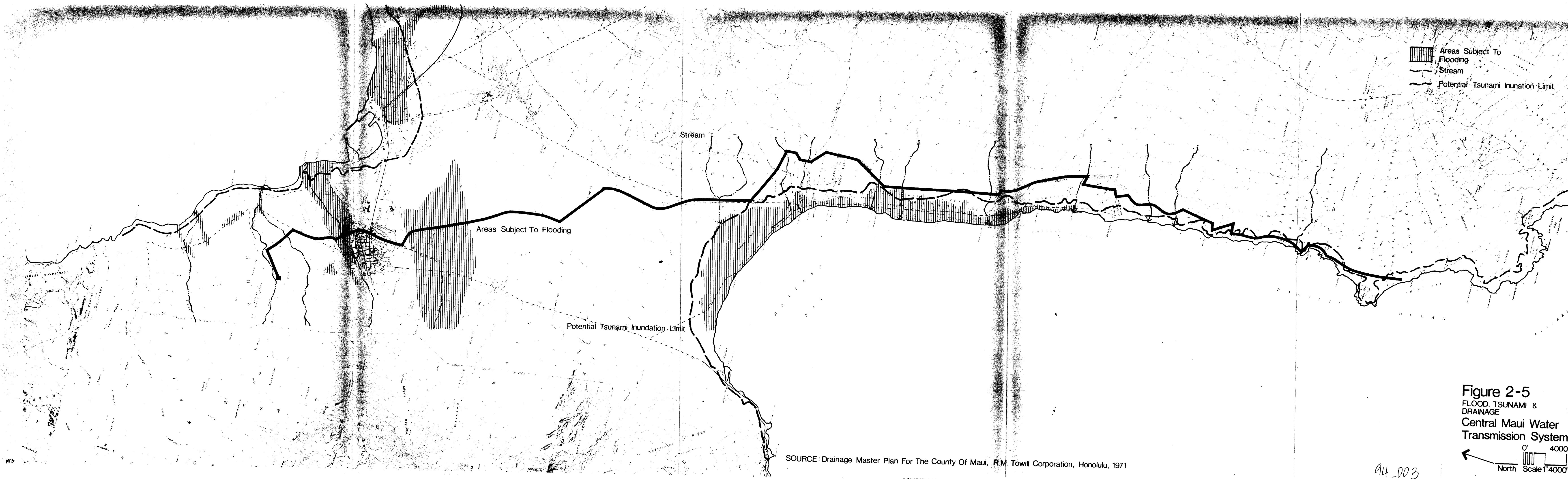
undation areas are shown in Figure 2-5.

## VI. AMBIENT AIR QUALITY

The ambient air quality of the Central Maui Area is affected by agricultural activities, point source emissions, pollution from internal combustion engines, pollution from natural sources, and construction activities.

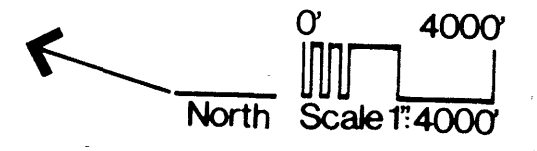
### Agricultural Activities

The major source of air pollution from agricultural activities results from the generation of dust during field preparation and particulate matter during field burning activities. Very little can be done to eliminate the problem of fugitive dust during field preparation. However, field burning activities which generate particulate matter are regulated by the State Department of Health which has established guidelines to ensure that such activities are not conducted during air stagnation



SOURCE: Drainage Master Plan For The County Of Maui, R.M. Towill Corporation, Honolulu, 1971

**Figure 2-5**  
 FLOOD, TSUNAMI &  
 DRAINAGE  
 Central Maui Water  
 Transmission System



94\_003

TABLE Z-1  
TSUNAMI DATA

Date	Location	Maximum Runup Height (meters)	Observations and Remarks
Nov. 7, 1837	Kahului	Unknown	"Two natives drowned, rest swam to safety"; 26 grass houses were carried 240 meters inland. No details.
	Lahaina	2.5	No details.
May 17, 1841	Lahaina	1.0	Water rose and fell repeatedly at intervals of 4 min., rushing violently and with great noise over the reefs.
Aug. 14, 1868	Kahului	3.6	Considerable damage.
Jan. 20, 1878*	North Coast	Unknown	Some houses destroyed.
Jan. 31, 1906	Kahului		Wave overflowed coastal road.
Aug. 16, 1906	Kahului		No destruction although lowlands in the vicinity of the town were flooded.
	Maalea	3.6	Some damage to the wharves.
	McGregor		Superstructure of wharf at McGregor's Landing was washed away.
Feb. 3, 1923	Kahului		Heavy damage in Kahului and east coast of Maui.
Mar. 3, 1923	Lahaina		Mar. 3 - Three small waves in harbor. First wave 05:00, water recede 10-14 meter horizontally; second wave 05:30; last wave few minutes later.
Apr. 1, 1946	Kahului	2.0	5.2 to 6.7 meters outside Kahului breakwater.
		6.7	4.0 meters at the head of the bay.
	Maliko Bay	8.5	
	Lahaina	2.0	Third wave the largest.
	Kaanapali	3.7	
	Hana	3.7	
Mar. 4, 1952	Kahului	4.3	
Nov. 4, 1952	Kahului		Kahului-Spreckelsville region of Maui suffered the greatest damage.
Sep. 13, 1953	Kahului	0.1	
Apr. 19, 1955	Kahului	0.1	
Mar. 29, 1958	Kahului	0.3	
Mar. 9, 1957	Kahului	3.68	Exceeded the gage limit which was 1.7 meters. Considerable damage along the northeast coast of the island.
Oct. 31, 1957*	Kahului	0.1	
Jul. 9, 1958	Kahului	0.1	
Nov. 7, 1958	Kahului	0.3	
Nov. 13, 1958*	Kahului	0.1	
May 4, 1959	Kahului	0.2	
May 23, 1960	Kahului	2 - 4.5	
		2.8	Wave height exceeded gage limit of 2.8 meters. A church floated 6.1 meters away from its foundation.
Oct. 13, 1963	Kahului	0.4	
	Kaanapali	0.1	
Oct. 20, 1963	Kahului	0.4	
Mar. 27, 1964	Kahului	3.7	Flooded shopping center near waterfront; total damage \$52,590.
Oct. 17, 1966	Kahului	0.2	
Dec. 28, 1966	Kahului	0.2	
May 16, 1968	Kahului	1.0	

\*Questionable tsunami.

Source: Flood Hazard Information, Island of Maui, 1971.

periods.

#### Point Source Emission

Major sources of point source air pollution in the project area as follows: emissions from the boilers of Wailuku Sugar Mill located in Wailuku, boilers of Hawaiian Commercial & Sugar Company located in Puunene, and the Maui Electric generating facilities located in Kahului and Maalaea. All of these point sources of air pollution must meet current regulations found in Chapter 43, Air Pollution Control to insure conformance with State and Federal air quality standards.

#### Pollution From Internal Combustion Engines

Exhaust emissions from internal combustion engines are a source of pollution in urbanized areas. Control of this pollution source will depend on Federal enforcement and compliance by the automobile industry.

#### Pollution From Natural Sources

Natural air pollutants include dust, particulate matter from forest and brush fires, and ocean salt spray.

#### Construction Activities

Dust and other particulate matter are associated with construction activities. Most of these activities are short-term, and compliance with existing County and State regulations by the contractors reduces, in most instances, the amount of dust generated during construction

activities.

#### VII. AMBIENT NOISE LEVELS

The existing noise environment along the proposed alignment varies according to land form, land use, and general activities occurring within the area of the alignment. Agricultural and natural areas have low noise levels varying between 20 to 30 dBA. Rural areas, where a greater amount of activity occurs, have slightly higher ambient noise levels, ranging from 35 to 45 dBA. Urban areas, with traffic and construction activities occurring, have the highest noise levels, and range from approximately 46 dBA in urban residential areas to 60 dBA in an urban shopping center. High ambient noise levels are also found along the shoreline, where surf and wind create noise levels ranging from 50 to 60 dBA, approximating the sound levels in a more developed urban area which is dominated by traffic noise.

#### VIII. FLORA AND FAUNA

In order to examine the effects of the proposed project on flora and fauna, a zone of influence was established two hundred feet wide centered along the transmission line alignment. Flora and fauna within this zone were recorded and mapped during a field survey which is described in Appendix B. Figure 2-6 shows existing wildlife areas and

sampling points. Appendix C lists all species of plants identified during the survey and their relative abundance.

The Central Maui Water Transmission System alignment passes through five major zones or vegetative associations as mapped by Jones and Stokes and the Hawaii Division of Fish and Game (1973). These zones are generally categorized as:

1. The Kiawe Forest Zone
2. The Dry Grassland Zone
3. The Sugar Cane Zone
4. The Dry Brushland Zone
5. The Urban Zone

The following is a general description of the location of these zones and the vegetation occurring within the zones found during a recent field survey.

A. Flora

1. Kiawe Forest Zone

This vegetative association dominates the alignment and extends from Makena to Waiehu, broken by sugarcane fields, grasslands, brushlands and urban areas. Kiawe (Prosopis pallida) often forms a true forest with a dense canopy and an understory of native and introduced grasses, vines, herbs and shrubs including koa haole (Leucaena leucocephala), guinea grass (Panicum maximum), lantana (Lantana camara), uhaloa (Waltheria americana), klu (Acacia farnesiana),

blue morning glory (Ipomea congesta), and spiny amaranth (Amaranthus spinosus). Recent rains had resulted in a lush growth of buffle grass (Cenchrus ciliaris) which dominated the ground, particularly along the Kihei to Makena coast. Sporadically along the west coast, endemic wiliwili trees (Erythrina sandwicensis) were found interspersed in the more open kiawe forest. In the high areas, opiuma trees (Pithecellobium dulce) of large proportion blend in with the mesquite and other "weeds", such as hairy merremia (Merremia aegypti), cocklebur (Xanthium canadense), sandbur (Cenchrus echinatus), and indigo (Indigofera suffruticosa) occur as an understory.

## 2. Dry Grassland Zone

This zone is confined for the most part to a location above Kihei at Waiakoa, although more extensive areas of this type may occur along portions of the route unsurveyed. Buffle is the dominant grass with a mixture of redtop grass (Agrostis alba), bermuda grass (Cynodon dactylon), and occasional shrubs such as klu and slender mimosa (Desmanthus virgatus).

## 3. Sugar Cane Zone

Cane (Saccharum officinarum) predominates here as the pipeline alignment borders the fields along the route. Adventitious grasses, herbs and

# CORRECTION

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



blue morning glory (Ipomea congesta), and spiny amaranth (Amaranthus spinosus). Recent rains had resulted in a lush growth of buffle grass (Cenchrus ciliaris) which dominated the ground, particularly along the Kihei to Makena coast. Sporadically along the west coast, endemic wiliwili trees (Erythrina sandwicensis) were found interspersed in the more open kiawe forest. In the high areas, opiuma trees (Pithecellobium dulce) of large proportion blend in with the mesquite and other "weeds", such as hairy merremia (Merremia aegypti), cocklebur (Xanthium canadense), sandbur (Cenchrus echinatus), and indigo (Indigofera suffruticosa) occur as an understory.

## 2. Dry Grassland Zone

This zone is confined for the most part to a location above Kihei at Waiakoa, although more extensive areas of this type may occur along portions of the route unsurveyed. Buffle is the dominant grass with a mixture of redtop grass (Agrostis alba), bermuda grass (Cynodon dactylon), and occasional shrubs such as klu and slender mimosa (Desmanthus virgatus).

## 3. Sugar Cane Zone

Cane (Saccharum officinarum) predominates here as the pipeline alignment borders the fields along the route. Adventitious grasses, herbs and

shrubs along the edges include nutgrass (Cyperus rotundus), garden spurge (Euphorbia hirta), fuzzy rattlepod (Crotalaria incana), slender amaranth (Amaranthus viridis), and radiate fingergrass (Chloris radiata). Where the pipeline route crosses gulches, castor bean (Ricinus communis) and guinea grass flourish.

#### 4. Dry Brushland Zone

This zone occurs sporadically all along the route where natural or man-provided water is scarce. Dryland species such as haole koa, klu, lantana, hairy abutilon (Abutilon molle), saltbush (Atriplex sp.) and cactus (Opuntia megacantha) are common. Occasionally tree tobacco (Nicotiana glauca) occurs and blue morning glory forms thickets. The endemic ilima (Sida fallax) is often present.

#### 5. Urban Zone

Because of man's propensity for planting decorative and fruit-producing plants, this zone is the most complex in terms of flora. Along the pipeline alignment such introduced species as coconut (Cocos nucifera), bougainvillea (Bougainvillea sp.), monkeypod (Samanea saman), hibiscus (Hibiscus sp.) candlebush (Cassia alata), be-still (Thevetia peruviana), sisal (Agave sisalana), and night-blooming cereus (Hylocereus undatus) have been

planted. They are often mixed with such naturally occurring plants as false mallow (Malvastrum coromandelianum), cheeseweed (Malva parviflora), and popolo (Solanum nodiflorum). A few native species such as the endemic caper (Capparis sandwichiana) and uhaloa, and indigenous milo (Thespesia populnea), hau (Hibiscus tiliaceus), and naupaka (Scaevola sp.) are found in this zone. Trees such as the ironwood (Casuarina sp.), mango (Mangifera indica), Java plum (Eugenia sp.), and Christmas berry (Schinus terebinthifolius) are present. Other introduced plants seen along the alignment in urban and urbanizing areas include guava (Psidium guajava), moon vine (Ipomea alba), golden crownbeard (Verbesina enceloides), napier grass (Pennisetum purpureum), and California grass (Brachiaria dictyoneurum). Thunbergia (Thunbergia fragrans), an attractive clumping plant, has been planted along roads and occurs also as a weed.

B. Wildlife

Twelve species of birds and one mammal were seen during the field survey. An additional six kinds of birds, six mammals, two reptiles, and one amphibian exist based on signs observed and conversations with residents and wildlife authorities. Only one bird is endemic; two are indigenous, and one of these is migratory. Appendix D lists all species of wildlife either seen

during the survey or believed to be present and their relative abundance.

1. Birds

The avifauna of the transmission system route can be categorized by either origin (endemic, indigenous or introduced), by habitat (land birds, shorebirds, waterbirds) or by utility to humans (gamebirds, songbirds, predators or scavengers). All of these divisions are represented in the area between Makena and Waiehu.

a. Endemic Species

Only one uniquely Hawaiian bird is probably present: the Hawaiian owl or pueo (Asio flammeus sandwichensis). It is not endangered and is common to Maui and other islands in the State. The endangered Hawaiian stilt (Himantopus himantopus knudseni) is known to inhabit Kanaha Pond, Kealia Pond, and the small brackish ponds near Puu Olai at Makena (Berger and Walker, 1975).

This species was seen at the Puu Olai ponds on December 15, 1975. A brief survey of Waiale reservoir on December 16, 1975, revealed ten Hawaiian stilts, four black-crowned night herons, and eleven golden plover. Kealia Pond 1/2 mile to the west of point "G" (Figure 2-6) on the alignment is a State Wildlife Sanctuary

which also harbors the stilt, heron and migratory shorebirds during certain times of the year. Also, the manager at the Kihei Wastewater Treatment Plant, 3/4 of a mile east of the pipeline route, reported that stilts were not uncommon visitors to the storage pond there.\*

b. Indigenous Species

Two indigenous, but unendangered species were seen during the survey. One, the black-crowned night heron (Nycticorax nycticorax hoactli) is a piscivorous waterbird usually associated with streams, ponds, reservoirs, tidal areas, and estuaries. Within the project alignment area, they are concentrated around the Waiale Reservoir (they probably roost in the vicinity of point "D" as shown on Figure 2-6) but may occur occasionally in the urban and residential areas along perennial streams. The other is the most ubiquitous migratory shorebird in Hawaii, the Pacific golden plover (Pluvialis dominica fulva). This species frequents lawns, golf courses, fallow cane fields, brackish ponds and pastures and was seen at Makena, Puunene, Waiale, and in

---

\*He also reported he had seen "ducks" and "a white goose".

Wailuku town. Although the plover does not breed in Hawaii, some (probably juveniles) remain throughout the year.

c. Introduced Species

The introduced song birds recorded included the Japanese white-eye (Zosterops japonica japonica), common mynah (Acridotheres tristis), house finch (Carpodacus mexicanus frontalis), house sparrow (Passer domesticus), cardinal (Cardinalis cardinalis), ricebird (Lonchura punctulata), and mockingbird (Mimus polyglottos). These birds are common along the route, throughout Maui and the State. Lace-necked doves (Streptopelia chinensis), barred doves (Geopelia striata), and grey francolins (Francolinus pondercerianus) were common game birds seen and ring-necked pheasants (Phasianus colchicus), feral pigeons (Columba livia), California quail (Lophortyx californicus), and Rio Grande turkeys are known to be resident to portions of the alignment. The grey francolin was introduced to Maui between 1958 and 1961 and is widely distributed throughout Central Maui (Medeiros, et al., 1969). During the survey, they were seen or heard from Makena to the outskirts of Wailuku.

Medeiros (1969) shows the Rio Grande turkey as being found from sea level along the Kihei-Makena coast to the central plain. Although not seen, they undoubtedly occur, particularly in the kiawe forest zone when bean production is at its peak. The barn owl (Tyto alba) was reported by Berger and Walker (1975) as seen on June 16, 1974 at an elevation of 200 feet at Kihei. (This would be in the vicinity of point "H" on Figure 2-6). This owl and the native pueo are the only two predacious birds found in the study area.

2. Mammals

The one mammal seen was the small Indian mongoose (Herpestes auropunctatus) which is found commonly along the entire route but concentrated where human activity is high and where food and cover is abundant. Three rodent species have been reported along the line as evidenced by records of the State Department of Health. Traps set by the Vector Control Branch caught brown rats (Rattus rattus), Polynesian rats (Rattus exulans), and house mice (Mus musculus). Their relative abundance is indicated by the following samples at selected locations along the alignment:

AREA	DATE	TRAPS SET	<u>RATTUS</u> <u>RATTUS</u>	<u>RATTUS</u> <u>EXULANS</u>	<u>MUS</u> <u>MUSCULUS</u>
Waiehu	Nov. 1975	252	37	7	4
Wailuku	Oct. 1975	774	180	38	-
Kihei	Sept. 1975	495	37	8	4
Kihei	Nov. 1975	241	27	-	2

Source: Excerpted from State Department of Health, Vector Control Branch monthly reports for Maui.

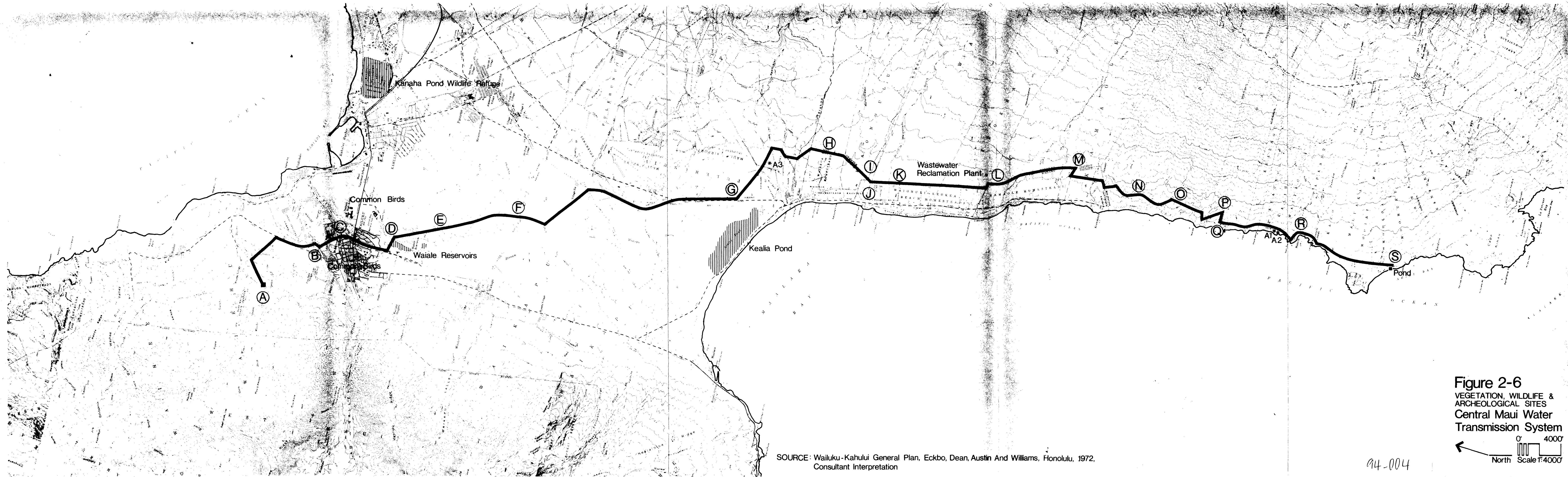
It should be noted that house mice populations are extremely cyclic and that the low numbers shown on the foregoing table are only representative of relative abundance in the fall of 1975. In 1974 a population "explosion" of mice occurred on Maui during which "thousands" of mice were reported by residents around their homes in Kihei and Makena. Brown rats are the most cosmopolitan in their distribution in the study area. The Polynesian rat is found in areas farthest from human activity or in locations with low brown rat populations (Joseph Duarte, personal communication). Feral cats (Felis catus) and "semi-wild" dogs (Canis familiaris) are probably present in rural and wildland areas as they were reported by Berger and Walker at Kihei (1975). In discussions with personnel of the Division of Fish and Game on Maui, it was found that Axis deer (Axis axis) have expanded their range from the release site in



lower Kula to the lowlands between Kihei and Makena. No tracks or droppings were seen during the survey, but it can be assumed that they are resident to the southern half of the project area at some time during the year.

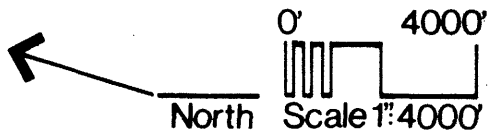
### 3. Reptiles and Amphibians

Berger and Walker (1975) reported three species of reptiles and one amphibian specie from the Makena and Kihei areas during their two studies: the mourning gecko (Lepidodactylus lugubris), fox gecko (Hemidactylus garnotti), snake-eyed skink (Ablepharus boutoni poecilopleurus), and giant neotropical toad (Bufo marinus). None of these species was seen during the December field survey, but the foreman at the Kihei Wastewater Treatment Plant said that there was a "bufo problem" there occasionally. The fox gecko is probably more abundant in the dry southern coastal areas, the mourning gecko more prevalent around human habitation (Wailuku, Waiehu), and the skink throughout the alignment where moist vegetative conditions prevail (Oliver, et al. 1953). The toad probably occurs where standing fresh water is available for completion of its life cycle.



SOURCE: Wailuku-Kahului General Plan, Eckbo, Dean, Austin And Williams, Honolulu, 1972, Consultant Interpretation

**Figure 2-6**  
 VEGETATION, WILDLIFE &  
 ARCHEOLOGICAL SITES  
 Central Maui Water  
 Transmission System



94-004

IX. ARCHAEOLOGICAL/HISTORIC SITES

In order to determine whether significant archaeological sites would be endangered by construction of the pipeline, a reconnaissance archaeological survey was made along the transmission line alignment. While no archaeological remains were found within the actual pipeline alignment, the alignment will pass three archaeological sites as shown in Figure 2-6. Two sites are located in the southern portion of the project area west (makai) of the pipeline alignment and east (mauka) of Kihei Road. A third site is situated in brushland above Kihei.

The first site (Point A 1 on Figure 2-6) is situated about 67.36 m. (221 ft.) northwest of station 42+00, between power pole (pp) 15 and power pole 14. This site is approximately 15.85 m. (52 ft.) west of the pipeline (station 40+00) alignment. This site is a rectangular platform of unmortared stone masonry measuring 8.6 m. (28.21 ft.) by 7.6 m. (24.93 ft.). It abuts the southwest (makai) side of an unmortared wall that roughly parallels this section of the alignment. The structure is 0.70 m. (2.30 ft.) high on its makai side and is paved with stones varying from double-fist size to head size.

The second site (Point A 2 on Figure 2-6) is situated on the crest of a low ridge about 15.24 m. (50 ft.) southwest of station 56+00, between pp 9 and pp 8. This site is

approximately 13.11 m. (43 ft.) west of the pipeline (station 56+16) alignment. This site is a low-walled rectangular enclosure constructed of mortarless masonry. It measures 9.30 m. (30.50 ft.) by 11.50 m. (37.72 ft.) and its walls are about 0.75 m. (2.46 ft.) wide and 0.50 m. (1.64 ft.) high. The site overlooks a small gulch to the northeast and (across Kihei Road) a sandy beach to the west.

The size and form of the two sites indicate that both are prehistoric--that is, both were probably built and used before Western contact (1778-79). While fragments of bottle glass were found on the surface of the platform, they probably were deposited long after the abandonment of the structure by its prehistoric inhabitants. The proximity of both sites to the ocean suggest that they were built and used by people whose economic activities were marine-oriented. It is probable that both structures were house foundations. While these sites are rather small and simple, they are remnants of the ancient Hawaiian settlement pattern and should be allowed to remain intact.

A third site is situated about 15.2 m. (50 feet) south of station 458+00. (Point A 3 on Figure 2-6). This site is a C-shaped structure which is relatively common throughout Hawaii.

at approximately

here is a view

## URBAN ENVIRONMENT

The urban environment of Central Maui is comprised of two areas: Wailuku-Kahului and Kihei. Wailuku-Kahului are two adjacent towns which form the most highly urbanized area on Maui. Wailuku is the County seat and the older of the two towns. Kahului is the site of more recent residential, commercial and industrial development. The island's only deep water harbor and its major airport are located in Kahului. This area is the site of three major shopping centers, the community college, three high schools, Maui Memorial Hospital, and a large proportion of the island's professional offices.

The Kihei area is a coastal region on the lee side of the island and includes the communities of Maalaea, Kihei, Wailea, and Makena. Urbanization of Kihei is well underway. The area has seen a great deal of development in the past few years as evidenced by new residential subdivisions and many new condominiums.

The following discussion of the urban environment, as well as subsequent sections of the EIS, will focus primarily on the two areas of Wailuku-Kahului and Kihei-Makena. These areas are meant to represent the planning areas delineated in the Wailuku-Kahului and Kihei General Plans unless otherwise indicated.

### IX. SOCIAL CHARACTERISTICS

In preparing a description of social characteristics, it was necessary to aggregate the census tracts which comprise

the Wailuku-Kahului planning area. While this practice does not result in an accurate measure of social characteristics, it is intended to serve as a general guide to the overall social environment in this area.

The data which follow are based on the 1970 Census and are reported in three sources: The Maui Community Profile (1972), A Socio-Economic Study of Maui County (1972), and Community Profiles for Hawaii (1973).\*

#### Wailuku-Kahului

Wailuku-Kahului is divided into four census tracts (CT): 309 (Paukukalo), 310 (Wailuku), 311 (Kahului), and 312 (also Kahului). The combined resident population of these four tracts is 17,371 persons in 4,753 households or 45 percent of the population of Maui island. The average household size is 3.5 persons per household which is identical to the all-island figure of 3.5. Based on average percentile, the major ethnic groups in the area are Japanese (32 percent), Filipino (31.7 percent), Hawaiian or Part-Hawaiian (15 percent), Caucasian (7.5 percent), and Portuguese (8.2 percent). The median age is 25, and the sex ratio (male/100 females) is 107. Of adults over 20 years of age, 51 percent have at least a 12th grade education.

The unemployment rate for males in the area is slightly

---

\*The 1975 Census Survey Update prepared for Maui Economic Opportunity, Inc. was reviewed but not used in this EIS.

less than 3 percent, or almost the same as the Maui Island figure. The rate of unemployment for females in this area (30 percent) is very close to the rate for females on Maui island as a whole (28 percent). The breakdown by census tract, however, indicates a relatively high percentage of unemployed females in the two Kahului tracts and Paukukalo (32 percent in CT 311 and 35 percent in CT 312) and 38 percent in CT 309) and a markedly lower 15 percent for Wailuku.

The distribution of family income in the two Kahului tracts reveals a heavy concentration of household incomes between \$8,000 and \$24,000 annually - approximately - 71 percent. In Wailuku, family income is heavily concentrated between \$10,000 and \$24,999 annually - approximately - 57 percent of the tract. Family income in Paukukalo is fairly distributed across all income categories but is concentrated between \$6,000 and \$9,000 annually.

Wailuku-Kahului is surrounded by several villages and towns --notably Waiehu, Waihee, and Waikapu. These villages are part of the planning area, but are rural rather than urban areas. For census purposes, the Waihee-Waiehu area is combined with Waikapu, a similarly rural area at the base of the West Maui Mountains along the western perimeter of the Central Maui Plain. Together these areas form census tract 308.

The resident population of the census tract is 1,299 persons in 351 households, constituting 4 percent of the total population of Maui Island. The major ethnic groups in

the area are Filipino (22 percent), Portuguese (19 percent), Hawaiian or Part-hawaiian (18 percent), Japanese (14 percent), Caucasian (13 percent), and Puerto Rican (11 percent). The median age is 25 compared to 24 for the entire island of Maui. The sex ratio (males/100 females) is 111 compared to 104 for all of Maui island. Of adults over 20 years of age, 44 percent have at least a 12th grade education.

The unemployment rate for males in the area is 7 percent, somewhat higher than the 3 percent for the island as a whole. For females, however, the unemployment rate is 8 percent, lower than the 28 percent figure for the entire island.

The distribution of family income in this tract appears to be concentrated in middle and upper income categories. The percentage of families with incomes below \$6,000 is 26 percent as compared to families in the \$6,000-\$11,999 category (34 percent) and families earning \$12,000 and up per year (40 percent).

#### Maalaea-Kihei-Makena

For census purposes, the Kihei tract (307) consists of the area from Maalaea to Wailea. Makena is included in tract 303, Kula-Ulupalakua. Because the number of households in Makena is so small, and because their data is inseparable from that of the rest of this very large tract, the data which follow refer to tract 307 (Kihei) only, and can be considered representative of the vast majority of residents in the entire Kihei-Makena area.



The resident population of this area is 1,636 persons in 483 households or 4 percent of Maui Island's resident population. The major ethnic groups in the area are Caucasian (56 per cent), Japanese (17 per cent), and Filipino (11 percent). The median age is 27.5, and the sex ratio (male/100 females) is 127. Of adults over 25 years of age, 29 percent have at least a 12th grade education. The comparable island-wide figure is also 29 percent.

The unemployment rate for males in the area is 3 percent--the same as for the entire island of Maui. For females, however, the rate in this tract is 38 percent, 10 percent higher than the island-wide rate.

The distribution of family incomes for this area suggests there are relatively few families in the middle income range between \$6,000 and \$11,999 per year (26 percent), and relatively more in the adjacent groups of \$2,000-\$5,999 (34 percent), and \$12,000 and up (29 percent). Thus the distribution is bi-modal, with more high-income and low-income families than middle-income families.

#### X. ECONOMIC CHARACTERISTICS

It is difficult to discuss the local economics of Wailuku-Kahului and Kihei independently because of the lack of separate data on these areas and the interdependency of the entire economy of Maui Island. However, certain generalizations can be made. Wailuku-Kahului will continue as the financial, commercial, and industrial nucleus of the island as well as Central Maui. The Kihei area is becoming a

distinct economic center as it achieves its potential as a resort-residential community. This area is anticipated to figure prominently in the economy of Maui County as its resort-oriented facilities are developed and as the visitor industry occupies an increasingly larger role in the economy of the island.

The following discussion presents the existing economic situation on a regional, rather than a local basis, concentrating on the growth of population and tourism in Maui and its relationship to the project area.

A. Population and Employment

The population of Maui County has increased steadily during the 1970's as shown in Table 2-2. Although the population of Maui County increased at a rate of only 1 percent per year during the decade between the 1960 and 1970 censuses, that rate has increased to approximately 3.2 percent per year since 1970. Of the 46,156 residents counted in the 1970 Census, 16,739 or 36.3 percent, were under the age of 18. This data suggests that between 1970 and 1980 approximately 10,000 residents would pass the age of 18 and either enter advanced educational facilities, enter the County job market, or emigrate. It is estimated that during the same decade, only 5,000 residents would pass the age of 65 and retire from the labor force age grouping.

TABLE 2-2

POPULATION OF THE ISLAND OF MAUI

<u>Year</u>	<u>Total Resident Population</u>	<u>Percent Increase Over Previous Year</u>	<u>Total De Facto Population*</u>	<u>Percent Increase Over Previous Year</u>
1970	39,100	-	42,000	-
1971	40,700	4.0%	44,600	6.2%
1972	43,200	6.0%	48,700	9.2%
1973	44,200	2.3%	50,100	2.9%
1974	44,500	.7%	51,500	2.8%

Source: The State of Hawaii Data Book, 1975.

\*Includes visitors present, excludes residents temporarily absent

During 1974, jobs available in Maui County were distributed among the following industries:

TABLE 2-3  
JOB DISTRIBUTION BY INDUSTRY

	<u>Annual Average of Number of Jobs Available - 1974</u>	<u>Annual Average of Number of Jobs Available - 1972</u>
Non-agricultural Wage and Salary		
Construction	1,650	1,170
Manufacturing	1,980	2,140
Transportation, Communications, Utilities	1,250	1,060
Wholesale & Retail Trade	3,900	3,450
Finance, Insurance & Real Estate	910	600
Services	4,060	3,620
Government	<u>3,150</u>	<u>2,670</u>
Subtotal-Non-agricultural Wage & Salary	16,900	14,710
Agricultural Wage & Salary	3,020	2,150
Self-Employed (includes unpaid family workers & domestics)	<u>2,320</u>	<u>2,670</u>
TOTAL	22,240	19,530

Source: State of Hawaii Data Book, 1975.

Although the distribution of jobs has remained about the same by industry, the availability of new jobs during the

two year shift has reflected a concentration of new opportunities in agriculture, and in those non-agricultural positions related to the growth of the visitor industry on Maui, as shown in the following tabulation:

CHANGES IN THE NUMBER OF JOBS BY INDUSTRY  
1972 TO 1974, IN MAUI COUNTY

	<u>Change in Number of Jobs</u>
Non-Agricultural Wage and Salary	+ 2200
Construction	+ 480
Manufacturing	- 160
Transportation, Communications, and Utilities	+ 200
Wholesale and Retail Trade	+ 450
Finance, Insurance & Real Estate	+ 310
Services	+ 440
Government	+ 480
Agricultural Wage and Salary	+ 870
Self-Employed (includes unpaid family workers and domestics)	- 350
	+2720

During this two year period, 1,880 of the 2,720 new jobs, or 70 percent, can be traced to the growing demand of visitors and residents for facilities and services. Just as for the State as a whole, the visitor industry and its related need for facilities and services is seen as the primary source to meet the future job needs of Maui's population at this time.

TABLE 2-4

VISITOR INDUSTRY GROWTH - MAUI COUNTY

	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Estimated Number of Westbound Visitors	465,700	554,800	710,100	766,800	852,200	929,565
Estimated Length of Stay in Days	<u>x 2.97</u>	<u>x 3.08</u>	<u>x 3.16</u>	<u>x 3.12</u>	<u>x 3.23</u>	<u>x 3.42</u>
Estimated Visitor-Days per Year	1,383,129	1,708,784	2,243,916	2,392,416	2,752,606	3,179,112
Estimated Daily Visitor Census	3,789	4,682	6,148	6,555	7,541	8,710
Number of Hotel Units Available	2,940	3,942	3,876	5,109	5,731	5,967
Percentage of Occupancy	66.7%	66.9%	70.6%	76.5%	74.7%	72.3%

Sources: Maui County in 1975, by First Hawaiian Bank, and Research and Statistics Office of Hawaii Visitors Bureau

B. Existing Visitor Industry Conditions

Maui County has experienced tremendous growth in its visitor industry during the 1970's. As shown in Table 2-4, both the number of visitors and their length of stay have increased dramatically each year in response to the new visitor facilities available on the island.

Although much of this past growth in the visitor industry has occurred in the Kaanapali area, the Maalaea-Kihei-Makena area with its proximity to all of Maui's attractions and its own attractive beaches is expected to increase its appeal to visitors with the construction

TABLE 2-5

PLANNED HOTEL CONSTRUCTION

<u>Maui Island</u>	<u>Existing Units</u>	<u>Planned Additional Units<sup>1</sup></u>	<u>Announced Completion Dates For Planned Additional Units</u>		
			<u>1976</u>	<u>1977</u>	<u>No Date</u>
Wailuku-Kahului	369	60	60	-	-
Lahaina-Kaanapali-Napili	4,346	836	236	200	400
Hana	87	-	-	-	-
Kula-Makawao-Paia	23	90	-	-	90
Kihei-Maalaea	<u>1,142</u>	<u>1,201</u>	<u>845</u>	<u>349</u>	<u>7</u>
Total:	5,967	2,187	1,141	349	497

<sup>1</sup>Hotels and CondominiumsSource: Hawaii Visitors Bureau Plant Inventory, October, 1975

of future hotel units. Announced construction plans for Maui indicate that more than half of the confirmed new units will be constructed near Kihei, as shown in Table 2-5. These totals include only those projects for which definite plans have been announced, and which are expected to begin by 1977.

XI. URBAN INFRASTRUCTUREA. Water Supply, Distribution and Storage Reservoirs.1. Water Supply and Distribution

The Central Maui area derives water from the Mokuhou Wells, Iao Tunnel, and Kepaniwai Well.

The Mokuhou Wells have a drawing capacity of approximately 10 mgd and Iao Tunnel and Kepaniwai Well have a combined drawing capacity of approximately 1 mgd.

Approximately 3-4 mgd of water is transmitted from the Mokuhau Wells to the Maalaea-Kihei-Makena area and the remainder (approximately 6-7 mgd) supplies the Kahului, Paia-Kuau, and Paukukalo areas. Iao Tunnel and Kepaniwai Well serve the higher elevation areas of Wailuku Town, Wailuku Heights, and Waikapu.

2. Storage Reservoirs

Four storage reservoirs are located in Wailuku-Kahului. Two reservoirs with a combined capacity of 2.76 mg are located at the 500 foot elevation above Wailuku. A 1.0 mg reservoir is located at the Mokuhau Wells, and a 2.0 mg reservoir is near Maui Memorial Hospital. A 3.0 mg reservoir near the Maui County Jail site will be in service shortly.

Five reservoirs presently serve the Kihei area. A 2.0 mg reservoir is located in North Kihei and a 2.0 mg reservoir in Wailea. Three reservoirs with a combined capacity of 1.14 mg are located in the Maui Meadows area. An additional 1.0 mg reservoir is also under construction in the Maui Meadows area.

B. Wastewater

There are no operational wastewater reclamation plants in Wailuku-Kahului although one is presently under construction. Wastewater is conveyed by gravity flow sewers and pumping stations to outfall lines extending to offshore waters.



The Wailuku outfall serves the town of Wailuku and a portion of Kahului Town. The outfall, a 24-inch cast iron force main over 800 feet in length, discharges wastewater into waters approximately 24 feet deep.

The wastewater generated from Kahului is conveyed by a gravity line to the Kahului pumping station and from there is pumped through a force main to an 18-inch outfall which discharges to offshore waters at a depth of approximately 14 feet. It has been estimated that in 1970 wastewater discharge from both outfalls ranged between 3.64-3.86 mgd (EPA, 1974).

Wastewater from Kihei and Wailea is collected and transmitted to the County reclamation facility mauka of Kamaole Homesteads. The sewerage area extends from the easterly end of Kealia Pond in North Kihei to the southern boundary of the Wailea development. Wastewater is collected via gravity flow lines along Kihei Road and pumped uphill for secondary treatment. Treated wastewater is currently used to irrigate an experimental pasture site near the plant or disposed via injection wells. In the future, portions of the reclaimed wastewater will be used to irrigate Kalama Park.

C. Roads

The major highways, streets, and roads along the proposed pipeline alignment include Kahekili Highway, Lower Main Street, Mokulele Highway, Kihei Road, and the unimproved portion of Kihei Road near Makena. These vary in condition from smooth paved segments to

unpaved dirt roads. The paved segments are generally undivided two lane highways approximately 18 to 20 feet wide lying within 40 to 60-foot rights-of-way. Street grades are relatively flat ranging from 0-5 percent. Pavement conditions in some areas are noticeably deteriorated with numerous potholes.

The unpaved portion of Kihei Road near Makena is approximately 14 feet wide. The road profile grades range from 0-12 percent. Future improvements are planned for this roadway by the County of Maui.

The State plans to construct a two lane undivided highway, Piilani Highway, mauka of Kihei Road which will eventually extend 12.6 miles between the Mokulele-Kihei Road intersection and the Makena Road-Kula Highway intersection. The highway represents the final segment of a paved all-points connector highway system between Kahului, Kula, Wailea, Makena, and Kihei.

D. Power

Existing power generating facilities of Maui Electric Company (MECO) can produce a total 72.89 megawatts (MW): 40 MW by the major facility on Kahului Bay, 32.89 MW by the existing diesel unit installation at Maalaea Bay. In addition, MECO has contracts with Pioneer Mill Company and Hawaiian Commercial and Sugar Company for providing a total of 13.0 MW of a standby power. This power is not available on a continuous firm basis but is available during an outage or overload

of a MECO generator.

Kihei-Makena obtains electric power from a 69 kilovolt transmission circuit loop extending from generating facilities at Kahului Harbor east to Kula, west to Wailea, then to Kihei-Makena and back to Kahului. Two substations are located on the leeward portion of the route. At present, MECO can provide enough power for Maui island, however, an expansion of MECO's Maalaea generating facility will be necessary to meet 1980 power demands.

E. Communication

Hawaiian Telephone Company provides telephone service which is channeled through two central offices. The Wailuku central office has a maximum capacity of 7,200 transmission lines. Of this amount, 4,141 lines are currently used to handle 7,294 business and resident telephones (including extensions). The Kihei central office handles 2,731 telephones on 1,529 transmission lines. Capacity of this central office is 4,000 transmission lines.

The location of some of the infrastructure elements discussed in this section is shown in Figure 2-7.

XII. PUBLIC FACILITIES

A. Schools

Public schools in Wailuku and Kihei form the

Baldwin Educational Complex. Kihei, Lihikai, Waihee, and Wailuku Elementary Schools along with Iao Intermediate School "feeds" students into Baldwin High School. Current enrollment in the Baldwin Complex is 4,154 students.

In addition, Kahului is served by Kahului School, which, along with schools in the Paia, Puunene, Makawao, Haiku, and Kula areas, feeds students into Maui High School. Current enrollment in the Maui High Complex is 4,237 students.

B. Parks, Beach Parks, Recreational Facilities

There are twenty County recreation sites and four State sites all within a four mile radius of Wailuku. These include parks, playgrounds, beach areas and community centers as shown in the following inventory:

<u>COUNTY</u>	<u>STATE</u>
Waihee Beach Park	Iao Valley
Waiehu Golf Course	Kahului Boat Launch
Puuhala Ball Park	Hawaiian Homes Park
Mokuhau Ball Park	Halekii/Piihana
Kepaniwai Park	
Papohaku Park	
Wailuku Community Center	
Wells Ball Park	
Wailuku Historic District Park	
Maui War Memorial Center	
Maui Zoo & Botanical Gardens	
Kahului Breakwater Park	
Kahului Pool	
Kamalii Park	
Kahului Ball Park	
Lihikai Park	
Kahului Community Park	
Waikapu Ball Park	

Source: An Inventory of Potential and Actual Outdoor Recreation Resources on Maui Island, 1973.

In order to maximize use of these facilities, the County has developed an extensive array of annual recreation programs geared to different age groups. The Department of Parks also conducts after school and Saturday morning programs for children at most school plants in the Central Maui area.

Maalaea-Kihei-Makena has the potential for becoming one of the most outstanding beach oriented recreation areas in the State. Mai-Po'ina oe Iau Park, Kalama Park and Kamaole Park (Numbers 1, 2 and 3) provide Maui residents with about 55 acres of public beach parks. The State of Hawaii owns an additional 175 acres of beach reserve land. There are eleven rights-of-way for pedestrian access to beaches in addition to existing beach parks. Five of the eleven rights-of-way are in the Wailaea development and have been improved and dedicated to the County by the developer. There is a small boat harbor and a launching ramp for trailer transported boats at Maalaea. Launching ramps are also available at Kalama Park, Kahului Harbor, and Makena Landing. At Wailea, a golf course open to the public is in operation with a second course under construction.

### XIII. PUBLIC SERVICES

#### A. Fire

Wailuku-Kahului is served by the Wailuku Fire Station, which has nine men on duty at all times. Their primary equipment consists of two 250 gallon per

minute mini-pumpers and one 1,250 gallon per minute triple combination pumper. A utility ambulance is located at the station.

There is one fire station in Kihei near Kalama Park. Fifteen men are assigned to the station with five men on duty at all times. They have an American La France fire truck which can pump 1250 gallons of water per minute.

Response time from the Kihei fire station to any point in Kihei-Makena is estimated at 5-10 minutes. If additional back-up is needed, response time from the Wailuku fire station to the Kihei area is 15-20 minutes and to Wailea 20-25 minutes. These time estimates can vary according to traffic, weather, and time of day.

The fire department can and do call on the sugar companies to provide water tankers and bulldozers in the event their equipment cannot control large brush fires. The Department of Public Works also provides water tankers and other equipment if the situation warrants the need.

B. Police

There are 126 police personnel assigned to District 1 - Wailuku. This total includes police officers and personnel assigned to Administration, Records Division, Traffic Section, Vice Section, Juvenile Section, and Criminal Investigation Division. One beat officer is permanently assigned to the Kihei area.

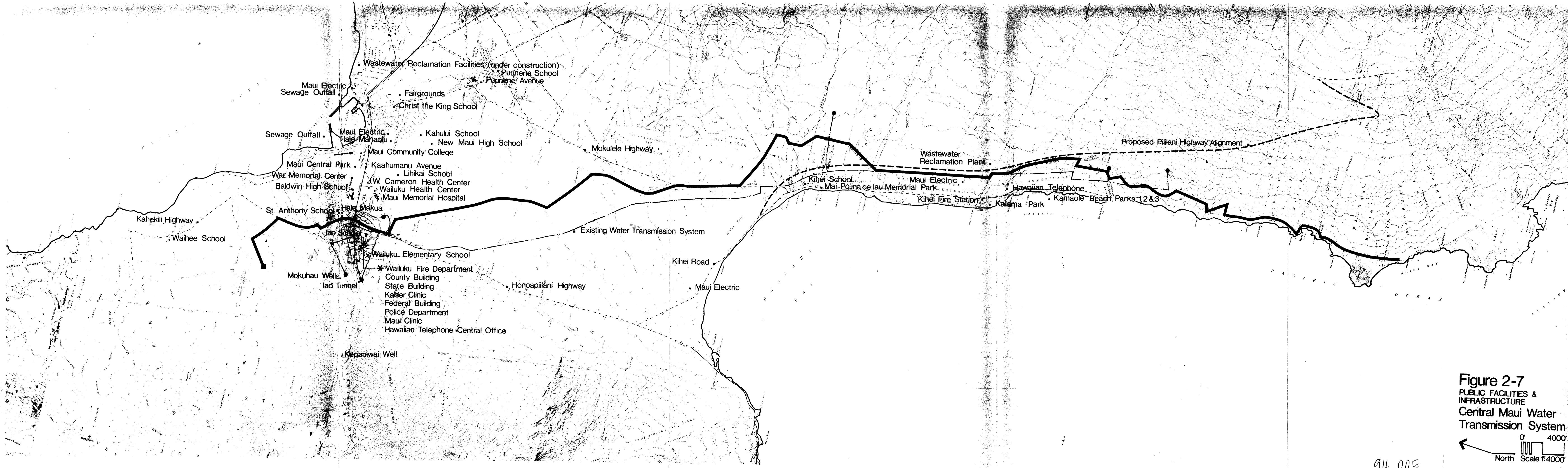
C. Refuse

Refuse collection is provided by the County of Maui on a once-a-week basis. At the present time, County refuse collection is considered adequate. Two private companies augment public refuse services.

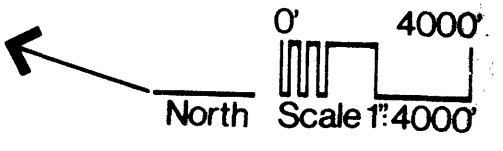
D. Health Services

Medical facilities for the County are provided by the Maui Memorial Hospital and Kula Hospital. In addition, 11 field nurses from the Public Health Division provide field services to the County. Four nurses are assigned to Wailuku-Kahului and one each to Kihei and Makena. These nurses provide free services such as immunizations, food preparation clinics, well-baby clinics, vision testing, and care for the elderly or invalid. Tuberculin tests, diabetes screening, dental and public health programs, X-ray clinics, and free medication for certain communicable diseases are also available to Maui residents through public health programs.

The location of some of the public facilities discussed in this section is shown in Figure 2-7.



**Figure 2-7**  
 PUBLIC FACILITIES &  
 INFRASTRUCTURE  
 Central Maui Water  
 Transmission System



94-005



**land use plans 3**

SECTION 3

THE RELATIONSHIP OF THE PROPOSED ACTION  
TO LAND USE PLANS, POLICIES, AND  
CONTROLS FOR THE AFFECTED AREAS

Development of the respective communities within the County of Maui is anticipated to occur within the framework of various general plans prepared and adopted for these areas. These general plans are basic policy documents, setting forth the County's philosophy as to how the various parts of the island will be shaped in the future. The major regions on the island of Maui encompassed by general plans include West Maui, Wailuku-Kahului, and Maalaea-Kihei-Makena. A general plan has been prepared for Upcountry (Makawao-Kula-Pukalani), but has not yet been approved. Although these plans have been prepared at different times, there are nevertheless certain basic policy directions which are common to all. These include:

1. The desire to achieve a balanced economy which is not dependent upon any single employment generator.
2. Encouragement of diversified agriculture, including programs for agricultural parks, and agricultural education and training.
3. Maintaining primary agriculture--sugar and pineapple--as a vital segment of the County's economy.
4. Limiting major resort development to designated areas in West Maui and Kihei-Makena.
5. Maintaining other areas of the County as basically residential in character. (Wailuku-Kahului will continue as the primary commercial, industrial, financial, and governmental center of Maui as well as a residential area).

6. Requiring that development which does occur provide adequate open space, be aesthetically pleasing and in harmony with Maui's environment.

Land uses in the project area are delineated by the Kihei General Plan\* and the Wailuku-Kahului General Plan shown in Figure 3-1. Both plans were approved by the County to guide the long range development of the respective communities. They are, in effect, policy documents for determining the location and extent of development and the desired land use pattern for controlling development in Central Maui.

The initial Kihei General Plan was adopted in 1969 to guide the long range development of the area between Maalaea Bay and La Perouse Bay. Within this 22 mile stretch of coastline are the communities of Maalaea, Kihei, Wailea, and Makena. The impetus for preparing a general plan was to insure the balanced and orderly growth of a sparsely developed area with the potential for becoming a major residential and resort community. The planners foresaw the economic potential of resort development to the Maui community and formulated a plan which would control this development and also preserve the region's most outstanding asset--22 miles of oceanfront with 13 miles of sandy beaches. Among the goals and objectives of the plan were:

1. Provide for the balanced and orderly development of the planning area, encouraging economic development which recognizes the long-range benefits of prudent land use allocations.

---

\*The 1969 Kihei Civic Development Plan has undergone several revisions and is now referred to as the Kihei General Plan. A comprehensive update of the Kihei General Plan was completed in November, 1975.

2. Preserve and enhance the natural beauty of the region as an economic and environmental resource.
3. Preserve and develop park lands and recreation resources for resident and visitor populations.
4. Develop and encourage high standards of design in public and private areas.
5. Provide an efficient and balanced transportation network for the movement of people and goods.
6. Stimulate the involvement of as many people as possible in the planning and development processes of the area.

The Wailuku-Kahului General Plan was prepared in 1972 and established land use guidelines for the development of Wailuku-Kahului and outlying areas of Waihee, Waiehu, Puunene, and Waikapu. The goals and objectives of the plan were to:

1. Provide for and encourage the participation of as many people as possible in the community growth process of the area.
2. Encourage and maintain a "balanced" growth of the community.
3. Provide proper balance of housing for all age and economic groups in the community.
4. Preserve and maintain the natural environment of the area.

Despite the differences in geographic setting and community planning issues, both plans were formulated on certain planning principles:

1. That planned growth is necessary and desirable to maintain the quality and life-style of the affected communities.
2. Through proper planning, affected communities may accommodate future development within the restrictions of general plans without despoilation of the environment.

3. The general plans must be realized through a continuous partnership of public and private interests wherever and whenever possible.

The proposed project is one of several capital improvements which will enable implementation of the approved general plans for Central Maui. The planned Piilani Highway, the operational Kihei Wastewater Reclamation Plant, the Wailuku-Kahului Wastewater Treatment Plant, and the Lahaina Wastewater Treatment Plant are examples of other capital improvements.

Maui County uses traditional zoning and subdivision controls to implement the desired land use policies delineated in the general plans. In addition, the County has initiated or implemented several innovative programs to insure that County planning policies are carried out. These programs include:

1. Encouraging major projects to utilize the County's Planned Development Ordinance, which provides flexible controls on aesthetics, open space, and other amenities.
2. Establishing an Urban Design Review Board to provide professional input in reviewing development proposals.
3. Administering the newly-enacted Shoreline Management Law to provide for protection of coastal areas, together with visual and physical access to the shore.
4. Developing agriculture parks at Kula, and Hoolehua, Molokai, and providing for agriculture education and research with Pacific Basin regional implications.
5. Working together with private enterprise in the development and transmission of adequate water resources for all parts of the island.

6. Developing and enforcing anti-speculation measures for housing projects developed with the financial support of the public sector.

The use of these innovative programs in conjunction with traditional controls such as zoning, subdivision ordinances, and building codes represent actions by the County government to enhance the natural environment while providing for the orderly, quality growth of Maui County.

In concert with the County's long-range plans, the Board of Water Supply is moving forward with a comprehensive program of water resource development and transmission. The proposed project is one element of this program. Other major elements include:

1. Improvements to the Upper and Lower Kula Water Systems.
2. Improvements to the Lower Paia-Kuau Water System.
3. Initial discussions leading toward an integrated water supply system for the island of Molokai.
4. Working with the County's Department of Public Works in utilizing sewage effluent for irrigation of recreational and agricultural areas.
5. Working with the State of Hawaii's Department of Land and Natural Resources to develop additional water sources in West Maui.
6. Improvements to the water systems serving rural areas such as Hana, Keanae, Haiku, Peahi, Ulupalakua, Kalae (Molokai) and Ualapue to Pukoo (Molokai).

Although the proposed project may be larger in scope than others, it is nevertheless only one element of a comprehensive program to upgrade the development and delivery of water to communities where needed, in accordance with the County's long-range program for community development.

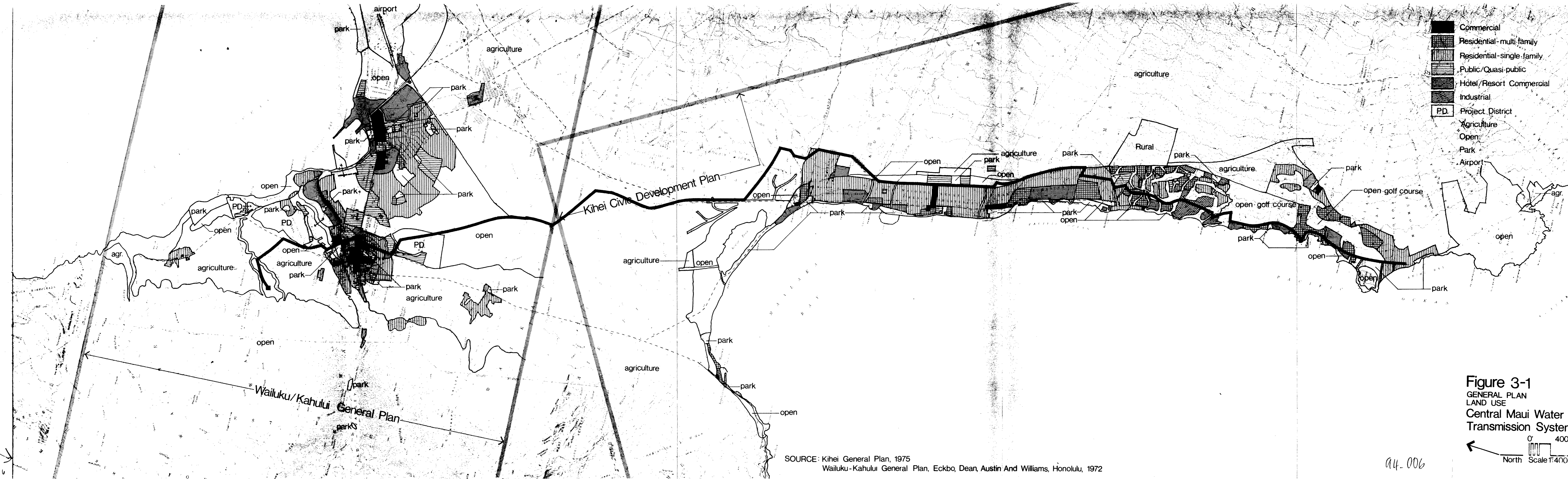
6. Developing and enforcing anti-speculation measures for housing projects developed with the financial support of the public sector.

The use of these innovative programs in conjunction with traditional controls such as zoning, subdivision ordinances, and building codes represent actions by the County government to enhance the natural environment while providing for the orderly, quality growth of Maui County.

In concert with the County's long-range plans, the Board of Water Supply is moving forward with a comprehensive program of water resource development and transmission. The proposed project is one element of this program. Other major elements include:

1. Improvements to the Upper and Lower Kula Water Systems.
2. Improvements to the Lower Paia-Kuau Water System.
3. Initial discussions leading toward an integrated water supply system for the island of Molokai.
4. Working with the County's Department of Public Works in utilizing sewage effluent for irrigation of recreational and agricultural areas.
5. Working with the State of Hawaii's Department of Land and Natural Resources to develop additional water sources in West Maui.
6. Improvements to the water systems serving rural areas such as Hana, Keanae, Haiku, Peahi, Ulupalakua, Kalae (Molokai) and Ualapue to Pukoo (Molokai).

Although the proposed project may be larger in scope than others, it is nevertheless only one element of a comprehensive program to upgrade the development and delivery of water to communities where needed, in accordance with the County's long-range program for community development.



- Commercial
- Residential - multi-family
- Residential - single-family
- Public/Quasi-public
- Hotel/Resort Commercial
- Industrial
- Project District (P.D.)
- Agriculture
- Open
- Park
- Airport

**Figure 3-1**  
 GENERAL PLAN  
 LAND USE  
 Central Maui Water  
 Transmission System

0' 4000'  
 North Scale 1:4000'

SOURCE: Kihei General Plan, 1975  
 Wailuku-Kahului General Plan, Eckbo, Dean, Austin And Williams, Honolulu, 1972

94-006



**environmental impacts 4**

SECTION 4

ANTICIPATED ENVIRONMENTAL IMPACTS AND  
MITIGATIVE MEASURES TO MINIMIZE ADVERSE IMPACTS

The construction of the proposed water transmission line will generate two types of environmental impacts on the Central Maui area. These impacts can be categorized as "primary impacts", resulting from the installation of the pipeline, and "secondary impacts" resulting from growth in the Central Maui area made possible by the provision of additional water.

The primary impacts are, for the most part, construction-related and limited to the duration of the project's construction. In most instances, these impacts can be documented and appropriate mitigative measures recommended to minimize their impact. These impacts are discussed in the first part of this report and are limited to the proposed pipeline alignment.

Secondary impacts resulting from growth are difficult to accurately assess. The difficulty stems from uncertainty as to the rate at which development will proceed, its scope, and the changing attitudes of the people towards development.

Nonetheless, an attempt has been made to identify significant anticipated impacts and to discuss their implications on the physical, social, and economic environment.

## PRIMARY IMPACTS

### I. AIR QUALITY

Ambient air quality will be affected by dust and emissions generated during construction which is anticipated to last 18-24 months. Dust will be raised during clearing and grubbing activities, excavation, and backfilling operations necessary to the installation of the pipeline. Dust will also be generated by the movement of construction vehicles on cane haul roads, improved roads, and other rights-of-way. Along the leeward coast unpredictable local winds will contribute to recurring dust problems.

Emissions will be generated during the operation of heavy construction equipment and vehicles. Combustion discharges can be expected from petroleum-fueled equipment used during site development.

During construction, dust and emissions may be a short-term nuisance but will be mitigated by appropriate measures. Dust levels will be controlled by water-wagons and/or other water sprinkling systems as required or needed. Roadways near construction sites will be periodically sprinkled to contain and control vehicular dust generation.

All activities will be conducted so as to minimize dust generation, and will be in compliance with the Air Pollution Control Regulations of the Department of Health and all applicable County ordinances relating to grading, excavation,

and dirt stockpiling procedures.

Combustion emissions from construction vehicles and equipment are not anticipated to cause a significant problem. Control measures will be taken to minimize the discharges and will include the proper maintenance and operation of equipment to promote maximum efficiency and minimum level of discharge.

Other short-term impacts on air quality are not anticipated. Open burning of any debris will not be permitted, and all applicable State and County ordinances will be followed.

## II. NOISE

Noise will be generated during all phases of construction activities, and will present a temporary nuisance to residents of areas near the pipeline alignment. Conventional construction equipment will be used, and noise generated will occur in the ranges presented in Figure 4-1. Use of pneumatic impact equipment will be minimal in urban areas. However, it is anticipated that blasting operations and extensive use of pneumatic impact equipment will be necessary in some locations above Kihei. Blasting noises will be mitigated by the use of controlled charges and blasting mats which also serve as a safety measure for construction workers.

Since construction will proceed incrementally along the proposed alignment, noise disturbance will be temporary in any location. General construction noise will be mitigated

FIGURE 4-1  
CONSTRUCTION EQUIPMENT NOISE RANGES

		NOISE LEVEL (dBA) AT 50 FT					
		60	70	80	90	100	110
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	EARTH MOVING	COMPACTERS (ROLLERS)		H			
		FRONT LOADERS		-----			
		BACKHOES		-----			
		TRACTORS		-----			
		SCRAPERS, GRADERS		-----			
		PAVERS			H		
		TRUCKS			-----		
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	MATERIALS HANDLING	CONCRETE MIXERS		-----			
		CONCRETE PUMPS			H		
		CRANES (MOVABLE)		-----			
		CRANES (DERRICK)				H	
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	STATIONARY	PUMPS		H			
		GENERATORS		-----			
		COMPRESSORS		-----			
IMPACT EQUIPMENT		PNEUMATIC WRENCHES			-----		
		JACK HAMMERS AND ROCK DRILLS			-----		
		PILE DRIVERS (PEAKS)				-----	
OTHER		VIBRATOR		-----			
		SAWS		-----			

Note: Based on Limited Available Data Samples

Source: EPA, 1971.

by limiting the hours of construction to between 7:00 a.m. and 4:00 p.m., five days a week. In addition, the contractor will ensure that all mufflers on construction equipment are functional and properly maintained.

### III. TRAFFIC

The proposed project will not substantially affect traffic patterns along the proposed pipeline alignment. For the most part, the pipeline has been purposely diverted away from major streets and highways. Minor disruptions will occur in rural areas where the pipeline crosses existing highway alignments. This will be a temporary effect lasting no more than 2-4 days at each cross-over point.

In urban areas, particularly Wailuku, traffic disruptions will be an intermittent inconvenience until this section of the pipeline is completed. During construction, movement of heavy equipment, trenching and backfilling operations, and general construction activities may necessitate the closing of streets on a temporary basis around construction sites. In this situation, through traffic will be diverted onto other streets thus limiting access to only local traffic. The contractor will be responsible for notifying motorists of pending construction, posting construction warning notices or signs, and stationing flagmen to divert traffic.

Construction vehicles will create a short-term nuisance and contribute to congestion while transporting materials from supply sources to project sites. Off-site hauling operations will occur during the normal hours of construction.

#### IV. ALTERATION OF LAND FORM

Where necessary, a 25 to 50 foot corridor will be cleared along the alignment to expedite site preparation, pipeline installation, movement of construction vehicles, and stockpiling of dirt and construction material. The natural terrain within the corridor will be disturbed through clearing, grubbing, grading, trenching, and backfilling operations. It is estimated that trenches 5 to 10 feet wide and 6 to 10 feet deep are required for installation.

The primary impact of these operations will be the removal of all existing vegetation within the pipeline corridor and the alteration of the topsoil regime within the pipeline trench. Following installation, the pipeline trench will be backfilled to existing grade in order to stabilize soil conditions and allow re-vegetation. With the exception of trees, re-vegetation should occur within 6 to 12 months.

#### V. LAND USE

No impacts on existing land uses are anticipated except that during construction approximately 9 acres of sugar cane will be temporarily removed from cultivation. Following construction, the land will be replanted with sugar cane. The transmission line alignment will not affect other agriculture ventures.

#### VI. FLORA AND FAUNA

The plants and wildlife along the pipeline alignment are, for the most part, introduced species widespread on Maui or elsewhere in the State. The endemic and indigenous plant

species recorded are common varieties. The pipeline will not pass through any areas which could be considered sensitive with respect to rare plants.

All of the mammals, reptiles, and amphibians likely to be present are common introduced species. The pipeline will not significantly affect any wildlife habitats. The pipeline will not pass through any habitat considered "critical" for endangered water birds, particularly the Hawaiian Stilt, or habitats of other endangered avifauna.

#### VII. ARCHAEOLOGICAL SITES

The proposed pipeline alignment will not intrude on any significant archaeological sites. The alignment was compared to previously-recorded archaeological sites plotted by the staff of the Statewide Inventory of Historic Places, and none of the known sites was found to be within the pipeline alignment.

In order to protect all sites near the proposed alignment, all identified sites will be clearly flagged so that they can be avoided by vehicular and pedestrian traffic during the laying of the pipeline. If any subsurface sites are uncovered, work will stop, and professional archaeologists will be brought in to scientifically examine the sites.

In addition to the above measures, a blanket permit to disinter will be obtained following the regulations of Chapter <sup>321</sup>~~734~~, Hawaii Revised Statutes to ensure that any possible burial found while excavating the pipeline trench will be handled according to the above statute. The State



Department of Health, Office of Records and Other Vital Statistics, will be contacted to expedite this matter.

VIII. URBAN INFRASTRUCTURE

A. Water

No significant impact on water supply is anticipated. Water will be used to control dust levels as required during construction activities. In addition, water will be used to clean and test the completed pipeline.

B. Wastewater

No significant impact on wastewater disposal is anticipated.

C. Power

No significant impact on electrical power is anticipated.

D. Communication

No significant impact on telephone service is anticipated.

IX. PUBLIC FACILITIES

Aside from noise and dust, no significant impacts on public facilities such as schools and parks are anticipated. There may be an impact at Kahului Harbor, as construction material ordered outside of Maui County is delivered and stored temporarily in the port area until transferred to the construction baseyards.

X. PUBLIC SERVICES

No significant impacts on police and fire protection services are anticipated. If necessary, night-time security

for baseyards, materials, and construction equipment stored along the route will be provided by the contractor. In addition, the contractor will be responsible for disposing of construction refuse and debris at County approved refuse sites.

XI. ECONOMIC

The immediate benefit of the transmission line project will be an infusion of cash and the provision of jobs in the State, and particularly in Maui County. The estimated \$11.3 million (using 1974 dollars) to be spent on the line may involve the purchase of some materials outside Hawaii, but it is anticipated that the major portion of this amount will be spent in purchasing labor and services within the State. These direct expenditures will provide direct tax revenues to the State, County and Federal governments. Of the total \$11.3 million, approximately 35 percent or \$3.95 million will be spent for labor payroll and fringe benefits. Of that total, approximately 9 percent or \$360,000 will be devoted to payroll taxes. An additional \$452,000 can be expected in revenues from general excise and gross income taxes paid by suppliers, subcontractors, and the contractor. These direct expenditures, particularly the amount spent in wages and salaries, will generate an increased demand for goods and services from construction workers and suppliers sharing in the project payments.

It is anticipated that most of the labor needed for the construction of the water transmission line will be hired from Maui County. This will be of substantial benefit to

the economy of the County, not only because of the infusion of cash and the resulting stimulation of purchases already discussed, but also because of the social benefits derived by providing additional jobs within the construction industry. Of the full construction costs of \$11.3 million, approximately 35 percent will be spent for labor, providing full time employment during the 18-24 months of the project for 75 to 125 workers.

SUMMARY

As noted previously, short-term impacts are construction related and for the most part limited to the duration of project construction. These impacts will be mitigated by the application of appropriate measures mentioned in this EIS and by other measures deemed necessary by the contractor and/or the County. During this phase of the project, the adverse impacts are expected to be limited to possible annoyance, irritation, and inconvenience due to construction noise and dust, or to temporary congestion or rerouting of traffic in portions of the project area.

Beneficial impacts generated during the construction phase of the project will be primarily economic, with subsequent beneficial social impacts.

## SECONDARY IMPACTS

### XII. ECONOMIC

The development of a new water transmission line to serve Central Maui will increase the availability of water and implement the County's long range growth plans. As such, Central Maui is expected to experience population increases, and further economic development, which will provide jobs and services to meet the needs of Maui residents and visitors.

#### A. Population Projections

Population projections in this EIS are projected to a 1985-1990 time horizon. The projections are based on the estimated number of visitors to Hawaii by 1985 (a proportion of which will visit Maui) and recent estimates of the number of residents within the Wailuku-Kahului and Kihei planning areas.

##### 1. Visitor Projections

The number and type of visitor facilities constructed in the Kihei area, and new housing for residents working in the resort related facilities in Kihei will depend to a degree on the expected increase in the number of visitors to Maui, and on their length of stay. The island of Maui has become an increasingly popular visitor destination area for first-time visitors, return visitors, and Hawaii residents, as more attractive resort areas have been developed.

While Oahu remains a destination island for almost all of Hawaii's visitors, those who do travel to one or more neighbor islands have shown a consistent preference for Maui, as indicated in Table 4-1.

The Task Force on Alternative Economic Future for Hawaii's conservative estimate indicated that the total number of visitors to Hawaii could reach 5 million per year by 1985, which implies an increase of about 6 percent per year. A similar projection of 4.7 million visitors per year was accepted as reasonable by the Tourism Planning Advisory Committee in their January 1976 report, implying an annual increase rate of about 5.5 percent.

TABLE 4-1  
PERCENTAGE DISTRIBUTION OF INTENDED VISITS

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
Only Oahu	34.1%	33.0%	35.9%	33.2%
Only the Neighbor Islands	-	3.6%	6.0%	7.7%
Oahu and Neighbor Islands	<u>65.9%</u> 100.0%	<u>63.4%</u> 100.0%	<u>58.1%</u> 100.0%	<u>59.1%</u> 100.0%
Kauai	41.5%	39.2%	34.8%	33.5%
Hawaii	45.6%	43.9%	40.7%	41.1%
Maui	48.7%	49.3%	45.2%	47.3%

Source: Hawaii Visitors Bureau Annual Reports, 1972, 1973, 1974

According to expressed intentions to visit Maui, a total of 852,200 westbound visitors visited Maui during 1974, or 44 percent of the total westbound visitors responding. When combined with visitors traveling beyond Hawaii, the percentage drops to 39 percent, since these visitors usually pass through the island with a brief stay on Oahu, and do not generally plan side trips to the neighbor islands. If Maui were to continue to receive the same percentage of visitors through 1985, the number of tourists per year would be approximately 39 percent of 4,700,000, or 1,833,000. More importantly, the length of stay for Maui's visitors has been increasing steadily during the 1970's, with a higher number of total visitor days each year. If the trend of longer stays were to continue through 1985, the length of stay might reasonably become 4.2 to 4.4 days, which would mean annual visitor days for Maui would total 7,698,000 to 8,065,200. These visitor days would mean an average number of visitors per day of between 21,100 to 22,100 by the year 1990. Of this total it is anticipated that 46 percent or approximately 9,710 to 10,170 visitors per day will stay in Kihei and 3 percent or approximately 628 visitors per day will stay in Wailuku-Kahului.

The anticipated increase in the visitor

population will make their presence in Maui more noticeable. However, the development of specific resort areas with appropriate visitor oriented facilities to service the visitors, such as that at Kihei-Makena and Kapalua, will continue to minimize their visibility in those areas of Maui not specifically devoted to visitors.

## 2. Resident Projections

It is anticipated that growth in the Wailuku-Kahului planning area will occur at a slower rate than that of Kihei. Current population estimates suggest that the 1985-1990 population of Wailuku-Kahului will be within the projections made in the Wailuku-Kahului General Plan. As such, the 1985-1990 population of this area is anticipated to range between 25,000 and 27,000 persons. On the basis of this assumption, the 1985-90 de facto population (residents and visitors) of Wailuku-Kahului is projected to range between 25,628 and 27,628 persons.

Population growth in the Kihei planning area is much more difficult to project due to the various factors affecting the pace of development. An analysis of the 1990 population projected in the 1970 Kihei General Plan and the Water Master Plan for the County of Maui (1971) suggests these estimates appear to be too accelerated to match more recent

economic trends on Maui and demographic trends in the region. As such, the 1990 population levels projected by these two documents in all likelihood will not occur until well after 1990, or may never materialize at all.

During its recent update of the Kihei General Plan, the County Planning Department projected a 1995 population of 13,000 residents. An analysis of this projection and other demographic data suggests a more reasonable estimate of Kihei's 1985-1990 resident population to range between 12,000 and 15,000 residents based on an estimated present population of 3,000 in Kihei. It is assumed that an accelerated program for construction of primary visitor facilities, housing, and commercial and industrial developments will take place by 1990 thus contributing to a faster rate of population growth.

On the basis of the above assumption the 1985-1990 de facto population (residents and visitors) of Kihei is projected to range between 21,710 and 25,170 persons. Adding this to the projected de facto population of Wailuku-Kahului, the total de facto population of the project area is estimated to be between 47,338 and 52,798 persons for the time period considered.



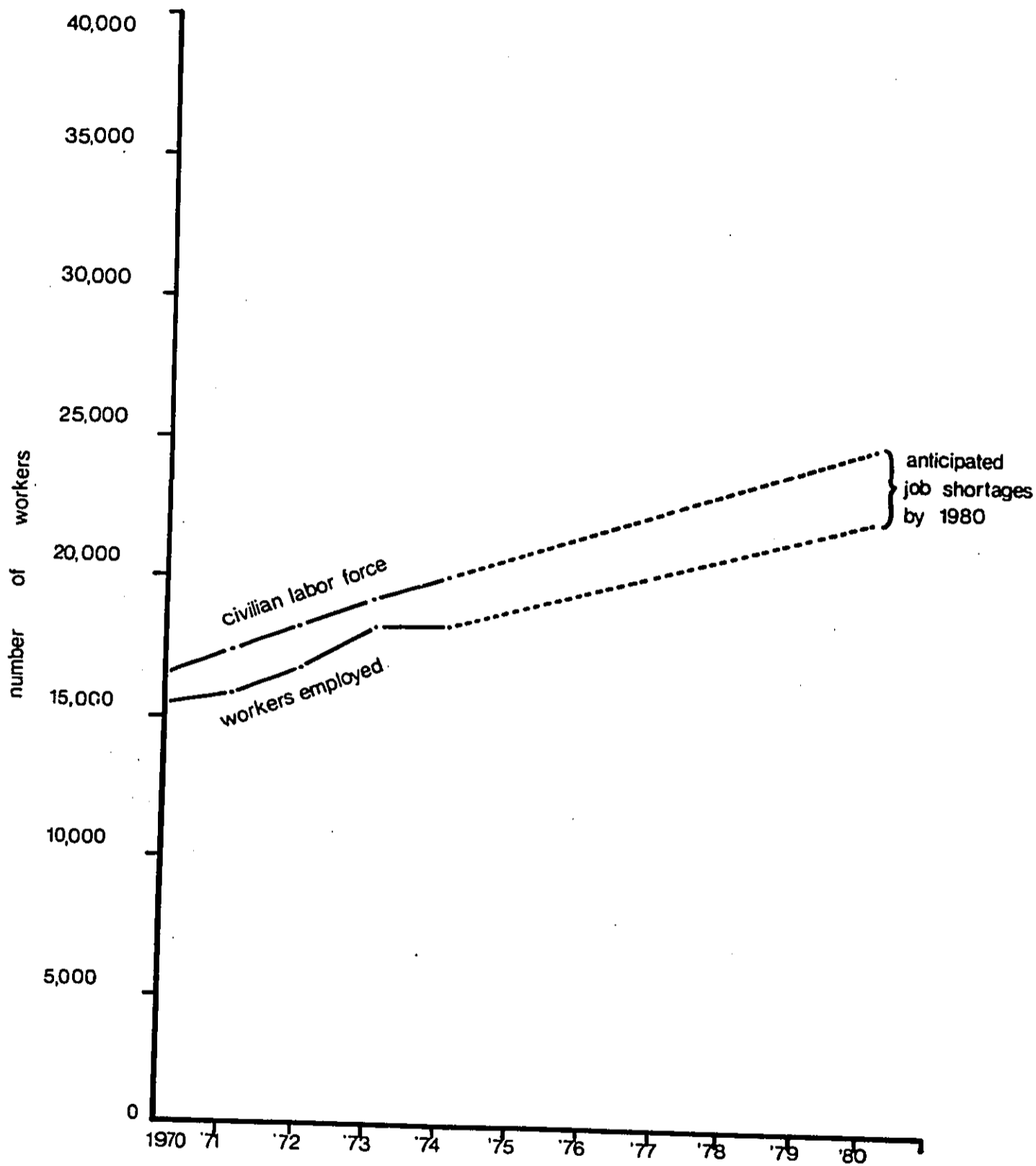
B. Employment Projections

As shown in Figure 4-3, the size of Maui island's labor force, if growth continues at its present rate, would reach approximately 25,000 persons by 1980. If present trends continue and growth in the number of employed reaches approximately 22,500 by 1980, the shortage of jobs on the island of Maui alone would reach 2,500, or 10 percent of the work force. Without new employment opportunities in the visitor industry and in the construction of visitors' facilities, this unemployment could worsen during the 1980's. The labor force and the number of employed persons represented in Figure 4-3 are only those persons who are actively seeking employment and who are eligible for State and County assistance in unemployment benefits. The potential labor force is probably considerably greater, since it also includes those persons interested in obtaining work, but whose eligibility for compensation has lapsed, or who have not worked recently and are therefore not eligible for compensation. Included in this category are many young persons, and women who have worked in the home for some time and are ready to seek outside employment, as well as workers who have been unemployed for long periods. The potential labor force also includes residents from all other islands who are actively unemployed, or potential entrants into the labor market, and who might consider relocation to

figure 4-2

Labor Force Projections Without New Sources of Employment

Comparison of number of persons actually employed and number of persons in civilian labor force on the island of Maui. Actual for 1970, projected for 1975 through 1980.



Maui if assured of adequate employment opportunities there. Since job shortages similar to Maui's are anticipated on each of the other islands during the late 1970's and early 1980's, a developing statewide problem could be alleviated by encouragement of new job opportunities on Maui.

C. Development of Visitor Facilities

In January of 1976, the Governor's Tourism Advisory Planning Committee released their report on the potential increase in visitor facility development which might be desirable to provide jobs for local and incoming residents. Their report discussed the need for Hawaii to provide 6,000 new jobs per year for the next ten years to provide full employment for the projected growth in local population, and 9,400 new jobs per year to provide employment for both local and in-migrant job needs. Their report looked to the visitor industry to provide nearly half of these new jobs in Hawaii's economy.

Several assumptions used by that Committee in preparing their report and considerations of the future job opportunities in the visitor industry can be relied on to provide similar projections for the development of the visitor industry within Central Maui. Two such assumptions are:

- assumed party size of 1.88 per hotel room
- assumed occupancy rate of 76%

Based on these assumptions and additional assumptions noted as part of Table 4-2, it is estimated that 8,045 visitors of the total 12,390 gain in visitors for the island of Maui by 1990 will accrue to the Kihei-Makena area. On the same basis, 5,880 visitor units will need to be added to the existing supply in the Kihei-Makena area as the area grows to become one of the two primary visitor centers on Maui. In calculating the potential employment in future construction and hotels and projected tax revenues, the lower number of visitors to Maui (21,100) is used. The resulting projections of tax revenues are therefore conservative.

D. Projected Employment in Construction and Visitor Industries

The construction of visitor facilities to serve the expected increase in visitors to Central Maui may occur at any time in the future that the market growth indicates a need for such expansion. It is likely that most of the planned developments already zoned except for the Seibu property will be completed during the next ten to fifteen years, that is, by 1990. Construction of primary visitor facilities, residential housing needed by the increased population, and commercial and industrial development during this period will have the effect of sustaining higher employment levels within Maui County's construction industry, and later within the visitor service industries.

TABLE 4-2

VISITOR FACILITY PROJECTIONS

LOCATION	VISITOR UNITS <sup>1</sup>		ASSIGNMENT OF PRESENT VISITORS PER DAY ON <u>PRESENT UNITS</u>	ASSIGNMENT OF ESTIMATED GAIN IN VISITOR DAYS BASIS OF <sup>2</sup> <u>ASSIGNMENT</u>	TOTAL VISITORS <u>PER DAY</u>	% of TOTAL ESTIMATED BY <u>LOCATION</u>
	EXISTING	PLANNED (Hotels & Condominiums)				
Hana	87	-	130	-	130	0.6
Kula-Makawao	23	90	35	1.1% 131	166	0.8
Wailuku-Kahului	369	60	540	0.7% 88	628	3.0
Kihei-Maalaea	1142	1201	1664	64.9% 8045	9709	46.0
Lahaina-Kaana- pali-Napili	<u>4346</u>	<u>836</u>	<u>6341</u>	<u>33.0%</u> 4126	<u>10467</u>	<u>49.6</u>
TOTAL	5967	2187	8710	100.0% 12390	21,100	100.0

## Sources of Data and Basis for Calculations:

<sup>1</sup>Hawaii Visitors Bureau Plant Inventory, October, 1975.

<sup>2</sup>Remainder of visitor days assigned to Kihei-Maalaea after direct calculation of visitor days from planned units for Kula-Makawao and for Wailuku-Kahului with 150% X planned units for Lahaina-Kaanapali-Napili.

Based on the ranges of population gains estimated for Kihei-Makena and Wailuku-Kahului and the increases in visitor units before 1990 discussed earlier, construction expenditures for the two areas initially could vary from \$576,285,000 to \$664,995,000 as shown in Table 4-3.

Of the total expenditures for construction, approximately \$274,258,300 to \$335,083,600 would be spent for labor, including wages and fringe benefits, and would provide jobs for approximately 530 to 645 construction workers each year for the next 20 years if the projected construction were to take place before 1990. In 1975, there were approximately 2150 construction workers in Maui County, and 450 of those were reported to be unemployed by the end of 1975.

With payroll taxes estimated at 9 percent of the total cost of labor, the State and Federal governments would receive approximately \$24,683,200 to \$30,157,500 in tax revenue from this labor source alone over the full period of construction.

A secondary effect of the construction of new residences, visitor facilities, and commercial and industrial improvements would be the continued employment of persons in service, retail and trade professions who now support construction employment and serve construction employees on Maui. This is estimated at between 370 and 450 jobs annually\* until 1990, if the

---

\*Based on multiplier of 1.7 as estimated by the First Hawaiian Bank.

TABLE 4-3

ESTIMATED CONSTRUCTION EXPENDITURES

POPULATION GROWTH BY 1990		<u>RANGE OF CONSTRUCTION<sup>1</sup></u>	
<u>LOCATION</u>	<u>RANGE OF GAIN IN POPULATION</u>	<u>LOW</u>	<u>HIGH</u>
Wailuku- Kahului	2400- 4700	\$33,750,000	\$66,105,000
Kihei-Makena	9000-12000	<u>\$169,155,000</u>	<u>\$225,510,000</u>
SUBTOTAL RESIDENTIAL		\$202,905,000	\$291,615,000

Estimated cost of construction hotels in Kihei-Makena by 1990:

5025 rooms @ \$50,000 room = \$294,000,000

Estimated cost of constructing related commercial and industrial buildings @ 27% of visitor units<sup>2</sup> \$ 78,380,000

Total range of construction costs: \$576,285,000 to \$664,995,000

<sup>1</sup>Based on \$45,000 and 3.2 residents per single-family dwelling and \$55,000 and 2.0 residents per apartment.

<sup>2</sup>Based on ratios of land use approved by Kihei General Plan.

projected construction were to take place by then.

The employment which would take place in the visitor-related employment and the secondary employment that would result from local household spending due to the increase in production initiated by increased visitor expenditures follows, based on The Impact of Tourism on the Hawaiian Economy - An Input-Output Analysis. These calculations are based on visitor expenditures and therefore are related directly to the number of visitor days for Kihei-Makena and Wailuku-Kahului estimated in the 1985-1990 time frame.

Based on this analysis, it is estimated that an increase of 8,045 visitor-days in Kihei-Makena would result in annual purchases of \$125,620,000 and would create 7,914 new jobs in the visitor industry.\* Taking into account the employment generated by this visitor related employment, indirect and additional employment for 2,261 workers would be realized on Maui. These estimates indicate the significant impact the development of the visitor industry on Maui would have on the problem the County now faces, and will continue to face, in providing employment to the rapidly increasing labor force discussed earlier in this section.

---

\*For a million dollar change in visitor expenditures about 63 employees will be hired in the visitor industry of which 16 jobs will be in the hotel industry, 6 jobs in the transportation industry, and 41 jobs in other industries that comprise the visitor industry.



E. Projected Property Tax Revenues

The economic value to Maui County of the new construction in Central Maui would be primarily in increased property tax revenues. Basing the cost of expected improvements in 1975 dollars, and using tax rates currently in effect for each type of improvement in Maui County, the improvements, when completely constructed, would net an increase in property tax revenues of \$5,184,500 to \$6,005,500 annually in Central Maui.\* These revenues would not be realized until all construction was completed, probably by 1990, but if construction were to proceed on a fairly even level over those fifteen years, the increase in tax revenues could be expected to occur gradually, with an increase of approximately \$300,000 to \$350,000 per year for each of the next fifteen to twenty years until the total development projected is reached.

XIII. SOCIAL

Social changes arising from development are related to many variables which are difficult to quantify and for which no data base is readily available. Hence, precise prediction of these changes is not possible. Some generalizations about anticipated impacts can be made, even when the exact nature or extent of the change cannot be predicted.

---

\*Based on real property tax laws in effect as of December 31, 1975.

Within these limitations, the following discussion attempts to highlight several existing social conditions which are likely to change as a result of the project and related development, and also existing patterns of change which may be accelerated or amplified by such development.

Although the greatest amount of growth and development related to the pipeline project is expected to occur in the Maalaea-Kihei-Makena region, social impacts incurred as a result of development and population increases are anticipated in other areas as well. The social impacts are likely to be most dramatic in the area slated for the greatest growth, Kihei, and more subtle in Wailuku-Kahului.

A. Demographic Characteristics

Some changes in the demographic characteristics of the increased populations may be anticipated. These changes are likely to be more pronounced in Maalaea-Kihei-Makena than in Wailuku-Kahului.

Wailuku-Kahului

It is expected that some residents of outlying areas on Maui and some new residents as well may move to Wailuku-Kahului in response to a number of variables which may be linked to development in the Kihei area. These variables include such factors as greater job opportunity, increased family income, and availability of housing. There is no basis for expecting the new residents to differ substantially from the

current residents, and significant changes in the demographic characteristics of the augmented population may not be predicted.

Maalaea-Kihei-Makena

In the Kihei area, on the other hand, characteristics of the increased population, both resident and visitor, are likely to differ from the existing population characteristics as shown in the 1970 Census. Until the 1980 census data are available for comparison purposes, it cannot be substantiated, but it appears that the ethnic subgroup most heavily represented in recent years' migration into Kihei has been Caucasian. Additionally, most visitors to the area are Caucasians arriving from the United States mainland and Canada. [This may represent a trend away from the predominance of Hawaiians and Portuguese reported in the 1970 census, a trend that may possibly become characteristic of future growth throughout this area.]

Although it cannot be predicted with confidence, it is conceivable that the pattern of growth in the Kihei community itself may differ somewhat from that at the Wailea resort and Makena. The economic and social considerations which attract many island families to the major new resort developments might not be in force in

nearby Kihei where less expensive existing and future housing may be available. Availability of housing, greater job opportunity spawned by development in Wailea and Makena, additional facilities and services which become available with development (such as a new highway to facilitate commuting), combined with the natural amenities of the area may make Kihei more appealing to local Maui residents.

B. Reduced Unemployment

Development of the area is expected to create many new job opportunities. Because of the resort character of much of this development, most of the jobs are expected to be in service, retail, and trade occupations related to the visitor industry. As noted in the discussion of the economic impacts of development, it is anticipated that approximately 7914 new jobs will be created in the visitor industry between 1985-1990.

Reports prepared in 1974 for both the Hawaii Visitor's Bureau and the Wailea Development Company indicate that 75 percent of visitor-related workers are not heads of households. Based on this information it is likely that three-fourths of the new service occupations in the Kihei area may be filled by wives of men employed on Maui and, to some extent, by their older sons and daughters who have not yet left home.

As discussed in the Sociological Profile (Section 2) of this report, both Wailuku-Kahului and Maalaea-

Kihei-Makena have high unemployment rates for women (35 percent and 38 percent respectively). If the pattern of employment in service occupation holds, it may be anticipated that resort development in Kihei may lead to a marked reduction in the unemployment rate for women.

C. Increased Socio-Economic Status

The employment by the tourist industry of the wife, and in some families of the older sons and daughters, is likely to result in increased family income and greater purchasing power. This increase in purchasing power may have many effects, including, for example, enabling the family to become involved in recreational and other activities which formerly were not an option for them because of limited income. It also may mean that the family will be able to buy a house instead of renting, or if they already own one, that they may seek housing that is more suitable or satisfying to them.

Educational level, another indicator of socio-economic status, is also likely to increase. It may be anticipated that some of the new employees themselves will return to school. Maui Community College has a travel industry management program designed to provide training for persons seeking to train for some aspects of work in the visitor industry. Data reported by the college indicate that the average age of their students

is 25, which suggests that a number of older individuals return to school after some years have passed since graduation from high school. It may be expected that this pattern will continue, and that employment and advancement opportunities in the tourist industry may motivate some people to return to school.

Educational opportunities for sons and daughters also may be generated by an augmented family income. For example, a university education in Honolulu or on the mainland may become a real possibility for many who could not have considered it before.

D. Alteration of Traditional Family Roles

As a consequence of presently unemployed women finding jobs outside the home, one may expect to see some alteration in the traditional family style in which the woman's role is that of housewife and mother. This evolution in woman's role has been witnessed throughout our society for some time. In recent years the trend has accelerated, and in all likelihood it will continue.

Some evidence that women on Maui welcome this change is provided by the fact that so many identify themselves as unemployed. The desire of many women to alter their traditional role through employment outside the home is manifested in this data. The continued development of the Kihei area and the job opportunities which result from this development may facilitate continued increases in the number of families in which

both the husband and wife work.

E. Social Welfare and Other Services

Some changes in the requirements for these services are likely to occur along with or following other development-related effects. Although they are extremely difficult to delineate and quantify, some examples of potential impacts may be given. For example, a reduction in dependency on certain social services such as food stamps may occur as a result of increases in employment and socio-economic status. On the other hand, the need for other services such as day care centers for the young children of working mothers may be somewhat greater.

There will be a need for activities and services which increase resident-visitor interaction. Through its Department of Parks and Recreation, the County already has planned a number of such activities, including golf and tennis clinics, exercise programs, and ceramics classes to name a few. Programs such as these may be expected to foster social interaction between residents and visitors and between long-term and newly arrived residents. The increased sociability may contribute toward increasing the feeling of belonging and becoming a part of the community for many of Maui's newcomers.

XIV. AIR QUALITY

The ambient air quality of the Central Maui area, pre-

viously described in Section 2 (VII), is affected by agricultural activities, point source emissions, pollution from internal combustion engines, construction activities and from natural sources. All these sources with the exception of pollution from natural sources can be controlled by enforcement of governmental air pollution regulations. It is therefore anticipated that the ambient air quality should not be adversely affected.

Specifically, the ambient air quality of the Kihei area is influenced by pollution from natural sources, dust and ocean salt spray. Portions of the area are anticipated to have continued dust problems due to low rainfall and the lack of vegetative cover. To some extent, the dust originating from Kealia Pond and the Maalaea mudflats have been minimized by the commercial activities of Fishfarms Hawaii which pumps water into Kealia Pond and prevents the pond from drying.

Landscaping in the developing areas of Kihei will also aid in the prevention of future dust problems. As for salt spray, very little can be done to prevent this natural air pollution source.

#### XV. NOISE LEVELS

Residual noise levels in the study area will be altered as land usage is altered. When land usage changes from rural to suburban, from suburban to urban, or urban to downtown city, the outdoor residual noise level can be expected to increase by 10 dBA or more. If land usage is



not altered, then residual noise levels will remain approximately the same (EPA, 1971).

Residual noise levels in the Kihei-Makena area will show the greatest change, resulting from increased urbanization as projected in the Kihei General Plan. It is anticipated, however, that such levels will change primarily in areas away from the shoreline, where existing noise levels range from approximately 20 to 45 dBA. The areas along the shoreline, which have noise levels ranging from 50 to 60 dBA, depending upon wind and surf conditions, will not be as affected by noise generated from increased urban activities.

Increased traffic volume will be the major contributor to an increase in residual noise levels in the area. This increase will be most apparent along the new Piilani Highway to be constructed to the east of Kihei Road. Noise levels along this new corridor are anticipated to range between 58-65 dBA (Piilani Highway Draft EIS) and will be exceeded 50 percent of that time (L<sub>50</sub>) at a distance of 50 feet from the highway.

#### XVI. ALTERATION OF LANDFORM

Landform will be altered during site preparation and construction activities associated with future development. Clearing and grubbing operations will remove vegetative cover, and trenching and grading activities will alter existing terrain. Such activities will disturb existing soil conditions and, with the absence of vegetation, in-

crease the probability of soil loss and surface runoff, as well as altering drainage patterns. These impacts can be minimized by strict adherence to the standards contained in the County grading ordinance. The monitoring of grading activities by appropriate County agencies will ensure that the public health, safety, and welfare is not endangered.

#### XVII. OFF-SHORE WATER QUALITY

The major source of water pollution affecting the offshore water of Central Maui is the discharge of raw sewage. The recent completion of the Kihei Wastewater Reclamation Plant has generally corrected the threat of pollution in the Kihei area. Upon completion of the Kahului-Wailuku Wastewater Reclamation Plant, raw sewage pollution of the offshore Kahului waters will be eliminated. Both treatment facilities have been designed to meet present and future community needs and no degradation of offshore water quality is anticipated.

Increased urbanization may also affect off-shore water quality by:

1. The loss of vegetation during site development activities which may increase erosion and therefore cause sedimentation and turbidity in coastal waters of the Kihei-Makena area.
2. Increased surface runoff from paved areas which may carry chemicals and other matter associated with urban activities into near-shore waters.

In addition, chemical additives, such as fertilizer, pesticides, and herbicides on the land may also percolate into the groundwater and ultimately be carried into the ocean through groundwater seepage.

All potential actions which may alter water quality in both the off-shore receiving waters and groundwater will be monitored by appropriate State and County agencies. Monitoring and enforcement of State and Federal water quality standards by appropriate agencies will insure that water quality would never be adversely affected to such an extent so as to endanger public health or safety.

#### XVIII. FLORA/FAUNA

It is difficult to ascertain the impacts of development on flora and fauna without specific development proposals and in-depth studies of the flora and fauna where specific developments are proposed. However, certain generalizations can be made.

Development activities will remove existing vegetation. As a result, it can be anticipated that animal habitats will be affected and the wildlife populations (densities rather than types) substantially reduced. As development is completed, a restructuring of flora and fauna resident to the area can be anticipated.

As much as possible, the small brackish ponds near Puu Olai should be maintained as a habitat for the Hawaiian Stilt.

#### XIX. LAND USE

Urban development will generate land use changes throughout the project area. These changes will occur primarily in the Kihei area since this area is largely undeveloped and general planned for residential-resort development. As it is difficult to assess the impacts of land use changes

without specific development proposals, certain generalizations can be made as follows:

1. Land will be developed in accordance with its zoning.
2. Land values will increase.
3. Improvements to real property will expand the County's tax base.
4. Development of large areas under single ownership may increase the opportunity to achieve quality development.
5. The future rate of land use changes will depend on external economic conditions, re-evaluation of existing general plans and zoning by policy-makers, and the attitudes of the people toward development.

XX. URBAN INFRASTRUCTURE

The new Central Maui Water Transmission System is one of several capital improvements necessary to implement the desired objectives of County approved general plans. Like the existing waterline, other public facilities need to be reevaluated periodically in order to meet anticipated future demands. In order to accommodate future development, the State and County have embarked on capital improvement programs geared to supplement or upgrade existing facilities. A description of planned improvements and potential environmental impacts are discussed below.

A. Highways

Transportation facilities are also required for urban growth. Kihei Road by itself may be inadequate to handle future traffic loads. As such, the State Department of Transportation proposes to construct a

major thoroughfare, Piilani Highway, linking Kihei and Ulupalakua. Aside from providing a continuous transportation link between Central Maui and the Kula area, the highway will serve planned developments in the region. An EIS on this proposed highway has been prepared and is currently under review.

Average daily traffic (ADT) on the new highway is projected at 4,400 vehicles per day by 1979 (if construction is completed). By 1993, ADT is anticipated to reach the design capacity of the highway, which is 7,400 vehicles per day; Kihei Road, by 1993, is anticipated to handle 5,400 vehicles per day (DOT, 1973). Although the number of vehicles will increase because of the highway, it is expected that at any given traffic density exhaust emission levels might decrease because of the smoother traffic flow. The internal combustion engine will burn fuel more efficiently at constant speeds, therefore, reducing the amount of unburned hydrocarbon and carbon monoxide released into the atmosphere. Also, improved emission control devices installed on newer automobiles and more stringent control of older vehicles will reduce the automobile emissions per vehicle. (DOT, 1973).

B. Wastewater

The new municipal wastewater reclamation plant at Kihei has an initial design capacity of 4 mgd. The facility can be expanded to accommodate future loads

and will eventually collect and treat all sewage from Maalaea to Wailea. A complete wastewater collection, treatment and effluent disposal system will be required to serve the Makena area.

The Wailuku-Kahului Wastewater Reclamation Plant, currently under construction, will have an initial capacity of 6 mgd. Secondary-treated wastewater effluent will be disposed via deep injection wells.

C. Power

As Maui's population increases, so will the need for electrical power. Maui Electric Company (MECO) anticipates they will be able to produce enough generating capacity to meet future power requirements.

D. Communication

Future development will warrant expansion of Hawaiian Telephone Company's Wailuku and Kihei central offices. This can be accomplished with little or no disruption to present service. Expansion will probably be necessary by the mid 1980's.

XXI. PUBLIC FACILITIES

A. Schools

The State Department of Education projects future educational requirements (facilities and programs) based on an assumed number of school age pupils per housing unit type.

Enrollment in the Baldwin Complex is projected to increase more than 40 percent in the next 20 years. This growth will result primarily from the addition of approximately 2,200 housing units within the Waiehu-Waihee-Wailuku area and an estimated 4,000-5,000 housing units in Kihei-Makena. Enrollment estimates for the Kihei-Makena region assume that 50-70 percent of the future housing units will be resort-oriented with a subsequent minor impact on the school population. For purposes of comparison, enrollment in the Maui High Complex is projected to increase 35 percent in the next 20 years, assuming 4,800 new housing units will be constructed. Sixty percent of the new housing is assumed to occur in the Makawao-Pukalani area.

B. Parks and Recreation Facilities

The influx of new residents, particularly in the Kihei area, will have an impact on existing recreational areas. The beaches of this area are the primary recreational area used by residents and visitors. In order to provide access to this prime recreational area, the County has not only provided beach parks but has required developers to provide public access to the beaches. For example, in the Wailea development, public access and landscaped walkways to the beaches and parking lots at five locations have been provided and dedicated to the County of Maui. Within existing developed areas, the County has also embarked on a

program to acquire public rights-of-way.

Future State and County efforts to provide additional recreational facilities in the area will depend on available funds. It is anticipated the County will continue to upgrade existing facilities and to provide for additional recreational facilities as needed and financially feasible.

## XXII. PUBLIC SERVICES

### A. Police and Fire

Anticipated population increases in the project area will undoubtedly cause a need for greater police and fire protection capability. The new water transmission line will supply enough water to sustain sufficient fire flows thus remedying a shortcoming in the existing water line. As further development takes place, additional fire personnel and equipment will be required. The County is currently evaluating the need for a new fire station at the junction of the new Piilani Highway and Wailea Road entrance.

An increase in police service to the area will also be required as development proceeds. Generally, as densities in an area increase so does crime. Based on existing trends, as reported by the Maui County Police Department, theft may be a major problem in the coming years. Increases in such crimes will warrant additional personnel and beat routes. In addition, police and fire personnel can be expected to engage in



more sea rescue operations than is presently the case.

B. Refuse

Solid waste generation is anticipated to increase as population increases. By 1990, refuse on the order of 176 tons per day may be generated in the project area (Hawaii State Plan for Solid Waste Recycling, 1972).

A secondary impact of increased solid waste will be on waste disposal. The existing Waikapu sanitary landfill will probably reach its capacity by 1977 and other county landfill sites must be found, if the primary disposal mode continues as sanitary landfill. The County is currently studying alternative sites for use as sanitary landfills and alternative solid waste disposal methods.

SUMMARY

The cumulative economic, social, and physical secondary impacts attendant with increased development can be summarized as follows:

1. The Maui County economic base will not be dependent on any single employment and income generator. Development will have multiplier effects on income and employment, not only in the construction and visitor industries, but also in agriculture, retail and wholesale trade, manufacturing, and other sectors of Maui's economy. In effect, income and employment attendant with development will generate additional economic opportunities throughout Maui.
2. Increased job opportunities will, in turn, result in increased family income and purchasing power. The attendant increase in family income may have many effects including, for example, enabling the family to engage in activities which were previously not an option for them because of limited income.

3. The County's tax base will expand and the revenues generated will provide for additional and improved public facilities and services throughout the County of Maui.
4. The overall housing stock of Maui will increase.
5. The resident and visitor population of Maui will increase.

In addition to the above impacts, physical alteration of landform, alteration of air and water quality, removal of vegetation, increases in noise levels, and traffic increases may be anticipated.

These impacts can be mitigated by the enforcement of Federal and State regulations and County ordinances.

Development will place additional demands on public facilities and services. Improvements to public facilities (such as highways) are already planned and will be financed by the Federal government and State and County capital improvement monies.

**adverse environmental effects 5**

SECTION 5

PROBABLE ADVERSE ENVIRONMENTAL EFFECTS  
WHICH CANNOT BE AVOIDED

Construction activities will create short-term inconveniences such as dust, noise, and traffic disruptions which can be mitigated by the proper application of dust, noise, and traffic control measures. Land alteration will disturb existing soil regimes and remove existing vegetation. Earth-moving activities may contribute to soil loss around project sites and sedimentation in low lying elevations if there is significant rainfall during construction. Some sugar cane acreage will be temporarily removed from production.

Further urbanization will result as a consequence of the implementation of the proposed project and other scheduled public improvements. However, the pace of development will be influenced by factors other than only capital improvements. Such increases in urbanization will contribute to alterations in existing air and water quality, ambient noise levels, and wildlife habitats and vegetation. The application and enforcement of County, State and Federal regulations pertaining to the aforementioned impacts will ensure that the health, safety, and welfare of the community are not endangered.

**alternatives 6**

SECTION 6

ALTERNATIVES TO THE PROPOSED ACTION

I. NO ACTION

If the proposed project is not implemented, there would be no commitment of fiscal resources, and the physical environment along the pipeline alignment would remain in its present state. Since the present Central Maui Water Transmission System is approaching its safe operating limits, forsaking its improvement jeopardizes the welfare of Mauians dependent on the system for water. Leeward residents will continue to face the prospects of water shortages and insufficient fire flows for fire protection.

A no action alternative would preclude total implementation of much of the intent of the General Plans for the Wailuku-Kahului and the Kihei-Makena areas. Without an adequate water delivery system and additional water, future growth in both areas would be curtailed, resulting in a slowdown in new housing construction, the loss of increased tax revenues, and the loss of potential employment opportunities for Maui residents. The loss of job opportunities applies not only during pipeline construction but also to direct and indirect jobs created by future development.

II. ALTERNATIVE ALIGNMENT

Both the DLNR and Towill reports recommended new water source development in Waikapu, hence a transmission line alignment from Waiehu-Waihee to Kihei-Makena was not considered.

The DLNR report recommended water be transmitted from Waikapu across the isthmus via Maalaea to North Kihei. The pipeline would then parallel the existing pipeline to a storage reservoir in Kamaole. A new pipeline would then be extended from Kamaole to Makena.

The Towill report recommended an alignment approximating that of the DLNR report from Waikapu across the isthmus via Maalaea to North Kihei. Rather than paralleling the existing pipeline, the recommended alignment would then continue south from North Kihei along Kihei Road to a termination point in Makena.

The exact alignment of the pipeline from Waiehu to Makena can vary somewhat from that depicted throughout this EIS. However, the least cost for all facilities will result if the transmission line is routed across the central isthmus by the most direct route possible (as shown in this EIS). The proposed alignment minimizes short-term environmental impacts which would be significantly greater if the pipeline proceeded through urban areas. In addition, land acquisition costs and long-term disruptions to residential and commercial activities make an urban alignment an expensive proposition.

Another alternative to the proposed alignment is to develop water sources close to the service areas. However, present data on groundwater explorations shows that only brackish water can be expected to be encountered in the Kihei area, and a potential source at Waikapu has not yielded sufficient quantities of potable water. A recent

study, Desalting Water in Hawaii (DLNR, 1975), analyzed the economic costs of desalting water in the Kihei area. Three desalting methods were investigated: electro dialysis, ion exchange, and reverse osmosis. According to the study, the least cost alternative is electro dialysis. Under this alternative water can be desalted at a cost ranging between \$.78 to \$1.17 per thousand gallons depending on the design capacity of the plant, degree of treatment, and the number of operating days. These costs do not include distribution costs. As a comparison, in 1974, the domestic water rate on Maui island was \$.41 per thousand gallons. The report further states: "It is unlikely that desalting brackish water even at top priority locations will provide an economically competitive alternative to transporting existing sources unless transport distances are very great or expensive water treatment and costly impounding facility must be provided for the source."

### III. ALTERNATIVE PIPELINE SIZE

The proposed water transmission line, which varies in size from 12 to 42 inches, has been sized to transmit water which will meet the projected maximum day demands of the Central Maui area including fire flow needs for fire protection. Engineering and economic considerations preclude installation of a smaller size pipeline. A smaller pipeline, varying in size from 12 to 36 inches, does not have the capacity to transmit the projected maximum day demands including proper fire flow protection. This alternative



would require an additional 75 feet of "head" in order to overcome internal pipe friction. As a result, increased pumping costs can be anticipated.

If a smaller sized pipeline were to be installed, the labor costs and environmental impacts of this alternative would be the same as installing the proposed pipeline. In terms of material costs, a smaller sized pipeline would be less expensive on a dollar/linear foot basis. However, the higher pumping costs over the life of the pipeline would offset the savings in material costs.

The estimated minimum life of the pipeline is 60 years. It is economically unwise and poor engineering practice to install a smaller sized pipeline only to possibly have water demand exceed its transmission capacity within 60 years. If this occurs, and another pipeline is needed, the high costs of material and labor in the future makes this alternative an expensive proposition in addition to the short-term adverse environmental effects resulting from the installation of the pipeline.

**short term uses**  
**long term productivity** **7**

SECTION 7

RELATIONSHIP BETWEEN LOCAL SHORT-TERM  
USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE  
AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The installation of the proposed transmission line will increase the quantities of water available to the project area. It is one of a series of actions which will provide for the orderly and controlled growth of the project area, as delineated in the Wailuku-Kahului General Plan and the Kihei General Plan.

Increased development in the project area will lead to an expansion in the overall housing stock of Maui, provide increased job opportunities, and expand the County's tax base. The increased revenues accruing from development will provide financing for additional public services and facilities throughout Maui County, benefiting all communities as well as those of the project area.

Urbanization of any scope, however, requires the consumption of natural resources, raw and secondary materials, and energy, and results in the alteration of the natural environment. This alteration may include changes in land form, and changes in offshore water quality, air quality, and ambient noise levels.

The scope and magnitude of these changes will be controlled through governmental policies and regulations. It must be recognized, however, that these changes will occur

to some degree as development proceeds and are a direct result of providing for the needs of people.

**resource commitment 8**

SECTION 8

IRREVERSIBLE AND IRRETRIEVABLE  
COMMITMENTS OF RESOURCES

The installation of the transmission line will involve the commitment of capital, labor, raw materials, and energy. Land will also be committed along the pipeline alignment and its use curtailed primarily to open space or agricultural activities, in order to facilitate access to the line for maintenance and repairs. In addition, the siting of structures within the transmission line easement will be prohibited.

The installation of the proposed transmission line will not entail the destruction of any historical or archaeological resources. The operation of the line, however, will accommodate urbanization in the project area, which, in turn, will result in increased consumption of raw and secondary materials, natural resources, and energy. These will be, for the most part, irreversibly and irretrievably committed. The domestic use of water from the proposed well source can also be considered as a commitment of a resource that is irreversibly and irretrievably committed. Without adequate recharge to the basal aquifer, more wells may be required, thereby committing more water resources from separate aquifers.

**unresolved issues 9**

SECTION 9

SUMMARY OF UNRESOLVED ISSUES

The final pipeline alignment has not been determined. The final alignment will depend on public input during the EIS review period, consultation with governmental agencies, negotiation with private land owners affected by the project, and the final location of the water source.

The precise amount of water in the basal aquifer has not been determined. The amount of water that can be safely withdrawn will be determined after the proposed well is operational and pumping tests are conducted.



התורה והמצוות

**approvals 10**

SECTION 10

LIST OF NECESSARY APPROVALS

Federal

Department of the Army, Corps of Engineers

State

Department of Transportation  
Department of Health

County

Department of Public Works  
Department of Planning  
Planning Commission

Private

Wailuku Sugar Company  
Alexander & Baldwin Inc.  
Hawaiian Commercial & Sugar Company  
Roy K. P. Chong et. al.  
Charles C. Krumbhar et. al.  
Kaonoulu Ranch  
Haleakala Ranch  
Leadership House of Systems, Inc.  
Wailea Development Company  
Ulupalakua Ranch

**organizations and 11  
persons consulted**

SECTION 11

PERSONS AND ORGANIZATIONS CONSULTED

Federal Government

Col. Charles S. Varnum, Director of Facilities  
Engineering, Department of the Army  
Kisuk Cheung, Chief, Engineering Division, Department of the Army  
Maurice H. Taylor, Area Supervisor, U. S. Department of the Interior, Fish and Wildlife Service  
Frank T. Hidaka, District Chief, U. S. Geological Survey

State of Hawaii

Hideto Kono, Director, Department of Planning and Economic Development, State of Hawaii  
Christopher Cobb, Director, Department of Land and Natural Resources  
John Farias, Director, Department of Agriculture  
E. Alvey Wright, Director, Department of Transportation  
Dr. James S. Kumagai, Deputy Director, Department of Health  
Francis C. H. Lum, State Conservationist, U. S. Department of Agriculture, Soil Conservation Service  
Dr. Richard Marland, Office of Environmental Quality Control  
Manabu Tagamori, Study Manager, Hawaii Water Resources Regional Study  
Dr. Steven Lau, Director, Water Resources Research Center  
Dr. Doak Cox, Environmental Center, University of Hawaii

County of Maui

The Honorable Elmer Cravalho, Mayor, County of Maui  
Lanny Morisaki, Chairman, Maui County Council  
Toshio Ishikawa, Director, Department of Planning  
Ralph Masuda, Environmental Coordinator  
Wayne Uemae, Director, Department of Public Works  
Eric Soto, Economic Coordinator  
Edwin Okubo, Coordinator, Office of Federal Programs and Housing Coordinator  
Jan Dapitan, Director, Department of Parks and Recreation  
Abraham Aiona, Chief of Police  
Ronald Mokugawa, Deputy Fire Marshall

Other

Maurice Morita, President, Maui Jaycees  
Dennis Hinahara, President, Maui Lions Club  
Susumu Matoi, President, Kahului Town Association  
Roger I. Knox, Manager, Maui Chamber of Commerce  
Shirley Davis, President, Wailuku Business and Professional Association  
Takeshi Iwamoto, President, Kahului Business and Professional Association  
Edward Wilson, Jr., Hawaii Visitors Bureau  
Hawaii Hotel Association, Maui Chapter, Rod Hartless, President  
Russ Riley, President, Planners, Architects & Landscape Architects of Maui (P.A.L.M.)  
Ralph Hayashi, President, Maui Chapter, Hawaii Society of Professional Engineers  
William Naschal, President, Kihei Community Association  
Sam Garcia, President, Kihei Aloha Association  
George P. Ferreira, President, Kihei Canoe Club  
Richard Mayer, Maui Community College  
Michael H. Lyons II, President, Kahului Rotary Club  
Roger M. Melrose, President, Rotary Club of Maui  
Wm. S. Haines, Manager, Hawaiian Commercial & Sugar Co.  
Garvie Hall, President & Manager, Pioneer Mill Co., Ltd.  
Masao Okasako, President, Maui 442nd Veterans Club  
Harry N. Kobayashi, President, Maui AJA Veterans, Inc.  
Henry Koja, President, Maui Vegetable Growers Association  
Henry Nihei, President, Maui Produce Procession Association  
Chester Koga, President, Maui Farmers Cooperative  
William Eby, President, Maui Cattlemen's Association  
Pardee Erdman, Ulupalakua Ranch  
Peter Baldwin, Haleakala Dairy  
Erling Wick, President, Maui County Board of Realtors  
Mits Arisumi, President, Home Builders Assn., of Hawaii  
Joseph Heacock, President, Maui Contractors Association  
Dorvin Leis, President, Plumbing & Mechanical Contractors Association  
Frank Makimoto, President, Maui Automotive & Retail Gasoline Dealers Association  
Gordon Von Tempsky, President, Maui Auto Dealers Assn.  
Tony Hodges, Life of the Land  
Conservation Council of Hawaii, Maui Chapter

**consultation period 12  
responses**

SECTION 12  
RESPONSES RECEIVED DURING THE  
CONSULTATION PERIOD

SECTION 12

RESPONSES RECEIVED DURING THE  
CONSULTATION PERIOD



GEORGE R. ARIYOSHI  
GOVERNOR



RICHARD E. MARLAND, PH.D.  
DIRECTOR

TELEPHONE NO.  
548-6915

STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL  
OFFICE OF THE GOVERNOR  
550 HALEKAUWILA ST.  
ROOM 301  
HONOLULU, HAWAII 96813  
December 29, 1975

Marvin T. Miura  
Environment Impact Study Corp.  
Suite 401  
American Saving & Loan Bldg.  
Financial Plaza of the Pacific  
915 Fort Street Mall  
Honolulu, Hawaii 96813

SUBJECT: Environmental Impact Statement Preparation Notice for the  
Central Maui Water Transmission System for Waihee-Makena,  
Maui, Hawaii

Dear Dr. Miura *[Signature]*

This Office appreciates your request for comments on the above project. However, our present staff shortage prevents us from participating in the consultation process. We will comment on the EIS when it is submitted to the Environmental Quality Commission.

We thank you for soliciting our participation. We hope in the near future our Office may be able to comment on the preparation notice.

Sincerely,

*[Signature]*  
Richard E. Marland  
Director

February 18, 1976

Dr. Richard Marland  
Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, HI 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION STUDY

Dear Dr. Marland:

Thank you for reviewing the Notice of Preparation for the above project. We look forward to your participation when the EIS is completed.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg

Eric Soto  
RICKI R. YASUI  
AGENT



COUNTY OF MAUI  
DEPARTMENT OF ECONOMIC DEVELOPMENT  
WAILUKU, MAUI, HAWAII

December 29, 1975

Dr. Marvin T. Miura, Ph.D.  
Environmental Impact Study Corp.  
Suite 401  
American Savings & Loan Bldg.  
Financial Plaza of the Pacific  
915 Fort Street Mall  
Honolulu, Hawaii, 96813

Re: Environmental Impact Statement Preparation Notice for the Central  
Maui Water Transmission System Waihee-Makena, Maui, Hawaii

Dear Dr. Miura:

A review of the Environmental Assessment/Determination, prepared by the Maui County Board of Water Supply, shows a general positive effect of the Central Maui Water Transmission System Waihee-Makena. The potential impacts as listed in the assessment must be fully discussed and documented.

It is believed that the purpose of the line in the alleviation of water storages due to the demand and potential demand must be expanded upon and discussed in detail. The expected growth and expansion of business and population should be evaluated as related to the expected water needs.

The shortterm impact during construction must be put into context for the achievement of the project.

Marvin, I believe that the project assessment touches on the areas needed for the E.I.S. and an elaboration and documentation is necessary. I hope my short comments will be of some assistance.

Sincerely,

Eric Soto  
Economic Development Specialist

ES:1b

February 18, 1976

Mr. Eric Soto  
Economic Development Specialist  
Department of Economic Development  
County of Maui  
Wailuku, Maui 96793

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Soto:

Thank you for reviewing the subject project. Your comments are appreciated and will be incorporated in the EIS. which will be forwarded to you for further review and comment.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MEM;cg

ELMER F. CRAVALHO  
MAYOR



SUGICHI HIRAGA  
FIRE CHIEF  
MARCO M. MEYER  
DEPUTY FIRE CHIEF

COUNTY OF MAUI  
DEPARTMENT OF FIRE CONTROL  
WAILUKU, MAUI, HAWAII 96793

December 29, 1975

Enviromental Impact Study Corp.  
Suite 401, 915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Dr. Miura:

Re: E.I.S. Preparation Notice for Central Maui Water  
Transmission System, Wahee-Makena, Maui

In our review of the above referenced preparation notice, the Maui Fire Department would tend to support the proposed inter-connected water distribution system that would improve the existing water supply.

Very truly yours,

*Ronald Mukogawa*  
Ronald Mukogawa  
Fire Prevention Inspector

February 18, 1976

Mr. Ronald Mokugawa  
Fire Prevention Inspector  
Department of Fire Control  
County of Maui  
Wailuku, Maui 96793

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Mokugawa:

Thank you for your review of the above project. A copy of the project's EIS will be forwarded to you for your future review and comment.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg

JAMES S. USHIJIMA  
County Clerk



OFFICE OF  
**COUNTY CLERK**  
COUNTY OF MAUI  
WAILUKU, HAWAII 96793  
January 5, 1976

MANUEL K. OISHI  
Deputy County Clerk

Dr. Marvin T. Miura  
President  
Environment Impact Study Corporation  
Suite 401  
915 Fort Street  
Honolulu, Hawaii 96813

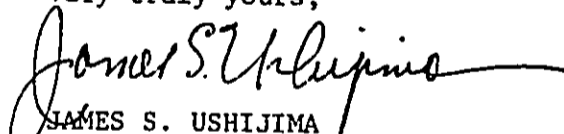
Dear Dr. Miura:

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION  
NOTICE FOR THE CENTRAL MAUI WATER TRANS-  
MISSION SYSTEM WAIHEE-MAKENA, MAUI, HAWAII

Thank you for your letter of December 23, 1975, concerning the above-captioned matter.

Your communication was presented to the Council on January 5, 1976, and referred to its Committee of the Whole and the Economic Development, Environment, and Ecology Committee for consideration.

Very truly yours,

  
JAMES S. USHIJIMA  
County Clerk

/lye



OUR REFERENCE

YOUR REFERENCE

# POLICE DEPARTMENT

COUNTY OF MAUI

WAILUKU, MAUI, HAWAII 96793

January 6, 1976



Address All  
Communications to  
Abraham Aiona,  
Chief of Police  
Philibert L. Vierra,  
Deputy Chief of Police

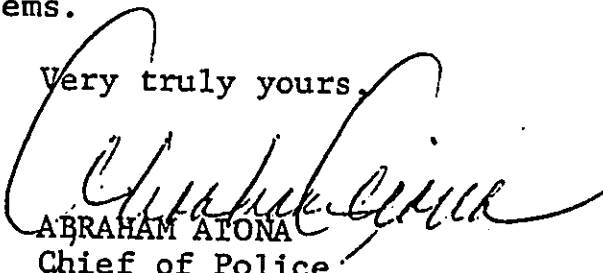
Marvin T. Miura, Ph.D.  
President  
Environment Impact Study Corp.  
Suite 401, American Savings &  
Loan Building  
915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Doctor Miura:

RE: ENVIRONMENTAL IMPACT STATEMENT PREPARATION  
NOTICE FOR THE CENTRAL MAUI WATER TRANSMISSION  
SYSTEM, WAIHEE-MAKENA, MAUI, HAWAII.

We have reviewed the Environmental Assessment/Deter-  
mination prepared by the Maui County Department of  
Water Supply and have no comments since the report  
spells out what they intend to do as it pertains to  
noise and traffic problems.

Very truly yours,

  
ABRAHAM AIONA  
Chief of Police



February 18, 1976

Mr. Abraham Aiona  
Chief of Police  
County of Maui Police Department  
Wailuku, Maui 96793

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Aiona:

Thank you for your review of the above project. A copy of the project's EIS will be forwarded to you for your future review and comment.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg

# UNIVERSITY OF HAWAII

Water Resources Research Center

Office of the Director

January 7, 1976


Dr. Marvin T. Miura  
President  
Environment Impact Study Corp.  
Suite 401 American Savings & Loan Bldg.  
915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Marvin:

With regards to your request of December 22, 1975 for comments on the document, "Environmental Impact Statement preparation notice for the Central Maui water transmission system Waihee-Makena, Maui, Hawaii," I am forwarding the following two comments:

1. No specific comments on the pipeline route itself. Only one question concerning the existing water supply from Mokuhau well. Is the water supply to be used for the Kahului-Paia exclusive of the Kihei-Makena area or is it to be combined with the Waiehu well supply and maintained as the Central Maui System?
2. What will be the impact on the ground water body in northwest Maui of developing these additional large amounts of water at Waiehu?

Sincerely yours,



L. Stephen Lau  
Director, WRRRC

LSL:jmn

AN EQUAL OPPORTUNITY EMPLOYER

2540 Dole Street - Honolulu, Hawaii 96822

February 18, 1976

Dr. Stephen Lau  
Director  
Water Resources Research Center  
University of Hawaii  
2540 Dole Street  
Honolulu, HI 96822

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Dr. Lau:

Thank you for your review and comments for the subject project. In response to your question, Mokuhau well source will be combined with the Waiehu source and maintained as one interconnected Central Maui Water System.

Upon completion, a copy of the project's EIS will be forwarded to you for further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg



DEPARTMENT OF PLANNING  
AND ECONOMIC DEVELOPMENT

GEORGE R. ARIYOSHI  
Governor

HIDETO KONO  
Director

FRANK SKRIVANEK  
Deputy Director

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

January 7, 1976

Ref. No. 0039

Dr. Marvin T. Miura, President  
Environment Impact Study Corporation  
915 Fort Street Mall, Suite 401  
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Environmental Impact Statement Preparation Notice for  
the Central Maui Water Transmission System Waihee-  
Makena, Maui

Thank you for your letter of December 22, 1975, transmitting a copy  
of the subject EIS Preparation Notice.

The following comments are offered for your consideration in the  
preparation of the environmental impact statement.

1. The determination of any significant historical or archaeological sites within the vicinity of the proposed project should be closely coordinated with the Department of Land and Natural Resources since this agency is responsible for preserving and maintaining such sites.
2. The EIS should discuss the anticipated impacts of the proposed project on adjoining land uses, development trends and other related demands for public facilities and services in the area. Accordingly, we suggest close coordination of the proposed project with the appropriate public agencies.

Thank you for this opportunity to review the preparation notice.

Sincerely,

*Frank Skrivaneck*  
for HIDETO KONO

February 18, 1976

Mr. Hideto Kono  
Director  
Department of Planning  
and Economic Development  
P. O. Box 2359  
Honolulu, HI 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Kono:

Thank you for your review of the above project. Your comments are appreciated and will be incorporated into the EIS which will be completed shortly. A copy of the EIS will be forwarded to you for further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg

**HAWAIIAN COMMERCIAL & SUGAR COMPANY**

A DIVISION OF ALEXANDER & BALDWIN, INC.

PUUNENE, MAUI, HAWAII 96784

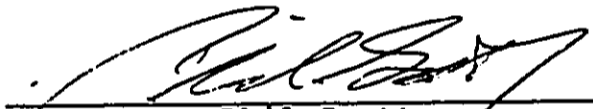
January 8, 1976

Marvin T. Miura, Ph.D., President  
Environment Impact Study Corp.  
Suite 401 American Savings & Loan Bldg.  
915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Marvin:

Thank you for sending us the copy of Environmental Impact Statement Preparation Notice For The Central Maui Water Transmission System Waihee-Makena. We have reviewed this material and have no disagreement with it or anything to add to it.

Sincerely,

  
\_\_\_\_\_  
Phil Scott  
Assistant Manager For Agriculture

PS:ec

February 18, 1976

Mr. Phil Scott  
Assistant Manager for Agriculture  
Hawaiian Commercial & Sugar Company  
Iunene, Maui 96784

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Scott:

Thank you for reviewing the preparation notice for the above project. A copy of the LIS will be available shortly for your further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTH:cg

GEORGE R. ARIYOSHI  
GOVERNOR OF HAWAII



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

January 8, 1976

GEORGE A. L. YUEN  
DIRECTOR OF HEALTH

Audrey W. Mertz, M.D., M.P.H.  
Deputy Director of Health

Henry N. Thompson, M.A.  
Deputy Director of Health

James S. Kumagai, Ph.D., P.E.  
Deputy Director of Health

In reply, please refer to:

File: EPHS-SS

Marvin T. Miura, Ph.D.  
President, Environment Impact  
Study Corp.  
Suite 401, American Savings & Loan Bldg.  
915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Dr. Miura:

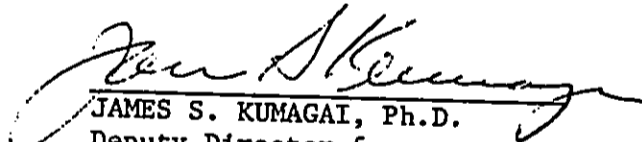
Re: Environmental Impact Statement: Central Maui Water  
Transmission System, Waihee-Makena, Maui, Hawaii

Thank you for allowing us to review and comment on the  
subject proposed project.

Staff comments are as follows: Since the up country water  
has not been of the best quality, consideration should be given to the  
possibility of supplying the up country with water from the proposed  
system.

We realize that the statements are general in nature due to  
preliminary plans being the sole source of discussion. We, therefore,  
reserve the right to impose future environmental restrictions on this  
project at the time final plans are submitted to this office for review.

Sincerely,

  
JAMES S. KUMAGAI, Ph.D.  
Deputy Director for  
Environmental Health

BC:sc



February 18, 1976

Dr. James S. Kumagai  
Deputy Director for Environmental Health  
Department of Health  
P. O. Box 3378  
Honolulu, HI 96801

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Dr. Kumagai:

Thank you for reviewing the subject project. Your comments are appreciated and will be incorporated into the project's EIS. Upon completion, a copy of the EIS will be forwarded to you for further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg

PLANNING COMMISSION  
Kazuo Kage, Chairman  
George Murashige, Vice-Chairman  
Shiro Hokama  
Patrick Kawano  
Charles Ota  
Leo Polo, Jr.  
Harlow Wright  
Wayne Uemae, Ex-Officio  
Shigeto Murayama, Ex-Officio



Elmer F. Cravath,  
Mayor

Tosh Ishikawa  
Planning Director

Yoshikazu "Zuke" Matsui  
Deputy Planning Director

COUNTY OF MAUI  
PLANNING DEPARTMENT

200 S. HIGH STREET  
WAILUKU, MAUI, HAWAII 96793

January 12, 1976

Dr. Marvin Miura, President  
Environment Impact Study Corp.  
915 Fort Street Mall, Suite 401  
Honolulu, Hawaii 96813

Dear Dr. Miura:

Re: EIS Preparation Notice  
Central Maui Water Transmission System  
Waihee-Makena, Maui, Hawaii

We have reviewed the Environmental Assessment for the subject project and suggest that the following areas be addressed in the EIS.

1. Archaeological survey report be incorporated with the EIS. Restoration/preservation plans of any significant sites if found during the course of the survey.
2. While most of the project will be away from urban areas, dust control and erosion control measures must be practiced throughout the entire project.
3. What significant effects (short and long term) will the proposed project have on existing public services and facilities?

Thank you for the opportunity to comment on the EIS preparation notice. Further comments as necessary will be directed to your office if not addressed in the EIS for the proposed project.

Please contact me at any time, should you have any questions.

Yours very truly,

A handwritten signature in cursive script that reads "Ralph Masuda".

RALPH MASUDA  
Environmental Planning Coordinator

February, 18, 1976

Mr. Ralph Masuda  
Environmental Coordinator  
County of Maui Planning Department  
200 South High Street  
Wailuku, Maui 96793

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Masuda:

Thank you for reviewing the Notice of Preparation for the subject project. Your suggestions and comments are appreciated and will be addressed in the EIS. Upon completion, a copy of the project's EIS will be forwarded to you for further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

NTM:cg

**UNITED STATES DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**

440 Alexander Young Building, Honolulu, Hawaii 96813

January 14, 1976

Dr. Marvin Miura  
c/o Environment Impact Study Corp.  
Suite 401, 915 Fort Street Mall  
Honolulu, HI 96813

Dear Dr. Miura:

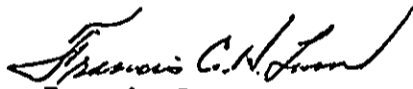
Subject: Environmental Impact Statement Preparation Notice  
for the Central Maui Water Transmission System  
Waihee-Makena, Maui, Hawaii

We have reviewed the subject preparation notice and have the following comment:

The water transmission pipeline will traverse the Happy Valley RC&D Flood Prevention Measure Plan area. Noting the location of the pipeline on your project map, it seems that the alignment will not affect any of our proposed structural works.

Thank you for the opportunity to review this preparation notice.

Sincerely,

  
Francis C. H. Lum  
State Conservationist



February 18, 1976

Mr. Francis C. H. Lum  
State Conservationist  
United States Department of Agriculture  
Soil Conservation Service  
440 Alexander Young Building  
Honolulu, HI 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Lum:

Thank you for reviewing the preparation notice for the above project. A copy of the EIS will be available shortly for your further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Division of Ecological Services  
821 Millilani Street  
Honolulu, Hawaii 96813

Reference: ES

January 15, 1976

Mr. Marvin T. Miura, Ph.D., President  
Environment Impact Study Corp.  
915 Fort Street Mall, Suite 401  
Honolulu, Hawaii 96813

Dear Sir:

We have reviewed the environmental impact statement preparation notice for the Central Maui Water Transmission System Waihee-Makena, Maui, Hawaii, and offer the following comments:

Description of the Proposed Project. The discussion of the proposed water source should be more substantive. What is its anticipated capacity and would it meet anticipated demands of the future? Would it deplete spring flows of nearby streams or other existing water sources?

Description of the Affected Environment. A survey of fish and wildlife resources should be included.

Short Term Impacts. 3. Erosion. Specific erosion control measures over stream crossings and along the entire transmission route should be described.

Long Term Impacts. The effect on fish and wildlife resources should be discussed.

Sincerely yours,

Maurice H. Taylor  
Area Supervisor

cc: RD (ES), Portland



February, 18, 1976

Mr. Maurice H. Taylor  
Area Supervisor  
United States Department of the Interior  
Fish and Wildlife Service  
Division of Ecological Services  
821 Mililani Street  
Honolulu, HI 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Taylor:

Thank you for reviewing the Notice of Preparation for the subject project. Your suggestions and comments are appreciated and will be addressed in the EIS. Upon completion, a copy of the project's EIS will be forwarded to you for further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg



DEPARTMENT OF THE ARMY  
HEADQUARTERS UNITED STATES ARMY SUPPORT COMMAND, HAWAII  
APO SAN FRANCISCO 96558

AFZV-FE-EE

Dr. Marvin T. Miura  
Environment Impact Study Corp.  
Suite 401, American Savings and Loan Building  
Financial Plaza of the Pacific  
915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Dr Miura:

Reference is made to the Environmental Impact Statement Preparation Notice for the Central Maui Water Transmission System Waihee-Makena, Maui, Hawaii.

We have reviewed the EIS preparation notice and have no comments to offer.

Thank you for the opportunity to review this document.

Sincerely yours,

CHARLES S. VARNUM  
Colonel, CE  
Director of Facilities Engineering

CF:  
Office of Environmental Quality Control





February 18, 1976

Colonel Charles E. Varnum  
Director of Facilities Engineering  
Department of the Army  
Support Command Hawaii  
APO San Francisco 96558

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Colonel Varnum:

Thank you for reviewing the preparation notice for the above project. A copy of the EIS will be available shortly for your further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg



DEPARTMENT OF THE ARMY  
U. S. ARMY ENGINEER DISTRICT, HONOLULU  
BLDG. 230, FT. SHAFTER  
APO SAN FRANCISCO 96558

PODED-PV

19 January 1976

Dr. Marvin T. Miura, President  
Environment Impact Study Corporation  
American Savings & Loan Bldg, Suite 401  
915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Dr. Miura:

Your request for comments on the Environmental Assessment/Determination for the Central Maui Water Transmission System, Waihee-Makena, Maui, Hawaii, was received on 29 December 1975. The following comments are offered for consideration:

a. The proposed water main crossing of Iao Stream falls within the Corps of Engineers' proposed flood control project for Iao Stream. We request that the design and layout of the water main in the vicinity of Iao Stream be coordinated with our office.

b. The assessment appears to address the construction and installation of the transmission pipeline alone, rather than the entire water system development, including the proposed development of a water source in the Waihee-Waiehu area. Although the water source development would be done by private interests, its impacts should be addressed in conjunction with the evaluation of the transmission line, or in a separate environmental impact statement, if necessary. The potential long-term impacts upon depletion of groundwater resources, related hydrologic changes, and energy commitments for pumping facilities should be discussed. In addition, an evaluation of alternative solutions to the water supply problem and alternative sources should be included. Coordination with the U.S. Geological Survey and the Hawaii Water Resources Regional Study is recommended.

Thank you for the opportunity to comment on the Environmental Impact Statement Preparation Notice. We would appreciate a copy of this document when it is available.

Sincerely yours,

  
KISUK CHEUNG  
Chief, Engineering Division



February, 18, 1976

Mr. Kisuk Cheung  
Chief, Engineering Division  
U. S. Army Engineer District, Honolulu  
Building 230, Ft. Shafter  
APO San Francisco 96558

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Cheung:

Thank you for reviewing the Notice of Preparation for the subject project. Your suggestions and comments are appreciated and will be addressed in the EIS. Upon completion, a copy of the project's EIS will be forwarded to you for further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg

JAMES S. USHIJIMA  
County Clerk

MANUEL K. OISHI  
Deputy County Clerk



OFFICE OF  
**COUNTY CLERK**  
COUNTY OF MAUI  
WAILUKU, HAWAII 96793

January 19, 1976

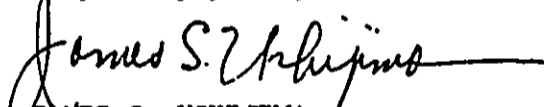
Dr. Marvin T. Miura, President  
Environment Impact Study Corporation  
Suite 401  
915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Dr. Miura:

In behalf of the Council of the County of Maui, we transmit a copy of COMMITTEE REPORT NO. 76-1, placing on file your letters concerning your undertaking environmental impact statement studies for the Kahului Harbor and the Central Maui Water Transmission System projects.

Committee Report No. 76-1 was adopted by the Council at its meeting of January 16, 1976.

Very truly yours,

  
JAMES S. USHIJIMA  
County Clerk

/lye

enc.

GEORGE R. ARIYOSHI  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
869 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813

January 20, 1976

E. ALVEY WRIGHT  
DIRECTOR

DEPUTY DIRECTORS  
WALLACE AOKI  
RYOKICHI HIGASHIONNA  
DOUGLAS S. SAKAMOTO  
CHARLES O. SWANSON

IN REPLY REFER TO:

STP 8.3460

Dr. Marvin T. Miura, Ph.D.  
President  
Environment Impact Study Corp.  
Suite 401, American Savings &  
Loan Building  
915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Comments on EIS Preparation Notice  
for the Central Maui Water Transmission  
System, Waihee-Makena, Maui, Hawaii

Thank you for the opportunity to comment on your proposal. Since our Department's Piilani Highway project is in the same area, we suggest close coordination of your project with our Highways Division's Design Branch.

Sincerely,

*E. Alvey Wright*  
E. ALVEY WRIGHT  
Director

February 18, 1976

Mr. E. Alvey Wright  
Director  
Department of Transportation  
869 Punchbowl Street  
Honolulu, HI 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Wright:

Thank you for your review of the above project. Your comments are appreciated and will be incorporated into the EIS which will be completed shortly. A copy of the EIS will be forwarded to you for further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg

GEORGE R. ARIYOSHI  
GOVERNOR



JOHN FARIAS, JR.  
CHAIRMAN, BOARD OF AGRICULTURE

YUKIO KITAGAWA  
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII  
DEPARTMENT OF AGRICULTURE  
1428 SO. KING STREET  
HONOLULU, HAWAII 96814

January 27, 1976

Marvin T. Miura, Ph.D., Pres.  
Environment Impact Study Corp.  
915 Fort Street Mall, Suite 401  
Honolulu, HI 96813

Dear Marvin:

Subject: Environmental Impact Statement Preparation Notice For  
the Central Maui Water Transmission System Waihee-  
Makena, Maui, Hawaii

The primary effect of the proposed water supply system will be to assure domestic users of an adequate supply. There are no immediate benefits to agriculture.

The studies referenced (page 2) indicate total demand will increase by 26.3 mgd by 2000. Information presently available indicate this may be 10-20 percent of the potential supply available in the Waiehu region (per HWRRS studies). The greatest impact may be through reduced infiltration into the Central Maui basal supply. This could reduce the agricultural potential of this area. It is suggested that this matter be given consideration in your environmental impact statement.

Thanks for the opportunity to provide comments.

A handwritten signature in cursive script, appearing to read "John".

John Farias, Jr.  
Chairman, Board of Agriculture

JF:AD:e

February 18, 1976

Mr. John Farias  
Director  
Department of Agriculture  
1428 South King Street  
Honolulu, HI 96814

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Farias:

Thank you for your review of the above project. Your comments are appreciated and will be incorporated into the EIS which will be completed shortly. A copy of the EIS will be forwarded to you for further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg





IN REPLY REFER TO:

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION  
5th Floor, 1833 Kalakaua Avenue  
Honolulu, Hawaii 96815

February 5, 1976

Dr. Marvin T. Miura, President  
Environment Impact Study Corp.  
Suite 401, 915 Fort Street Mall  
Honolulu, Hawaii 96813

Dear Dr. Miura:

We have received the Environmental Assessment/Determination for the Central Maui Water Transmission System, Waihee-Makena, Maui, Hawaii and have no comments except to point out that while the long-term impacts upon the Maalaea-Kihei-Makena area are discussed, no mention is made of the impacts on nearby areas which might also be affected. For example, how will the exportation of an additional 20+ mgd of water from West Maui affect the water supply, economic development, social structure, and public services and facilities of the Wailuku-Kahului area?

Sincerely,

*F. T. Hidaka*

F. T. Hidaka  
District Chief

cc: Regional Hydrologist, WRD, WR, Menlo Park, CA (Attn: L. E. Newcomb)  
G. H. Davis, WRD, Reston, VA (Attn: G. H. Chase)

February 18, 1976

Mr. Frank T. Hidaka  
District Chief  
United States Department of  
the Interior  
Geological Survey  
Water Resources Division  
1833 Kalakaua Avenue  
Honolulu, HI 96815

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM

Dear Mr. Hidaka:

Thank you for your review of the above project. Your comments are appreciated and will be incorporated into the EIS which will be completed shortly. A copy of the EIS will be forwarded to you for further review.

Very truly yours,

---

Marvin T. Miura, Ph.D.  
President

MTM:cg

GEORGE R. ARIYOSHI  
GOVERNOR OF HAWAII



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

CHRISTOPHER COBB, CHAIRMAN  
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU  
DEPUTY TO THE CHAIRMAN

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

February 17, 1976

Dr. Marvin T. Miura, Ph.D.  
President  
Environment Impact Study Corporation  
915 Fort Street Mall, Suite 401  
Honolulu, Hawaii 96813

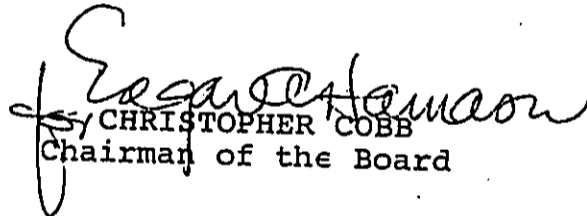
Dear Dr. Miura:

We have reviewed the EIS preparation notice for the Central Maui water transmission system.

One of the environmental impacts of the system will be to increase property values in the area. This will tend to increase the cost of any land acquisitions needed for public projects. This impact should be covered in the EIS.

Please consult with the State Historic Preservation Officer, Jane Silverman (Phone 548-6408) to determine what possible effects there may be on State historic sites.

Sincerely,

  
CHRISTOPHER COBB  
Chairman of the Board

cc: Historic Sites  
State Parks

**e.i.s. responses** **13**  
**and comments**

**University of Hawaii at Manoa**  
Water Resources Research Center

MEMORANDUM

MEMO TO: Environmental Quality Commission

FROM: Reginald H. F. Young <sup>RHFY</sup>  
Asst. Director, WRRC

SUBJECT: EIS for Central Maui Water Transmission System

We have reviewed the subject EIS and have no further comment on the proposed project. We will retain the EIS in our files for future use and reference.

RHFY:jmn



DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Dr. Reginald H. F. Young  
Assistant Director  
Water Resources Research Center  
University of Hawaii at Manoa  
Honolulu, HI 96822

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Dr. Young:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*

GEORGE H. KAMOSHII  
DIRECTOR



ANDREW I. T. CHANG  
DIRECTOR OF SOCIAL SERVICES & HOUSING

STATE OF HAWAII  
DEPARTMENT OF SOCIAL SERVICES AND HOUSING  
P.O. Box 339  
Honolulu, Hawaii 96809

July 9, 1976

Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813


Gentlemen:

Re: Central Maui Water Transmission System

We are pleased that a water system of this magnitude has been planned for Central Maui.

We feel that the proposed system will have to be very beneficial to the drier areas of Makena, Kihei and will be of great economic benefit to urban Maui.

We are returning the EIS for your further usage.

  
Director



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

September 9, 1976

Mr. Andrew I. T. Chang  
Director  
Department of Social Services  
and Housing  
State of Hawaii  
P. O. Box 339  
Honolulu, HI 96809

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Chang:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*



GEORGE P. ANTONI  
GOVERNOR



VALENTINE A. DIETZMANN  
MAJOR GENERAL  
ADJUTANT GENERAL

STATE OF HAWAII  
DEPARTMENT OF DEFENSE  
OFFICE OF THE ADJUTANT GENERAL  
FORT RUGER, HONOLULU, HAWAII 96816

HIENG

12 JUL 1976

Dr. Albert Tom, Chairman  
Environmental Quality Commission  
550 Halekaiwila Street  
Honolulu, Hawaii 96813

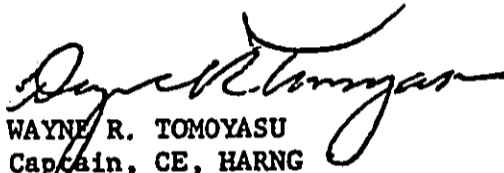
Dear Dr. Tom:

Kalakaua Commercial Complex and  
Central Maui Water Transmission System

Thank you for sending us copies of the Environmental Impact Statements for the proposed "Kalakaua Commercial Complex" and "Central Maui Water Transmission System". We have received the publications and have no comments to offer.

We are returning the Environmental Impact Statements for the proposed projects per your request.

Yours truly,

  
WAYNE R. TOMOYASU  
Captain, CE, HARNG  
Contr & Engr Officer

Enclosures



**DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI**

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Captain Wayne R. Tomoyasu  
CE, HARNG  
Department of Defense  
State of Hawaii  
Fort Ruger, Honolulu, HI 96816

**SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT**

Dear Captain Tomoyasu:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*

GEORGE R. ARIYOSHI  
GOVERNOR



JOHN FARIAS, JR.  
CHAIRMAN, BOARD OF AGRICULTURE

YUKIO KITAGAWA  
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII  
DEPARTMENT OF AGRICULTURE  
1428 SO. KING STREET  
HONOLULU, HAWAII 96814

July 15, 1976

MEMORANDUM

To: Environmental Quality Commission

Subject: Central Maui Water Transmission System  
Waiehu-Makena, Maui - II - 3 & 4

The Department of Agriculture has reviewed the final Environmental Impact Statement (EIS) and has no additional comments. The copy has been retained.

Thank you for the opportunity to review this matter.

*for Yukio Kitagawa*  
John Farias, Jr.  
Chairman, Board of Agriculture

JK:d:d



DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Mr. John Farias, Jr.  
Director  
Department of Agriculture  
State of Hawaii  
1428 South King Street  
Honolulu, HI 96814

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Farias:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*

DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 11th AIR FORCE (MILITARY)  
APO SAN FRANCISCO 96355



REPLY TO  
ATTN OF: DEEE (Mr. Nakashima, 4492158)

15 JUL 1976

SUBJECT: Environmental Impact Statements

TO: Environmental Quality Commission  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

1. This Headquarters has no comment to render relative to the Environmental Impact Statement for the following projects:

a. The Proposed Honouliuli Interceptor Sewer System, Oahu, Hawaii

b. The Proposed Kalakaua Commercial Complex, Oahu, Hawaii

c. Central Maui Water Transmission System, Waiehu to Makena, Maui, Hawaii

2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your development projects throughout the State and the opportunity to review the statements.

  
BEN-D. KOSA  
Dep Dir of Civil Engineering





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

September 9, 1976

Mr. Ben D. Kosa  
Deputy Director of Civil Engineering  
Department of the Air Force  
Headquarters, 15th Air Base Wing (PACAF)

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Kosa:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*



DEPARTMENT OF PLANNING  
AND ECONOMIC DEVELOPMENT

Kamamalu Building, 250 South King St., Honolulu, Hawaii \* Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

GEORGE K. ARIYOSHI  
Governor

HIDETO KONO  
Director

FRANK SKRIVANEK  
Deputy Director

July 26, 1976

Ref. No. 1688

MEMORANDUM

TO: Dr. Richard E. Marland, Director  
Office of Environmental Quality Control

FROM: for Hideto Kono, Director *Frank Skrivaneck*

SUBJECT: Environmental Impact Statement for the Proposed Central Maui  
Transmission System

We have reviewed the subject statement and find that the potential environmental impacts associated with the proposed project have been adequately addressed.

We have no further comments to offer at this time but appreciate this opportunity to review the subject statement.



DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Mr. Hideto Kono  
Director  
Department of Planning and  
Economic Development  
State of Hawaii  
P. O. Box 2359  
Honolulu, HI 96804

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Kono:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*



*Orig to Marland*

GEORGE R. ARIYOSHI  
GOVERNOR OF HAWAII

R. ... U



GEORGE A. L. YUEN  
DIRECTOR OF HEALTH

Audrey W. Moriz, M.D., M.P.H.  
Deputy Director of Health

James S. Kumagai, Ph.D., P.E.  
Deputy Director of Health

Henry N. Thompson, M.A.  
Deputy Director of Health

73 ... II 30

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

July 27, 1976

WATER SUPPLY  
MAUI

In reply, please refer to:  
File: EPHS-SS

MEMORANDUM

To: Dr. Richard E. Marland, Director  
Office of Environmental Quality Control


From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Central Maui  
Water Transmission System

Thank you for allowing us to review and comment on the subject EIS. Please be informed that we have no objections to this project.

Staff comments are: Prior to any major construction taking place, consideration should be given to the design of the subject water system to meet all of the requirements of the Safe Drinking Water Act.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

  
JAMES S. KUMAGAI, Ph.D.

cc: Dept. of Water Supply, Maui



DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109

WAILUKU, MAUI, HAWAII 96793

James S. Kumagai, Ph.D.  
Deputy Director of Health  
Department of Health  
State of Hawaii  
P. O. Box 3378  
Honolulu, Hawaii

September 9, 1976

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Dr. Kumagai:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System. We offer the following response to your comments:

The water quality of the proposed water source will be tested and the results submitted to the Department of Health for their approval. The well will be flushed after drilling to ensure that silt does not enter the well shaft and is not transmitted through the water line. The well shaft will be cased in steel and grouted to prevent surface water from entering it. In addition, the water transmission line will be chlorinated and flushed prior to use. The Department of Water Supply will sample and at all times comply with all applicable rules and regulations of the Department of Health.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*

UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

---

440 Alexander Young Building, Honolulu, HI 96813

August 1, 1976

Dr. Richard E. Marland  
Office of Environmental Quality Control  
550 Halekauwila St., Rm. 301  
Honolulu, HI 96813

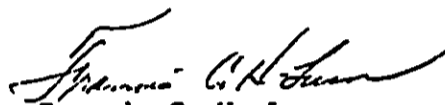
Dear Dr. Marland:

Subject: Environmental Impact Statement for Central Maui  
Water Transmission System, Waiehu to Makena, Maui, HI

We have reviewed the subject EIS and have no comments to offer.

Thank you for the opportunity to review this document.

Sincerely,

  
Francis C. H. Lum  
State Conservationist

cc:  
Dept. of Water Supply  
County of Maui  
P. O. Box 1109  
Wailuku, Maui, HI 96793





DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Mr. Francis C. H. Lum  
State Conservationist  
United States Department of  
Agriculture  
Soil Conservation Service  
440 Alexander Young Building  
Honolulu, HI 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Lum:

We thank you and your staff for reviewing the Environmental  
Impact Statement for the proposed Central Maui Water Transmission  
System.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*

Wayne Uerna, Ex-Officio  
Shigeto Murayama, Ex-Officio



Tosh Ishikawa  
Planning Director

Yoshikazu "Zuke" Matsui  
Deputy Planning Director

COUNTY OF MAUI  
PLANNING DEPARTMENT

200 S. HIGH STREET  
WAILUKU, MAUI, HAWAII 96793

August 2, 1976

Dr. Richard E. Marland, Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Dr. Marland:

Re: Environmental Impact Statement for the Central Maui  
Water Transmission System

We have reviewed the subject EIS and submit the following  
comments:

1. The EIS adequately covers the concerns of the consulted parties which have been documented in the EIS. The EIS addresses adequately all possible environmental impact (primary and secondary) that could be expected from a project dealing with the transmission of water.
2. The subject project is necessary to meet the water needs of the project area as defined by the appropriate County General Plans.
3. We concur that the alignment of the proposed water transmission system will have certain short-termed effects that occur during the construction period, but with proper precautions and mitigative measures these effects will be minimized.
4. A minor portion of the water transmission system appears to be within the Special Management Area of the County of Maui and shall be subject to the "Interim Coastal Zone Management Rules and Regulations of the County of Maui.

Thank you for the opportunity to comment on the subject EIS.

Yours very truly,

RALPH MASUDA  
Environmental Planning Coordinator

cc Water Department



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

September 9, 1976.

Mr. Ralph Masuda  
Environmental Coordinator  
County of Maui  
Planning Department  
200 South High Street  
Wailuku, Maui 96793

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Masuda:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System. All applicable County and State permits will be obtained prior to construction. Specifically, the requirements of the Shoreline Management Area Permit will be discussed with the Maui County Planning Department after the final pipeline alignment has been established.

Sincerely,

A handwritten signature in cursive script, reading "Shigeto Murayama".

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*

GEORGE K. ARIYOSHI  
GOVERNOR



E. ALVEY WRIGHT  
DIRECTOR

DEPUTY DIRECTORS  
WALLACE AOKI  
RYOKICHI HIGASHIONNA  
DOUGLAS S. SAKAMOTO  
CHARLES O. SWANSON

RECEIVED

AUG 15 1976

DEPT. OF WATER SUPPLY  
MAUI

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
869 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813

IN REPLY REFER TO:

August 3, 1976

STP 8.3789

Mr. Shigeto Murayama  
Director  
Department of Water Supply  
P.O. Box 1109  
Wailuku, Hawaii 96793

Dear Mr. Murayama:

Subject: Environmental Impact Statement  
for Central Maui Water  
Transmission System

Thank you for the opportunity to review your environmental impact statement. We have no comments on the general contents of the report. However, we suggest that you coordinate your plans with our Highways Division and obtain a highway construction permit prior to construction.

Sincerely,

*E. Alvey Wright*  
E. ALVEY WRIGHT  
Director



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

September 9, 1976

Mr. E. Alvey Wright  
Director  
Department of Transportation  
State of Hawaii  
869 Punchbowl Street  
Honolulu, HI 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Wright:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System. Construction plans for the proposed project will be coordinated with the State Highways Division and all necessary highway construction permits obtained prior to the start of construction.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*



Russell O. Hill  
2881 S. Kihei Road  
Kihei, Hawaii 96753

August 4, 1976

KL: WLU  
1976 AUG 10 10:44  
DEPT. OF WATER SUPPLY  
COUNTY OF MAUI

Mr. Shigeto "Mustard" Murayama  
Department of Water Supply  
County Building  
Wailuku, Hawaii 96793

Dear Sir,

Re: CENTRAL MAUI WATER TRANSMISSION SYSTEM

I am in favor of the proposed 36" transmission line to serve  
Kihei/Makena area.

This line will assure future orderly growth of the Kihei/Makena  
area.

Sincerely,

*Russell O. Hill*

Russell O. Hill



DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Mr. Russel O. Hill  
2881 South Kihei Road  
Kihei, Maui, HI 96753

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Hill:

We thank you for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System and for your favorable support of the proposed project.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*

Mr. Andrew S. Freitas  
P. O. Box 948  
Kihei, Hawaii 96753

August 4, 1976

76 AUG 14 1976

DEPARTMENT OF WATER SUPPLY  
HAWAII

Mr. Shigeto "Mustard" Murayama  
Department of Water Supply  
County Building  
Wailuku, Hawaii 96793

Dear Sir

Re: CENTRAL MAUI WATER TRANSMISSION SYSTEM

I would like to go on record as being in favor of this transmission line.

I am in favor of installation of a large transmission line at this time to ensure future water supply and eliminating the need of having to install additional lines in the future.

Sincerely yours,

*Andrew S. Freitas*  
Andrew S. Freitas



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

September 9, 1976

Mr. Andrew S. Freitas  
P. O. Box 948  
Kihei, Maui, HI 96753

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Freitas:

We thank you for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System and for your favorable support of the proposed project.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*

HANS RIECKE · ARCHITECT · INC.  
ARCHITECTURE PLANNING  
P. O. BOX 1627 · KAHULUI · MAUI · HAWAII · 96732 · ~~XXXXXXXXXX~~  
1808; 877-7688

August 5, 1976

Shigetaka "Mustard" Murayama  
Director  
Department of Water Supply  
County of Maui  
Wailuku, Hawaii 96793

RE: Proposed New Water Transmission Pipe

Dear Mr. Murayama:

As a permanent resident of Kihei, I would like to express my views on the proposed new water transmission pipe for the Kihei/Makena area.

Kihei is destined to be a major resort area on the Island of Maui by virtue of the excellent beaches in the area. The land being used for the resort area is not suitable for agricultural purposes which makes it ideal for urban expansion.

Without an increase in the water supply, this expansion can not take place and the economy of Maui would suffer dramatically because of it.

Very truly yours,



Hans Riecke, Architect, AIA

HR:eb



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

September 9, 1976

Mr. Hans Riecke, AIA  
P. O. Box 1627  
Kahului, Maui 96732

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Riecke:

We thank you for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System and for your favorable support of the proposed project.

Sincerely,

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*



DEPARTMENT OF THE ARMY  
HEADQUARTERS UNITED STATES ARMY SUPPORT COMMAND, HAWAII  
APO SAN FRANCISCO 96558

AFZV-FE-EE

05 AUG 1976

76  
DEPARTMENT OF WATER SUPPLY  
MAUI

Department of Water Supply  
County of Maui  
P.O. Box 1109  
Wailuku, Maui 96793

Gentlemen:

Reference is made to the Environmental Impact Statement for the  
Central Maui Water Transmission System Waiehu to Makena Maui  
Hawaii.

We have reviewed the EIS and have no comments to offer.

Thank you for the opportunity to review this document.

Sincerely yours,

CARL P. RODOLPH  
Colonel, CE  
Director of Facilities Engineering

CF:  
OFC OF ENVIR QUALITYCONTROL





DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Colonel Carl P. Rudolph, CE  
Director of Facilities Engineering  
Department of the Army  
HQS, U. S. Army Support Command, Hawaii  
APO San Francisco 96558

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Colonel Rudolph:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System.

Sincerely,

Shigeto Muraizama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

*"By Water All Things Find Life"*



RECEIVED

1976 AUG 9 PM 4 1

DEPARTMENT OF WATER SUPPLY



# University of Hawaii at Manoa

RE:0206

Environmental Center  
Crawford 317 • 2550 Campus Road  
Honolulu, Hawaii 96822  
Telephone (808) 948-7361

Office of the Director

6 August 1976

Department of Water Supply  
County of Maui  
P.O. Box 1109  
Wailuku, Maui 96793

Gentlemen:

## CENTRAL MAUI WATER TRANSMISSION SYSTEM ENVIRONMENTAL IMPACT STATEMENT

Concerning the above Environmental Impact Statement we submit herewith comments in whose preparation the following have been involved:

Doak C. Cox, Environmental Center  
Frank L. Peterson, Water Resources Research Center  
Glen Shepherd, Maui Community College

The construction of the proposed water system to which this EIS relates will have profound effects on the future development of Maui. In general the EIS seems quite acceptable. The distinction made in it (p. 4.1) between the primary impacts of the construction of the proposed transmission pipeline and the secondary impacts of the developments on Maui that will be encouraged and may be supported by the proposed system is quite appropriate. In our opinion the primary impacts will be minor, as the EIS indicates. The secondary impacts of a major expansion of a system of such fundamental importance as a water system are, however of very great significance, and it is encouraging to see so substantial an attempt as is reflected in the EIS to analyze these ramifying impacts whose nature is indeed as difficult to predict as is indicated (p. 4.1).

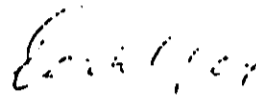
In our opinion, however, the EIS is quite inadequate in one major respect, that related to the water source. The EIS title "Central Maui Water Transmission System" suggests that it deals strictly with a proposed transmission system. However, the EQC regulations require that a group of actions that are components of a larger undertaking be treated as a single action in the EIS process (Reg. 1:22b).

AN EQUAL OPPORTUNITY EMPLOYER

Any system supporting development is dependent in part on nature, and this is particularly true of a water supply system. Of its natural and technological components, the former is by far the most difficult to analyze, but the analysis of the former is the more important; the natural carrying capacity limitations are fixed, these critical capacities are subject to the greater uncertainty, and oversights or miscalculations in their estimation have the more profound effects. The major inadequacies in the EIS are in the description of the source from which the water is to be derived, the estimation of the safe yield of this source, and the analysis of the impact implications of uncertainties in the estimation of this safe yield. The importance of these topics is so great that we discuss them in an attachment to the letter distinct from a second attachment containing our minor comments on the EIS.

We appreciate the opportunity we have had to review the EIS.

Yours very truly



Doak C. Cox

cc: OEQC

Attachments:

- A. Impact implications of safe yield uncertainties
- B. Minor comments

RECEIVED  
9 AM 4 15  
WATER SUPPLY  
HAWAII

CENTRAL MAUI WATER TRANSMISSION SYSTEM EIS  
IMPACT IMPLICATIONS OF SAFE YIELD UNCERTAINTIES

Overall System Components

The EQC regulations requiring that a group of actions that are components of a larger undertaking be treated as a single action in the EIS process is particularly pertinent in the case of a proposed water supply system in which any two or more of the components of water diversion, storage, transmission, distribution, and use are essentially undeveloped or will require substantial further development and will be mutually interdependent. This is the case of the proposed Central Maui water system.

In the Central Maui Water Transmission System EIS, descriptions of the transmission system and its impacts receive the greatest attention, but the discussion is not restricted to them.

Use is discussed in terms of conventional per-capita demand and population projections for the area served. In the supply-demand equation, the demand is treated for the most part as the known quantity, supply as the unknown. The discussion of the consequences of "no action" (pp. 6.1 - 6.2) recognizes that limitations of water supply may limit population carrying capacities, but the discussion relates solely to the supply limitation imposed by not increasing transmission capacity.

Storage and distribution receive little attention in the EIS for the probable and logical but unexpressed reason that additional storage and distribution may be provided incrementally, as required, by conventional means, with no very significant impacts.

This is true with respect to storage because only short-term storage will be required in the system. The capacity of the proposed transmission system will be sufficient to carry the maximum-day demands (p. 6.3), reducing downstream storage requirements to those necessary to even out decimal variations in demand. It is assumed, logically in this case but only implicitly, that larger seasonal mismatches of supply and demand may be avoided by differential rates of draft on the natural storage of the source.

Inadequacies of the EIS related to distribution, artificial storage, and their impacts, and the relations of the combination of these and transmission to the demand, are minor and easily rectified. More important inadequacies relate to the safe yield of the source and its relationship to the projected demand.

Need for and Identification of Source

The total projected Central Maui demand (p. 1.4) and the yield of present sources (p. 1.1), are identified as indicated below, from which the remaining

demand which must be met from new sources may be estimated as indicated:

Year	<u>Maximum-day demands, mgd</u>		
	1980	1990	2000
Total demand	22	37	52
Safe yield, present sources	<u>11</u>	<u>11</u>	<u>11</u>
Additional requirement	11	26	41

Of possible sources that have been considered (pp. 1.2 - 1.4), a ground-water aquifer ( or aquifers) in the Waiehu-Waihee area has been selected as that from which the additional requirement is to be met. The reasons for the identification of this source as the most promising one are probably valid, although the EIS discussion of the limitations of the other sources is minimal. However, the nature and probable limitations of this source deserve much more discussion than has been provided.

#### Nature of Waiehu Source

The Waiehu source to be developed (pp. 1.4 - 1.5, 1.7 - 1.8) is clearly basal groundwater, in basaltic lava flows, and at least in part artesian (p. A - 1). Although not so stated in this context, the lavas are those of the Wailuku series (p. 2.8). The principal confining member (caprock) consists of breccia and conglomerate derived from the erosion of the West Maui volcano (p. A - 1). It is also recognized that the groundwater is at least in part in the form of a Herzberg lens or lenses, underlain by salt water (p. A - 3), although this may not be true of mauka compartments confined by dikes.

It is recognized that the aquifer may be divided into compartments by dikes (p. 1.9), as seems most likely in the mauka portions, but it is not recognized that additional compartmentalization may result from buried bedrock valleys filled with sediments. The observations of a head of 16 feet near the point of proposed further development and also at a point 3½ miles away suggest that there is no effective compartmentalization. The EIS does not discuss the relation of the head to that at the Mokuhaio wells.

The recharge of the aquifer is not discussed at all in the EIS. In all probability, the principal recharge is from dike zones farther mauka in the West Maui mountains. Additional recharge may result from infiltration of stream water in non-artesian mauka sections of the aquifer, and from the lower slopes, through the caprock, although the EIS states that the caprock is impermeable and separates perched water in the sediments from the basal aquifer (p. A - 1). (Even though the horizontal conductivity in the horizontal is many times that in the vertical, the hydraulic gradient for vertical flow is much greater than that for horizontal flow and the horizontal area of the caprock is much greater than its cross sectional area.) Considering the

location of the test wells it is very doubtful that the data on water quality in the basal aquifer could indicate whether there is or is not significant contamination from recharge by excess irrigation, and in any case these data could not indicate that there is no recharge from this source as stated (p. A - 1).

The discharge of the basal aquifer or aquifers is also not discussed in the EIS except as it is claimed that draft from it will not affect brackish coastal springs (p. A - 3). These springs are undoubtedly fed by aquifers within the sedimentary caprock, and leakage from the bedrock aquifer to the caprock makai is as likely as percolation in the reverse direction mauka. Certainly, however, the observed springs cannot account for more than a small fraction of the discharge, and it seems probable that the major discharge is to the sea north of Waihee.

An implication of this probability is that, regardless of the extent of compartmentalization, the basal aquifers are interconnected, not only as far south as Waiehu, but also to Iao. The EIS states that monitoring of test wells at Waiehu show that pumping of the Mokuohau wells at Iao has no effect at Waiehu (p. A - 2). Such monitoring could indicate, at most, that variations in pumping rate at Mokuohau have no observable effects at Waiehu, because the test wells at Waiehu were not drilled at the time draft began at Mokuohau. It is even possible that the aquifer at Mokuohau is partially interconnected with the aquifer south of Iao that supplies the Wailuka Sugar Co. shaft, though analyses have not detected any cross effects.

#### Waiehu Source Safe Yield

There is very little discussion of the safe yield of the Waiehu source, the draft that is planned on that source, or the relationship between the planned draft and the safe yield.

A consortium of firms will apparently be responsible for developing up to 19 mgd. in the Waiehu-Puuohala area (p. 1 - 8), and the objective of the first increment of development is 10 mgd. Both amounts are probably in terms of maximum-day yields. The 10 mgd. is almost but not quite as great as the additional requirement apparently to be met in 1980, but the 19 mgd. falls far short of the apparent additional requirements for 1990 and 2000.

The EIS states that "Water removal, in excess of the aquifer recharge, will result in the infiltration of sea water into the Ghyberg-Herzberg lens." It does not recognize that any draft in the lens will result in lens shrinkage, rise in the salt-fresh mixing zone, increase in the thickness of the mixing zone, and reduction of the depth of water of domestic quality on both of the latter accounts. It also does not recognize that the safe yield can only be a fraction of the total recharge.

At one point the EIS states that "The precise amount of water in the basal aquifer has not been determined" (p. 9.1) although the quantity of water stored in the lens is not the most important question. Elsewhere, it states

that "the exact recharge rate and safe water removal rate [safe yield] will not be known until the proposed well is operational and pumping tests are conducted [A-3]."

In actuality, the possible range of the safe yield could be crudely estimated from present information. Because natural storage in the basal aquifer is very great, maximum-day yields are of no importance and, for comparison, the projected additional maximum-day demands (beyond present supplies) may be translated to additional mean demands using the conversion factor (1 mgd. mean = 1.5 mgd. max.) indicated in Saito-Hill-Stearns report plate 2.

<u>Year</u>	<u>Additional mean demand, mgd.</u>
1980	7½
1990	17½
2000	27

There is a discussion of safe yield but no actual estimate of the safe yield of an aquifer in the area in a "Preliminary report on the water resources of the Wailuku Area, Maui," by George Yamanaga and C. J. Huxel, Jr., (Div. Water and Land Dev. Circ 61, 1970). The closest approach to an actual attempt to estimate the safe yield of a basal aquifer in the area has been a recharge estimation by M.C. Casky (The recharge of the Waikapu aquifer, Maui, University of Hawaii MS. Thesis, 1968). Casky did not estimate the safe yield of either the Waikapu aquifer or the Waiehu aquifer, but his means of recharge estimation could be extended to the Waiehu aquifer. Neither of these reports is cited in the EIS or listed in its references.

The closest that the Saito-Hill-Stearns report (which is listed in the references but not cited in this connection) comes to safe-yield estimation for the basal aquifer at Waiehu is a statement (p. 15) that, "If properly designed, no danger of salt water invasion would occur, since under the Ohyhen-Herzberg theory, salt water lies 700 feet or more below sea level." Disregarding the inadequacy of the rationale, the development plan on which the judgement is based is of interest: The plan involves staged development, whose implications as to mean draft may be estimated using the same factor for conversion from maximum-day to mean as above:

<u>Date</u>	<u>No. of Waiehu wells</u>	<u>Draft mgd.</u>	
		<u>Max-day</u>	<u>Mean</u>
1977	1	9	6
1981	2	18	12
1987	3	27	18
1993	4	36	24

In the estimates by Casky of the recharge of the Waikapu aquifer, the minimum estimate differs from what he called the "average" estimate by a factor of two. A similar range of uncertainty would probably apply to estimates for the Waiehu aquifer. A further uncertainty would be introduced in the estimate of the developable fraction of recharge.

Some reduction in the range of estimates of the safe yield of the Waiehu aquifer may be possible, as suggested by the EIS, through the use of monitoring data associated with the operation of the initially proposed well. However, anything approaching exact establishment of the safe yield will not be possible unless the safe yield is approached or exceeded by the average initial draft. That this is so is indicated by the fact that the safe yield of the similar Honolulu aquifers is still subject to perhaps 10 or 15% uncertainty after nearly 100 years of development, nearly 60 years of draft approaching the safe yield, and about 40 years analysis under modern concepts.

The initial draft indicated in the EIS, 10 mgd., probably represents pumping capacity or maximum-day draft. It should be recognized that this capacity is very large as compared with those normally provided by drilled wells in Hawaii, although the Wailuku shaft delivers 15 mgd. in total from three wells in close proximity.

The results of initial well testing will be most significant in terms of safe-yield estimation if the well is pumped continuously at full capacity, which should be attempted as soon as transmission facilities are provided that will permit useful disposition of the water.

On very general grounds it seems reasonable that the safe yield of the Waiehu aquifer will not be approached by a 10 mgd. mean draft, but this will not assure that the mean requirements of 1990 and 2000 can be met.

#### Impacts of Safe Yield Uncertainty

The inadequacies of the EIS with respect to discussion of the nature and safe yield of the Waiehu source have direct pertinence to the major shortcoming in the identification of the possible impacts of the proposed transmission system. The history of water developments is replete with cases of agricultural and urban developments that were allowed to proceed on the basis of deceptive appearances as to the adequacy of water supply sources. In some cases the deception resulted from inadequate length or inadequate analysis of precipitation records. In many cases, however, it has resulted from overestimate of safe yields of ground water aquifers, or even from failures to recognize that safe yields are limited.

The risk of deception of the latter sort is particularly great if the storage of the aquifer is great; if it is difficult to estimate changes in storage; if it is difficult to estimate recharge, discharge, or the changes in recharge or discharge that will result from changes in head; if the safe yield is dependent not only on ordinary hydraulic factors but on salt-fresh mixing; and if the demand approaches or exceeds the minimum estimate of safe

yield. Except perhaps for the last, all of these conditions pertain in the case of the Waiehu source.

Because there is a significant risk of over reliance on a water source, the impacts of possible excesses of demand impaired by planned development or even actual development should be analyzed and discussed in the EIS.

If the minimum probable safe yield of the Waiehu aquifer exceeds the 6 mgd. mean additional 1980 water requirement to be met by draft from this aquifer, but if the maximum probable safe yield does not exceed the 24 mgd. mean additional 2000 requirement, the following questions are pertinent:

- a. Can the plans that would permit the additional development between 1980 and 1990 be revised to discourage instead of encourage this development?
- b. How effective would such revision be in discouraging development?
- c. What would be the ramifying secondary impacts of limitations of growth?
- d. What additional water sources or additional drafts on present sources might be developed? (Here the inadequacy of the EIS discussion of alternative sources is critical.)
- e. What would be the impacts of the development and transmission of water from their sources?
- f. What reduction of per-capita demand might be effected, and with what impacts?

If the maximum probable safe yield were less than the 6 mgd. mean additional 1980 water requirement, the pertinence of all of the above questions would be sharpened, with the period of development of concern in the first reduced to the 4 years between now and 1980.

If the minimum probable safe yield as estimated at any date might be exceeded by the demand to be supplied from the aquifer by that date; if possible developments of alternative sources proved very difficult, time-consuming, or costly; and if per-capita demand proved relatively inflexible, the following additional questions would be pertinent:

- g. How long could the demand be satisfied by draft or storage?
- h. Through what mechanism might or would the population in the service area be reduced?
- i. What would be the ramifying secondary impacts of a population reduction induced by these mechanisms?



The gravity of these questions indicates the great importance of the estimation of safe yield in relation to anticipated demands. This importance suggests that the following additional questions should be addressed in the EIS:

- j. What is the range of percent estimates of safe yield?
- k. What is the range of safe-yield estimates that might be made by further analysis of present information?
- l. How may the range of safe-yield estimates be most quickly reduced by monitoring and analysis associated with the initial water development or otherwise?

CENTRAL MAUI WATER TRANSMISSION SYSTEM EIS

MINOR COMMENTS

Land Use Policy

After indicating that Maui County's land use policies include: "5. Limiting major resort development to designated areas in West Maui and Kihei-Makena" (p. 3.1), the EIS lists the following: "Maintaining other areas of the County as basically residential in character (Wailuku-Kahului will continue as the primary commercial, industrial, financial, and governmental center of Maui as well as a residential area)." It is surely not intended that a residential character is to be maintained in agricultural and conservation areas, nor that existing commercial and industrial centers other than those in Wailuku-Kahului are to be abandoned. Indeed, maintaining primary agriculture, stimulating diversified agriculture, and achievement of a balance economy are also listed as policies, although these policies are not identified with areas in the listing. We suggest rewording of policy 5.

Recent Development Proposal

It would be well to recognize in the EIS the proposal by Alexander and Baldwin of a major new urban development in the sand hills between Wailuku-Kahului and Waikapu, and to comment on the water requirements for this development in relation to the proposed water transmission system to whatever extent is possible considering the recency of the proposal.

Direct Impacts of Proposed Water Development

In the light of the extensive comments in attachment A on the nature of the proposed water source in Waikapu and the implications of uncertainties in its safe yield, it is worth noting that, in spite of the uncertainties, it is quite unlikely that significant direct impacts will result from the proposed water development.

Although the brackish coastal springs might possibly be somewhat affected by draft from the basal water body (as pointed out in the attachment A), the effects will be minor at most, and the impacts insignificant. Because the major natural discharge of the basal groundwater is not only unused but at an unknown location, there can be no significant impacts from its reduction.

Pipeline Route

The description of the pipeline route (pp. 1 - 9 to 1 - 11) adds little or nothing to the location of the line as indicated in fig. 1 - 2. The rationale for most of the routing may be obvious, but there is no explanation of some of the jogs, for example the wide detour around Kihei.



**DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI**

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Doak C. Cox, Ph.D.  
Director, Environmental Center  
University of Hawaii  
Crawford 317  
2550 Campus Road  
Honolulu, HI 96822

**SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT**

Dear Dr. Cox:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System. As your comments were separated into two sets: Attachment A pertaining to the description of the source, and Attachment B to the EIS; our responses are arranged to coincide with the comments contained in each attachment.

**ATTACHMENT A**

We have been advised by our attorneys that Chapter 343, HRS, and the Environmental Quality Commission's Environmental Impact Statement Rules and Regulations do not apply to the water source development program since that program is being undertaken by private parties without involvement of any

*"By Water All Things Find Life"*

State or County funds or lands. Therefore, the EIS for the transmission line does not address itself to the water source development program directly. We do, however, recognize the scope and substance of the comments you have submitted about the water source development program and, without prejudice to or waiving our legal position, we submit the following response to your comments:

Overall System Components

Additional water storage and distribution systems will be provided incrementally by the Department of Water Supply. In addition to County improvements, private developers, in some cases, will be required to install their own storage reservoirs and distribution systems.

Need For and Identification of Source

A discussion of alternative sources of water is covered later in specific reference to your comments.

Nature of Waiehu Source

We concur with your discussion in general.

Presently, indications are that there may not be any connection between the Iao (Mokuhau) aquifer and the Waiehu aquifer; and that there is the probability that Waiehu and Waihee are interconnected as one large aquifer. "The five test holes which have been drilled thus far, give a comprehensive view of the aquifer. The water fills the interstices in the basalt which will act like a huge tank when

pumped. It is anticipated that the entire basin may be developed at this site, unless a dike barrier exists, the existence of which cannot be determined until after the pumps are in operation."\* These indications are not to be taken as fact and can only be proven or disproven by continued pumping and monitoring of the Waiehu and Mokuahu sources beginning as soon as a production well or wells are completed. The development of a well or a series of wells at Waiehu will recover water believed to be wasting into the sea north of Waiehu.

The recharge of the aquifer is recognized as being of prime importance and continued monitoring at Waiehu will be carried on to enhance knowledge in this respect and to insure that the safe yield of the aquifer is not exceeded.

#### Waiehu Source Safe Yield

We concur with the statement that "any draft in the lens will result in lens shrinkage, rise in the salt-fresh mixing zone, increase in the thickness of the mixing zone, and reduction of the depth of water of domestic quality on both of the latter accounts." It is also true that the safe yield will not be 100 percent of total recharge.

You are correct in your assumption that demand quantities of water for the various time periods stated in the

---

\*Stearns, Harold, Second Supplement to the Central Maui Water Study of March 1974, February, 1974.

EIS are maximum day amounts based on one and one half times the average daily demand. The incremental installation of wells and pumping facilities is planned to keep the aquifer from being over pumped. Based on available information, and the professional opinion of the project's consulting geologist, "a very large recharge area with high rainfall exists inland of the basin; hence, quantities in excess of 20 mgd should be recoverable."\* If this proves true, then as water demand dictates, additional wells will be developed. There will be sufficient time to monitor and evaluate data to ascertain the safe yield of the proposed water source. In no instance will additional wells be developed at this source unless the resulting analysis confirms that the safe yield has not been reached.

Impacts of Safe Yield Uncertainty

COMMENT:

a) Can the plans that would permit the additional development between 1980 and 1990 be revised to discourage instead of encourage this development?

b) How effective would such revision be in discouraging development?

c) What would be the ramifying secondary impacts of limitations of growth?

RESPONSE:

These three comments are interrelated and a single response is given.

---

\*Saito, Norman, Engineering Consultants, Inc., CH<sub>2</sub>M Hill Inc., and Dr. Harold T. Stearns, Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs, March, 1974.

Development can be discouraged by revising the General Plans of the areas to be served by the proposed project, that is, Kihei-Makena and Wailuku-Kahului. General plans are long-range policy guidelines for attaining community goals and objectives. They should not be considered as fixed documents which cannot be modified. However, such a course of action would require extensive analysis of the components which make up the plan and may take several years to develop.

It is difficult to ascertain the effectiveness of such an action without knowing what types of development would be permitted if the general plans for the area were to be revised. Priorities would have to be established in determining the types of development (i.e., residential, commercial, and resort) and its relationship to the goals and objectives of Maui County and if such development is in the best interests of Maui residents.

In addition, the Board of Water Supply can undertake various short-term actions to discourage development. The specific actions which may be taken by the Department of Water Supply include but are not limited to the following:

1. If the Department of Water Supply determines that the existing water supply is inadequate to meet fire flow requirements or will adversely affect existing water users, it will not issue water meters and will not approve any subdivision plans

unless an adequate water supply is available.

2. The Water Department may also require extension of existing mains if problems exist in its distribution system.

In general, any general plan revisions and specific actions by the Board of Water Supply would probably be effective in limiting development in the Kihei-Makena and Wailuku-Kahului areas. However, the results of such an action will induce significant secondary economic, social, and physical impacts throughout Maui. These secondary impacts also are difficult to empirically ascertain at this time. These impacts could be partially minimized by revising all existing general plans, and County goals and objective to reflect limited growth in Kihei-Makena and Wailuku-Kahului.

COMMENT:

d) What additional water sources or additional drafts on present sources might be developed? (Here the inadequacy of the EIS discussion of alternative sources is critical.)

RESPONSE:

Kihei

Groundwater explorations have indicated that only brackish water can be found along the coastal area up to the 600 foot elevation from Kihei to Makena. An exploratory well was recently developed by the State Department of Land and Natural Resources near Pulehu and the safe well yield



estimated at .5 mgd. The risk of developing this source is greater than that of Waiehu due to the lack of knowledge of recharge to the "Pulehu aquifer". In addition, it is anticipated that this source cannot supply the total projected water requirements for the Kihei area.

#### Waikapu

This area may contain sufficient water quantities to supply a portion of projected demands in Central Maui. However, recent exploratory drilling by the State Department of Land and Natural Resources Division of Water and Land Development has been unsuccessful. Additional exploratory drillings are not planned for this area at this time.

#### Iao Valley

Water sources include the Kepaniwai Park Well, Iao Tunnel, and the Mokuhaul Wells. The existing Kepaniwai Park Well and Iao Tunnel supply approximately 1 mgd to the Wailuku high level service area. The base yield of these sources is not sufficient to meet future water requirements and further development of these sources would not substantially increase water yields.

The Mokuhaul Wells are the existing major water source for the Central Maui service area. The drilling of additional water wells at Mokuhaul and the increased draft may result in saltwater intrusion problems.

#### Exchange of Effluent for Irrigation Water

One major source of new water which could be made

available in the future is the exchange of irrigation water for properly treated sewage effluent. Water which is perfectly suitable for domestic use is being used for irrigation. Partially treated sewage, which could be further treated and used for irrigation, is being wasted. The technology for reuse of treated sewage effluent for cane irrigation is presently being studied by the University of Hawaii. The major problem of the reuse of sewage effluent for irrigation is the effects of nutrient concentration and lowered crop production. This problem may be reduced by dilution with other waters and a system of exchange could be operational by the time water developed through conventional means runs short.

#### Desalination

As mentioned in the EIS, a recent study, Desalting Water in Hawaii (DLNR, 1975), analyzed the economic costs of desalting water in the Kihei area. Three desalting methods were investigated: electro dialysis, ion exchange, and reverse osmosis. According to the study, the least cost alternative is electro dialysis. Under this alternative water can be desalted at a cost ranging between \$.78 to \$1.17 per thousand gallons depending on the design capacity of the plant, degree of treatment, and the number of operating days. These costs do not include distribution costs. As a comparison, in 1974, the domestic water rate on Maui island

was \$.41 per thousand gallons. The report further states:  
"It is unlikely that desalting brackish water even at top priority locations will provide an economically competitive alternative to transporting existing sources unless transport distances are very great or expensive water treatment and costly impounding facility must be provided for the source."

As a result of exploratory drillings in Kihei which have yielded brackish water, unsuccessful drilling in Waikapu, the unproven technology for irrigation water-effluent exchange, and the economic limitations for processing seawater or brackish water, the most prudent means to provide for the future water needs of Central Maui is to develop the basal water supplies in the Waiehu-Waihee area.

COMMENT:

e) What would be the impacts of the development and transmission of water from their sources?

RESPONSE:

Any draft in the lens (of the Waiehu aquifer) will result in lens shrinkage, rise in the salt-fresh mixing zone, increase in the thickness of the mixing zone, and reduction of the depth of water of domestic quality on both of the latter accounts.

As indicated earlier, it is presumed that the Iao aquifer and Waiehu aquifer are not interconnected. If this is correct, water withdrawal from the Waiehu aquifer should not affect the head at the Mokuahu Wells. Of course, this

can only be ascertained after sustained pumping and monitoring of the Mokuhau Wells and the proposed water source.

The impacts of the developments of the alternative sources would range from slight in some cases to very severe in others.

COMMENT:

f) What reduction of per-capita demand might be effected, and with what impacts?

RESPONSE:

At the present time there are several measures which the Department of Water Supply may use to reduce per capita demand. These measures include:

- a) controlling the size of issued water meters,
- b) reducing water pressures,
- c) informing Maui residents of water conservation measures.

In addition to the above measures, should the need arise, The Director of the Department of Water Supply may:

1. Where negligent or wasteful use of water exists on any premises, the department may discontinue the service if such conditions are not corrected within five days after giving the consumer written notice of intent to do so.
2. Whenever, in the director's opinion, special conservation measures are advisable, in order to

forestall water shortage and a consequent emergency, the department may restrict the use of water by any reasonable method of control.

COMMENT:

g) How long could the demand be satisfied by draft or storage?

RESPONSE:

An excess of demand over the safe yield could be met by storage in the aquifer for at least five years. We anticipate that use of this stored water would be minimal and before this condition occurred additional sources would be developed.

COMMENT:

h) Through what mechanism might or would the population in the service area be reduced?

i) What would be the ramifying secondary impacts of a population induced by these mechanisms?

RESPONSE:

An immediate reduction in the existing population would be extremely difficult to induce.

Land use changes could reduce the population in the service area over a long period of time. Changes in land use would not directly control the birth rate but could discourage residents and economic activities from locating in the area. For example, restrictions on land use changes would be exemplified by a general plan revision and changes in zoning. The General Plan could permit only residential

development within the overall physical boundaries of the planning area, and zoning could further curtail the type of residential development.

The ramifying secondary effects of a General Plan revision are difficult to ascertain at this time.

COMMENT:

j) What is the range of present estimates of safe yield?

k) What is the range of safe yield estimates that might be made by further analysis of percent information?

l) How may the range of safe yield estimates be most quickly reduced by monitoring and analysis associated with the initial water development or otherwise?

RESPONSE:

The State Department of Land and Natural Resources Report R-38 (page 33) estimated the quantity of water in the Waiehu-Waihee basin by means of a simplified water budget system using rainfall, surface run-off, and evaporation. The resulting net groundwater percolation was estimated to be 20 mgd average from a total rainfall of 95 mgd. (The 20 mgd average is equivalent to 30 mgd maximum day as used in the Saito report.)

A range of safe yield estimates has not been calculated; however, it is estimated by Dr. Harold T. Stearns, the project's consulting geologist, that quantities of water in excess of 20 mgd should be recoverable. A study of recharge to the Waikapu aquifer estimated a probable uncertainty ratio

between "average estimates" and "minimum estimates" of recharge at approximately 2 to 1.\* If this uncertainty factor is applied to the Waiehu aquifer, a conservative present estimate of safe yield may range between 20 and 40 mgd, and possibly greater than 40 mgd.

As previously stated in our response under Nature of Waiehu Source, extensive test borings have been made in the Waiehu-Waihee area and core samples obtained. The results of the test borings indicate the basal water elevation stands at approximately 16 feet above mean sea level which suggests the aquifer is very large.

The decision to develop the Waiehu-Waihee aquifer was based on the data obtained from the extensive exploratory drilling and studies thereof made by Dr. Harold T. Stearns. The selected well site and future well sites have a very good expectation of safely yielding water quantities needed to meet future demands of the Central Maui water service area. The first production well is now being drilled at a ground elevation of 500 feet above mean sea level. It is located approximately 1½ miles to the north of the existing Mokuhau Wells. Test pumping of this well is expected to commence within the next month. The results will be closely observed and will develop a safe well yield. Observation

---

\*Caskey, Melvin C., The Recharge of the Waikapu Aquifer, August, 1968.

holes at Mokuahau, Puuohala, Waiehu, and Waihee will be closely monitored to obtain data on water level differences caused by the test pumping. Draw down at various pumping rates will be measured and recovery times recorded. If initial testing shows water is plentiful, then a second well will be installed and test pumped.

The range of safe yield estimates can be accelerated by pumping the proposed well field to its maximum and conducting monitoring studies. This can be accomplished by cutting down on the Mokuahau draft and furnishing as much water as possible to the service area from the proposed water source.

ATTACHMENT B

COMMENT:

Land Use Policy

After indicating that Maui County's land use policies include: "5. Limiting major resort development to designated areas in West Maui and Kihei-Makena" (p. 3.1), the EIS lists the following: "Maintaining other areas of the County as basically residential in character (Wailuku-Kahului will continue as the primary commercial, industrial, financial, and governmental center of Maui as well as a residential area)." It is surely not intended that a residential character is to be maintained in agricultural and conservation areas, nor that existing commercial and industrial centers other than those in Wailuku-Kahukui are to be abandoned. Indeed, maintaining primary agriculture, stimulating diversified agriculture, and achievement of a balance economy are also listed as policies, although these policies are not identified with areas in the listing. We suggest rewording of policy 5.



RESPONSE:

Policy 5 has been reworded to read:

5. Maintaining the existing land use pattern for other areas in the County.

COMMENT:

Recent Development Proposal

It would be well to recognize in the EIS the proposal by Alexander and Baldwin of a major new urban development in the sandhills between Wailuku-Kahului and Waikapu, and to comment on the water requirements for this development in relation to the proposed water transmission system to whatever extent is possible considering the recency of the proposal.

RESPONSE:

The quantity of water which will be required for the proposed development is unknown.

COMMENT:

Direct Impacts of Proposed Water Development

In the light of the extensive comments in attachment A on the nature of the proposed water source in Waikapu and the implications of uncertainties in its safe yield, it is worth noting that, in spite of the uncertainties, it is quite unlikely that significant direct impacts will result from the proposed water development.

Although the brackish coastal springs might possibly be somewhat affected by draft from the basal water body (as pointed out in the attachment A), the effects will be minor at most, and the impacts insignificant. Because the major natural discharge of the basal groundwater is not only unused but at an unknown location, there can be no significant impacts from its reduction.

RESPONSE:

We are in agreement with the comment.

COMMENT:

Pipeline Route

The description of the pipeline route (pp. 1-9 to 1-11) adds little or nothing to the location of the line as indicated in fig. 1-2. The rationale for most of the routing may be obvious, but there is no explanation of some of the jogs, for example the wide detour around Kihei.

RESPONSE:

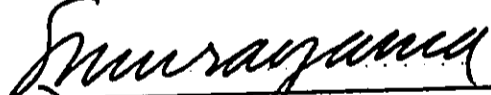
The routing of the pipeline was dictated by several considerations. These included:

- a) the available corridors for laying the pipeline,
- b) minimizing the number of landowners whose lands would be traversed by the pipeline,
- c) avoiding urban areas to minimize the effects of construction related impacts, and
- d) restraints imposed by landowners affected by the pipeline route.

All of these considerations contributed to the jogs, and changes in direction of the selected route.

We hope our responses have satisfactorily answered your comments.

Sincerely,



Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Division of Ecological Services  
821 Mililani Street  
Honolulu, Hawaii 96813

Reference: ES

July 15, 1976

Interim Director  
Environmental Quality Commission  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Sir:

We have reviewed the draft environmental impact statement for the Central Maui Water Transmission System, and offer the following comments for your consideration:

Page 2-25, Section 2, VIII.B.1.a. Endemic Species. To avoid confusion, the identification of Kealia Pond as a State Wildlife Sanctuary should be followed with a description of its specific wildlife protective features.

Page 2-26, Section 2., VIII.B.1.b. Indigenous Species. The description of the black-crowned night heron (Nycticorax nycticorax hoactli) as a piscivore tends to be rather restrictive. Berger (1972) in Hawaiian Birdlife, mentions that: ". . . it feeds primarily on aquatic insects, fish, frogs and mice."

Page 4-7, first paragraph, Section 4.VI. Flora and Fauna. The distance between the transmission route and known endangered species habitat or other wetlands should be identified.

Page 4-32, Section 4.XVI. Alteration of Landform. The discussion concerning land clearing operations should be more specific to allow adequate evaluation of potential soil erosion problems. We suggest that the revised EIS should clearly mention the amount of land that can be exposed at one time and the duration of the exposure period that will be stipulated under the contract document. It is further suggested that the paragraph be modified to clearly state that upon completion of construction activities, disturbed areas will not be immediately seeded to minimize potential erosion problems, but instead, vegetation would be allowed to slowly grow over construction scars. It is also suggested that the effectiveness of the County's grading ordinance be illustrated by examples.



Page 4-33, Section 4.XVII. Off-Shore Water Quality. To illustrate how accelerated urbanization can adversely affect nearshore waters, representative marine environments adjacent to urbanized communities throughout Hawaii should be examined. The statement should identify alterations in the marine resource following the recent development along the Maalaea-Kihei coast through interviews with fishermen, researchers, etc.

Page 4-38, Section 4.XXI.B. Parks and Recreational Facilities. The County's policy requiring developers to provide public access to beaches deserves additional discussion. The statement should indicate whether this policy has been established through specific legislation or whether such stipulations are applicable through provisions of just certain project requirements. Would the public be assured of access at given intervals along coastal areas? Would public access also include a specified number of parking stalls? Would there be assurances that access to beaches are within reasonable walking distance?

Page 9-1, Section 9. Summary of Unresolved Issues. We suggest that the statement examine alternatives to the proposed water source to disclose the full project impact in the event that future tests prove that the supply will be sufficient for only short-term needs or that other water sources will be affected.

Because some of the actions described in the environmental statement may conflict with the programs and objectives of the U. S. Fish and Wildlife Service, our response should not be considered to be approval of the project or actions described in the document. Rather, it should be regarded as relating only to the adequacy of the statement as a full disclosure document.

Sincerely yours,

*Maurice H. Taylor*  
Maurice H. Taylor  
Field Supervisor

cc: ARD, AE



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

September 9, 1976

Mr. Maurice H. Taylor  
Field Supervisor  
United States Department of the Interior  
Fish and Wildlife Service  
Division of Ecological Services  
821 Mililani Street  
Honolulu, HI 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Taylor:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System. In answer to your comments, we offer the following responses:

COMMENT:

Page 2-25, Section VIII.B.1.a. Endemic Species. To avoid confusion, the identification of Kealia Pond as a State Wildlife Sanctuary should be followed with a description of its specific wildlife protective features.

RESPONSE:

Kealia Pond was established as a State Wildlife Sanctuary in 1952 to provide habitat for the Hawaiian Stilt, Hawaiian Coot, and other migratory waterfowl, and to protect native and migratory waterfowl. Wildlife protective features

*"By Water All Things Find Life"*

for Kealia Pond and other State Wildlife sanctuaries are mandated by State statute (HRS Chapter 191: Birds and Mammals). It is unlawful for any person, other than a person holding a permit to take, catch, injure, kill, or destroy, or attempt to take, catch, injure, or destroy any wild bird. Also, it is unlawful to keep or have possession of any wild bird, dead or alive, or to damage or destroy a nest of any wild bird (HRS 1955, Ch. 191, Sec. 191-13).

COMMENT:

Page 2-26, Section 2, VIII.B.1.b. Indigenous Species. The description of the black-crowned night heron (Nycticorax nycticorax hoactli) as a piscivore tends to be rather restrictive. Berger (1972) in Hawaiian Birdlife, mentions that: ". . . it feeds primarily on aquatic insects, fish, frogs, and mice."

RESPONSE:

Agree. According to Berger: "They (Nycticorax nycticorax hoactli) eat fish, frogs, snakes, mice, insects, crayfish, and a wide variety of other aquatic life."

COMMENT:

Page 4-7, Section 4, VI. Flora and Fauna. The distance between the transmission route and known endangered species habitat or other wetlands should be identified.

RESPONSE:

The shortest distance between the transmission alignment and known wildlife habitat are as follows:

Kealia Pond	1400 feet
Waiale Reservoir	130 feet
Salt Pond South of Puu Olai	150 feet
Kanaha Pond	2 1/2 miles

COMMENT:

Page 4-32, Section 4. XVI. Alteration of Landform. The discussion concerning land clearing operations should be more specific to allow adequate evaluation of potential soil erosion problems. We suggest that the revised EIS should clearly mention the amount of land that can be exposed at one time and the duration of the exposure period that will be stipulated under the contract document. It is further suggested that the paragraph be modified to clearly state that upon completion of construction activities, disturbed areas will not be immediately seeded to minimize potential erosion problems, but instead, vegetation would be allowed to slowly grow over construction scars. It is also suggested that the effectiveness of the County's grading ordinance be illustrated by examples.

RESPONSE:

The County of Maui, in its grading ordinance, has adopted the "Universal Soil Loss Equation" (USLE) and the related "Severity Number" to limit grading operations and keep soil loss within reasonable limits. The soil losses vary in accordance with soil erodibility, rainfall, and length of run and slope. The severity number is based on soil loss, area, duration of construction, and other downstream factors. Presently, the County of Maui does not have a direct area limitation but sets limits by severity number and soil loss. Comparatively, the City and County of Honolulu has adopted the same system but with a 15 acre limit.

The chief concern of the "USLE" is the soil loss per drainage area and therefore, relatively speaking, with the narrow strip being opened for the pipeline trench, the soil loss per drainage area is small.

We estimate an average of 300 linear feet of pipe is to

be installed in a day in open areas. By watering the finished open areas for dust control, the natural vegetation should return in about a month's time. Projected over the length of the pipeline alignment, this would mean an average of about five acres of exposed area, well below Honolulu Standards. Again, the cultivated lands, roads, and other developed areas should be restored as soon as practical.

COMMENT:

Page 33, Section 4. XVII. Off-Shore Water Quality. To illustrate how accelerated urbanization can adversely affect nearshore waters, representative marine environments adjacent to urbanized communities throughout Hawaii should be examined. The statement should identify alterations in the marine resource following the recent development along the Maalaea-Kihei coast through interviews with fishermen, researchers, etc.

RESPONSE:

Alterations to the marine environment following recent development of the Maalaea-Kihei area cannot be identified without a basis for comparison. To our knowledge and to researchers we have contacted, there is a paucity of marine data reported for this area prior to urbanization. As we do not know what the marine environment was like prior to urbanization, we cannot empirically ascertain what alterations may have occurred over time. Recently, some studies of nearshore waters have been undertaken primarily around Makena. The Division of Fish and Game of the Department of Land and Natural Resources have conducted several fish surveys in Ahihi Bay and La Perouse Bay. An Environmental



Impact Statement prepared for the Seibu Real Estate Company investigated the existing marine environment around Makena and the type of marine impacts which may be expected as development of the area occurs. In addition, Kihei was selected as a site for initial analysis and mapping of different coastal resources and processes as part of the State's Coastal Zone Management Program. These studies and future research will provide baseline marine data which will aid in assessing future potential impacts on marine resources.

COMMENT:

Page 4-38, Section 4 XXI. B. Parks and Recreational Facilities. The County's policy requiring developers to provide public access to beaches deserves additional discussion. The statement should indicate whether this policy has been established through specific legislation or whether such stipulations are applicable through provisions of just certain project requirements. Would the public be assured of access at given intervals along coastal areas? Would public access also include a specific number of parking stalls? Would there be assurances that access to beaches are within reasonable walking distance?

RESPONSE:

The County's policy for providing beach and other access rights-of-way has been established through legislation. The reviewer is referred to the Permanent Ordinances of the County of Maui, Chapter 11, Article I, Section 11-1.9 (c) Beach and other access rights-of-way. According to the ordinance:

- 1) Where subdivisions front along the shoreline or other public recreation areas, rights-of-

way to these areas shall be created at intervals of not greater than 1500 feet. The location of the rights-of-way shall be agreed to by the subdivider and the Director of the Planning Department.

- 2) The Director of the Planning Department may require consolidating rights-of-way to provide sufficient area for vehicular access, parking, and development of shoreline or other recreational facilities.

In addition to the above ordinance, the County has embarked on an ambitious program for acquiring rights-of-way to beaches and shoreline fishing areas. Recently, the County of Maui requested \$185,000 in matching funds from the State for a variety of acquisition projects that range from pathways to larger amounts of land to include parking facilities.

COMMENT:

Page 9-1, Section 9. Summary of Unresolved Issues. We suggest that the statement examine alternatives to the proposed water source to disclose the full project impact in the event that future tests prove that the supply will be sufficient for only short-term needs or that other water sources will be affected.

RESPONSE:

We have been advised by our attorneys that Chapter 343, HRS, and the Environmental Quality Commission's Environmental Impact Statement Rules and Regulations do not apply to the water source development program since that program is being

undertaken by private parties without involvement of any State or County funds or lands. Therefore, the EIS for the transmission line does not address itself to the water source development program directly. We do, however, recognize the scope and substance of the comments you have submitted about the water source development program and, without prejudice to or waiving our legal position, we submit the following response to your comments:

Kihei

Groundwater explorations have indicated that only brackish water can be found along the coastal area up to the 600 foot elevation from Kihei to Makena. An exploratory well was recently developed by the State Department of Land and Natural Resources near Pulahu and the safe well yield estimated at .5 mgd. The risk of developing this source is greater than that of Waichu due to the lack of knowledge of recharge to the "Pulahu aquifer". In addition, it is anticipated that this source cannot supply the total projected water requirements for the Kihei area.

Waikapu

This area may contain sufficient water quantities to supply a portion of projected demands in Central Maui. However, recent exploratory drilling by the State Department of Land and Natural Resources Division of Water and Land Development has been unsuccessful. Additional exploratory drillings

are not planned for this area at this time.

Iao Valley

Water sources include the Kepaniwai Park Well, Iao Tunnel, and the Mokuahau Wells. The existing Kepaniwai Park Well and Iao Tunnel supply approximately 1 mgd to the Wailuku high level service area. The base yield of these sources is not sufficient to meet future water requirements and further development of these sources would not substantially increase water yields.

The Mokuahau Wells are the existing major water source for the Central Maui service area. The drilling of additional water wells at Mokuahau and the increased draft may result in saltwater intrusion problems.

Exchange of Effluent for Irrigation Water

One major source of new water which could be made available in the future is the exchange of irrigation water for properly treated sewage effluent. Water which is perfectly suitable for domestic use is being used for irrigation. Partially treated sewage, which could be further treated and used for irrigation, is being wasted. The technology for reuse of treated sewage effluent for cane irrigation is presently being studied by the University of Hawaii. The major problem of the reuse of sewage effluent for irrigation is the effects of nutrient concentration and lowered crop production. This problem may be reduced by dilution with

other waters and a system of exchange could be operational by the time water developed through conventional means runs short.

#### Desalination

As mentioned in the EIS, a recent study, Desalting Water in Hawaii (DLNR, 1975), analyzed the economic costs of desalting water in the Kihei area. Three desalting methods were investigated: electro dialysis, ion exchange, and reverse osmosis. According to the study, the least cost alternative is electro dialysis. Under this alternative water can be desalted at a cost ranging between \$.78 to \$1.17 per thousand gallons depending on the design capacity of the plant, degree of treatment, and the number of operating days. These costs do not include distribution costs. As a comparison, in 1974, the domestic water rate on Maui island was \$.41 per thousand gallons. The report further states: "It is unlikely that desalting brackish water even at top priority locations will provide an economically competitive alternative to transporting existing sources unless transport distances are very great or expensive water treatment and costly impounding facility must be provided for the source."

As a result of exploratory drillings in Kihei which have yielded brackish water, unsuccessful drilling in Waikapu, the unproven technology for irrigation water-effluent exchange, and the economic limitations for processing seawater or

brackish water, the most prudent means to provide for the future water needs of Central Maui is to develop the basal water supplies in the Waiehu-Waihee area.

Waiehu Source

Based on available information, and the professional opinion of the project's consulting geologist, Dr. Harold T. Stearns, "a very large recharge area with high rainfall exists inland of the basin; hence, quantities in excess of 20 mgd should be recovered."\* If this proves true, then as water demand dictates, additional wells will be developed. The incremental installation of wells and pumping facilities is planned to keep the aquifer from being over pumped. There will be sufficient time to monitor and evaluate data to ascertain the safe yield of the proposed water source. In no instance will additional wells be developed at this source unless the resulting analysis confirms that the safe yield has not been reached.

It is presumed that the Iao aquifer and Waiehu aquifer are not interconnected. If this is correct, water withdrawal from the Waiehu aquifer should not affect the head at the Mokuahu Wells. Of course, this can only be ascertained

---

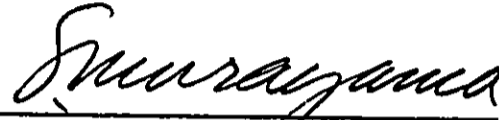
\*Saito, Norman Engineering Consultants, Inc., CH<sub>2</sub>M Hill Inc., and Dr. Harold T. Stearns, Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs, March, 1974.

after sustained pumping and monitoring of the Mokuhan Wells  
and the proposed water source.

The development of a well or a series of wells at  
Waiehu will recover water believed to be wasting into the  
sea north of Waiehu.

We hope we have satisfactorily answered your comments.

Sincerely,



Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC



DEPARTMENT OF THE ARMY  
U. S. ARMY ENGINEER DISTRICT, HONOLULU  
BLDG. 230, FT. SHAFTER  
APO SAN FRANCISCO 96558

RECEIVED

PODED-P

56 AUG 1976 10 23

DEPT. OF WATER SUPPLY  
COUNTY OF MAUI

Mr. Shigeto Murayama, Director  
Department of Water Supply  
County of Maui  
P.O. Box 1109  
Wailuku, Hawaii 96793

Dear Mr. Murayama:

We have reviewed the environmental impact statement for Central Maui Water Transmission System, Waiehu to Makena, Maui, Hawaii, and have the following comments to offer.

a. Any section of the project involving construction in navigable waters will require a Department of the Army (DA) permit, pursuant to Section 10 of the River and Harbor Act of 1899. In addition, Section 404 of the Federal Water Pollution Control Act of 1972 (P.L. 92-500) requires a DA permit for any discharge of dredged or fill material in navigable waters.

b. The Corps of Engineers is preparing plans and specifications for flood control improvements on Iao Stream. Construction is scheduled to be initiated in April 1977. The proposed 36-inch water main appears to cross the planned flood control levee on the right bank of Iao Stream. It is requested that the detailed design and alignment plans for the water main be coordinated with our office as soon as possible. In addition, flood control studies for the Kihei District are scheduled to begin in FY 1977. The proposed water transmission system will be considered during the flood control project planning.

c. Appendix A provides not only additional information on the water source, as stated on page 1-9, but also an evaluation of the anticipated impacts of the proposed action on the basal aquifer and on existing water sources. These impacts are not discussed in Section 4 or Section 5 of the statement. Although the conclusions of Appendix A appear to indicate that the proposed action will not adversely affect the basal aquifer or existing water sources, these matters should be addressed in Section 4, Anticipated Environmental Impacts and Mitigative Measures to Minimize their Impact.





PODED-P  
Mr. Shigeto Murayama

5 August 1976

Thank you for the opportunity to review this statement. We would appreciate being kept informed of the progress of this project.

Sincerely yours,

  
KISUK CHEUNG  
Chief, Engineering Division

Copy furnished:  
Dr. Richard E. Marland, Director  
Office of Environmental Quality Control  
State of Hawaii  
550 Halekauwila Street, Rm 301  
Honolulu, Hawaii 96813



DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Mr. Kisuk Cheung  
Chief, Engineering Division  
Department of the Army  
U. S. Army Engineer District, Honolulu  
Bldg 230, Fort Shafter  
APO San Francisco, 96558

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Cheung:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System. In response to your comments we offer the following:

COMMENT:

a) Any section of the project involving construction in navigable waters will require a Department of the Army (DA) permit, pursuant to Section 10 of the River and Harbor Act of 1899. In addition, Section 404 of the Federal Water Pollution Control Act of 1972 (P.L. 92-500) requires a DA permit for any discharge of dredged or fill material in navigable waters.

RESPONSE:

The consulting engineers for the proposed project will be in contact with your department to ascertain if a Section 404 permit will be required.

*"By Water All Things Find Life"*

COMMENT:

b) The Corps of Engineers is preparing plans and specifications for flood control improvements on Iao Stream. Construction is scheduled to be initiated in April 1977. The proposed 36-inch water main appears to cross the planned flood control levee on the right bank of Iao Stream. It is requested that the detailed design and alignment plans for the water main be coordinated with our office as soon as possible. In addition, flood control studies for the Kihei District are scheduled to begin in FY 1977. The proposed water transmission system will be considered during the flood control project planning.

RESPONSE:

Detailed construction plans for the proposed project will be submitted to the Corps of Engineers prior to advertising of the project.

COMMENT:

c) Appendix A provides not only additional information on the water source, as stated on page 1-9, but also an evaluation of the anticipated impacts of the proposed action on the basal aquifer and on existing water sources. These impacts are not discussed in Section 4 or Section 5 of the statement. Although the conclusions of Appendix A appear to indicate that the proposed action will not adversely affect the basal aquifer or existing water sources, these matters should be addressed in Section 4, Anticipated Environmental Impacts and Mitigative Measures to Minimize their Impact.

RESPONSE:

A discussion of impacts on the basal aquifer was not included in Sections 4 and 5 of the EIS because the water source development is being undertaken by private parties without any involvement of State or County funds or land. We have been advised by our attorneys that Chapter 343, HRS, and the Environmental Quality Commission's Environment Impact Statement Rules and Regulations do not apply to the

water source development program and, without prejudice to or waiving our legal position, we submit the following additional response:

The State Department of Land and Natural Resources Report R-38 (page 33) estimated the quantity of water in the Waiehu-Waihee basin by means of a simplified water budget system using rainfall, surface run-off, and evaporation. The resulting net ground water percolation was estimated to be 20 mgd average from a total rainfall of 95 mgd. (The 20 mgd average is equivalent to 30 mgd maximum day as used in the Saito report.)

Based on available information, and the professional opinion of the project's consulting geologist, Dr. Harold T. Stearns, "a very large recharge area with high rainfall exists inland of the basin; hence, quantities in excess of 20 mgd should be recovered."\*

A range of safe yield estimates has not been calculated. A study of recharge to the Waikapu aquifer estimated a probable uncertainty ratio between "average estimates" and "minimum estimates" of recharge at approximately 2 to 1.\*\*

---

\*Saito, Norman, Engineering Consultants, Inc., CH<sub>2</sub>M Hill Inc., and Dr. Harold T. Stearns, Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs, March, 1974.

\*\*Caskey, Melvin C., The Recharge of the Waikapu Aquifer, August, 1968.

If this uncertainty factor is applied to the Waiehu aquifer, a conservative present estimate of safe yield may range between 20 and 40 mgd, and possibly greater than 40 mgd.

Extensive test borings have been made in the Waiehu-Waihee area and core samples obtained. The results of the test borings indicate the basal water elevation stands at approximately 16 feet above mean sea level which suggests the aquifer is very large.

The decision to develop the Waiehu-Waihee aquifer was based on the data obtained from the extensive exploratory drilling and studies thereof made by Dr. Harold T. Stearns. The selected well site and future well sites have a very good expectation of safely yielding water quantities needed to meet future demands of the Central Maui Water Service area. The first production well is now being drilled at a ground elevation of 500 feet above mean sea level. It is located approximately 1½ miles to the north of the existing Mokuohau Wells. Test pumping of this well is expected to commence within the next month. The results will be closely observed and will develop a safe well yield. Observation holes at Mokuohau, Puuohala, Waiehu, and Waihee will be closely monitored to obtain data on water level differences caused by the test pumping. Draw down at various pumping rates will be measured and recovery times recorded. If initial testing shows water is plentiful, then a second well will be installed and test pumped.

The range of safe yield estimates can be accelerated by pumping the proposed well field to its maximum and conducting monitoring studies. This can be accomplished by cutting down on the Mokuhau draft and furnishing as much water as possible to the service area from the proposed water source.

We hope we have satisfactorily responded to your comments.

Sincerely,



---

Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM: fu

cc: Dr. Richard Marland  
Director, OEQC

GEORGE R. ARIYOSHI  
GOVERNOR



RICHARD E. MARLAND, PH.D.  
DIRECTOR

TELEPHONE NO.  
548-8915

STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL  
OFFICE OF THE GOVERNOR  
650 MALEKAUWELA ST.  
ROOM 301  
HONOLULU, HAWAII 96813

August 6, 1976

Shigeto Murayama, Director  
Department of Water Supply  
County of Maui  
P.O. Box 1109  
Wailuku, Maui 96793

AUG 11 1976

SUBJECT: Environmental Impact Statement for Central Maui Water  
Transmission System

Dear Mr. Murayama,

As of this date, this Office has received ten comments on the above subject. An attached sheet lists the responding agencies and organizations.

In our review of the environmental impact statement, we have several areas in which the document should expand discussion. We offer the following comments:

1. Although page 1-7 indicates that the county's share will not exceed \$4 million dollars, what is the state's contribution?
2. Are any state lands involved? If so, how many acres?
3. Another source of air pollution in the Air Quality section under construction in the EIS should be noted. Fugitive dust will be generated from vehicular traffic on dirt road during construction.
4. In many places along the alignment near the leeward coast, the land may require blasting. This should be noted as a source of noise pollution and should be discussed further in the EIS. In addition, discussion should also include the impact of blasting on the nearby residential areas.
5. Page 2-32 indicates that three historic sites were located. What are their historic value? We recommend consultation with the state historic preservation officer prior to construction.

6. The discussion regarding the secondary impacts of the proposed action should be expanded. Since Table 2-5 indicates that the future developments in the Kihei area will have a total of 2,343 units, existing lifestyle of present residents will alter significantly in the future. Thus, we recommend that discussion of the sociological characteristics and the affected change be included in the revised EIS.
7. Under alternatives on page 6-1, the EIS states, "A no action alternative would preclude total implementation of much of the intent of the General Plans for the Wailuku-Kahalui and the Kihei-Makena areas." However, it should be realized that a general plan is a policy that serves as a guide for private and public actions in achieving stated goals and objectives. It should not be considered as a fixed document that is incapable of being modified. For example, the condition exists that water is not abundant, then reconsideration of the general plan is necessary. Thus, we recommend further discussion of the no action alternative.
8. In the section short-term uses vs. long-term productivity, the discussion should be expanded to include secondary impacts in terms of growth stimulation, increased developments increased air, noise, water pollution, and cultural alteration. Acknowledgement of these impacts is not sufficient. What long-term risk are involved? Are there any trade-offs for short-term uses?
9. The EIS should mention the type of use for the water. In other words, will the water be supplying domestic needs and/or agricultural needs? Does the present water system also supply agricultural needs? What impact will the proposed action have on agriculture if the needs are competing with domestic usage in the future?
10. We note that comments during the consultation process, comments were included. However, responses have been omitted from the document. In the content requirements, Section 1:42 m. of the EIS Regulations states that the EIS shall contain, "Reproduction of comments and responses made during the consultation process." We strongly recommend that they be included in the revised EIS.
11. Our Office would like to point out that the proposed action is one of the primary factors to growth. Increasing the availability of water stimulates growth. Thus, by providing the water, a demand may be created. The EIS has not been clear as to whether this action has a present demand to be fulfilled or is a demand being created. A discussion is warranted.



12. The EIS is also not clear as to whether the well can meet the demand. What actions will be taken if the source cannot provide the water for the demand? Where will the water then come from to meet the projected need? We strongly recommend that these points be considered.

#### RECOMMENDATION

For fairness and brevity, our Office did not attempt to summarize other commentors. Instead, we strongly recommend that each comment be given careful consideration.

We further recommend that (1) written responses be sent directly to the commentor with a copy to our Office; (2) if your responses refer the commentor to the EIS, a copy of the revised statement should be sent to the commentor; and (3) that comments be accepted after the thirty day review period in order for a more comprehensive analysis of the proposed action.

The EIS Regulations states that the accepting authority may accept responses beyond the fourteen day response period. This Office will consider responses after the fourteen day period.

We trust that these comments have been helpful in preparing revised EIS. We thank you for the opportunity to review this document. We look forward to the revised EIS.

Sincerely,

/s/ Richard E. Marland

Richard E. Marland  
Director

Attachments

cc: Marvin Miura, (with attachments)



DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI  
P. O. BOX 1109

WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Richard E. Marland, Ph.D.  
Director  
Office of Environmental Quality Control  
550 Halekauwila Street  
Room 301  
Honolulu, HI 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Dr. Marland:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System. In answer to your questions, we offer the following responses:

COMMENT:

1) Although page 1-7 indicates that the county's share will not exceed \$4 million dollars, what is the state's contribution?

RESPONSE:

The County's share of \$4 million was allocated to the County of Maui Board of Water Supply by the State of Hawaii. No other State funds are involved.

*"By Water All Things Find Life"*

COMMENT:

2) Are any state lands involved? if so, how many acres?

RESPONSE:

Approximately 2.5 acres of State lands are involved in the proposed project. Of this total, 2.4 acres are located at the old Puunene Airport. These lands are currently leased to Alexander & Baldwin, Inc., for sugarcane production. The remaining .1 acre is a total of lands where the pipeline crosses the Kuihelani Highway.

COMMENT:

3) Another source of air pollution in the Air Quality section under construction in the EIS should be noted. Fugitive dust will be generated from vehicular traffic on dirt road during construction.

RESPONSE:

Dust, as a potential source of air pollution, was mentioned in the EIS. We agree that fugitive dust will be generated from vehicular traffic on dirt roads during construction. The following dust pollution control measure will be written into the construction specifications. (From the Public Health Regulations of the State Department of Health, Chapter 43, "Air Pollution Control", Section 10. Fugitive Dust.)

a) No person shall cause or permit any materials to be handled, transported, or stored; or a building, its appurtenances, or a road to be constructed, altered,

repaired or demolished without taking reasonable precautions, as approved by the Department, to prevent particulate matter from becoming airborne. Examples of some reasonable precautions are:

- (1) Use, where possible, of water or chemicals for control of dust in the demolition of existing building or structures, construction operations, the grading of roads or the clearing of land;
- (2) Application of asphalt, oil, water or suitable chemicals on roads, materials stockpiles, and other surfaces which can give rise to airborne dusts;
- (3) Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods shall be employed during sandblasting or other similar operations;
- (5) The paving of roadways and their maintenance in a clean condition;
- (6) The prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means.

b) No person shall:

(1) cause or permit the discharge of visible emissions of fugitive dust beyond the lot line of the property on which the emissions originate; or

(2) cause or permit to be emitted into the atmosphere any dust from any source in such a manner that the ground level concentrations at a point selected by the Department exceeds:

(aa) 150 micrograms per cubic meter above upwind concentrations. Samples shall be obtained by using a high volume air sampler or other equivalent method for a 12-hour period; or

(bb) A fallout of 3.0 grams of dust per square meter above upwind concentrations for any 14-day period. Dustfall samples shall be obtained by using fallout jars of 8 inches in diameter and 12 inches in depth or any larger jars of equivalent proportions;

provided that this subsection 10(b) shall not apply to persons engaged in agricultural practices or to persons who can demonstrate to the Director that best practical operation or treatment is being implemented.

COMMENT:

4) In many places along the alignment near the leeward

coast, the land may require blasting. This should be noted as a source of noise pollution and should be discussed further in the EIS. In addition, discussion should also include the impact of blasting on the nearby residential areas.

RESPONSE:

The exact location and number of specific sites which will require blasting will not be known until that portion of the pipeline trench is started. Conventional trenching equipment such as backhoes, bulldozers with a ripper, and pneumatic hammers will be used before resorting to blasting.

A State licensed "powder man" will be in charge of all blasting activities. If blasting is required, blasting mats and controlled charges will be used to not only minimize noise but to also serve as a safety measure for workers and residents. The blasting mats will confine the small stone fragments and the use of controlled charges will minimize ground borne vibrations. The size of the charges will be controlled by the project engineer. Blasting activities are not anticipated to generate sufficient ground borne vibrations and adverse noise levels which may adversely affect residents or structures.

The contractor will carry sufficient liability insurance to pay for any damages that may be incurred as a result of blasting activities. Persons in nearby areas will be notified 2 days prior to blasting and no one will be permitted within the construction area when blasting is taking place. If

electric blasting caps are used, "No radio communication" warning signs will be posted to minimize the chances of accidental discharge.

COMMENT:

5) Page 2-32 indicates that three historic sites were located. What are their historic value? We recommend consultation with the state historic preservation officer prior to construction.

RESPONSE:

The size and form of the two sites located near the southern terminus of the pipeline indicate that both are prehistoric, that is, both were probably built and used before Western contact (1778-79). While fragments of bottle glass were found on the surface of the platform, they probably were deposited long after the abandonment of the structure by its prehistoric inhabitants. The proximity of both sites to the ocean suggest that they were built and used by people whose economic activities were marine-oriented. It is probable that both structures were house foundations. While these sites are rather small and simple, they are remnants of the ancient Hawaiian settlement pattern and should be allowed to remain intact. The significance of the third site has not been determined. This site is located between the old Puunene Airport and Kihei and contains a C-shaped structure which is relatively common throughout Hawaii.

The proposed pipeline alignment will not intrude on the three sites . The sites will be clearly flagged so that

they can be avoided by vehicular and pedestrian traffic during the laying of the pipeline. The State Preservation Officer has been notified of the proposed project and will again be consulted prior to construction.

COMMENT:

6) The discussion regarding the secondary impacts of the proposed action should be expanded. Since Table 2-5 indicates that the future developments in the Kihei area will have a total of 2,343 units, existing lifestyle of present residents will alter significantly in the future. Thus, we recommend that discussion of the sociological characteristics and the affected change be included in the revised EIS.

RESPONSE:

Social changes arising from development are related to many variables which are difficult to quantify and for which no data base is readily available. Hence, precise prediction of these changes is not possible. Some generalizations about anticipated impacts can be made, even when the exact nature or extent of the change cannot be predicted. Within these limitations, the following discussion attempts to highlight several existing social conditions which are likely to change as a result of the project and related development, and also existing patterns of change which may be accelerated or amplified by such development.

Although the greatest amount of growth and development related to the pipeline project is expected to occur in the Maalaea-Kihei-Makena region, social impacts incurred as a result of development and population increases are antic-



ipated in other areas as well. The social impacts are likely to be most dramatic in the area slated for the greatest growth, Kihei, and more subtle in Wailuku-Kahului.

A. Demographic Characteristics

Some changes in the demographic characteristics of the increased populations may be anticipated. These changes are likely to be more pronounced in Maalaea-Kihei-Makena than in Wailuku-Kahului.

Wailuku-Kahului

It is expected that some residents of outlying areas on Maui and some new residents as well may move to Wailuku-Kahului in response to a number of variables which may be linked to development in the Kihei area. These variables include such factors as greater job opportunity, increased family income, and availability of housing. There is no basis for expecting the new residents to differ substantially from the current residents, and significant changes in the demographic characteristics of the augmented population may not be predicted.

Maalaea-Kihei-Makena

In the Kihei area, on the other hand, characteristics of the increased population, both resident and visitor, are likely to differ from the existing population characteristics as shown in the 1970 Census. Until the

1980 census data are available for comparison purposes, it cannot be substantiated, but it appears that the ethnic subgroup most heavily represented in recent years' migration into Kihei has been Caucasian. Additionally, most visitors to the area are Caucasians arriving from the United States mainland and Canada.

Although it cannot be predicted with confidence, it is conceivable that the pattern of growth in the Kihei community itself may differ somewhat from that at the Wailea resort and Makena. The economic and social considerations which attract many island people to the major new resort developments might not be in force in nearby Kihei where less expensive existing and future housing may be available. Availability of housing, greater job opportunity spawned by development in Wailea and Makena, additional facilities and services which become available with development (such as a new highway to facilitate commuting), combined with the natural amenities of the area may make Kihei more appealing to local Maui residents.

B. Reduced Unemployment

Development of the area is expected to create many new job opportunities. Because of the resort character of much of this development, most of the jobs are expected to be in service, retail, and trade occupations

related to the visitor industry. As noted in the discussion of the economic impacts of development, it is anticipated that approximately 7914 new jobs will be created in the visitor industry between 1985-1990.

Reports prepared in 1974 for both the Hawaii Visitor's Bureau and the Wailea Development Company indicate that 75 percent of visitor-related workers are not heads of households. Based on this information it is likely that three-fourths of the new service occupations in the Kihei area may be filled by wives of men employed on Maui and, to some extent, by their older sons and daughters who have not yet left home.

As discussed in the Sociological Profile (Section 2) of this report, both Wailuku-Kahului and Maalaea-Kihei-Makena have high unemployment rates for women (35 percent and 38 percent respectively). If the pattern of employment in service occupation holds, it may be anticipated that resort development in Kihei may lead to a marked reduction in the unemployment rate for women.

C. Increased Socio-Economic Status

The employment by the tourist industry of the wife, and in some families of the older sons and daughters, is likely to result in increased family income and greater purchasing power. This increase in

purchasing power may have many effects, including, for example, enabling the family to become involved in recreational and other activities which formerly were not an option for them because of limited income. It also may mean that the family will be able to buy a house instead of renting, or if they already own one, that they may seek housing that is more suitable or satisfying to them.

Educational level, another indicator of socio-economic status, is also likely to increase. It may be anticipated that some of the new employees themselves will return to school. Maui Community College has a travel industry management program designed to provide training for persons seeking to train for some aspects of work in the visitor industry. Data reported by the college indicate that the average age of their students is 25, which suggests that a number of older individuals return to school after some years have passed since graduation from high school. It may be expected that this pattern will continue, and that employment and advancement opportunities in the tourist industry may motivate some people to return to school.

Educational opportunities for sons and daughters also may be generated by an augmented family income. For example, a university education in Honolulu or on

the mainland may become a real possibility for many who could not have considered it before.

D. Alteration of Traditional Family Roles

As a consequence of presently unemployed women finding jobs outside the home, one may expect to see some alteration in the traditional family style in which the woman's role is that of housewife and mother. This evolution in woman's role has been witnessed throughout our society for some time. In recent years the trend has accelerated, and in all likelihood it will continue.

Some evidence that women on Maui welcome this change is provided by the fact that so many identify themselves as unemployed. The desire of many women to alter their traditional role through employment outside the home is manifested in this data. The continued development of the Kihei area and the job opportunities which result from this development may facilitate continued increases in the number of families in which both the husband and wife work.

E. Social Welfare and Other Services

Some changes in the requirements for these services are likely to occur along with or following other development-related effects. Although they are extremely difficult to delineate and quantify, some examples of

potential impacts may be given. For example, a reduction in dependency on certain social services such as food stamps may occur as a result of increases in employment and socio-economic status. On the other hand, the need for other services such as day care centers for the young children of working mothers may be somewhat greater.

There will be a need for activities and services which increase resident-visitor interaction. Through its Department of Parks and Recreation, the County already has planned a number of such activities, including golf and tennis clinics, exercise programs, and ceramics classes to name a few. Programs such as these may foster social interaction between residents and visitors and between long-term and newly arrived residents. The increased sociability may contribute toward increasing the feeling of belonging and becoming a part of the community for many of Maui's newcomers.

COMMENT:

7) Under alternatives on page 6-1, the EIS states, "A no action alternative would preclude total implementation of much of the intent of the General Plans for the Wailuku-Kahalui and the Kihei-Makena areas." However, it should be realized that a general plan is a policy that serves as a guide for private and public actions in achieving stated goals and objectives. It should not be considered as a fixed document that is incapable of being modified. For example, the condition exists that water is not abundant, then reconsideration of the general plan is necessary. Thus, we recommend further discussion of the no action alternative.

RESPONSE:

We agree that the Wailuku-Kahului and Kihei General Plans are policy documents that serve as long-range guides for achieving community goals and objectives. We further agree that both plans are not fixed documents that are incapable of being modified. Changes to the Kihei General Plan were made as recently as November, 1975. We would like to add, that aside from having the proper zoning, development proposals must meet the criteria of various government agencies for items such as water, sewers, and utilities before development can occur.

We assume that the statement, "the condition exists that water is not abundant, then reconsideration of the General Plan is necessary" refers to the Kihei area. We concur with the proposition if the lack of water was the only parameter. However, the proposition does not consider the situation as it currently exists, that is, water is transmitted to Kihei from the Wailuku area.

If a no action alternative was pursued, other sources of water and means of transmission could be developed which would still enable implementation of the Kihei General Plan. For example, a water source could be developed close to the Kihei service area. However, as discussed in the EIS, recent exploratory drillings along the Kihei coastline and up to the 600-foot elevation have failed to yield sufficient

quantities of potable water. An alternative for providing potable water is desalinization. This alternative is an expensive proposition and is more than likely a "last resort alternative".

Thus, the proposed project is the least costly alternative for supplying and transmitting sufficient quantities of water to meet the needs of the Central Maui area.

COMMENT:

8) In the section short-term uses vs. long-term productivity, the discussion should be expanded to include secondary impacts in terms of growth stimulation, increased developments increased air, noise, water pollution, and cultural alteration. Acknowledgement of these impacts is not sufficient. What long-term risk are involved? Are there any trade-offs for short-term users?

RESPONSE:

There are numerous risks and trade-offs involved in decision-making. A decision to allocate resources for one course of action may preclude use of that resource for another course of action. The final outcome, of course, is subject to priorities and on-going debate within the planning process. A decision by the Board of Water Supply to request the State Legislature to appropriate \$4 million for the waterline suggests the proposed project has a high priority in the County's capital improvements program. A decision to develop Kihei and Lahaina into residential-resort developments confines this type of development to these specific regions, thereby not subjecting other areas to the same kinds of development.



Environmental impacts, both short and long-term and adverse and beneficial, are the risks and trade-offs resulting from the proposed project. Increased development will socially and economically benefit Maui residents but these changes may induce potentially adverse impacts on the physical, social, and economic environment. These impacts were discussed in the EIS. The continuous application and enforcement of applicable State and County regulations can minimize the risk of significant adverse environmental degradation. It must be clearly recognized, however, that these changes will occur to some degree as development proceeds and are a direct result of providing for the needs of people.

COMMENT:

9) The EIS should mention the type of use for the water. In other words, will the water be supplying domestic needs and/ or agricultural needs? What impact will the proposed action have on agriculture if the needs are competing with domestic usage in the future?

RESPONSE:

The water will be used primarily for domestic needs but also will supply water to those agriculture activities currently drawing water from the existing transmission system. In the Central Maui area the large sugar plantations use surface water or draw water from their own wells for crop irrigation. Large farming ventures such as Trojan Farm, and several plant nurseries, use both brackish water

from their own wells and County water for crop irrigation. RJR Foods, which operates a food processing plant near Kahului, draws water from its own wells. There will be no impacts on existing agriculture activities.

COMMENT:

10) We note that comments during the consultation process, comments were included. However, responses have been omitted from the document. In the content requirements, Section 1:42m. of the EIS Regulations states that the EIS shall contain, "Reproduction of comments and responses made during the consultation process." We strongly recommend that they be included in the revised EIS.

RESPONSE:

Acknowledged. The comments received during the consultation period have been included in Section 12 - Consultation Period Responses of the revised EIS.

COMMENT:

11) Our Office would like to point out that the proposed action is one of the primary factors to growth. Increasing the availability of water stimulates growth. Thus, by providing the water, a demand may be created. The EIS has not been clear as to whether this action has a present demand to be fulfilled or is a demand being created. A discussion is warranted.

RESPONSE:

The proposed action is one of several capital improvements which will provide for the orderly and controlled growth of the project area as delineated in the Wailuku-Kahului and Kihei General Plans. Both plans set forth the County's philosophy for determining the location and extent of development and the desired land use pattern for controlling

development in Central Maui.

The proposed action is not creating a demand for water as the demand already exists. Water demands in the Central Maui area have been increasing at a rate of 8-10 percent per year for the past five years. The pumping capacity of the Mokuhou Wells and the transmitting capacity of the existing transmission system are approaching their safe operating limits. As a result, there have been periodic short-term water shortages throughout the distribution system. It is anticipated that the periods of water shortages will continue unless improvements to the transmission system are made and new water sources located.

COMMENT:

12) The EIS is also not clear as to whether the well can meet the demand. What actions will be taken if the source cannot provide the water for the demand? Where will the water then come from to meet the projected need? We strongly recommend that these points be consideration.

RESPONSE:

We have been advised by our attorneys that Chapter 343, HRS, and the Environmental Quality Commission's Environmental Impact Statement Rules and Regulations do not apply to the water source development program since that program is being undertaken by private parties without involvement of any State or County funds or lands. Therefore, the EIS for the transmission line does not address itself to the water source development program directly. We do, however, re-

cognize the scope and substance of the comments you have submitted about the water source development program and, without prejudice to or waiving our legal position, we submit the following response to your comments:

It is anticipated that the Waiehu water source can meet projected water demands for Central Maui. Based on available information, and the professional opinion of the project's consulting geologist, Dr. Harold T. Stearns, "a very large recharge area with high rainfall exists inland of the basin; hence, quantities in excess of 20 mgd should be recoverable."\* If this proves true, then as water demand dictates, additional wells will be developed. The incremental installation of wells and pumping facilities is planned to keep the aquifer from being over pumped. There will be sufficient time to monitor and evaluate data to ascertain the safe yield of the proposed water source. In no instance will additional wells be developed at this source unless the resulting analysis confirms that the safe yield has not been reached.

If the source cannot provide enough water to meet projected water demands, additional wells will have to be developed along the foothills of the West Maui Mountains between Waiehu and Kahakuloa.

---

\*Saito, Norman, Engineering Consultants, Inc., CH<sub>2</sub>M Hill Inc., and Dr. Harold T. Stearns, Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs, March, 1974.

Alternative sources of water were investigated. The following is a description of these alternatives.

Kihei

Groundwater explorations have indicated that only brackish water can be found along the coastal area up to the 600 foot elevation from Kihei to Makena. An exploratory well was recently developed by the State Department of Land and Natural Resources near Pulehu and the safe well yield estimated at .5 mgd. The risk of developing this source is greater than that of Waiehu due to lack of knowledge of recharge to the "Pulehu aquifer". In addition, it is anticipated that this source cannot supply the total projected water requirements for the Kihei area.

Waikapu

This area may contain sufficient water quantities to supply a portion of projected demands in Central Maui. However, recent exploratory drilling by the State Department of Land and Natural Resources Division of Water and Land Development has been unsuccessful. Additional exploratory drillings are not planned for this area at this time.

Iao Valley

Water sources include the Kepaniwai Park Well, Iao Tunnel, and the Mokuhaui Wells. The existing Kepaniwai Park Well and Iao Tunnel supply approximately 1 mgd to the Wailuku high level service area. The base yield of these sources is

not sufficient to meet future water requirements and further development of these sources would not substantially increase the water yields.

The Mokuhau Wells are the existing major water source for the Central Maui service area. The drilling of additional water wells at Mokuhau and the increased draft may result in saltwater intrusion problems.

#### Exchange of Effluent for Irrigation Water

One major source of new water which could be made available in the future is the exchange of irrigation water for properly treated sewage effluent. Water which is perfectly suitable for domestic use is being used for irrigation. Partially treated sewage, which could be further treated and used for irrigation, is being wasted. The technology for reuse of treated sewage effluent for cane irrigation is presently being studied by the University of Hawaii. The major problem of the reuse of sewage effluent for irrigation is the effects of nutrient concentration and lowered crop production. This problem may be reduced by dilution with other waters and a system of exchange could be operational by the time water developed through conventional means runs short.

#### Desalination

As mentioned in the EIS, a recent study, Desalting Water in Hawaii (DLNR, 1975), analyzed the economic costs of

desalting water in the Kihei area. Three desalting methods were investigated: electro dialysis, ion exchange, and reverse osmosis. According to the study, the least cost alternative is electro dialysis. Under this alternative water can be desalted at a cost ranging between \$.78 to \$1.17 per thousand gallons depending on the design capacity of the plant, degree of treatment, and the number of operating days. These costs do not include distribution costs. As a comparison, in 1974, the domestic water rate on Maui island was \$.41 per thousand gallons. The report further states: "It is unlikely that desalting brackish water even at top priority locations will provide an economically competitive alternative to transporting existing sources unless transport distances are very great or expensive water treatment and costly impounding facility must be provided for the source."

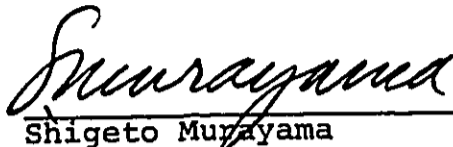
As a result of exploratory drillings in Kihei which have yielded brackish water, unsuccessful drilling in Waikapu, the unproven technology for irrigation water-effluent exchange, and the lack of technology or the economic limitations for processing seawater or brackish water, the most prudent means to provide for the future water needs of Central Maui is to develop the basal water supplies in the Waiehu-Waihee area.

Richard E. Marland, Ph.D.  
Director, OEQC

Page 23

We hope that we have satisfactorily answered your  
comments.

Sincerely,



Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu



RECEIVED

1976 AUG 11

9 59

DEPT. OF WATER SUPPLY  
HONOLULU



August 6, 1976

Office of Environmental Quality Control  
550 Halekauwila St.  
Room 301  
Honolulu, HI 96813

Department of Water Supply  
County of Maui  
P.O. Box 1109  
Wailuku, Maui, HI 96793

RE: Comments on environmental impact statement  
for the Central Maui Water Transmission System

To Whom it may concern:

**GENERAL COMMENTS:**

Life of the Land considers this "EIS" to be totally inadequate-- all of it! Sections 4, 6, 7, 8 and 9 are absurd, short, without meaning and totally avoid coming to grips with the analysis required by the law.

The environmental impacts of the proposed water system are inadequately and inaccurately presented; the effects of the proposed action on the economic and social welfare of both the community and the State are glossed over in self-serving statements designed to justify the project; effects of the economic activities arising out of the project are not truthfully dealt with; measures proposed to minimize adverse effects are only lightly touched upon; and alternatives to the action and their environmental effects are totally ignored.

Life of the Land is abhored at the lack of discussion of secondary environmental impacts of the proposed project! They are also shocked to find that absolutely no discussion is made of the fact that public ground waters are being treated as private property. The loss in revenues to the County and State of such an attitude is overwhelming!

There has been no cost-benefit analysis, need analysis, and the entire assessment is seen as a statement about the construction and installation of a transmission pipeline alone, rather than discussion of the entire water system development, including the proposed development of a water source in the Waiehu-Waihee area.

SPECIFIC COMMENTS:

1. Party preparing the EIS: Life of the Land objects to preparation of this statement by Norman Saito Engineering. It is our feeling that, because of past involvement by certain individuals in the proposed project, there is a conflict of interest which prevents objective analysis of the environmental effects of the project.

Moreover, Life of the Land objects to preparation of the impact statement by a private party. The law requires the agency proposing the project to prepare the EIS. In this case, that would mean the Department of Water Supply.

2. Section 1: Description of the Action: Ignored in this section is ownership of the waters proposed to be used.

It is not made clear that the project will in fact service not only Wailuku-Kahului and Maalaea-Kihei-Makena, but also Waikapu, Waiehu-Waihee, Kahului Airport, Spreckelsville, Paia-Kauau. There is no mention of the fact that the system proposed will be connected to both the Kahului and Paukukole reservoirs.

The statement also seems to intentionally mislead the public by stating, at p.1-7, that "OF the total project costs, the Board of Water Supply's share will not exceed \$4 million." A close reading of the contract for this project reveals that the County could in fact end up bearing the total cost of 11.3 million dollars for this project!

There is no discussion in the description of the water source of the fact that Waiehu-Waihee is the sole remaining area for water source exploration and development. This is crucial to any understanding of the effects this project will have on the long-run future of the island!

There is also no discussion of present water capacity from those sources now servicing the proposed service area. There is no discussion of present consumption in these areas. Both are crucial to an understanding of the need for this proposed new water system.

3. Section 2: Existing environment: It is pointed out in this section that the Central Maui area is excellent for intensive agricultural use. Yet there is not any discussion in later sections of the impact upon agriculture from commitment of these water resources to the Kihei area. What are the effects???

There is an excellent discussion of effected flood and tsunamis zones. Yet later sections fail to discuss the ramifications of the consequent development that will occur in some of these areas due to the injection of new water into

these communities.

It is also recognized that exhaust emission from internal combustion engines are a source of pollution in urbanized area. There is, however, no discussion of these emissions due to increased auto use (a secondary impact) in the later section on adverse environmental impacts.

Life of the Land takes issue with the scope of the vegetation, wildlife and archeological site studies. The effects of the proposed project will not be limited to the immediate area around the pipeline. This is especially important to the protection and preservation of historical sites not in the immediate vicinity of the pipeline but which will most certainly be effected with the consequent developments made possible by the water system.

4. Section 3: Land Use: It is stated at p. 3-5 that "the proposed project ...is ...only one element of a comprehensive program to upgrade the development and delivery of water to communities where needed, in accordance with the County's long-range program for community development."

What are those long-range plans? Moreover, if the above statement is in fact true, then an environmental impact statement must be done on the entire program, not just on this "element" of that program!

5. Section 4: Environmental Impacts:

There is no treatment of "water supply" as a primary impact.

The assessment is written as a justification of the project.

The problems mentioned in the body of the EIS are virtually totally ignored in this section.

Long term and irreversible impacts should include soil losses, increased surface runoff, sedimentation of bays and consequent effects, changing water quality.

The report does not say what the mitigating measures are to minimize short term impacts. Throughout the EIS, mention is made that State and Federal regulations will insure negative or minimal impacts. This is a conclusion which we fail to understand. What about permits which can be issued which allow for pollution??? Moreover, there is an implication throughout that impacts will be minimal. If that is true, why and what is being talked about here that will be "mitigated"?

Where is the discussion of the erosion and runoff from the water used to clean and test the pipelines???

There is absolutely no discussion of the negative effects to the communities such as Haiku, Pauwela, Ulupalkua-Kanaio, Kula, Olinda, Makawao, Peahi, etc, communities which will not be serviced by this expenditure of tax monies but which presently suffer from substandard and unhealthy water supplies. This must be considered!

In discussion of water draw-down, the study ignores such minor things as the fact that Mokuhaui well will be being pumped an additional 2 mgd in the future. Demands may also be increased on other water sources in the area. Yet there is no discussion of the effect of pumping 19 mgd from the Waiehu-Waihee source in light of these factors.

Where is the cost-benefit analysis and need analysis?

Objection is generally raised to the description of primary impacts. In actuality all we are getting is a description of the project!

Objection is also raised to the constant assumption (and justification) that the "contractor" will insure that all environmental and pollution regulations and controls are complied with. HOW does the drafter of the impact statement get by with making such conclusions? Or has the contract for this project already been let! Some fast explanation of this point better be made.

Not answered is the question of whether the proposed development of the Kihei-Makena area can occur absent this proposed water development project. This is very important.

The entire section of Secondary Impact is totally inadequate and LOL refused to waste time explaining in detail. Certain things are self evident: ie. what of the negative impacts of the tourist industry??? Crowding? Social dislocation and animosity? Breakdown in family relations as the mother goes to work? Increased crime? Potential for increased racial strife? Disruption of the lifestyles of the present Hawaiian community in and around the Makena area? Increased cost of living? Increased property taxes? etc.

Employment-- the project will provide jobs for construction in the next 20 years. Isn't that inducing growth with short term employment opportunities? This type of growth does not promote job diversity, all jobs are related to the tourist industry.

Employment projections are based on a lot of assumptions. Is that the type of employment 35-38% of the women are looking for?

The statement also assumes local people are not moving away from these visitor centers. Will they want to be employed in these hotel complexes? Couldn't this generate increased feelings of resentment of the visitor industry? There is a demonstrable lack of sensitivity on this issue.

Query: There will be an increased trend away from Hawaiian and Portuguese predominance in the communities effect. This should be analyzed.

Inadequate discussion of impact upon infrastructure. ie. demands upon waste water plants, power utilities.

Query: What are the mitigating measure to minimize impacts on wildlife and vegetation mentioned at p. 4-34? Does the restructuring mentioned here involve the disappearance of certain species? What about stream habitats effected? What about coastal waters?

6. Section 5: Adverse Impacts: This section is totally inadequate. The section, and especially the last paragraph, should be explained more clearly. Same should also be reconciled with section 8-land 9-1.

Where is the discussion of changing ground water levels?

Also, what about fact that without system no growth can occur in this area?

7. Section 6: Alternatives: Totally inadequate. The law intentions alternatives to the proposed action and the effects of those alternatives, not alternatives to how to place a pipeline!

The no-project alternative is very poorly discussed and analyzed. What about the alternative of using the money to upgrade the water supplies in up country Maui?

Also to be discussed is the alternative water sources available. What about using the water resources to redirect growth to already built up areas such as Lahaina or Kaanapali?

8. Sections 7 & 8: Both of these sections are totally inadequate and lack any understanding of the purposes to be served by these analysis.

Exhibited is that there is no clear understanding of the ground water supply by the preparers of this statement.

9. Section 9: Issues: The unresolved issues should and could be resolved through preparation of an adequate impact

statement. LOL especially objects to position of determining the most important issue-- question of water draw-down in source area only after project underway. Part of impact study must be testing of area to determine true effects. Otherwise run risk of building \$11 million project hooked to a source that cannot supply the water needed. This would result in inexorable and unwarranted tax burden upon taxpayers. A most illogical approach to build system and then see if there's enough water/!

**OTHER AND MISCELLANEOUS COMMENTS:**

The statement needs to address the changing hydrology-- the impact on the entire island's water resource development. Impact of the water used merely in the project area cannot be isolated. To do so may preclude supply of water to existing populations in the future. Will commitment of this last area of water reserves to Kihei-Makena and a population yet to come commit the existing population to use of lower quality of water in the future?

Query: Whether the water supply from Mokuau well is to be used for the Kahului-Paia area exclusively? Or will it be combined with the Waiehu-Waihee well supply and maintained as the Central Maui System-- with some waters ending up in Kihei and Makena???

Query: Inadequate discussion of the anticipated impacts of the proposed project on adjoining land uses, developments and trends therein and other related demands for public facilities and services.

Again, not discussed is the impact on the resource and supply area. ie. long-term impacts upon depletion of groundwater resources/? Related hydrological changes? Energy commitments for pumping facilities?

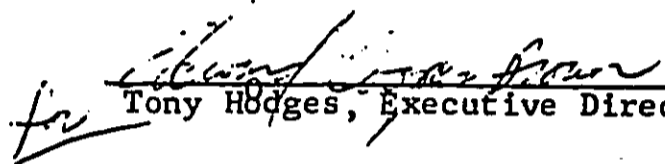
Query: Reports cited indicate that total demand will increase by 26.3 mgd by 2000. Information presently available indicates that this may be 10-20% of the potential supply available on Maui. The greatest impact may be through reduced infiltration into the Central Maui basal supply, reducing the agricultural potential of this area.

Query: Truly inadequate discussion of impacts, ;negative and positive, to surrounding communities from this project. ie. not answered is how the exportation of an additional 20+

million gallons of water per day from West Maui will effect the water supply, economic development, social structure, and public facilities and services of such areas as Wailuku, Kahului, and Paia.

Query: One of the environmental (economic) impacts of the system will be increased property values in the Kihei area. This will have both positive and negative implications. ie. cost of land acquisitions will increase, likewise property taxes will increase which could in turn force some people out of long-held homes and homesteads.

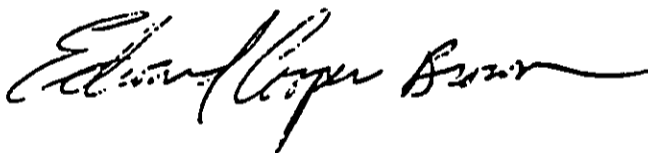
Submitted, this 7th day of August,  
1976.

  
Tony Hodges, Executive Director

I hereby certify that a copy of the foregoing was duly mailed to each of the following this 7th day of August, 1976:

County of Maui, Dept. of Water Supply  
Office of Environmental Quality Control

Edward Cooper Brown  
Attorney for Life of the Land





DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

Edward Cooper Brown, Esq.  
c/o Life of the Land  
404 Piikoi Street  
Honolulu, HI 96814

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Brown:

We thank you and your staff for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System. As your comments address both the construction of a transmission pipeline and the water source, we have separated the comments and responses into two sections. The first section responds to comments regarding the transmission pipeline, and the second section, the water source.

1. Party Preparing the EIS:

COMMENT:

Life of the Land objects to preparation of this statement by Norman Saito Engineering. It is our feeling that, because of past involvement by certain individuals in the proposed project, there is a conflict of interest which prevents objective analysis of the environmental effects of the project.

*"By Water All Things Find Life"*



RESPONSE:

Life of the Land is not specific as to which individuals have a conflict of interest in the proposed project. This comment, therefore, cannot be answered.

COMMENT:

Moreover, Life of the Land objects to preparation of the impact statement by a private party. The law requires the agency proposing the project to prepare the EIS. In this case, that would mean the Department of Water Supply.

RESPONSE:

The responsibility for the preparation and submission of the EIS belongs to the Board of Water Supply. Norman Saito Engineering Consultants, Inc. and Environment Impact Study Corporation were both contracted to assist the Department of Water Supply, and the Board's staff in the preparation of the EIS. Personnel of the Department actively participated in the preparation of the EIS. Norman Saito Engineering Consultants, Inc. and Environment Impact Study Corporation assisted in collecting the necessary contents of the EIS. However, all material compiled by the two consultants were extensively and thoroughly reviewed and recompiled by the personnel of the Department and resulted in the draft EIS which was subsequently submitted to the Board for its review and approval. Members of the Board reviewed the revised draft EIS prepared by the Department, made certain

changes and amendments, and approved the EIS which was then filed with the Office of the Governor, State of Hawaii, and the Environmental Quality Commission.

2. SECTION 1: DESCRIPTION OF THE ACTION

COMMENT:

Ignored in this section is ownership of the waters proposed to be used.

RESPONSE:

A joint venture comprised of Wailea Development Company, Seibu Real Estate Company, Ltd., Hawaiiana Investment Co. Inc., and A & B Properties, Inc., will be developing a water source of up to 19 mgd upon private property in Waiehu. Upon completion, this water source and the right of the private companies to draw upon it will be dedicated to the Board of Water Supply.

COMMENT:

It is not made clear that the project will in fact service not only Wailuku-Kahului and Maalaea-Kihei-Makena, but also Waikapu, Waiehu-Waihee, Kahului Airport, Sprecklesville, Paia-Kauau. There is no mention of the fact that the system proposed will be connected to both the Kahului and Paukukole reservoirs.

RESPONSE:

As stated in the EIS: Summary (p. i). PROPOSED ACTION

The proposed project will consist of the construction and installation of a water transmission system beginning in Waiehu in northwest Maui and

crossing the central isthmus to Makena in south Maui. The pipeline will vary between 12 to 42 inches in size. Water will be supplied to Wailuku-Kahului, Paia, Kuau on to Hookipa, Waikapu, Waiehu-Waihee, and Maalaea-Kihei-Makena.

The proposed and existing Central Maui Water Transmission System and all existing and proposed storage facilities will be maintained as an interconnected water system.

COMMENT:

The statement also seems to intentionally mislead the public by stating, at p.1-7, that "OF the total project costs, the Board of Water Supply's share will not exceed \$4 million." A close reading of the contract for this project reveals that the County could in fact end up bearing the total cost of 11.3 million dollars for this project!

RESPONSE:

As set out in the Central Maui Transmission Project Agreement, dated July 28, 1975, between the Board of Water Supply, Wailea Development Company and Seibu Real Estate Company, Ltd., the cost of the pipeline is estimated to be \$11.0 million. If the cost of the pipeline is in fact \$11.0 million the Board's share of said cost will be \$4.0 million. Wailea will bear 7/11ths and Seibu 4/11ths of the balance of \$7.0 million. In the event that the actual cost of the project is less than \$11.0 million, the cost of each venturers' participation

will be reduced in accordance with the prorata share it would have paid had the actual cost been \$11.0 million. In the event that the actual cost of the project exceeds \$11.0 million, then the share of the Board will be limited to \$4.0 million and the balance will be borne 7/11ths by Wailea and 4/11ths by Seibu. These provisions are contractual obligations of the parties as set out in the above mentioned agreement. In the event that any of the parties fails to make any capital contribution as required, the joint venture or any of the other venturers may legally enforce said obligation by initiating an action to compel compliance with the agreement or to seek damages for breach of the agreement or any other remedy permitted by law.

COMMENT:

There is no discussion in the description of the water source of the fact that Waiehu-Waihee is the sole remaining area for water source exploration and development. This is crucial to any understanding of the effects this project will have on the long-run future of the island!

RESPONSE:

It has not been determined if Waiehu-Waihee is the sole remaining area for water source exploration and development on Maui. Additional sources of water could be developed further west of Waiehu-Waihee and in East Maui if necessary.

With the exception of the recently developed water source at Kepaniwai, exploratory drillings in Kihei, Waikapu, and Iao Valley have shown that these areas have limited water source potential. This leaves Waiehu-Waihee as the most logical area for water source exploration and development in the Central Maui area.

COMMENT:

There is also no discussion of present water capacity from those sources now servicing the proposed service area. There is no discussion of present consumption in these areas. Both are crucial to an understanding of the need for this proposed new water system.

RESPONSE:

As stated in the EIS, Section 1, DESCRIPTION OF THE PROPOSED PROJECT (P. 1-1).

The primary source of water for the entire water system is the Mokuau Wells in Iao Valley which have a drawing capacity of 10 million gallons per day (mgd). In addition, the Iao Tunnel source and Kepaniwai Well, which have a combined average drawing capacity of 1 mgd, supply a portion of the Wailuku water service area.

The following table depicts water consumption (average daily demand) for the areas served by the existing Central Maui Water Transmission System.

	*Consumption (1,000 Gallons)		
	June 30,		
	1975	1974	1973
Wailuku	716,568	651,798	681,168
Kahului	1,005,071	939,494	893,830
Kihei	597,873	429,884	364,786
Waihee	23,078	22,493	20,514
Maalaea	23,311	17,036	14,506
Waikapu	32,202	30,906	29,755
Wailuku Heights	18,960	16,396	17,800
Paia-Kuau	79,983	72,998	62,919
Spreckelsville	44,440	41,809	44,443
TOTAL	2,541,486	2,222,814	2,129,721

3. SECTION 2: EXISTING ENVIRONMENT

COMMENT:

It is pointed out in this section that the Central Maui area is excellent for intensive agricultural use. Yet there is not any discussion in later sections of the impact upon agriculture from commitment of these water resources to the Kihei area. What are the effects???

RESPONSE:

In the Central Maui area the large sugar plantations use surface water or draw water from their own wells for irrigation. Large farming ventures such as Trojan Farm, and several plant nurseries, use both brackish water from their own wells, and County water for crop irrigation. RJR Foods, which operates a food processing plant near Kahului, draws water from its own wells. In effect then, there will be no adverse impacts on existing agriculture activities.

COMMENT:

There is an excellent discussion of effected flood and tsunamis zones. Yet later sections fail to discuss the ramnifications of the consequent development that

will occur in some of these areas due to the injection of new water into these communities.

RESPONSE:

Development has occurred in known flood and tsunami zones. The potential ramifications of any development in these zones without adequate flood control measures are quite apparent. In order to minimize flood hazards, several flood control improvements and studies are planned. These include the following:

- a) The Corps of Engineers is preparing plans and specifications for flood control improvements on Iao Stream. Construction is scheduled to be initiated in April 1977.
- b) The County of Maui is preparing plans for flood control improvements along lower Main Street. Plan specifications and an EIS for this project will be prepared within fiscal year 1976-77.
- c) Flood control studies for Kihei by the Corps of Engineers are scheduled to begin in fiscal year 1977.

The County of Maui has a Flood Plain and Tsunami Inundation Area Ordinance (Ordinance No. 716) which establishes use regulations and development standards in areas subject to flooding or tsunami inundation. The ordinance also requires floodproofing measures that are consistent with the flood protection elevation for areas to be developed. Some of the measures include:

- a) Anchorage to resist flotation and lateral movement.
- b) reinforcement of walls to resist water pressures

- c) addition of mass or weights to resist flotation
- d) installation of pumps to lower water levels in structures.

COMMENT:

It is also recognized that exhaust emissions from internal combustion engines are a source of pollution in urbanized area. There is, however, no discussion of these emissions due to increased auto use (a secondary impact) in the later section on adverse environmental impacts.

RESPONSE:

Exhaust emissions from increases in the number of automobiles were discussed in the EIS (Section 4. XX URBAN INFRASTRUCTURE. A. Highways). As stated in the EIS:

Average daily traffic (ADT) on the new highway (the Piilani Highway) is projected at 4,400 vehicles per day by 1979 (if construction is completed). By 1993, ADT is anticipated to reach the design capacity of the highway, which is 7,400 vehicles per day; Kihei Road, by 1993, is anticipated to handle 5,400 vehicles per day (DOT, 1973). Although the number of vehicles will increase because of the highway, it is expected that at any given traffic density exhaust emission levels might decrease because of the smoother traffic flow. The internal combustion engine will burn fuel more efficiently at constant speeds, therefore, reducing the amount of unburned hydrocarbon and carbon monoxide released into the atmosphere. Also, improved



emission control devices installed on newer automobiles and more stringent control of older vehicles will reduce the automobile emissions per vehicle. (DOT, 1973).

COMMENT:

Life of the Land takes issue with the scope of the vegetation, wildlife and archaeological site studies. The effects of the proposed project will not be limited to the immediate area around the pipeline. This is especially important to the protection and preservation of historical sites not in the immediate vicinity of the pipeline but which will most certainly be effected with the consequent developments made possible by the water system.

QUESRY:

What are the mitigating measure to minimize impacts on wildlife and vegetation mentioned at p. 4-34? Does the restructuring mentioned here involve the disappearance of certain species? What about stream habitats effected? What about coastal waters?

RESPONSE:

No significant impacts on flora and fauna are anticipated during construction of the pipeline. The removal of vegetation and wildlife habitat is a consequence of further development. This is stated in the EIS. It is difficult, however, to discuss mitigative measures that would minimize impacts on vegetation and wildlife without specific development proposals and in-depth studies of the flora and fauna resident to the area to be developed.

It is anticipated that the restructuring of flora and fauna resident to an area will not involve the disappearance of certain species. The foregoing statement covers large developments such as that at Wailea, and may not be applicable when a small parcel of land is improved.

There will be no perennial stream habitats affected in Kihei-Makena.

To our knowledge and to researchers we have contacted, there is a paucity of marine data reported for the Maalaea-Kihei-Makena area prior to urbanization. As we do not know what the marine environment was like prior to urbanization, we cannot empirically ascertain what alterations may have occurred over time. Recently, some studies of nearshore waters have been undertaken primarily around Makena. The division of Fish and Game of the Department of Land and Natural Resources have conducted several fish surveys in Ahihi Bay and LaPerouse Bay. An Environmental Impact Statement prepared for the Seibu Real Estate Company investigated the existing marine environment around Makena and the type of marine impacts which may be expected as development of the area occurs. In addition, Kihei was selected as a site for initial analysis and mapping of different coastal resources and processes as part of the State's Coastal Zone Management Program. These studies and future

research will provide baseline marine data which will aid in assessing future potential impacts on marine resources.

Historical sites in the project area should be protected from desecration. This is done by developers working with planners, archaeologists, the State Historical Preservation Office, County officials, and private organizations to preserve, protect, or restore historical artifacts and sites located within their properties. An excellent example of this is the Wailea development. The developers recognize the rich heritage of this area and are working to restore, where possible, sites of archaeological significance.

4. SECTION 3: LAND USE

COMMENT:

It is stated at p. 3-5 that "the proposed project . . . is . . . only one element of a comprehensive program to upgrade the development and delivery of water to communities where needed, in accordance with the County's long-range program for community development."

What are those long-range plans? Moreover, if the above statement is in fact true, then an environmental impact statement must be done on the entire program, not just on this "element" of that program!

RESPONSE:

The long range plans are County approved general plans for West Maui, Wailuku-Kahului, and Malaaea-Kihei-Makena. A general plan has been prepared for

Upcountry Maui (Makawao-Kula-Pukalani), but has not yet been approved. In addition, the County Planning Department is in the process of preparing a general plan for Paia.

5. Section 4: ENVIRONMENTAL IMPACTS

COMMENT:

There is no treatment of "water supply" as a primary impact.

RESPONSE:

As stated in the EIS (Section 4, Primary Impacts, VIII Urban Infrastructure, A. Water, pg. 4-8):

No significant impact on water supply is anticipated. Water will be used to control dust levels as required during construction activities. In addition, water will be used to clean and test the pipeline.

COMMENT:

Long term and irreversible impacts should include soil losses, increased surface runoff, sedimentation of bays and consequent effects, changing water quality.

RESPONSE:

No significant short-term impacts on soil loss, surface runoff, sedimentation, and water quality are anticipated during construction of the pipeline. These impacts were mentioned in the EIS (pgs. 4-32,33). In the absence of specific site development plans, these impacts cannot be quantified nor can the magnitude of the

impact be determined at this time.

The County of Maui, in its grading ordinance, has adopted the "Universal Soil Loss Equation" (USLE) and the related "Severity Number" to limit grading operations and keep soil loss within reasonable limits. The soil losses vary in accordance with soil erodibility, rainfall, and length of run and slope. The severity number is based on soil loss, area, duration of construction, and other down-stream factors. Presently, the County of Maui does not have a direct area limitation but sets limits by severity number and soil loss.

COMMENT:

Where is the discussion of the erosion and runoff from the water used to clean and test the pipelines???

RESPONSE:

The pipeline will be tested, cleaned and chlorinated in sections to minimize the amount of water which will be required for testing and cleaning. The water used for testing and cleaning will be discharged into existing waterways at a controlled rate to prevent erosion and runoff problems. The contractor may also be required to construct berms and basins to confine the water which then will percolate into the ground.

COMMENT:

There is absolutely no discussion of the negative effects to the communities such as Haiku, Pauwela, Ulupalkua-Kanaio, Kula, Olinda, Makawao, Peahi, etc,

communities which will not be serviced by this expenditure of tax monies but which presently suffer from substandard and unhealthy water supplies. This must be considered!

RESPONSE:

The communities of "Haiku, Pauwela, Ulupalakua, Kanaio, Kula, Olinda, Makawao, Peahi, etc." are outside the service area of the present Central Maui water distribution system and it would be difficult to anticipate the negative impacts on all these communities.

The monies to be used for the proposed project were allocated to the County of Maui Board of Water Supply by the State legislature. These monies, which were appropriated over several years, are capital improvements program funds and can only be spent on the project(s) for which it was allocated.

The long-term solution to the Upcountry water system (Haiku, Pauwela, Ulupalakua-Kanaio, Kula, Olinda, Makawao, etc.) has been worked out with the consumation of a water agreement between East Maui Irrigation, Co., Ltd., Alexander & Baldwin, Inc., and the County of Maui whereby up to 16 mgd, will be available from the Wailoa Ditch for Kula. This ditch, which was previously used almost exclusively for irrigation purposes, brings water into Central Maui from East Maui at an elevation of 1100 feet. In addition to periodic water shortages, the Upcountry water area is also subject to water

quality problems. High coliform counts require the residents to boil water prior to using. In order to remedy both problems, plans for two water treatment plants and a conveyance system for transmitting water from Wailoa Ditch have been initiated by the Board of Water Supply, and funds are included in the 1976 Maui County Capital Improvement Program for these developments.

COMMENT:

Where is the cost-benefit analysis and need analysis?

RESPONSE:

A cost-benefit analysis per se was not prepared for the proposed action. However, three major studies have considered the most desirable sources of water and means of transporting the same to meet future water needs in Central Maui. These studies were:

- 1) Towill, R. M. Corp., Water Master Plan for the County of Maui, December, 1971.
- 2) Water for Kihei-Makena, Island of Maui, Report R38, Prepared for Department of Water Supply, County of Maui, by Department of Land and Natural Resources, Division of Water and Land Development, State of Hawaii, Honolulu, Hawaii, October, 1970.
- 3) Saito, Norman Engineering Consultants, Inc., CH<sub>2</sub>M Hill Inc., and Dr. Harold T. Stearns, Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs, March, 1974.

COMMENTS:

Objection is generally raised to the description

of primary impacts. In actually all we are getting is a description of the project!

RESPONSE:

The probable primary impacts which may occur during construction and the mitigative measures which will be taken were discussed in Section 4 (Pages 4-2 to 4-11) of the Environmental Impact Statement.

COMMENTS:

Objection is also raised to the constant assumption (and justification) that the "contractor" will insure that all environmental and pollution regulations and controls are complied with. HOW does the drafter of the impact statement get by with making such conclusions? Or has the contract for this project already been let! Some fast explanation of this point better be made.

The report does not say what the mitigating measures are to minimize short term impacts. Throughout the EIS, mention is made that State and Federal regulations will insure negative or minimal impacts. This is a conclusion which we fail to understand. What about permits which can be issued which allow for pollution??? Moreover, there is an implication throughout that impacts will be minimal. If that is true, why and what is being talked about here that will be "mitigated"?

RESPONSES:

These two comments appear to be interrelated, hence a single response is given.

A contract for construction of the proposed project has not been advertised or awarded. Mitigative measures to minimize construction-related environmental impacts will be written into the construction contract. These measures include appropriate State and County Rules and Regulations such as the County Grading Ordinance



(No. 816) and State Department of Health Air Pollution Control Regulations (Chapter 43, HRS).

Variations to public health rules and regulations will not be needed during construction of the pipeline.

COMMENT:

Not answered is the question of whether the proposed development of the Kihei-Makena area can occur absent this proposed water development project. This is very important.

RESPONSE:

Growth can occur in the Kihei-Makena area without this proposed water development project. However, as the present Central Maui Water Transmission System is approaching its safe operating limits, forsaking its improvement jeopardizes the welfare of Mauians dependent on the system for water. Kihei residents will continue to face the prospects of periodic short-term water shortages.

Without an adequate water delivery system and additional water, future growth in Wailuku-Kahului and Kihei-Makena will slowdown resulting in a lowered rate of new housing construction, the loss of potential tax revenues, and employment opportunities for Maui residents.

COMMENT:

The entire section of Secondary Impact is totally inadequate and LOL refused to waste time explaining in detail. Certain things are self evident: ie. what of the negative impacts of the tourist industry???? Crowding? Social dislocation and animosity? Breakdown in family

relations as the mother goes to work? Increased crime? Potential for increased racial strife? Disruption of the lifestyles of the present Hawaiian community in and around the Makena area? Increase cost of living? Increased property taxes? etc.

RESPONSE:

As mentioned in Section 4 of the EIS, social changes arising from development are related to many variables which are difficult to quantify and for which no data base is available. Hence, precise predictions of these changes are not possible.

At the present time, there is no statistical data to substantiate the occurrence of significant negative impacts on Maui residents resulting from the visitor industry.

COMMENT:

Employment the project will provide jobs for construction in the next 20 years. Isn't that inducing growth with short term employment opportunities? This type of growth does not promote job diversity, all jobs are related to the tourist industry.

Employment projections are based on a lot of assumptions. Is that the type of employment 35-38% of the women are looking for?

The statement also assumes local people are not moving away from these visitor centers. Will they want to be employed in these hotel complexes? Couldn't this generate increased feelings of resentment to the visitor industry? There is a demonstrable lack of sensitivity on this issue.

RESPONSE:

A single response is given for the above comments.

The development of visitor-facilities in Kihei-

Makena is a County policy decision to confine that type of development to one area. As a result, the economic base of the community will be geared towards the visitor industry.

As stated in the EIS, approximately 7,914 new jobs will be created in the visitor industry between 1985-1990. In addition, indirect job opportunities will be created for 2,261 workers. These jobs will be concentrated in the project area but may stimulate additional employment throughout Maui.

There is no evidence to indicate that the job opportunities to be provided by the visitor industry is undesirable nor indications that resentment exists to the visitor industry on Maui.

A recent State-wide public opinion poll published by the State Department of Planning and Economic Development\* reported that 71.5% of the Maui respondents believed that tourism is good for Hawaii and 5.9% believed tourism is bad for Hawaii. In response to the question, "What, in your opinion, is the major advantage of expanding the tourist industry in Hawaii?" 56.9% of

---

\*Final Report of a poll of Hawaii State-wide Public Opinion concerning various issues related to tourism in Hawaii and conducted October 5-15, 1975. Prepared for the Department of Planning and Economic Development - State of Hawaii by the County of Maui.

the Maui respondents cites "creates more jobs", 12.9% cited "attracts more spending/investment", and 10.5% cited increases revenues for government." In addition, 3.2% of the respondents cited "causes little pollution" as an advantage.

QUERY:

There will be an increased trend away from the Hawaiian and Portugese predominance in the communities effect. This should be analyzed.

RESPONSE:

SEE ERRATA SHEET

COMMENT:

Inadequate discussion of impact upon infrastructure. i.e. demands upon waste water plants, power utilities.

6. SECTION 5: ADVERSE IMPACTS:

COMMENT:

This section is totally inadequate! The section, and especially the last paragraph, should be explained more clearly. Same should also be reconciled with section 8-1 and 9-1.

Also, what about fact that without system no growth can occur in this area?

RESPONSE:

The Environmental Quality Commission's Rules and Regulations pertaining to EIS content requirements, particularly information on adverse environmental affects which cannot be avoided state: ". . . This should be a brief summary of any adverse impacts in-

cluding those effects discussed in paragraph (e)."

(Paragraph e deals with probable environmental impacts which are adverse and unavoidable under the proposed action.) Potential adverse impacts resulting from the proposed action were discussed in Section 4 of the EIS and summarized in Section 5.

7. SECTION 6: ALTERNATIVES

COMMENT:

Totally inadequate. The law intentions alternatives to the proposed action and the effects of those alternatives, not alternatives to how to place a pipeline!

The no-project alternative is very poorly discussed and analyzed. What about the alternative of using the money to upgrade the water supplies in up country Maui?

Also to be discussed is the alternative water sources available. What about using the water resources to redirect growth to already built up areas such as Lahaina or Kaanapali?

RESPONSE:

Kihei

Groundwater explorations have indicated that only brackish water can be found along the coastal area up to the 600 foot elevation from Kihei to Makena. An exploratory well was recently developed by the State Department of Land and Natural Resources near Pulehu and the safe well yield estimated at .5 mgd. The risk of developing this source is greater than that of Waiehu due to the lack of knowledge of recharge to the "Pulehu aquifer". In addition, it is estimated that

this source cannot supply the total projected water requirements for the Kihei area.

Waikapu

This area may contain sufficient water quantities to supply a portion of projected demands in Central Maui. However, recent exploratory drilling by the State Department of Land and Natural Resources Division of Water and Land Development has been unsuccessful. Additional exploratory drillings are not planned for this area at this time.

Iao Valley

Water sources include the Kepaniwai Park Well, Iao Tunnel, and the Mokuahau Wells. The existing Kepaniwai Park Well and Iao Tunnel supply approximately 1 mgd to the Wailuku high level service area. The base yield of these sources is not sufficient to meet future water requirements and further development of this source would not increase the water yields substantially.

The Mokuahau Wells are the existing major water source for the Central Maui service area. The drilling of additional water wells at Mokuahau and the increased draft may result in saltwater intrusion problems.

Exchange of Effluent for Irrigation Water

One major source of new water which could be made available in the future is the exchange of irrigation water for properly treated sewage effluent. Water

which is perfectly suitable for domestic use is being used for irrigation. Partially treated sewage, which could be further treated and used for irrigation, is being wasted. The technology for reuse of treated sewage effluent for cane irrigation is presently being studied by the University of Hawaii. The major problem of the reuse of sewage effluent for irrigation is the effects of nutrient concentration and lowered crop production. This problem may be reduced by dilution with other waters and a system of exchange could be operational by the time water developed through conventional means runs short.

#### Desalination

As mentioned in the EIS, a recent study, Desalting Water in Hawaii (DLNR, 1975), analyzed the economic costs of desalting water in the Kihei area. Three desalting methods were investigated: electro dialysis, ion exchange, and reverse osmosis. According to the study, the least cost alternative is electro dialysis. Under this alternative water can be desalted at a cost ranging between \$.78 to \$1.17 per thousand gallons depending on the design capacity of the plant, degree of treatment, and the number of operating days. These costs do not include distribution costs. As a comparison, in 1974, the domestic water rate on Maui island was \$.41 per thousand gallons. The report further states:

"It is unlikely that desalting brackish water even at top priority locations will provide an economically competitive alternative to transporting existing sources unless transport distances are very great or expensive water treatment and costly impounding facility must be provided for the source."

As a result of exploratory drillings in Kihei which have yielded brackish water, unsuccessful drilling in Waikapu, the unproven technology for irrigation water-effluent exchange, and the economic limitations for processing seawater or brackish water, the most prudent means to provide for the future water needs of Central Maui is to develop the basal water supplies in the Waiehu-Waihee area.

The monies to be used for the proposed project were allocated to the County of Maui Board of Water Supply by the State legislature. These monies, which were appropriated over several years, are capital improvement program funds and can only be spent on the project(s) for which it was allocated. Therefore, these monies cannot be used to construct a pipeline to Kula or Lahaina-Kaanapali. As mentioned on page 15 of the responses to Life of the Land's comments, steps have been taken by the Board of Water Supply to solve the Upcountry water problems. The water can be used to redirect growth to already built up areas such as



Lahaina-Kaanapali, but the economic costs and potential environmental impacts of constructing a water transmission pipeline from Waiehu-Waihee to Lahaina-Kaanapali may be greater than that of the proposed action.

In addition, concentrating resort-residential development to West Maui is contrary to current County government policies. The County government has established as public policies, a determination as to where resort-residential development will occur. Two areas have been delineated by the County to accommodate development of this type: West Maui and Kihei-Makena. The proposed project, in addition to other capital improvement programs will allow for the orderly and controlled growth of Kihei-Makena and Wailuku-Kahului as delineated in their respective general plans.

8. SECTIONS 7 & 8:

COMMENT:

Both of these sections are totally inadequate and lack any understanding of the purposes to be served by these analysis.

Exhibited is that there is no clear understanding of the ground water supply by the preparers of this statement.

RESPONSE:

There are numerous risks and trade-offs involved in decision-making. A decision to allocate resources for one course of action may preclude use of that

resource for another course of action. The final outcome, of course, is subject to priorities and on-going debate within the planning process. A decision by the Board of Water Supply to request the State Legislature to appropriate \$4.0 million for the water-line suggests the proposed project has a high priority in the County's capital improvements program. A decision to develop Kihei and Lahaina into residential-resort developments confines this type of development to these specific regions, thereby not subjecting other areas to the same kinds of development. As such, it is also a decision to divert development away from lands in agricultural production, and underscores the importance of agriculture in Maui's economy.

The general plans for various Maui communities are long-range policy guidelines for attaining community goals and objectives and should not be considered as fixed documents which cannot be modified. As external conditions affect the community and peoples values change over time, the general plans can be modified to reflect these events.

Environmental impacts, both short and long-term and adverse and beneficial, are the risks and trade-offs resulting from the proposed project. Increased development will socially and economically benefit Maui

residents but these changes may induce potentially adverse impacts on the physical, social, and economic environment. These impacts were discussed in the EIS.

The continuous application and enforcement of applicable State and County regulations can minimize the risk of significant adverse environmental degradation. It must be clearly recognized, however, that these changes will occur to some degree as development proceeds and are a direct result of providing for the needs of people.

**OTHER AND MISCELLANEOUS COMMENTS:**

The statement needs to address the changing hydrology-- the impact on the entire island's water resource development. Impact of the water used merely in the project area cannot be isolated. To do so may preclude supply of water to existing populations in the future. Will commitment of this last area of water reserves to Kihei-Makena and a population yet to come commit the existing population to use of lower quality of water in the future?

**RESPONSE:**

No. It has not been determined if this is the last area of water reserves on Maui. The Board of Water Supply cannot commit the existing population to use of lower quality water in the future. The Board of Water Supply will constantly sample water and at all times comply with all applicable rules and regulations of the State Department of Health.

In addition, potable water from all sources must

comply with national drinking water standards established by EPA under the Safe Drinking Water Act (PL 93-523). Under this law, the quality of drinking water must be determined by periodic chemical analysis and compared with recommended drinking water standards. Procedures are established so that the public, the water supply agencies, and the State governments will work together to provide safe drinking water to all citizens.

QUERY:

Whether the water supply from Mokuau well is to be used for the Kahului-Paia area exclusively? Or will it be combined with the Waiehu-Waihee well supply and maintained as the Central Maui System-- with some waters ending up in Kihei and Makena???

RESPONSE:

A response to this query is found on pages three (3) and four (4) of the responses to Life of the Land's comments.

QUERY:

Inadequate discussion of the anticipated impacts of the proposed project on adjoining land uses, developments and trends therein and other related demands for public facilities and services.

RESPONSE:

These concerns were addressed in Section 4 of the EIS. Please refer to pages 4-1 thru 4-34.

QUERY:

Reports cited indicate that total demand will

increase by 26.3 mgd by 2000. Information presently available indicates that this may be 10-20% of the potential supply available on Maui. The greatest impact may be through reduced infiltration into the Central Maui basal supply, reducing the agricultural potential of this area.

RESPONSE:

The impacts on agriculture were discussed on page seven (7) of the responses to Life of the Land's comments.

The Hawaii Water Resources Regional Study has calculated Maui's daily available water supply at 1159 million gallons. The 26.3 mgd (total demand by 2000) represents approximately 2 percent of the daily available water supply -- not 10-20%.

QUERY:

Truly inadequate discussion of impacts, ;negative and positive, to surrounding communities from this project. ie. not answered is how the exportation of an additional 20+ million gallons of water per day from West Maui will effect the water supply, economic development, social structure, and public facilities and services of such areas as Wailuku, Kahului, and Paia.

RESPONSE:

These impacts were discussed in Section 4 of the EIS.

QUERY:

One of the environmental (economic) impacts of the system will be increased property values in the Kihei area. This will have both positive and negative implications. ie. cost of land acquisitions will increase, likewise property taxes will increase which could in turn force some people out of long-held homes and homesteads.

RESPONSE:

Property values in Kihei may increase as a result of the proposed project. To infer that land value is solely contingent on the availability of water is misleading. Other factors, such as location, accessibility, zoning, and market demand also influences land values.

As stated in the EIS, development will result in an expansion of the County's tax base. Increases in the real property assessment could be offset by recent changes to the method used for assessing real property by the State. Other changes in the real property tax laws such as an increase in the homeowners exemption (\$8,000 to \$12,000) and a recent legislative bill on residential dedication may further reduce the tax burden on the homeowner.

Water Source

COMMENT:

In discussion of water draw-down, the study ignores such minor things as the fact that Mokuauia well will be being pumped an additional 2 mgd in the future. Demands may also be increased on other water sources in the area. Yet there is no discussion of the effect of pumping 19 mgd from the Waiehu-Waihee source in light of these factors.

Where is the discussion of changing groundwater levels?

The unresolved issues should and could be resolved through preparation of an adequate impact statement. LOL especially objects to position of determining the most important issue-- question of water draw-down in source area only after project underway. Part of impact study must be testing of area to determine true effects. Otherwise run risk of building \$11 million project hooked to a source that cannot supply the water needed. This would result in inexorable and unwarranted tax burden upon taxpayers. A most illogical approach to build system and then see if there's enough water!

QUERY:

Again, not discussed is the impact on the resource and supply area. ie. long-term impacts upon depletion of groundwater resources/? Related hydrological changes? Energy commitments for pumping facilities?

RESPONSE:

We have been advised by our attorneys that Chapter 343, HRS, and the Environmental Quality Commission's Rules and Regulations do not apply to the water source development program since that program is being undertaken by private parties without involvement of any State or County funds or lands. Therefore, the EIS for the transmission line does not address itself to the water source development program directly. We do,

however, recognize the scope and substance of the comments you have submitted about the water source development program and, without prejudice to or waiving our legal position, we submit the following response to your comments:

Presently, indications are that there may not be any connection between the Iao (Mokuhau) aquifer and the Waiehu aquifer; and that there is the probability that Waiehu and Waihee are interconnected as one large aquifer. "The five test holes which have been drilled thus far, give a comprehensive view of the aquifer. The water fills the interstices in the basalt which will act like a huge tank when pumped. It is anticipated that the entire basin may be developed at this site, unless a dike barrier exists, the existence of which cannot be determined until after the pumps are in operation."\* These indications are not to be taken as fact and can only be proven or disproven by continued pumping and monitoring of the Waiehu and Mokuhau sources beginning as soon as a production well or wells are completed. The development of a well or a series of wells at Waiehu will recover water believed to be wasting into the sea north of Waiehu.

---

\*Stearns, Harold, Second Supplement to the Central Maui Water Study of March 1974, February, 1974.



The recharge of the aquifer is recognized as being of prime importance and continued monitoring at Waiehu will be carried on to enhance knowledge in this respect and to insure that the safe yield of the aquifer is not exceeded.

Any draft in the lens will result in lens shrinkage, rise in the salt-fresh mixing zone, increase in the thickness of the mixing zone, and reduction of the depth of water of domestic quality on both of the latter accounts. It is also true that the safe yield will not be 100 percent of total recharge.

Based on available information, and the professional opinion of the project's consulting geologist, Dr. Harold T. Stearns, "a very large recharge area with high rainfall exists inland of the basin; hence, quantities in excess of 20 mgd should be recoverable."\* If this proves true, then as water demand dictates, additional wells will be developed. There will be sufficient time to monitor and evaluate data to ascertain the safe yield of the proposed water source. In no instance will additional wells be developed at this source unless the resulting analysis confirms that the safe yield has not been reached.

---

\*Saito, Norman, Engineering Consultants, Inc., CH<sub>2</sub>M Hill Inc., and Dr. Harold T. Stearns, Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs, March, 1974.

The State Department of Land and Natural Resources Report R-38 (page 33) estimated the quantity of water in the Waiehu-Waihee basin by means of a simplified water budget system using rainfall, surface run-off, and evaporation. The resulting net ground water percolation was estimated to be 20 mgd average from a total rainfall of 95 mgd. (The 20 mgd average is equivalent to 30 mgd maximum day as used in the Saito report.)

A range of safe yield estimates has not been calculated; however, it is estimated that quantities of water in excess of 20 mgd should be recoverable. A study of recharge to the Waikapu aquifer estimated a probable uncertainty ratio between "average estimates" and "minimum estimates" of recharge at approximately 2 to 1.\* If this uncertainty factor is applied to the Waiehu aquifer, a conservative present estimate of safe yield may range between 20 and 40 mgd, and possibly greater than 40 mgd.

Extensive test borings have been made in the Waiehu-Waihee area and core samples obtained. The results of the test borings indicate the basal water elevation stands at approximately 16 feet above mean sea level which suggests the aquifer is very large.

---

\*Caskey, Melvin C., The Recharge of the Waikapu Aquifer, August, 1968.

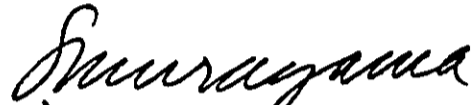
The decision to develop the Waiehu-Waihee aquifer was based on the data obtained from the extensive exploratory drilling and studies thereof made by Dr. Harold T. Stearns. The selected well site and future well sites have a very good expectation of safely yielding water quantities needed to meet future demands of the Central Maui water service area. The first production well is now being drilled at a ground elevation of 500 feet above mean sea level. It is located approximately  $1\frac{1}{2}$  miles to the north of the existing Mokuhau Wells. Test pumping of this well is expected to commence within the next month. The results will be closely observed and will develop a safe well yield. Observation holes at Mokuhau, Puuohala, Waiehu, and Waihee will be closely monitored to obtain data on water level differences caused by the test pumping. Draw down at various pumping rates will be measured and recovery times recorded. If initial testing shows water is plentiful, then a second well will be installed and test pumped.

The range of safe yield estimates can be accelerated by pumping the proposed well field to its maximum and conducting monitoring studies. This can be accomplished by cutting down on the Mokuhau draft and furnishing as much water as possible to the service area from the proposed water source.

The initial development of a ten million gallon per day source will create a power load of 1,050 kilowatts. Maui Electric Company's existing peak load is 61.4 megawatts. The power load of the Waiehu pumps is 1.71 percent of this peak. In other words, the added Waiehu load would increase Maui Electric Company's peak by 1.71 percent. This will not create a load problem for Maui Electric Company.

We hope we have satisfactorily responded to your comments.

Sincerely,



Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

August 7, 1976

Shigeto Murayama  
Board of Water Supply  
County of Maui  
Wailuku, Maui, Hawaii 96793

NO. 100

BOARD OF WATER SUPPLY  
MAUI

Re: Supplemental Comments by Life of the Land  
for the Central Maui Water Transmission System

Dear Mr. Murayama:

The following is a supplemental list of deficiencies that exist with the EIS for the Central Maui Water Transmission System.

Leading the list is the statement regarding the predicted daily demand for water in the Kihei-Makena area. Without any empirical data in support thereof, these assumptions must be viewed as nothing more than self serving presumptions designed to lead the reader to the conclusion that a water line is needed. Therefore, the EIS fails to meet its number one responsibility, and that is to justify the need for the project.

Criticism must also be made of the EIS's attempt to analyze secondary impacts resulting from the project. The assumption that it is difficult to accurately assess secondary impacts is untrue, and therefore further studies should have been conducted and documented. This is also true of the analysis of probable adverse environmental effects.

Equally deficient in content is the list of alternatives for the proposed action. Before any alternative can be discussed, the overall consideration as to which alternative is proper must be based on some form of cost-benefit analysis. This was ignored in the EIS and yet is a basic consideration under Chapter 343. Without this kind of analysis, the agency is denied an ability to make a reasoned choice called for under the law.

The discussion regarding the long term uses of man's environment was inadequate. By definition coverage should have been given to examining this project's impact as it relates to future generations. What the EIS contained was nothing more than pure rhetoric and in no way answered this important question. Similarly the impact statement was limited in its assessment of the secondary impacts this project would have. In fact, secondary impacts were totally ignored.

SCHWEIGERT  
ETTENCOURT  
AND COOK BLDG. SUITE 1100  
HAWAII, HAWAII 96814



In closing, the environmental impact statement of this project is what was predicted by Life of the Land in Civil No. 2888, a self serving prophecy designed to convince the reader that water is needed in the Kihei-Makena area. I wish to also refer you back to the criticisms raised in the filing of our complaint in Civil No. 2888 which are incorporated herein by reference.

I hope the above criticisms assist you in coming to a final resolution in this matter.

Very truly yours,

*John F. Schweigert*  
JOHN F. SCHWEIGERT

JFS/cm



DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793

September 9, 1976

John F. Schweigert, Esq.  
Castle & Cook Building  
Suite 1100  
Honolulu, Hawaii 96813

SUBJECT: CENTRAL MAUI WATER TRANSMISSION SYSTEM  
ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Schweigert:

We thank you for reviewing the Environmental Impact Statement for the proposed Central Maui Water Transmission System. In answer to your comments, we offer the following responses:

COMMENT:

Leading the list is the statement regarding the predicted daily demand for water in the Kihei-Makena area. Without any empirical data in support thereof, these assumptions must be viewed as nothing more than self serving presumptions designed to lead the reader to the conclusion that a water line is needed. Therefore, the EIS fails to meet its number one responsibility, and that is to justify the need for the project.

Equally deficient in content is the list of alternatives for the proposed action. Before any alternative can be discussed, the overall consideration as to which alternative is proper must be based on some form of cost-benefit analysis. This was ignored in the EIS and yet is a basic consideration under Chapter 343. Without this kind of analysis, the agency is denied an ability to make a reasoned choice called for under law.

*"By Water All Things Find Life"*

RESPONSE:

A cost-benefit analysis per se was not prepared for the proposed action. However, three major studies have reported the quantities of water which will be required to supply future water needs in Central Maui.

These studies were:

- 1) Towill, R. M. Corp., Water Master Plan for the County of Maui, December 1971.
- 2) Water for Kihei-Makena, Island of Maui, Report R38, Prepared for Department of Water Supply, County of Maui, by Department of Land and Natural Resources, Division of Water and Land Development, State of Hawaii, Honolulu, Hawaii, October 1970.
- 3) Saito, Norman Engineering Consultants Inc., CH<sub>2</sub>M Hill Inc., and Dr. Harold T. Stearns, Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs, March 1974.

A tabular representation of maximum daily water quantities (in mgd) projected by these studies for different time periods is as follows:

	<u>1980</u>	<u>1990</u>	<u>2000</u>
R. M. Towill	20.03	33.89	-
DLNR	13.12	19.69	-
Saito, et.al.	21.85	37.43	51.69

These studies used different approaches in arriving at their respective water projections. Despite the procedure differences, all three studies indicated that severe water shortages can be anticipated throughout Central Maui



unless appropriate measures are instituted to remedy the problem.

COMMENT:

Criticism must also be made of the EIS's attempt to analyze secondary impacts resulting from the project. The assumption that it is difficult to accurately assess secondary impacts is untrue, and therefore further studies should have been conducted and documented. This is also true of the analysis of probable adverse environmental effects.

RESPONSE:

Despite the difficulty in assessing secondary impacts an evaluation of secondary impacts was reported in Section 4 of the EIS.

COMMENT:

The discussion regarding the long-term uses of man's environment was inadequate. By definition coverage should have been given to examining this project's impact as it relates to future generations. What the EIS contained was nothing more than pure rhetoric and in no way answered this important question. Similarly the impact statement was limited in its assessment of the secondary impacts this project would have. In fact, secondary impacts were totally ignored.

RESPONSE:

There are numerous risks and trade-offs involved in decision-making. A decision to allocate resources for one course of action may preclude use of that resource for another course of action. The final outcome, of course, is subject to priorities and on-going debate within the planning process. A decision by the Board of Water Supply to request the State Legislature to appropriate \$4 million for the water-

line suggests the proposed project has a high priority in the County's capital improvements program. A decision to develop Kihei and Lahaina into residential-resort developments confines this type of development to these specific regions, thereby not subjecting other areas to the same kinds of development. As such, it is also a decision to divert development away from lands in agricultural production, and underscores the importance of agriculture in Maui's economy.

The general plans for various Maui communities are long-range policy guidelines for attaining community goals and objectives and should not be considered as a fixed document which cannot be modified. As external conditions affect the community and peoples values change over time, the general plans can be modified to reflect these events.

Environmental impacts, both short and long-term and adverse and beneficial, are the risks and trade-offs resulting from the proposed project. Increased development will socially and economically benefit Maui residents but these changes may induce potentially adverse impacts on the physical, social, and economic environment. These impacts were discussed in the EIS. The continuous application and enforcement of applicable State and County regulations can minimize the

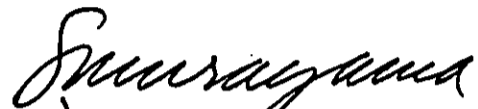
John Schwigert, Esq.

Page 5

risk of significant adverse environmental degradation. It must be clearly recognized, however, that these changes will occur to some degree as development proceeds and are a direct result of providing for the needs of people.

We hope we have satisfactorily responded to your comments.

Sincerely,



Shigeto Murayama  
Director  
Department of Water Supply  
County of Maui

SM:fu

cc: Dr. Richard Marland  
Director, OEQC

# appendices

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100

## APPENDIX A

### WATER SOURCE FOR THE CENTRAL MAUI WATER TRANSMISSION SYSTEM

#### EXISTING SURFACE AND SUBSURFACE CONDITIONS

##### Surface Conditions

The proposed well site is located at an elevation of 500 feet. This level is the upper limit of sugar-cane cultivation due to the steep slopes encountered at this elevation. The surface soils of the project area are of the Iao and Wailuku Series. Both series are mainly alluvial matter which are moderately permeable to surface water infiltration.

##### Subsurface Conditions

Exploratory drilling in the area shows the caprock of the artesian basin to consist of thick layers of dense breccia and conglomerate overlying the basaltic bedrock except at the well site where decomposed bedrock crops out. Results of some of the test holes indicate the breccia and conglomerate material to be over 500 feet thick, extending from the base of the Wailuku Mountains to the sea. These layers are impermeable and separate the perched water from the basal aquifer.

#### ANTICIPATED IMPACTS ON THE BASAL AQUIFER

##### Contamination of Basal Aquifer by Surface Water Infiltration

Water quality data from existing wells in the area show no bacterial or chemical pollutants, thus indicating that contamination of the basal aquifer by

surface infiltration from agriculture and natural runoff over the years has not occurred. Two major features account for the prevention of basal aquifer contamination by surface water infiltration. The first feature, the steep slopes, precludes cane cultivation above the 500 foot elevation and also facilitates rapid drainage of agricultural and natural runoff water. The second feature, the nearly impermeable caprock, prevents runoff water containing fertilizers and dissolved chemicals to infiltrate the basal aquifer. The thick layers of breccia and conglomerate prevent any perched water from joining the basal water. Contamination of the basal aquifer from surface runoff can only occur from areas adjacent to the well source. The well will be cased in steel and grouted to prevent surface water from entering it.

#### EFFECTS OF THE PROPOSED WATER WITHDRAWAL ON EXISTING WATER SOURCES

##### Mokuhau Wells

The County of Maui operates the Mokuhau Wells which presently serve the Central Maui Area. The wells are located approximately 2.6 miles south of the proposed well site. The results of monitoring three test wells near the proposed well site show that the pumping at Mokuhau Wells has no effect on the basal aquifer of the proposed water source. This indicates that water removal from the basal aquifer will not affect the Mokuhau aquifer. Conclusive proof can

be obtained only through monitoring of both aquifers over a long period time. The proposed wells will recover water now being wasted.

#### Existing Springs

There are several brackish springs along the seacoast below the project site. These springs are not potable. The water source must be supplied by perched water located between the ground surface and the caprock. It becomes contaminated by sea water at the coast. Thus, since the perched aquifer is physically separated from the basal aquifer, water removal from the basal aquifer will not affect the existing brackish springs.

#### Contamination of the Basal Aquifer by Sea Water Infiltration

Water removal, in excess of the aquifer recharge, will result in the infiltration of sea water into the Ghyben-Herzberg lens. The test wells and existing wells will be monitored and detailed analyses of the water levels and quality will be conducted to insure that no undesirable effects occur. The exact recharge rate and safe water removal rate will not be known until the proposed well is operational and pumping tests are conducted. The test and analyses will be made under the supervision of the County, State and Federal governments.

## APPENDIX B

### SURVEY METHODOLOGY of FLORA AND FAUNA

A field survey was conducted along the proposed Central Maui Water Transmission System alignment on December 15 and 16, 1975 to obtain an overview of the vegetation and wild-life present. A literature search was conducted on December 18 and 19, 1975 to determine whether other studies of the flora and fauna of the project sites had been made. As only minimal field work was accomplished, it is possible that many species of plants and perhaps animals were missed. The information provided herein is representative only of conditions and species present at the time the study was made.

#### A. Methods

Because of the great length of the project alignment (approximately 23 miles), it was not possible to walk or survey the entire length. Where possible, the line was driven by 4-wheeled drive vehicle or checked where a road intersected the line at right angles. Five or ten-minute walks on foot at selected, representative locations were made to sample the vegetation and search for animals or signs of them. These locations were indicated on Figure 2-6 as points "A" through "S". No mammal traps were set due to the brevity of the survey, but rodents resident to the area were described during interviews with personnel of the



Vector Control Branch of the State Department of Health. Conferences were also held with the staff of the Board of Agriculture, Division of Weed Control to discuss the presence of weeds and noxious plants and with the Assistant Forester of the State Division of Forestry to determine whether there were any endangered or endemic plants along the route. Unidentified plants were collected and brought to the University of Hawaii Botany Department where they were keyed out and given names. A two-hour field survey of the vicinity of the Waiale Reservoirs area (Point D) was made on December 16th to augment the brief stop made there the previous day. The literature search consisted of reviewing known studies of the natural history of Maui or of the areas along the project line and checking all volumes of the "Elepaio" (Journal of the Hawaii Audubon Society) issued between 1945 and 1975.

B. Findings

No studies of the biota of the entire alignment were found during the brief literature search. However, Berger and Walker conducted inventories of the flora and fauna of the Kihei area from Waiakoa to Kalama Park and from Poolenalena to Kanahena along the Makena coast. (Austin Smith and Associates Inc., August, 1974 and Neighbor Island Consultants, November, 1974). The Central Maui Water Transmission System alignment passes through both of their study

areas. Of Kihei, they say "...the flora and fauna of the Kihei region is highly altered from its original composition. Few endemic or indigenous plants or animals occur there and those that do are relatively common elsewhere on the Island, in the State or around the Pacific basin. Exotic plants and animals dominate the area and would probably continue to do so if development was accelerated." Although they described several species of native plants and animals in the Kihei study, none is endangered. The biota of the Makena study area is described as follows: "The vegetative cover is highly altered from pre-historic times when the predominant plant life most likely consisted of native bunch grasses and scattered dry-land trees. Exotic trees, shrubs, forbs, vines and grasses now predominate. The presence of cattle over a long period of time has contributed to the destruction of many plants in the area. The wildlife consists primarily of introduced species of birds, mammals and reptiles." The only endangered species described was the Hawaiian stilt (Himantopus himantopus knudseni) which they located in small brackish ponds near Puu Olai. The alignment passes immediately adjacent to the smaller of these ponds at point "S." References to the birdlife of Central Maui found in the Elepaio (Anon. 1945-1975) were confined to Kealia and Kanaha ponds, both of which are well removed from the project line.

No botanical studies of the areas bisected by the pipeline route have been made to the writer's knowledge.

APPENDIX C

FLORA: SUMMARY OF PLANTS NOTED

ENDEMIC SPECIES

<u>Common Name</u>	<u>Scientific Name</u>	<u>Form</u>	<u>Relative Abundance</u>
Ilima	<u>Sida fallax</u>	herb	Common
Uhaloa	<u>Waltheria americana</u>	herb	abundant
Wiliwili	<u>Erythrina sandwicensis</u>	tree	rare
'A'alii	<u>Dodonaea sp.</u>	shrub	rare
Caper (Pua-pilo)	<u>Capparis sandwichiana</u>	shrub	rare

INDIGENOUS SPECIES

<u>Common Name</u>	<u>Scientific Name</u>	<u>Form</u>	<u>Relative Abundance</u>
Morning glory (koali 'awahia)	<u>Ipomea congesta</u>	vine	abundant
Hau	<u>Hibiscus tiliaceus</u>	tree	rare
Scaevola (naupaka-kahakai)	<u>Scaveola sp.</u>	shrub	occasional
Milo	<u>Thespesia populnea</u>	tree	rare
False puncture vine (nohu)	<u>Tribulus cistoides</u>	herb	rare

EXOTIC SPECIES

<u>Common Name</u>	<u>Scientific Name</u>	<u>Form</u>	<u>Relative Abundance</u>
Mesquite (kiawe)	<u>Prosopis pallida</u>	tree	abundant
Koa-haole	<u>Leucaena leucocephala</u>	Shrub	abundant
Red top	<u>Agrostis alba</u>	grass	common
Bermuda grass (mamienie)	<u>Cynodon dactylon</u>	grass	common

## EXOTIC SPECIES con't.

Common Name	Scientific Name	Form	Relative Abundance
Black nightshade (popolo)	<u>Solanum nodiflorum</u>	herb	occasional
Lantana (lakana)	<u>Lantana camara</u>	shrub	common
Balsam apple	<u>Momordica charantia</u>	herb	occasional
Garden spurge	<u>Euphorbia hirta</u>	herb	common
Indigo (iniko)	<u>Indigofera suffruticosa</u>	shrub	occasional
Passionflower (pohapoha)	<u>Passiflora sp.</u>	vine	occasional
Fuzzy rattlepod	<u>Crotalaria incana</u>	shrub	occasional
Cocklebur (kikania)	<u>Xanthum canadense</u>	shrub	occasional
Clerodendron	<u>Clerodendron fragrans</u>	shrub	occasional
Slender mimosa	<u>Desmanthus virgatus</u>	shrub	occasional
Candlebush	<u>Cassia alata</u>	shrub	rare
Thunbergia	<u>Thunbergia erecta</u>	shrub	common
Slender amaranth (pakai)	<u>Amaranthus viridis</u>	herb	common
Sugar cane (ko)	<u>Saccharum officinarum</u>	grass	abundant
Ironwood	<u>Casuarina spp.</u>	tree	occasional
Java plum	<u>Eugenia spp.</u>	tree	occasional
Radiate fingergrass	<u>Chloris radiata</u>	grass	common
Spiny amaranth (pakai kuku)	<u>Amaranthus spinosus</u>	herb	common
Napier grass	<u>Pennisetum purpureum</u>	grass	common
Hairy abutilon	<u>Abutilon molle</u>	shrub	common
Guinea grass	<u>Panicum maximum</u>	grass	common
Honohono	<u>Commelina diffusa</u>	herb	occasional

## EXOTIC SPECIES con't.

Common Name	Scientific Name	Form	Relative Abundance
Castor bean (pa'aila)	<u>Ricinus communis</u>	shrub	abundant
Monkeypod ('ohai)	<u>Samanea saman</u>	tree	occasional
Mango (manako)	<u>Mangifera indica</u>	tree	occasional
Flora's paintbrush	<u>Emilia sonchifolia</u>	herb	occasional
Coffee senna (miki palaoa)	<u>Cassia occidentalis</u>	herb	occasional
Yellow star thistle	<u>Centaurea melitensis</u>	herb	occasional
Eucalyptus	<u>Eucalyptus sp.</u>	tree	rare
Manila tamarind (opiuma)	<u>Pithecellobium dulce</u>	tree	common
Guava (kuawa)	<u>Psidium guajava</u>	tree	occasional
Nutgrass (kili'o'opu)	<u>Cyperus rotundus</u>	sedge	abundant
Christmas berry	<u>Schinus terebinthifolius</u>	tree	occasional
False mallow	<u>Malvastrum coromandelianum</u>	shrub	common
Moon vine (koali-pehu)	<u>Ipomea alba</u>	vine	occasional
Sensitive plant (pua-hilahila)	<u>Mimosa pudica</u>	herb	occasional
Saltbush	<u>Atriplex spp.</u>	herb	rare
Klu	<u>Acacia farnesiana</u>	shrub	occasional
Coconut (niu)	<u>Cocos nucifera</u>	tree	rare
Indian mulberry (noni)	<u>Morinda citrifolia</u>	shrub	rare
Cactus (panini)	<u>Opuntia megacantha</u>	cactus	occasional
Cheeseweed	<u>Malva parviflora</u>	herb	common
Golden crownbeard	<u>Verbesina encelioides</u>	herb	common
Wild Zinnia (pua-pihi)	<u>Zinnia pauciflora</u>	herb	rare

## EXOTIC SPECIES con't.

Common Name	Scientific Name	Form	Relative Abundance
Hairy merremia (koali-kua-hulu)	<u>Merremia aegypti</u>	herb	common
Buffle grass	<u>Cenchrus ciliaris</u>	grass	abundant
Bougainvilla (pukanawia)	<u>Bougainvilla spp.</u>	shrub	occasional
Hibicus (aloalo)	<u>Hibiscus spp.</u>	shrub	occasional
Tree tobacco	<u>Nicotiana glauca</u>	tree	rare
Night-blooming cereus (pa-nini-o-ka puna-hou)	<u>Hylocereus undatus</u>	cactus	rare
Sisal (malina)	<u>Agave sisalana</u>	tree	rare
Be-still (noho-malie)	<u>Thevetia peruviana</u>	shrub	rare
Lion's ear	<u>Leonotis neptaefolia</u>	shrub	occasional
Apple of sodom (popolo-kikania)	<u>Solanum sodomeum</u>	shrub	occasional
Sow thistle (pua-lele)	<u>Sonchus oleracea</u>	herb	occasional
Hairy horseweed ('ilioha)	<u>Conyza bonariensis</u>	herb	occasional
Apple of peru	<u>Nicandra physalodes</u>	shrub	occasional
Giant fleabane	<u>Pluchea odorata</u>	shrub	rare
Beggar-tick	<u>Bidens pilosa</u>	herb	occasional
California grass	<u>Brachiaria dictyoneurum</u>	grass	occasional
Sandbur	<u>Cenchrus echinatus</u>	grass	occasional
Thunbergia	<u>Thunbergia fragrans</u>	vine	occasional
Oleander	<u>Nerium indicum</u>	shrub	occasional

APPENDIX D

FAUNA: SUMMARY OF ANIMALS PRESENT OR PROBABLY PRESENT  
(BIRDS)

ENDEMIC SPECIES

Common Name	Scientific Name	Relative Abundance	Observed	Probably Present
Short-eared owl (pueo)	<u>Asio flammeus</u> <u>Sandwichensis</u>	occasional		X

INDIGENOUS SPECIES

Common Name	Scientific Name	Relative Abundance	Observed	Probably Present
Black-crowned night heron (auku'u)	<u>Nycticorax nycticorax</u> <u>hoactli</u>	occasional	X	
Golden plover (kolea)	<u>Pluvialis dominica</u> <u>fulva</u>	occasional	X	

EXOTIC SPECIES

Common Name	Scientific Name	Relative Abundance	Observed	Probably Present
Spotted (chinese) dove	<u>Streptopelia chinensis</u>	Common	X	
Barred dove	<u>Geopelia striata</u>	abundant	X	
Common mynah	<u>Acridotheres t. tristis</u>	common	X	
Japanese white-eye	<u>Zosterops j. japonica</u>	abundant	X	
House finch (linnet)	<u>Carpodacus mexicanus</u> <u>frontalis</u>	common	X	
Mockingbird	<u>Mimus polyglottis</u>	common	X	
Cardinal	<u>Cardinalis cardinalis</u>	abundant	X	
House sparrow	<u>Passer domesticus</u>	common	X	
Rice-bird	<u>Lonchura punctulata</u>	common	X	



EXOTIC SPECIES Con't.

<u>Common Name</u>	<u>Scientific Name</u>	<u>Relative Abundance</u>	<u>Observed</u>	<u>Probably Present</u>
Barn owl	<u>Tyto alba</u>	rare		X
Ring-necked pheasant	<u>Phasianus colchicus</u>	occasional		X
Feral pigeon	<u>Columba livia</u>	common		X
Indian grey francolin	<u>Francolinus pondicerianus</u>	common	X	
Rio Grande turkey	<u>Meleagris gallapavo</u>	occasional		X
California quail	<u>Lophortyx californicus</u>	occasional		X

(MAMMALS)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Relative Abundance</u>	<u>Observed</u>	<u>Probably Present</u>
Small Indian mongoose (iolo-manakuke)	<u>Herpestes Auropunctatus</u>	common	X	
House mouse (iolo-li'ili'i)	<u>Mus Musculus</u>	common		X
Brown rat (iolo)	<u>Rattus rattus</u>	common		X
Polynesian rat (iolo)	<u>Rattus exulans</u>	rare		X
Feral cat (popoki)	<u>Felis catus</u>	common		X
Feral dog (ilio)	<u>Canis familiaris</u>	occasional		X
Axis deer (kia)	<u>Axis axis</u>	rare		X

(REPTILES)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Relative Abundance</u>	<u>Observed</u>	<u>Probably Present</u>
Mourning gecko (mo'o-ala)	<u>Lepidodactylus lugubris</u>	common		X
Fox gecko (mo'o-ala)	<u>Hemidactylus garnotti</u>	common		X
Snake-eyed skink (mo'o-ala)	<u>Ablepharus boutonii poecilopleurus</u>	common		X

(AMPHIBIANS)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Relative Abundance Observed</u>	<u>Probably Present</u>
Giant neotropical toad	<u>Bufo marinus</u>	occasional	X

## **references**

## REFERENCES

### GENERAL

- Atlas of Hawaii, Department of Geography, University of Hawaii, The University Press of Hawaii, Honolulu, Hawaii, 1973.
- Department of Education (DOE), Maui Complex Facilities Development Plan, 1975-1995, State of Hawaii.
- Department of Education (DOE), Baldwin Complex, Facilities Development Plan, 1975-1995, State of Hawaii.
- Department of Health (DOH), Statistical Report 1974, State of Hawaii, Honolulu, September, 1975.
- Department of Labor and Industrial Relations (DLIR), Selected Manpower Indicators, Maui County 1970, State of Hawaii, Honolulu, August, 1972.
- Department of Planning and Economic Development (DPED), 1975 Date Book, State of Hawaii, Honolulu, November, 1975.
- Department of Parks and Recreation, County of Maui, New Directions, Annual Report Fiscal Year 1974-1975, September, 1975.
- Department of Fire Control, County of Maui, Annual Report Fiscal Year 1974-1975, September, 1975.
- Draft Environmental Impact Statement Administrative Action for new Piilani Highway Project Nos. F-031-1 (4), F-031-1 (1), and F-037-1 (10), Route 31/37, Kihei to Makena Road, Kula Highway, Maui, Hawaii, Prepared by Highways Division, Department of Transportation, State of Hawaii.
- Eckbo, Dean, Austin and Williams, The Wailuku-Kahului General Plan, October, 1972.
- Flood Hazard Information Island of Maui, Report R39, Prepared by Department of the Army, Pacific Ocean Division, Corps of Engineers in cooperation with Department of Land and Natural Resources, Division of Water and Land Development, State of Hawaii, Honolulu, Hawaii, August 1971.
- Johnson, Larry, An Inventory of Potential and Actual Outdoor Recreation Resources on Maui Island, initiated and directed by the Division of State Parks, Department of Land and Natural Resources, State of Hawaii, September, 1973.
- Kobayashi, Noboru, Howard K. Nakamura, and Robert Ohata, Kihei Civic Development Plan, Prepared for the Maui County Planning Commission, February, 1970.

- Maui Economic Opportunity, Inc., and Office of Economic Opportunity, "A Socio-Economic Study" of Maui County, Prepared for Lokahi Pacific Incorporated, December, 1972.
- Maui Economic Opportunity, Inc., Summary Report, July 1974-June 1975, August, 1975.
- Neighbor Island Consultants, Seibu Makena Master Plan, Environmental Impact Statement, 1974.
- Saito, Norman Engineering Consultants Inc., CH2M Hill Inc., and Dr. Harold T. Stearns, Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs, March 1974.
- Soil Survey Interpretations Maui, Report R45, Prepared by Soil Conservation Service, United States Department of Agriculture in cooperation with Division of Water and Land Development, Department of Land and Natural Resources, State of Hawaii, Honolulu, Hawaii, January, 1972.
- Stearns, H. T. Geology of the Hawaiian Islands, Bulletin 8, Prepared in cooperation with the Geological Survey, United States Department of the Interior, Territory of Hawaii, January, 1946.
- Stearns, H. T., and G. A. McDonald, Geology and Ground Water Resources of the Island of Maui, Hawaii Division, Hydrography Bulletin 7, 1942.
- Takasaki, K. J., Preliminary Report on the Water Resources of Central Maui, Circular C62, Prepared by the United States Geological Survey in cooperation with Division of Water and Land Development, Department of Land and Natural Resources (DLNR), State of Hawaii, Honolulu, Hawaii, August, 1972.
- Towill, R. M. Corp., Sewerage Master Plan for the County of Maui, October 1971.
- Towill, R. M. Corp., Water Master Plan for the County of Maui, December 1971.
- Traffic Summary, Island of Maui, Island of Molokai, 1971, Publication HP 72-3, Department of Transportation (DOT), Highways Division, State of Hawaii, in cooperation with the U. S. Department of Transportation, Federal Highway Administration, October, 1972.
- Tri-Isle Research Conservation and Development Program, Program of Action, February, 1971.

United States Environmental Protection Agency, Wailuku-Kahului  
Wastewater Treatment and Disposal System, Final  
Environmental Impact Statement, F-EPA-24004-HI, June, 1974.

Water Desalting in Hawaii, Report R 50, Prepared for the State  
of Hawaii, Department of Land and Natural Resources  
Division of Water and Land Development and Office of  
Saline Water, U. S. Department of the Interior, by Nuclear  
& Systems Sciences Group, Holmes & Narver, Inc., June, 1974.

Water for Kihei-Makena, Island of Maui, Report R38, Pre-  
pared for Department of Water Supply, County of Maui, by  
Department of Land and Natural Resources, Division of  
Water and Land Development, State of Hawaii, Honolulu,  
Hawaii, October, 1970.

Westinghouse Electric Corporation, Environmental Impact  
Analyses for the Proposed Diesel-Combustion Turbine  
Generation Facility for Maui Electric Company, Pittsburgh,  
Pennsylvania, November, 1975.

## REFERENCES

### ECONOMIC

First Hawaiian Bank, Maui County in 1975 - Special report issued December, 1975.

\_\_\_\_\_, Economic Indicators - indexes listed in each recent issue.

Hawaii Visitors Bureau, Plant Inventory for October, 1975.

\_\_\_\_\_, Annual Reports, 1970-74.

\_\_\_\_\_, Monthly Reports, 1975-76.

Office of the Governor, State of Hawaii, Report of the Governor's Economic Advisory Task Force, August, 1975.

Saito, Norman, Engineering Consultants, Inc., CH2M Hill Inc., and Dr. Harold T. Stearns, Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs, March 1974.

State of Hawaii Department of Labor Research & Statistics Office, Labor Area Survey, November-December 1975.

State of Hawaii, Department of Planning & Economic Development, State of Hawaii Data Books, 1973, 1974, 1975.

\_\_\_\_\_, Interindustry Study of Hawaiian Economy, 1972.

\_\_\_\_\_, The Impact of Tourism on the Hawaiian Economy, An Input-Output Analysis, Research and Economic Analysis Division, December, 1975.

\_\_\_\_\_, Report of the Governors Tourism Advisory Committee, January, 1976.

State of Hawaii, Department of Taxation, General Excise and Use Tax Base and Tax Collections, 1974-75.

Tax Foundation of Hawaii, Government in Hawaii, 1975.

Towill, R. M., Corporation, Water Master Plan for the County of Maui, December, 1971.

U. S. Department of Commerce, Bureau of the Census, 1970 Census of Population and Housing for Honolulu SMSA.

\_\_\_\_\_, 1972 Census of Retail Trade - Hawaii.

\_\_\_\_\_, 1972 Census of Wholesale Trade - Hawaii.

\_\_\_\_\_, 1972 Census of Selected Service Industries - Hawaii.

## REFERENCES

### FLORA AND FAUNA

- Anonymous, The Elepaio, Journal of the Hawaiian Audubon Society, 1-35, Honolulu, Hawaii, 1945-1975.
- Anonymous, Hawaii's Endangered Waterbirds, U. S. Fish and Wildlife Service and Hawaii Divisions of Fish and Game, Honolulu, Hawaii, 1970.
- Austin, Smith and Associates, Inc., (Dr. Andrew J. Berger and Ronald L. Walker). An Inventory of the Flora and Fauna of the Kihei Area, Maui, Hawaii, Department of the Army, Pacific Ocean Division, Corps of Engineers, Honolulu, Hawaii, August, 1975.
- Berger, Andrew J., Hawaiian Birdlife, University of Hawaii Press, Honolulu, Hawaii, 1972.
- Bryan, E. H., Jr., Check List and Summary of Hawaiian Birds, Books About Hawaii, Honolulu, Hawaii, 1958.
- Haselwood, E. L. and G. G. Motter, Handbook of Hawaiian Weeds, Hawaiian Sugar Planters Association, Honolulu, Hawaii, 1966.
- Jones and Stokes Association, Hawaii Fish and Wildlife Plan, Vol. 1, State Division of Fish and Game, Honolulu, Hawaii, 1972.
- Kramer, Raymond J., Hawaiian Land Mammals, Charles E. Tuttle Company, Rutland, Vermont, 1971.
- Mederios, J. M. and R. L. Walker, Introduction of Exotic Game Birds, Project #W-5-R-20, State Division of Fish and Game, Mimeo, Honolulu, Hawaii, 1969.
- Munro, George C., Birds of Hawaii, Tongg Publishing Company, Honolulu, Hawaii, 1944.
- Neal, Marie C., In Gardens of Hawaii, Bernice P. Bishop Museum, Bishop Museum Press, Honolulu, Hawaii, 1965.
- Neighbor Island Consultants, (Dr. Andrew J. Berger and Ronald L. Walker). A Report on the Terrestrial Ecology of the (Seibu) Makena Area, Maui, Hawaii, Seibu Makena Master Plan EIS, Maui, Hawaii, November 1974.
- Oliver, J. A. and C. E. Shaw, The Amphibians and Reptiles of the Hawaiian Islands, Zoologica, 38:65-95, 1953.



- Peterson, Roger T., A Field Guide to Western Birds, Houghton Mifflin Company, Boston, 1961.
- Pope, Willis T., Manual of Wayside Plants, Charles E. Tuttle Company, Vermont, Tokyo, 1968.
- Porter, J. R., Hawaiian Names for Vascular Plants, University of Hawaii, Hawaii Agricultural Experiment Station, Honolulu, Hawaii, 1972.
- Ripperton, J. C. and E. Y. Hosaka, Vegetation Zones of Hawaii, Hawaii Experiment Station Bulletin, 1942.
- Tomich, P. Quentin, Mammals in Hawaii, Bernice P. Bishop Museum, Special Publication 57, Honolulu, Hawaii, 1969.
- Walker, R. L. Et. Al., Hawaiian Waterbirds Recovery Plan, (Preliminary Draft), Hawaiian Waterbirds Recovery Team, Unpublished, Uncirculated, Honolulu, Hawaii, 1975.

REFERENCES

SOCIAL

- Alexander, <sup>Henry</sup> Harry, Hawaii Hotel Association Investigation of Service-Tourist Related Employees and Their Housing Needs on the Island of Maui, May, 1971.
- \_\_\_\_\_, Wailea Development Corporation Investigation of Service-Tourist Related Employees and Their Housing Needs on the Island of Maui, April, 1971.
- Hawaii Urban Planning Information Center, Community Profiles for Hawaii, State of Hawaii Department of Planning and Economic Development, February, 1973.
- Kobayashi, Noboru, Howard K. Nakamura, and Robert Ohata, Kihei Civic Development Plan, Prepared for the Maui County Planning Commission, February, 1970.
- McClelland, C. P., and Michael Breitha, "A Socio-Economic Study" of Maui County, Prepared for Lokahi Pacific Incorporated, December, 1972.
- Neighbor Island Consultants, Seibu Makena Master Plan, Environmental Impact Statement, 1974.
- Sifton, W. Clifford, Maui Community Profile, April, 1970.