FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS)
CHAPTER 343, HAWAII REVISED STATUTES (HRS)
FOR
EAST MAUI WATER

DEVELOPMENT PLAN

PREPARED FOR THE
COUNTY OF MAUI
DEPARTMENT OF WATER SUPPLY
WAIIKUKU, MAUI, HAWAII

PREPARED BY
NORMAN SAITO ENGINEERING
CONSULTANTS, INC.

AND
PARAMETRIX, INC.
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CHAPTER I. INTRODUCTION AND SUMMARY

1.1 INTENDED USES OF THIS DOCUMENT

This environmental impact statement (EIS) has been prepared to examine the environmental acceptability of the East Maui Water Development Plan (EMPLAN). An environmental assessment/preparation notice was prepared and filed with The Office of Environmental Quality Control for publication in the Bulletin dated July 8, 1992. At the same time, a direct mailing was made to over 50 agencies, community groups, and private individuals requesting their comments, if any, on the proposed EMPLAN project. Their comments and the County’s responses are contained in Chapter XI.

The Draft EIS (DEIS) was prepared and filed with the Board of Water Supply, County of Maui as the accepting authority on October 23, 1992. Copies of the DEIS were also filed with OEQC and mailed to the list of consulted parties identified in Chapter X. Of the 65 copies of the DEIS mailed out to interested agencies and organizations, 17 responses were received. These comments and the responses are contained in Chapter XII.

This FEIS is intended to comply with Chapter 343, Hawaii Revised Statutes and the EIS regulations promulgated by Chapter 200 of Title 11, Department of Health. The purpose of this document is to provide information to public agencies and members of the affected communities about the nature of the subject action; to assess the environmental conditions of the properties involved in the proposed alignment; to evaluate the potential impacts of the proposed action on the affected communities and economic activities; and to consider alternatives to the proposed action.

1.2 DESCRIPTION OF THE PROPOSED ACTION

The EMPLAN proposes the design and construction of water transmission lines, storage reservoirs, and the development of source wells for a total pumping capacity of approximately 16 million gallons per day (MGD). This Plan is designed to meet the potable water needs of the Central Maui Water District for the next twenty years. As the system is developed, there will be periodic review and evaluation of both the water demand and the Community Plan ordinances that mandate the availability of potable water for future urban growth.

1.3 RATIONALE FOR ACTION

The Department of Water Supply (DWS) is responsible for the development, operation and maintenance of the Maui County Drinking
Water System. The Maui County Water Use and Development Plan is the DWS' long range planning document. The County's long range planning is stated in the County's General Plan and is used as a basis for formulating the nine Community Plans. The General Plan Objectives and Policies are more specifically reflected and expanded in the various Community Plans. Both the General Plan and the Community Plans were adopted in the early to middle 1980s and the General Plan was revised in September, 1991. The Community Plans are required to be updated at least every ten years to incorporate changes to population, economic conditions, and subsequent shifts in land uses. The updating of the Community Plans is now being done to assure that regional goals and objectives are being applied to current planning issues. The Community Plan areas of Wailuku-Kahului, Kihei-Makena, and Pala-Haiku have been determined to be areas that will experience planned growth in the next twenty years. This growth will result in increased demand for utilities, i.e. Water, Waste water treatment and disposal, Police and Fire protection services, and Solid Waste management.

In the ten years that have passed since the adoption of the Community Plans, definite changes in the County's economic base have resulted in corresponding changes in the direction that the County's resources have also taken. In water consumption, agriculture continues to be largest water user on Maui. Sugar and Pineapple are still the dominant agricultural economic factors, although diversification in agriculture is growing. Today, Maui County's economy has seen the emergence of the visitor industry as a mainstay and economically viable alternative to agriculture in terms of land use and as an employer.

The 1980 Community Plans were designed to address land use policy issues in broad guidelines that identified available undeveloped land in summary form, the Community Plan designations for these available lands, and the subsequent County services that are required to fully utilize these lands. In updating the Community Plans, it is necessary to address the demand for County services based on the need identified in the expanded growth areas, areas that were previously undeveloped. The final conclusion is that all segments of the County need water to grow as planned. Physical limitations of existing water sources have made it necessary to explore the development of water in areas of the County where water is underutilized. This strategy is essential if the DWS is to expeditiously address the stated goals of the Community Plans.

1.4 SUMMARY OF PROBABLE IMPACTS

Land Use The portions of the proposed project alignment will be irrevocably committed to public facility uses.

Flora and Fauna No endangered flora or fauna species are anticipated in the proposed alignment. Certain avifauna species may be disrupted
during the construction phase in the uninhabited gulch areas, but these disruptions are not of a permanent duration.

**Historic/Archaeological Resources** The technical study conducted for this project did not indicate the presence of any significant historic or archaeological sites in the proposed alignment. A project monitoring plan will be designed for use by the general contractor so that if sites are discovered in the construction phase, appropriate action can be taken.

**Agricultural Potential** There will be no major or significant economic impacts to the agricultural zoned lands along the proposed alignment. The DWS has done preliminary planning in conjunction with the affected landowners to minimize physical as well as economic impacts to sugar/pineapple operations.

**Noise** - Ambient noise levels will be exceeded during the construction phase. After completion of the alignment, the noise levels will not be significant as water will be confined in the pipeline and will be quiet. Well pump noise may be a factor, but due to their relative isolation, it will not be a significant contribution.

**Transportation Facilities** - Traffic will be temporarily impacted during the construction phase, particularly if installation of the alignment takes place in existing State/County roads rights-of-way. All contractors will be responsible for traffic control management during construction.

**Air Quality** - Ambient air quality standards may be exceeded during the construction phase, particularly with fugitive dust from trenching and materials hauling. Contractors will be responsible for dust abatement measures if considered necessary by the State Department of Health.

### 1.5 SUMMARY OF MITIGATING MEASURES

Construction related impacts such as soil erosion, fugitive dust and noise level violations due to construction equipment will be minimized by recognized construction techniques such as dust control sprinkling of the project alignment, noise abatement equipment on construction vehicles and machinery, and construction phasing.

### 1.6 SUMMARY OF UNRESOLVED ISSUES

The existing Community Plans for the areas affected by the proposed alignment are in various stages of review and updating. Due to the time required to complete this project, both the Community Plans and the physical ability of the well source sites to produce the planned water will be continually reviewed. The number of wells to be developed is
dependent on the aquifer conditions, and the ability of the aquifer to provide the required yield for transport to the Central Maui Water System. Planning guidelines may also be subject to evaluation and change due to new guidelines developed in the periodic land use policy plan review. These in turn could affect the demand and consequently, the planned development of the EMPLAN.

1.7 RELATIONSHIP TO LAND USE PLANS AND POLICIES

Chapter III contains a detailed discussion of the relationship between government plans and policies and the proposed project. The East Maui Water Plan is consistent with the current Maui County General Plan, and with affected Community Plan objectives and policies.

1.8 ALTERNATIVES CONSIDERED

The alternatives considered for this proposed project were various alignment scenarios which were reviewed by the DWS and alternative development of other sources of water i.e. desalination, surface water, and the Waihee Aquifer. These alternatives are discussed in greater detail in Chapter VII. The weighted values obtained from an economic analysis were the principal decision making tools employed in the selection process. The "No Action" alternative was not considered since the Community Plans had established the current need and long term future need for water in Wailuku-Kahului, Paia-Haiku, and Kihei-Makena.

1.9 LIST OF NECESSARY PERMITS AND APPROVALS

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CHAPTER II. PROJECT DESCRIPTION

This Chapter presents descriptive information on the proposed EMPLAN project. The project site is first located and then briefly described. A brief background summary of the purpose is presented, followed by an overview of the main features of the proposed development. A discussion of the EMPLAN objectives and the development schedule is then provided. Finally, the project's phasing schedule is provided. Data is from the East Maui Water Development Plan.

2.1 Location

The EMPLAN will involve the design and construction of approximately 86,000 lineal feet of transmission line and approximately 24,000 lineal feet of connecting pipes from East Maui sources to the Central Maui Water System. This project will begin from the Haiku and Paia well field sites to the Central Maui Water System near the Kuialani Highway. (See FIGURE 1) In addition to the lengths of transmission and connection pipelines, there will be well sources developed, and storage reservoirs designed and built.

2.2 Project Master Plan

The EMPLAN is a project that is on an accelerated schedule for implementation due to the precarious nature of the Iao aquifer's ability to provide an adequate and continuous supply of potable water for Central Maui customers. The EMPLAN involves the construction of a system that would normally be expected to be in place by the year 2012.

This plan involves the building of a 36" transmission main from the East Maui sources to a point of connection to the existing 36" Central Maui Water Transmission Main. Between Hamakuapoko and the Central Maui Water Transmission Main, three connections to the Central Maui System will be made. These connections will be at Puunene, Haleakala Highway, and Paia.

Five pairs of exploratory wells are planned in the Hamakuapoko-Haiku area. The wells are anticipated to produce a pumping capacity of 16 MGD and an average yield of approximately 10 MGD. Water from the wells, will pass through 100,000 gallon (minimum) storage/chlorine contact tanks. The tanks have been sized to service the lower elevation Haiku area, thus expanding the area served by the Central Maui Water System. (See FIGURE 3)

2.2.1 Project Master Plan Objectives

The DWS is focusing on a development plan to meet the future water requirements in the Central Maui area. The Central Maui Water Service area is generally considered as the isthmus which connects the East and West Maui Mountains from Waiehu to the North, Makena to the South, Paia-Kuau to the East, and Wailuku to the West. The Central Maui Water Service Area includes the entire Maui Community Plans of Wailuku-Kahului, Kihei-Makena, and the
Pala-Kuau portion of the Paia-Haiku Community Plan. The Central Maui Water System will be expanded to include portions of the Haiku area capable of being supplied from these sources.

2.2.2 Project Master Plan Land Use

The EMPLAN sources of ground water development are primarily in the areas east of the Central Maui Water Service Area. Existing and new exploratory wells in the Paia-Haiku area have provided preliminary evidence of potable quality water that can be developed in adequate quantities. The source development area is primarily in agricultural lands, and/or undeveloped vacant lands. The terrain features are varied, with the emphasis being placed on road rights of way for the transmission lines, with well sources being at elevations that provide both the gravity transmission capability as well as minimum drilling.

2.3 Project Phasing Schedule

The Plan is to develop sources nearest the Central Maui Service Area (Hamakuapoko) and head east. Phasing of the transmission pipelines is planned to proceed in a westerly direction ending with a connection to the existing central Maui Water Transmission Main. At the end of each pipeline phase, an inter-connection to the Central Maui Water System is proposed. The recommended Kaheka Route is depicted on FIGURE 1, with the phasing plan provided on the foldout. The phased development of 16 MGD of water is anticipated to occur over a 15 year period and not at one time.

The Maui County Planning Department (MCPD) is conducting a 20 year infrastructure assessment including water demand projections. The following graph (Figure 2) is the total consumption taken from the water system assessment section of the MCPD report for Wailuku-Kahului and Kihei-Makena (Paia-Haiku not included) under constrained and unconstrained conditions. The graph reflects a 20 year range between 25 to 29 MGD. The EMPLAN Schedule (shown below) is based on the unconstrained growth condition; it is therefore a conservative plan. The EMPLAN however is flexible; if the growth deviated from the unconstrained growth, the schedule can be changed to respond to the needs as they arise.

2.3.1 Phase 1

This initial phase will provide for well development in the Paia Aquifer and a transmission system to the Central Maui Water System. Two wells are proposed at Hamakuapoko, and if successful, these exploratory wells will be converted to production wells. (SEE FIGURE 5) Anticipated capacity for each well is 1.0 MGD. The production wells will be connected from the well sources to Paia where modifications to the existing water system between Paia and Kahului are proposed to permit full flow of the anticipated 2.0 MGD to Kahului. This Phase 1 is projected to be completed by June, 1993 and is estimated to cost $10.275 million in 1992 construction dollars.
2.3.2 Phase 2

This second phase is the most intricate and expensive of the phases since it involves a long length of pipeline from Kailua Gulch to Haleakala Highway as well as crossing Maliko Gulch. The high cost and extensive engineering are due to the required crossing of Maliko Gulch. The proposed method for crossing the Gulch consists of placing the waterline on the slopes of the Gulch above ground, supported on concrete pedestals. The waterline across the floor of Maliko Gulch may be supported by trestles or buried encased in concrete. Maintenance is a vital criterion in the decision making process. Prior to selection of a final alignment, an archeological survey is being conducted to determine if there are any significant archeological sites on the alignment. Phase 2 is anticipated to provide an additional 3.0 MGD source capacity for a combined total of 5.0 MGD source capacity from East Maui. An estimated 0.3 MGD from the Haiku Well will be used to service a portion of the Haiku area. The transmission capacity would be 5.0 MGD. Estimated costs for this Phase 2 would be $16,562 million. Estimated construction completion time is June, 1994.

2.3.3 Phase 3

The third phase involves the development of two more wells in the Haiku Aquifer along with associated site and connection work. Transmission system work in this phase will involve the installation of a 36" pipeline along Hansen Road completing the connection from Haiku to Puunene/Kahului. At Puunene, a connector into Kahului completes the work of this phase. Completion of this third phase will allow for 9.6 MGD of water to enter the Central Maui Service Area (Kahului-Paia). The two additional wells will increase the source capacity in the East Maui area to 8.0 MGD. Estimated cost for this phase is $10,030 million and is planned for completion by December, 1996.

2.3.4 Phase 4

The fourth phase adds two more wells in the Haiku Aquifer with associated site and connection work. This phase will take place in the Kuiaha area. The two additional wells will bring the total pumping capacity in the East Maui area to 12.0 MGD and the transmission capacity to 11.2 MGD. Estimated cost for the fourth phase is $4,154 million and completion time is scheduled for June, 1999.

2.3.5 Phase 5

Phase 5 involves the connection between Puunene and the Central Maui Transmission Main with a 36" pipeline. This will complete the East Maui Transmission Line. This phase will not add source capacity to the system, but will increase the water delivery capability to 25 MGD. Estimated cost for the fifth phase is $3,947 million and is estimated for completion by January, 2001.
2.3.6 Phase 6

Phase 6 involves the development of two more wells in the Haiku Aquifer. However, one of these wells is not considered in the source capacity since this phase contains the largest pump in the East Maui source. Also projected for Phase 6 is a 100,000 gallon chlorine contact/control tank and 1000 linear feet of 36" transmission main in Haiku Road. This sixth phase will result in an East Maui total pumping capacity of 16.0 MGD and a source capacity of 14.0 MGD*. The East Maui Transmission capacity would be 25 MGD. Estimated cost for this sixth phase is $3.535 million and completion time is estimated for June, 2004.

* Less largest pump in the East Maui System.

2.3.7 Summary of Costs

The East Maui Development Plan will cost an estimated total of $48.5 million dollars by the year 2004. It should be noted also that two additional wells will be needed to meet the 18.6 MGD projected demand. These wells and the total Plan can be evaluated on a timely review basis by the Department and also the County Administration as aquifer capacity and water demand rates are completed and put into service. Planning decisions will need to be made based on the aquifer's physical ability to provide adequate yield, development of alternative water sources, water conservation education programs, and the rate of growth Maui County plans to reach by the year 2012.
FIGURE 1

KAHULUI BAY

PROPOSED 36" EAST MAUI TRANSMISSION WATERLINE

EXISTING WATER SOURCES

CENTRAL MAUI WATER SYSTEM SERVICE AREAS

EXISTING 36" CENTRAL MAUI TRANSMISSION WATERLINE

MAALAEA BAY

PROJECT SITE PLAN

PROPOSED EAST MAUI TRANSMISSION WATERLINE
WATER DEMAND PROJECTIONS, BY LAND USE
1990 TO 2010

DEMAND (MG/D)

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30


☐ CONSTRAINED YEAR + UNCONSTRAINED

FIGURE 2
Haiku area
East Maui

FIGURE 4

INTERPRETIVE HYDROGEOLOGIC SECTION

Elevation in feet

Distance inland, in miles

— Freshwater interface — Dike — Tunnel

Resource Associates 2004
SITE PLAN
WELL PUMP NO. 2

NOT TO SCALE

FIGURE 5
EAST MAUI WATER DEVELOPMENT PLAN
GEOLOGIC SECTION
Hamakua poko Well #2 (5320-01)
FIGURE 6

WELL NO. 2
TOP OF CASING
EL. +181.46

KULA FORMATION
Deeply to partly
weathered podzolic
basalt and basaltic
tuff, yellowish-brown,
clayey, plastic, sandstone,
carrying patches
of secondarily
Alunite

EL.
100

700

400

0 MEAN SEA LEVEL
WATER LEVEL EL. -4.85'
BASAL AQUIFER

LEGEND:

CLAY AND DECOMPOSED ROCK
DECOMPOSED ROCK
CLAY
BLUE ROCK
CHINDER
Pahoehoe
CLAY AND PANOHEOHE

MAUI COUNTY BUILDING
(Shown for size relationship)

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CHAPTER III

RELATIONSHIP OF THE PROPOSED PROJECT TO EXISTING PUBLIC PLANS, POLICIES AND CONTROLS

This Chapter presents a discussion on relevant State and County Plans, policies and controls which affect the proposed project. No Federal controls were found to be relevant to the proposed action. Objectives and policies of the Hawaii State Plan are discussed first, followed by discussion of relevant State Functional Plans. This is then followed by a review of applicable provisions of the State Land Use Law. The relevant sections of the Maui County General Plan which applies to the pertinent Community Development Plans (Paia-Haiku, Kihei-Makena, and Wailuku-Kahului) are then discussed. Finally, the applicability of the Coastal Zone Management Act and Chapter 343, HRS are examined.

3.1 HAWAII STATE PLAN

The Hawaii State Plan serves as a guide for the future long term development of the State. It includes goals, objectives, policies, and priorities for the State, a basis for determining priorities, and allocating limited resources, and a process of coordination of State and County Plans. In addition to the State Plan, twelve functional plans (Sec.3.2) have been developed which set forth the policies, statewide guidelines, and priorities within specific fields of activities. In this section (Sec. 3.1) State Plan objectives and policies relevant to the proposed project are presented and discussed. Policies that are also included in the functional plans are discussed under the appropriate headings.

State Plan item: (226-5) Objectives and Policies for Population

(b) (3) “Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.”

Comment: The incremental expansion of the East Maui Water Development Plan is necessary to accommodate population growth as mandated by the Maui County Community Plans for the Paia-Haiku, Kihei-Makena, and Wailuku-Kahului Community Plan areas. The costs for the installation of these facilities and subsequent services to support increased population associated with the planned community growth will be included in capital improvement budgets prepared by the Board of Water Supply. All capital improvement projects will be designed and built to applicable Maui County standards.
State Plan item: (226-6) Objectives and Policies for the Economy in General

(b) (6) "Strive to achieve a sustained level of construction activity responsive to and consistent with, State growth objectives."

Comment: The County Administration has strived to maintain a balanced and sustained level of construction activity to the best degree practicable. This is especially the case in terms of infrastructure and utilities. Water Demand based on urban growth patterns has exceeded the ability of the County to meet certain goals and objectives, but a concerted effort to provide the basic utilities and services has been successful. Present and future construction planning is intended to insure that the local economy will not decline from lack of projects.

State Plan item: (226-13) Objectives and policies for the Physical Environment (Land, Air and Water Quality)

(b) (7) "Encourage urban development in close proximity to existing services and facilities."

Comment: The three specific Area Community Plans have been complied with; the proposed project will provide water required to sustain urban development.

State Plan item: (226-24) Objectives and Policies for Facility Systems in General

(b) (1) "Accommodate the needs of Hawaii’s people through improvement priorities established through the planning process."

Comment: Directed growth for the three affected Community Plan areas has been the subject of the planning process by the Administration and also the County Council. Full discussion has been provided by the Executive and Legislative branches to insure that the planning process has not been compromised. The resulting County ordinances clearly state the direction and type of growth that is planned for the next ten years, and this project will support that planned growth policy.


(a) (4) "Seek to provide for adequate housing to meet the needs of Hawaii’s people without encouraging an additional influx of people."
Comment: This project will not be the causal factor in future growth patterns. The project is complying with the needs and requirements of previously completed planning for urban development. Similar compliance can be expected of waste water management, solid waste management, fire and police protection, and other County services.

State Plan item: (226-104) Population Growth and Distribution Guidelines

(c) (2) "Encourage urban growth primarily to existing urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures."

Comment: The proposed project is subject to the physical availability of water source development in the subject development areas. Community Plans have been previously completed and these plans did not specifically address the physical availability of adequate water source/supply. Through exploration of other aquifer sources, an adequate supply to meet the future demands of these three Community Plan areas has been found in the Haiku-Paia area. The DWS determined in their EMPLAN that development of this source and transferring the underutilized supply to the three Community Plan areas would comply with the land use policies of the three Plans.

3.2 STATE FUNCTIONAL PLANS

Twelve Functional Plans have been established to help implement the Hawaii State Plan in coordination with the County General Plan and Community Development Plans. The Functional Plans work as the primary guide posts for implementation of the Hawaii State Plan. The Functional Plans pertinent to this project are: Housing Plan; Agricultural Plan; and Water Resources Plan. Sometimes, competing policy interests are found among the Functional Plans. For example, areas designated for agricultural use may also be considered as prime housing development areas.

3.2.1 State Housing Plan
State Housing Plan Item:

Objective A: "Develop greater opportunities for Hawaii’s people to secure reasonably priced, safe, sanitary, livable homes located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals."

Comment: The County has endeavored to work with the State as well as private sector residential developers to fulfill this vital component of the State Housing Plan. The Community Plans for the Wailuku-Kahului, Paia-Haiku, and Kihel-Makena areas provide as a planning guide the
projected population density of 38,900 over the next twenty years. Various
Project planning and land use approvals are under County review, with
initial construction planned for 1993.

3.2.2 State Agricultural Plan
State Agricultural Plan item:

Objective B: "Achievement of productive agricultural use of lands most
suitable and needed for agriculture."

Policy (B) (4) Encourage productive use of the most suitable agricultural
lands.

Policy (B) (5) Provide greater protection to agricultural lands in
accordance with the Hawaii State Constitution.

Comment: The proposed project alignment will not jeopardize or
detract from the Agricultural land uses presently in practice. Alignments
will generally be along existing State and County road rights-of-way, and
in certain instances, be along private agriculture service roads. Once
completed, the existing agricultural use can continue over the pipeline.

3.2.3 State Water Resource Plan
State Water Resource Plan item:

Objective A. Assure adequate municipal water supplies for
planned urban growth.

Objective E. Assure availability of adequate water for agriculture.

Comment: In 1990, under the provisions of Chapter 174C HRS, the State
Water Resources Development Plan was abandoned in favor of the State
Water Code. The Maui County Water Use and Development Plan is now
being updated as part of the continuing water use planning process. The
Community Plans for the County of Maui served as the basis for
projections of future needs. These Plans are currently being revised and
updated. The Water Use and Development Plan can serve as a guide for
the evaluation of potential impact of future growth on Maui, and
collectively, both the Community Plans and the Water Use and
Development Plan will provide guidelines for future planning.

3.3 STATE LAND USE LAW

Under the provisions of the State Land Use Commission Rules, a
boundary amendment application is necessary for uses that are non-
conforming to the land use designation. Under the provisions of Chapter 205, section 4.5 (7), the requirement is waived.

3.4 MAUI COUNTY GENERAL PLAN

The proposed project will implement the objectives and policies of the Maui County General Plan in the following area: Objective IV-Transportation, Objective B, Water: "To provide an adequate supply of potable and irrigation water to meet the needs of Maui County's residents."

This section will cite the applicable General Plan objective or policy, and then discuss it's applicability to the proposed project.

General Plan Item: Policies:

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

Comment: The Iao Aquifer has been determined to be very near the upper limits in terms of sustainable yield, and consequently, the exploration of new source wells in the Hamakuapoko area has indicated that potable sources are available to fulfill the mandate of the Community Plans for Kahului-Wailuku, Kihei-Makena, and Paia-Haiku.

General Plan Item: Policies

c. "Develop improved systems to provide better fire protection."

Comment: Providing water from East MAUI to the Kahului-Wailuku, Paia-Haiku, and Kihei-Makena Community Plan areas will support fire fighting capabilities by having an adequate source of water.

General Plan item: Policies

d. "Monitor growth activities throughout Maui County in order that development of new water sources is concurrent with approval of new developments."

Comment: As new proposed development is being reviewed at the land use policy amendment stages, (State Land Use Commission, County General Plan, and Zoning), new water development can and should maintain contact with the development review process so that development in planned areas does not exceed water supply.

General Plan Item: Policies

e. "Support the Board of Water Supply in its determination of future water needs consistent with the General Plan, Community Plans and the growth management strategy."

Comment: The Board's plans for water source development are subject to agency review at both the State level, (Dept. of Land and Natural Resources), and County level, Planning Dept., and Public Works Dept.
Also, as funding is more clearly identified, the needs for CIP future planning is also emphasized for future budget purposes.

General Plan Item: Policies

g. "Seek new sources of water by exploration in conjunction with other government agencies."
Comment: The Department is seeking cooperative efforts with the State DLNR, Division of Water Resource Management, as well as other agencies at the State and Federal levels.

General Plan Item: Policies

h. "Maintain the right to manage the County’s water sources and transmission systems at the County level."
Comment: The basic principle of home rule is of paramount importance.

General Plan Item: OBJECTIVE: 2. "To make more efficient use of our ground, surface, and recycled water sources."

i. "Develop a method of allocation of water based on community need."
Comment: This policy is essentially the same policy that has been reviewed and accepted in the Community Plans for future growth, density, and scheduling. The EMPLAN addresses allocation based on community needs.

3.5 COASTAL ZONE MANAGEMENT ACT (CHAPTER 205-A, HRS)

The East Maui Water Development Plan is not located within the special management area or coastal zone management areas and therefore a permit application submittal is not required.

3.6 ENVIRONMENTAL IMPACT STATEMENTS (CHAPTER 343, HRS)

All projects involving State or County lands or money are required to prepare an Environmental Impact Statement under the provisions of Chapter 343, HRS as administered by The Office of Environmental Quality Control. The Department of Water Supply determined that this project due to its' long range schedule, would require an EIS.
CHAPTER IV

IMPACTS ON THE PHYSICAL ENVIRONMENT

This chapter describes elements of the physical environment in which the proposed EMPLAN will be situated. After a brief description, each element is discussed in terms of probable impact (where appropriate) both to and from the proposed development. In certain cases, impacts are distinguished as: 1) Short-term impacts, confined primarily to the construction period; 2) Long-term impacts, that occur while the development is operational or represent irreversible impacts; or 3) Cumulative impacts, resulting from the combined effects of developing the EMPLAN. Measures to mitigate probable adverse impacts are proposed where appropriate.

4.1 CLIMATE

Average annual rainfall varies from 20 inches to 90 inches per year along the proposed Kaheka Route alignment. The lower elevations near Kahului-Wailuku average between 20-40 inches annually; the Pāia-Hamakuapoko area averages 25 to 40 inches annually; and the Makawao area averages between 60-90 inches annually. U.S. Dept. of Agriculture, Soil Conservation Service, "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, Aug.1972. Approximately two thirds of the rainfall occurs between November and March of a typical year. Northeast tradewinds occur more than 8 months out of the year, but are the most consistent between April and October. Average daily wind speeds range from 10-20 miles per hour. Kona winds from the south and south-east, are experienced about three months each year, mostly during the winter months. As elevations increase, temperature levels and solar radiation decrease.

4.2 SURROUNDING / ADJACENT LAND USES

Existing land uses on the recommended Kaheka Route alignment are primarily agricultural, with Sugar and Pineapple the dominant crops along the route. The land uses at the higher elevations of the alignment are smaller individual farm operations that consist of dairy, truck farms, flower/ornamental landscaping materials, and other rural agricultural activities. Sugar consists of 49% of the adjacent land uses, with Pineapple second at 23%. In describing the alignment by phase, it is noted that each phase description identifies location of the phased section by physical landmark, or road right-of-way. The Plan is designed to develop sources nearest the Central Maui Service Area (Hamakuapoko) and develop eastward. Phasing of the transmission pipelines is planned to proceed in a westerly direction ending with a connection to the existing Central Maui
Water Transmission Main. At the end of each pipeline phase, an interconnection to the Central Maui Water System is proposed. The following phase sequences describe the proposed schedule for design, construction, and connection. Figure 1 shows a plan view of the EMPLAN.

4.2.1 Phase 1: From the Hamakuapoko Wells, the route will go to Baldwin Avenue, then from Baldwin Avenue to Sunnyside Road, a 16" pipeline connection running from Sunnyside Road along Kailua Gulch and Hana Highway, connecting to an existing 12" waterline near the Maui Country Club.

4.2.2 Phase 2: From Sunnyside Road to Haleakala Highway with a connecting pipeline continuing to the Kahului Airport area. This phase also involves the development of two additional wells in the Haiku area, and extending the transmission main route across Maliko Gulch.

4.2.3 Phase 3: Will construct two more wells in the Haiku area and connect these wells to the Phase 2 wells. The transmission main would be extended from the Haleakala Highway running along Hana Highway and Hansen Road to Kahului Town.

4.2.4 Phases 4, 5, 6: The balance of the phases, (4, 5, 6) involve adding four more wells and extending the pipeline to these wells and making the pipeline connection to the Central Maui Transmission Line.

Intermediate connections to the Central Maui Water System between Hamakuapoko and the Central Maui Water Transmission Pipeline are planned at Paia, Haleakala Highway, and Puunene. These intermediate connections allow for phased construction of the transmission pipeline. In order to hydraulically connect the proposed East Maui Transmission Line directly to the existing Central Maui Transmission Line, a 4.0 million gallon (MG) pressure break/supply tank (Baldwin 560 Reservoir) is proposed near the intersection of Holomua Road and Baldwin Avenue. The reservoir will act as a pressure break, storage, and flow-through reservoir. As such, it will not be subject to possible stagnation, loss of chlorine residual and undesirable bacterial growth. Figure 3 is a conceptual reservoir site plan.

During this Plan review period, the locations shown on the various graphic figures are not site specific, but are shown in general locations without detail. The exact route should be determined during the design phase of the Project.
4.3 EXISTING IMPROVEMENTS

4.3.1 Existing Condition

With the exception of the two wells already drilled, site conditions along the alignment route are unchanged. All existing uses still prevail and have not been altered pending the completion of this environmental disclosure document and approval of the EMPLAN by the Board of Water Supply.

4.3.2 Probable Impacts

The EMPLAN project alignment will be developed in close coordination with the Department of Public Works, State Department of Transportation, Highways Division, and affected landowners. There will be short term construction related impacts to the ambient air and noise standards due to excavation, use of heavy equipment machinery for well drilling and the trenching and placement of the transmission pipeline. Traffic will be impacted by the proposed alignment work, particularly along the highways and roads that are heavily traveled during the work day. The Contractor will have to provide the County a traffic management plan to accommodate the anticipated traffic tie-ups that may occur due to this work. For the portion of the work in the agricultural fields, the coordination with the sugar and pineapple operations will need to be closely monitored so as not to unduly interfere with harvesting or field maintenance operations.

The proposed crossing at Maliko Gulch will be the most challenging from a construction perspective and also from an adverse impact potential. At present, the construction of the crossing is planned as follows: The pipeline along the slopes of the gulch is expected to be constructed on the surface. The pipe will be strapped to a concrete pad on the sides of the gulch. The concrete will be firmly established into the side walls with anchors drilled into the hard basalt. Preliminary site investigation of the gulch reveals a hard layer essentially vertical from approximately 150 to 200 feet below the top. Above that hard layer extensive geological investigation will be necessary to design proper support. Archaeological studies conducted at the point of crossing have provided data on the alignment location and if necessary, the pipeline alignment can be adjusted to accommodate any significant archeological sites or finds. (See Exhibit A.)

Finally, there will also be impacts to the various utilities that share existing road rights-of-way, i.e. electrical, sewer, telephone, water, and drainage. Construction standards for the placement of the water transmission lines have been established by the Department as Water System Standards Vol.1 & 2 (reference 5 in EMPLAN.)

1. Minimum cover for water mains 8-inch and larger is 3.0 feet.
2. Type and classes of Water Mains:
   Ductile Iron, Class 52
   Concrete cylinder Pipe, Class 150 or Class 250
3. Wherever the main crosses under a stream bed or structure constituting a potential hazard to the main or where the main is considered inaccessible, the main shall be jacketed. Necessary measures shall be taken to protect the stream embankment from erosion at the points of crossing.
4. Main valves shall be installed with the water transmission main so that the maximum distance between valves shall not exceed 2000 feet for mains 16-inch and larger. Main valves on water distribution mains shall be spaced not more than 750 feet in residential agriculture and agricultural areas and 500 feet for all other areas.
5. Butterfly or bevel geared valves shall be used on water mains 16-inch and larger. Gate valves shall be used on water mains 12-inches and smaller.
6. Manholes shall be constructed for butterfly valves.

4.3.3 Mitigating Measures

The Department can mitigate adverse impacts due to traffic congestion by scheduling construction to take place along high traffic volume corridors after peak AM and PM travel times. Also, as a standard condition, the Contractor will be responsible for providing traffic control personnel to keep the traffic flow smooth and even.

Construction taking place in agricultural areas, i.e. sugar and pineapple fields, will need to coordinate work schedules with the agricultural operators so as not to unduly interfere with the field operations. This will be done by scheduling the construction operations during time periods when the agricultural field operations are not on full schedule and/or work at the other phases of the total alignment which do not interfere with agricultural field activities.

Construction activity in Maliko Gulch will need to monitored closely with emphasis on the cultural and historical impacts that may prevail on the crossing alignment. As stated previously, an adjustment of the crossing alignment can be made to avoid impacting a significant historical or archaeological find.

For the proposed reservoir sites, the State Historic Sites Preservation Division, Department of Land and Natural Resources has recommended that all sites be investigated for historic and cultural sites, prior to construction. This can be accommodated at the pre-design stage when various locations will be reviewed for final selection.
4.4 Physical Hazards

The Maliko Gulch crossing presents the most significant physically demanding and challenging hazard in terms of construction. The crossing is expected to be located within 500 yards mauka of the Lowrie Ditch siphon. In this area, the gulch lower rim varies from 580 feet mean sea level (MSL) to 650 feet MSL; the bottom varies from 280 feet MSL to 350 feet MSL. Trenching down the slopes was not considered feasible due to the difficulty of the terrain and the tremendous loss of agricultural lands that would be needed to provide workable slopes. The final crossing location will be determined and selection made based on the archaeological studies, foundation investigation and engineering principles. For the balance of the EMPLAN alignment, the use of rights-of-way on existing roads (State, County, and private agricultural service roads) provides a stable terrain that will permit installation and also the efficient maintenance of the alignment after installation is completed. Other gulches, well sites, and reservoir locations will be designed to meet the physical terrain features of their respective sites with a minimum of adverse impacts to the sites.

4.5 Topography

4.5.1 Existing Conditions

The EMPLAN alignment topography is in relatively moderate terrain for the major part of the alignment. The adverse terrain features are in areas where site specific or physical requirements are a consideration. These would include the following criteria: the ability to withdraw water from an aquifer; cross a major terrain feature such as a gulch; and site a reservoir adjacent to a well field. Topographical surveys for the alignment have not been conducted at this stage of the EMPLAN. It is anticipated that this construction detail will be performed during the final design drawings prior to building permit review and approval.

4.5.2 Probable Impacts

Alteration to the terrain features for the EMPLAN alignment will be for the most part of minor significance. This is due to the fact that the major part of the proposed alignment is to be placed along existing roadways and agricultural service roads. Also, where the alignment will cross over agricultural fields, the terrain is level to moderately sloping. Typical trenching for pipeline installation will be to a depth of 6-8 feet which would permit the placement and covering of the 36" pipe with cover material approximately 3-5 feet. In the agricultural fields where active cultivation will be continuing, the depth of cover material would be 5-6 feet.
The major terrain factor will be at the major gulch crossing (Maliko Gulch) and where the storage reservoirs will be sited in proximity to the well fields. At these critical points of terrain alteration, there will be noticeable change to the terrain features due to the construction methodology to be employed for the installation of the pipeline. Soil investigations to determine design conditions will be necessary at the Maliko Gulch crossing site. Preliminary investigation of the gulch in this area reveals a hard layer essentially vertical from approximately 150 to 200 feet below the top. Anchoring below that layer will generally be done on the detritus slope. Above that hard layer extensive geological investigation will be necessary to design proper support.

4.6 Soils and Agricultural Potential

4.6.1 Existing Conditions
The soils in the EMPLAN alignment consist primarily of material from weathered igneous rock. The major portion of the alignment lies between 80 and 700 feet above sea level and contains a variety of soils in the following series. Haliimaile Series; Molokai Series; Paia Series; Haiku Series; Pulehu Series; Puuone Sand; Rough Broken Land; ; and Waiakea Series. As stated in earlier chapters of this document, the primary alignment design concept calls for the major portion of the alignment to be placed on the roadways and/or agricultural service road rights-of-way. In this sense, the alteration to existing terrain features of roadways and the impacts to soil types is not considered a major or significant impact consideration. The Department has established construction - building standards for pipeline placement, storage reservoir and pump station site improvements, and other facility improvements. Soil studies will in all probability not be a requirement for the pipeline placement work on existing State and County roadways; in the agricultural field areas, the service roads will also be examined in terms of use patterns and soil types. The soil will be examined at the Maliko Guich Crossing, the various reservoir locations, and other proposed improvements that the Department deems necessary.

4.6.2 Agricultural Lands of Importance to the State of Hawaii (ALISH)
The ALISH maps are the State's means of classifying the agricultural land resources. For purposes of this document, the portions of the proposed alignment that will in fact use the agricultural lands in the Paia-Haiku areas, will be in lands classified by the State as "Prime". As defined by the ALISH maps, "Prime lands have the soil quality, growing season, and moisture supply needed to produce a sustained yield of crops economically when treated and managed according to modern farming methods." The acreage that is anticipated to be taken is 115 acres including roads, etc. Once the water line is constructed, most of the land can revert back to it's original use. This will be finalized when the recommended alignment has been finalized and site specific drawings are completed.
4.6.3 Probable Impacts
The loss or withdrawal of the agricultural lands for use in the EMPLAN project is estimated to be approximately 5 acres. In terms of economic loss, the acreage in question is not expected to be of major significance to the economy of the County or the State's agricultural productivity. The Department will be monitoring the design phase of the EMPLAN, with particular attention to the taking of private agricultural lands. As the various phases are initiated, completed, and placed into service, the demand and consumption for projected growth becomes of vital importance to future taking of private lands.

4.7 Hydrology
The proposed EMPLAN is to withdraw adequate quantities of potable water from the Paia basal aquifer. The development of East Maui sources began with the drilling and testing of two wells west of Maliko Gulch in the Paia Aquifer. These test wells are capable of providing pump capacities of between 0.75 to 2.0 million gallons per day (MGD) each. Subsequently, additional wells are to be located and developed east of Maliko Gulch in the Haiku basal aquifer which lies primarily within the northeast rift zone of East Maui. Exploratory drilling is expected to proceed incrementally eastward towards an increasingly water rich area. A total of eleven exploratory wells are estimated to be drilled and tested at an elevation of approximately 700' mean sea level (MSL). These eleven preliminary planned wells supersede an earlier conceptual plan that suggested a total of 28 wells might be needed to supply 14 MGD. This previous estimate of 28 wells was based on locating the wells closer to the ocean between the elevations of 200 and 500' MSL, where pump capacities of only 0.5 MGD per well could be expected from a thinner portion of the basal aquifer.

4.7.1 Existing Conditions
At the present time, the water sources in the Paia-Haiku area consist primarily of limited well sources and surface water. Demand is essentially for the rural and agricultural consumer in the East Maui communities of Haiku, Kula, Makawao, and Paia. Major agricultural water users such as Sugar and Pineapple also take water from existing sources in this area. Current water withdrawal rate for current consumers is estimated at 17 MGD.
4.7.2 Proposed Development

a. Hydrogeological background
The hydrogeology of the Paia and Haiku aquifers has been studied and reported in the Central Maui Water Study, Part II, prepared for the Maui Department of Water Supply by Norman Saito Engineering Consultants, Inc. (February, 1991). This report describes the Paia Aquifer as a thin basal lens with a mauka to makai water table gradient of 1.6 ft./mile, based upon a reported head of 4.3 feet in the upper Haiku well. The sustainable yield of the Paia aquifer has been estimated at 2-3 MGD.

The Haiku aquifer lies mostly within a 2.7 mile wide rift zone defined by two separate alignments of volcanic vents. Although no surface exposures have been discovered, associated dikes with a northwesterly trend presumably occur beneath these two alignments and if so, may have an influence on ground water conditions and direction of flow. However, evidence of any ground water conditions affected by dikes in the rift zone must await further exploratory drilling. Reported heads of 3.4 feet in the Haiku School well and 5.0 feet in the Baldwin Manor well indicate a higher water table gradient in the Haiku aquifer than in the Paia aquifer which in turn suggests greater ground water recharge as would be expected in a higher rainfall area. A sustainable yield of 15 MGD has been estimated for the Haiku aquifer which extends from Maliko Gulch eastward along the coast towards Kakipi Gulch, a distance of about 5.5 miles. At the present time, the Haiku School and Baldwin Manor wells are the only wells which tap the Haiku basal aquifer.
b. EMPLAN
The EMPLAN proposes to move eastward to establish an alignment of pumping centers that can provide increased yield of potable quality water. This planned development is based on the assumed existence of a thicker basal lens that results from higher rainfall incidence in the eastern sectors of the aquifer, and geological conditions similar to those experienced to date. Confirmation of these assumptions will be made when the exploratory wells are drilled in the proposed locations. The criteria for the location and design of the well fields are as follows:
* Sites to be located approximately two miles inland from coast.
* Sites to be spaced approximately 2,000 feet apart.
* Sites to be located at an elevation of approximately 700 feet.
* Wells to have anticipated pump capacities of one to two MGD each.
* Wells to be cased and tested at a depth of -30 ft. MSL, before drilling any open hole. Maximum open hole depth of -60 ft. MSL (if required by field conditions.)
* Sites to located along existing road or highway rights-of-way.
4.7.3 Probable Impacts
The EMPLAN anticipates developing the Haiku basal aquifer which lies near sea level several hundred feet or more below the ground, surface water streams and diversions, and scattered high-level, ephemeral perched ground water sources. The wells will be located at an elevation of approximately 700 feet and are expected to encounter approximately 150 to 200 feet of moderately permeable andesitic Kula lavas before encountering permeable basaltic Honomanu lavas. A few of the wells may encounter small quantities of high-level ground water perched on scattered impermeable layers in the capping Kula lavas. These perched ground water sources typically yield only small quantities of water because of their limited extent and recharge and, consequently, are not suitable as municipal sources of supply.

The probable impacts that can be anticipated would be if high-level perched water is encountered during drilling of a well, it will temporarily drain downward in the drill hole into the underlying permeable Honomanu basalt formations. However, when completed, each well will be cased with solid steel casing from the ground surface to sea level elevation and the annular space between the casing and the drill hole will be grouted with cement, sealing off any high-level perched ground water, protecting the well from surface contamination and permitting only basal ground water to be developed.

4.7.4 Mitigative Measures
The EMPLAN proposes to develop basal ground water in the Haiku area and will not affect existing wells because all of them (except the Hokoana Well and the Baldwin Manor well) tap and develop high-level perched ground water located above the basal ground water lens.

The development of well sources will proceed incrementally. Based upon careful analysis of pumping tests and actual pumpage data obtained as each well is drilled and placed into service, the estimated sustainable yield of 15 MGD (Central Maui Water Study, Part II) to 31 MGD (Commission on Water Resource Management, Water Resources Protection Plan, 1990, will become more precisely known. Consequently, the planned development of some 16 MGD maximum capacity with no adverse impact on the Haiku basal aquifer and its sustainable yield. Basal ground water which currently is wasted into the ocean as underflow in the basalt formations offshore will be intercepted by wells located inland at the 700 foot elevation and put to beneficial use as municipal water supply.

4.8 Flora and Fauna

4.8.1 Flora
The major part of the EMPLAN alignment is proposed for installation along existing State and County roadways, agricultural service roads, or on locations off the agricultural service roads. This is due primarily to the
need to have unimpeded access for service and maintenance in the
unlikely event of breakdown or damage to the pump equipment, or
pipeline. The exception is the major gulch crossing at Maliko Gulch. Most
of the proposed alignment has been in either Sugar or Pineapple
cultivation for an extended period, and as a result, other plant species are
rare, or consist of weedy species. These weedy species are primarily
alongside the roads and in the cultivated fields, and they are primarily
grases. In the gulch areas and off the agricultural service roads, the mixed
forest type of flora consisted of a mixture of introduced tree species such
as Eucalyptus spp., silk oak Grevillea robusta, varieties of guava, Java
Plum, and native tree species such as Ohi'a (Metrosideros collina ssp.
polymorpha), and Koa (Acacia koa). No rare, threatened, or endangered
plant are located in the basic pipeline alignment, and the native species
found in the gulch perimeter area will not be affected by the crossing.
There are representations of these native species throughout the Hawaiian
Islands in similar types of habitat.

4.8.1.2 Fauna
The introduced vegetation which has established itself on the proposed
alignment and the high use factor of road traffic do not provide adequate
habitat suitable for any of the endemic species of birds or mammals. The
one exception again will be the gulch crossing at Maliko Gulch. The daily
patterns of the Hawaiian Hawk or Hawaiian Owl would be to pass
through the semi-forested area of the gulch in search of food,
companionship, or on their way to a different sector of the upland
mountains. The introduced species of avifauna and mammals are typical
of urban-agricultural areas. These would include the Indian Mynah;
common gray dove; the barred or spotted dove; Kentucky cardinal;
English sparrow, and the most recently introduced bird species, the red
vented bulbul. The rodents seen or most likely to exist would be the roof
rat, and Indian mongoose. It is highly unlikely that any endangered bird or
mammal species will be observed in the project's alignment, because a major
portion of the alignment has been greatly disturbed and modified.

4.8.1.3 Aquatic Resources
Concerns on the potentially adverse impacts to existing streams and high
level water endowed areas due to the well drilling have been reviewed by
Water Resources Associates, an Honolulu based consultant. Their
response to the questions of potential impacts to rivers, streams, and other
sources of high level water were primarily that there would be little
concern. The drilling of wells at the 700 foot elevation would be to reach
the fresh basal water lens and pump from the aquifer directly. The well
would be cased and grouted with cement from the ground surface to the
basal aquifer. This would ensure that no percolating, or perched ground
water, or streams flows would be affected. (See Figure 4)
4.9 Noise
4.9.1 Existing Conditions
Existing noise levels vary significantly within or along the project alignment. Existing traffic noise levels along the Hana Highway would be in the typical noise level ranges of 65 Ldn to 70 Ldn. There are no sound attenuation berms or barriers on the Hana Highway and therefore, the predictable levels from the centerline of the highway could be higher during peak travel time. Similarly, the agricultural service roads can experience abnormally high noise levels during peak harvest time when cane haul trucks are moving harvested cane to the Puunene Mill for processing. In normal times, the occasional service pickup truck will not result in high noise level readings. The relative isolation of the agricultural fields from established urban sectors and the historic acceptance of the industry practices have resulted in minimal complaints about vehicular noise.

4.9.1.1 Non-Traffic Noise
The proposed project will have during the construction phase, the short-term construction related noise of the equipment used for the trenching; the material carriers bringing pipe to the section of the alignment being placed; and the equipment used to place the pipe in the trench. Other constructed related noise sources would be the well drilling and drilling at the gulch crossing if it felt that anchor placements will require pre-drilling. All these sources will cease upon construction completion. Most of the noise will take place only during actual construction.

4.9.2 Traffic related Noise
A predictable increase in traffic related noise levels can be anticipated, particularly during the phases of work on highly traveled segments of Hana Highway, Baldwin Avenue, and other State and County roadways. These will be of predictable duration and under the State Department of Health Community Noise Regulations. The general contractors will have to comply with noise abatement devices on their construction equipment, i.e. mufflers on exhausts, avoid “gunning” machinery, and other measures to minimize noise impacts in areas of close proximity to urban-residential sectors.

4.10 AIR QUALITY
4.10.1 Existing Conditions
Present air quality in the proposed project alignment is considered to be very good. Long term monitoring stations at Kihei and Lahaina maintained by the State Department of Health have consistently recorded airborne particulates and sulfur dioxide levels that are within allowable State of Hawaii Air Quality Standards (AQS). However, particulates and carbon dioxide emissions from nearby sugar cane fires do present potential degradation to the air quality in the project area. Also, the
fugitive dust during clearing of the burned cane in the harvest process create temporary exclusions of the AQS.

4.10.2 Probable Impact
Direct impacts will result during the temporary construction phase for this proposed project. The principal generator of fugitive dust will be the construction equipment that is involved in the trenching of the pipeline alignment. This can be abated or mitigated by proper construction pollution control methods, i.e. watering the alignment under construction, and also keeping the work schedule within the normal working hours of 7:00 a.m. to 3:30 p.m. Another construction related impact to the ambient air quality will be the vehicular traffic that may be delayed on the roads being used for the pipeline placement. Increased emissions of carbon monoxide and nitrogen dioxide can be anticipated from the delays on the segment of roadway being worked. The use of traffic police to maintain a steady flow of traffic movement can abate the delays and reduce the emission levels to within the AQS. If undue delays are experienced, it will result in temporary exclusions of the State AQS at that location.

4.11 SCENIC AND AESTHETIC RESOURCES

4.11.1 Existing Conditions
The proposed EMPLAN alignment will employ the State, County or agricultural roadways and the scenic vistas or aesthetic values will be impacted during the construction phase. Upon completion of the pipeline installation, the current or existing views of roads and agricultural fields will remain uninterrupted. The Maliko Gulch crossing may be visually impacted with the placement of the pipeline and the foundation works used to secure the pipe in place, but the relative isolation of the crossing site will not be of significant impact to the general public since only service maintenance workers and occasional hunters will see the pipeline after construction is completed. The storage reservoirs will also present some visual or aesthetic concerns; the Department may consider using earth tones or green colors blending with the surroundings to mitigate this potential problem.

4.12 HISTORICAL AND ARCHAEOLOGICAL SITES

4.12.1 Existing Conditions
The archaeological consulting firm of Aki Sinoto Consulting conducted a field survey of the Maliko Gulch area and a literature search in June, 1992. The fieldwork involved a walk-through of the Gulch perimeter, and also at the bottom of the Gulch. The steepness of the side slopes precluded any site investigations and it was considered unlikely that any site or finds of significance would be there due to the terrain conditions. Exhibit A is attached as the report on their findings.
CHAPTER V.

SOCIO-ECONOMIC IMPACTS

This Chapter discusses the socio-economic impact of the proposed EMPLAN project with respect to the economy, employment, and land uses along the EMPLAN alignment.

5.1 PRESENT LAND USE

The EMPLAN is influenced by the Paia-Haiku Community Development Plan in the East, the Kihei-Makena Community Development Plan in the South, and the Kahului-Wailuku Community Development Plan in the North-West. In these three Plan areas, the blending of Agriculture with Urban uses, i.e. residential, resort, and commercial, has resulted in the established patterns of development taking place in close proximity to employment centers. The single exception to this conclusion is the commuting patterns that resort employees to the West Maui destination resorts of Kaanapali and Kapalua take daily from Central Maui residential districts. Also, the commuter patterns to resort areas in Kihei-Makena are becoming more strongly established. The largest acreage still remains in Sugar, with Pineapple in second place. The Urban designated lands in the three Community Development Plans will not be adversely impacted by the EMPLAN; the potential land use impacts will take place within the Agricultural District at the higher elevations where the rainfall is more prevalent. The Principal purpose in the acquisition of the agricultural lands will be for well sites; storage reservoir locations; agricultural service roads for pipeline installation; and possible taking for easements for pipeline installation across agricultural lands that may be in cultivation. The physical impacts will not be significant since the taking of lands is not severe. Concerns have been expressed by the residents and agricultural communities of Paia-Haiku regarding the taking of this water from their districts. The impacts may be felt more noticeably in the social consciousness of the residents by the movement of water from a water-rich area in the East Maui mountains to the residential, business, and industrial communities of Kahului-Wailuku, and the Resort-Commercial areas in Kihei-Makena. These concerns have been more specifically addressed to the appropriateness of taking the water on the basis that the EMPLAN could affect their ability to retain their continued use of high level water for their diversified agriculture, dairy and cattle operations, plant and nursery farms, and other activities more normally associated with a rural lifestyle that predominates in the Paia-Haiku communities. The technical studies that have been conducted to date have established the extent of water available in the East Maui mountains, and it is on the basis of the hydrological studies that the EMPLAN is proposing the series of well sites to develop and make available the sustained yield of 10 MGD.
needed for the three Community Development Plan communities to the year 2012.

5.2 ECONOMY

The economy of the County as a whole will not experience significant change due to the implementation of the EMPLAN. Property tax increases that may attributed to the change in Land Use Boundary amendments, County Development and Zoning changes have already been established by the completed changes in those basic policies. The intent of the EMPLAN is to insure that adequate County services, potable water, will be available for those users of the improved lands. Funding for these proposed improvements is scheduled to come from the Department of Water Supply through the assessment of connection fees similar to those that have been charged over the past twenty years.

5.3 EMPLOYMENT

The EMPLAN will provide a significant contribution to the construction industry which is experiencing a downward trend in activity. The anticipated benefits to the State and Maui County from the projected construction of almost $50 million dollars based on the full development of the EMPLAN will be a boost to the Maui economy. It is anticipated that if fully implemented, the EMPLAN will require 30 construction workers for fifteen years, and contribute $20.0 million dollars of payroll that will be taxed by State and County.

5.3.1 PROBABLE IMPACTS

No reductions in agricultural employment is anticipated due to the implementation of the EMPLAN. The relatively minor taking of agricultural lands for well sites and storage reservoir sites will not adversely impact the two major agricultural activities of Sugar and Pineapple. The continuous policy of the Department is to practice conservation of potable quality water and attempt to feasibly develop alternative sources for agricultural and other non-potable requirements, i.e. fire protection, construction, industrial uses, landscaping irrigation, etc.
CHAPTER VI.

IMPACTS ON PUBLIC FACILITIES AND SERVICES

This Chapter describes the existing conditions of public facilities, utilities and services in the three Community Development Plan Areas and the relationship of these systems to the proposed EMPLAN. Public facilities are those systems which are provided, staffed, and maintained by government to serve the public health, safety, and welfare. They include roadways, fire and police protection, refuse collection and disposal, parks and recreation, and water supply. Public utilities are distributed services, such as electricity, wastewater treatment and disposal, and communications. These services are provided either by a public agency directly, or by a publicly regulated utility. In the implementation of the EMPLAN, two categories of public facilities will be impacted by the proposed project; they are Transportation and Fire Protection.

6.1 TRANSPORTATION FACILITIES

6.1.1 Existing Conditions

Primary development of the EMPLAN will utilize State and County roadway rights-of-way wherever practicable. The intent of the plan is to limit the impacts of both the construction and the maintenance of the pipeline alignment. Also, the EMPLAN will maintain cost controls by the use of agricultural service roads and other off-road sites for the well sites and reservoir locations. By so doing, the Department will be able to develop facilities that will be out of the public eye and also away from possible damage and or contamination. In previous chapters, the general phased alignments have been identified. Decisions as to the actual alignment will not be made until the Board of Water Supply has had the opportunity to examine the entire EMPLAN in its relationship to the Central Maui Water Development Plan. This will insure that the affected communities in the three community development plan areas will have ample opportunity to express their specific concerns and positions relative to the EMPLAN.

6.1.2 ACCESS IMPROVEMENTS

All proposed facility improvements required for the EMPLAN, (well sites, storage reservoir sites, major gulch crossings, and pipeline installations), will require easements for perpetual access for repair and maintenance. All proposed access roads, site improvements, and associated uses will be improved and maintained at County expense. Land acquisition if required on privately held lands, will be subject to negotiated purchase at fair market values to be established and approved by the Board of Water Supply. Easement rights on State, County, or agricultural service roads will also be negotiated and approved by the Board of Water Supply with the appropriate agency or private entity affected by the easement request. Pending the final alignment determination, the
programmed plan of land acquisition will initially involve the two exploratory wells that are under construction. The design and construction of the storage reservoirs are under way, and the initial alignment that is identified as Phase 1 in the EMPLAN will be reviewed by Department staff.

6.1.3 PROBABLE IMPACTS - LOCAL IMPLICATIONS

The implementation of the EMPLAN will not result in significant adverse physical impacts at the outset. The physical implications of well drilling and reservoir construction are not considered significant activities in terms of impacts to ambient Air and Noise standards. In addition, the activities will be taking place in relatively isolated locations that are away from established urban/residential or commercial zones. Pipeline installation will have more significantly adverse impacts to the Air and Noise standards since the activity will be taking place on established transportation arterials. Traffic patterns will be affected as construction activities may require lane closures, or diverting of established traffic flows to achieve the installation of the pipeline and other ancillary and support components of the pipeline. The contractor will be required to post traffic safety advisories in the media to keep the motoring public aware of future construction on major traffic arterials. Also, the onsite construction activities will require traffic security to maintain the flow of traffic in as smooth a condition as practicable. Work scheduling can also be a vital segment of maintaining traffic flow patterns. This would include later start time and earlier closing time to permit the use of all existing roadway lanes during peak traffic hours. This will be subject to review by the Department and the contractors to determine if costs will be controlled on a longer schedule, or with more work scheduled during off-peak traffic time. Work that is not located within the established traffic patterns can be scheduled ahead so that various phases of the EMPLAN can tie together separately, albeit not in a continuous pattern.

6.1.4 PROBABLE IMPACTS - REGIONAL IMPLICATIONS

The regional implications that the EMPLAN will have on County transportation facilities are remote. The scope of the total project is at once expansive, but also limited. This is due to the nature of the EMPLAN which is designed to seek and provide potable water in sufficient quantities to meet the long term future demands as identified in the Community Development Plans. It can be assumed that as exploration provides sustainable yields, the pipeline portion of the work schedule can proceed on a more accelerated pace. This could also result in either more impacts to the traffic flow patterns, but also could result in a quicker resolution to the projected congestion. It is concluded that traffic impacts will remain essentially localized.
6.2 FIRE PROTECTION

Fire Protection is the only other County service that would be impacted to a significant extent with the implementation of the EMPLAN. Design planning to provide water to future planned urban land uses, i.e. residential, resort, commercial, and industrial must also include fire protection. The balance of County services essential to the advent of planned urbanization can proceed on a more reduced pace, since the onsite activities of the urbanization will provide a clearer picture only after the physical improvements have been reviewed and approved by the Planning, Public Works, Police, and other County agencies. For the actual physical improvements required in the EMPLAN, once the construction has been completed, the Department will be responsible for the daily operations and the periodic maintenance of the facilities.
CHAPTER VII

ALTERNATIVES TO THE PROPOSED ACTION

Chapter 200 of Title 11, Environmental Impact Statement Rules (11-200-17 (f)) requires a discussion of "any known alternatives . . . which could feasibly attain the objectives of the action." The rules further specify that the alternatives be explored and evaluated in light of enhancement to environmental quality or the avoidance of adverse environmental effects.

Variations of two alternatives are examined in this section: (1) the alternative of no action or of postponing action pending further study; and (2) alternatives related to different designs, sources, or methodologies of the proposed action which would present different environmental impacts.

7.1 NO ACTION ALTERNATIVE

The No Action alternative, or its’ variant, postponement of action, would preserve the EMPLAN alignment and the various potential well and reservoir sites in their present state. A discussion on the advantages and disadvantages of the No Action alternative is provided in the following:

Advantages

* No further planning or design work time and charges would be required to continue the efforts of the EMPLAN project.

* All current or existing agricultural operations along the selected alignment would continue without potential loss or interruption due to the EMPLAN phasing schedule of construction.

* No Action or further postponement of the EMPLAN would maintain the Haiku Aquifer in its' present condition, without the planned withdrawal of the basal aquifer water for Central Maui use.

* Potential vehicular congestion on the State and/or County roadway alignments selected for the EMPLAN would be relieved of the short-term traffic tie-ups due to the proposed construction activity.

Disadvantages

* The three Community Development Plan areas for the communities of Wailuku-Kahului, Kihei-Makena, and Paia-Haiku would not be provided with their supply of potable water. This could delay or abort their Urban planned growth through the year 2012.
* Economic growth as planned by the County Administration and approved by the County Council would experience a potentially severe setback in terms of housing availability and construction related employment, as well as associated impacts to suppliers, vendors, and support services for the Resort and Commercial projects that would have been developed.

The affected Community Development Plans are in their 10 year review period and the decisions to alter the previously approved Plans are under review. The EMPLAN is of a longer planning duration since the implementation of a program to develop adequate or sustainable yield of potable water is both time consuming and technically demanding. Exploratory wells are necessary to determine both quantity and quality of available water that will meet Department standards for potable quality.

* Individual water use is increasing; even with no new sources and no additional persons, the Iao Aquifer will not be adequate.

7.2 ALTERNATIVE SOURCE CONSIDERATIONS

The Department has considered various alternatives of source development, the use of non-potable quality water with pre-treatment, water conservation programs, and non-potable water for non-potable uses. Briefly, these are as follows:

a. Developing the Waihee Aquifer - The estimated cost of developing this aquifer was $18.6 million (1990 dollars). The sustainable yield value is commonly taken to be 8.0 MGD; however, the practical developable limit has not been demonstrated by experience. 4 MGD is a comfortable estimate, and reliance on more water than the projected 4 MGD would require field demonstration. Also, the 4 MGD will not be sufficient to provide the quantity of water needed over the planning period for the Community Development Plans.

b. Desalination - The 1992 Water Use Plan suggests that the costs to design and build a 1 MGD facility would be $2.5 million and the attendant Operations/Maintenance costs would be approximately $2.30/1000 gallons of raw water with 800 mg/l chloride content (brackish water). In addition, the daily disposal of the resulting brine with the resulting environmental problems make alternative source development more feasible and practical.

c. Surface Water - The planned use of surface water for potable purposes is not considered as cost effective or socially redeeming since the costs for pre-treatment though less than desalination, are still of high. The social unacceptability of taking this water from agricultural users is not a high priority consideration for the Department. Planned sharing of basal aquifer sources is more equitable.
d. **Outside Water** - Analysis of water consumption in the Kihel district indicates that this area has a higher than average consumption of water that is used for purposes other than normal household purposes. It is estimated that at the present time, more than 4.8 MGD, or approximately 70% of the total water used is used as outside water. The use of water other than potable quality water is recommended in a conservation directed method. However, the reduction of potable water use as outside water would still not overcome the need to develop new water sources.

e. **Water Conservation** - The DWS is proposing to implement a public awareness program regarding water conservation. The reduction of water use anticipated from this program has not been determined, and the development of new sources will still be programmed.

7.3 ALIGNMENT ALTERNATIVES

The EMPLAN considered various alignment alternatives in the design engineering and economic analysis review process. The final alignment selected was made on the basis of least environmental impacts, tempered by economic cost factors.

7.4 ANALYSIS AND CONCLUSIONS

The EIS rules concerning "rigorous exploration and objective evaluation" of feasible alternatives have been applied in this chapter. The "No Action" or postponement alternative would preserve the existing conditions along the proposed alignment route, in addition to the well and reservoir sites. This alternative will not resolve the planned demand for potable water in the three Community Development Plan areas planned for expansion and development by the year 2012. The various alternatives identified as a through e in 7.2 would also not provide in adequate quantity or questionable quality, the demanded volume for the year 2012.

In conclusion, the Department has evaluated the alternative proposals and finds that the proposed EMPLAN and the recommended alignment will be in the County's best interest. The greatest public benefit is the Department's goal in developing and transporting this water from East Maui to Central Maui.
CHAPTER VIII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Chapter 200 of Title 11, Environmental Impact Statement Rules (11-200-17 (k)) requires the "identification of unavoidable impacts and the extent to which the action makes use of non-renewable resources during the phases of the action, or irreversibly curtails the range of potential uses of the environment . . ."."

The long term programmed plan for the EMPLAN will permanently commit money, time, labor and physical resources. The decision to develop adequate water source and transport this water for use in the Central Maui Water System is a planned direction that is unlikely to be reversed. The other unavoidable impacts include the temporary traffic congestion that may result due to construction related activities on the roadway systems; the potential impacts to high level water by the exploratory well drilling; and finally, the transport of the water resource to meet urban demands. These commitments should be evaluated in light of planning directions that have been established by the Administration and executed by the Legislative branch of County government, the County Council.
CHAPTER IX

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

Chapter 200 of Title 11, Environmental Impact Statement Rules (11-200-17(j)) requires a brief discussion of the "extent to which the proposed action involves trade-offs between short-term losses and long term losses or vice versa, and a discussion of the extent to which the proposed action forecloses future options, narrows the range of beneficial uses of the environment, or poses long term risks to health or safety..."

As discussed in previous chapters, the proposed action will provide potable water from a water rich area of Maui for use by Maui County in fulfilling its obligated role as the Department of Water Supply. This action will not adversely impact the State's long-term agricultural economy or levels of productivity. No short-term exploitation of physical resources that will have long term consequences has been identified during the design and review stage of the EMPLAN. There are no known long-term risks to public health and safety which would occur as a result of this project's implementation. In the unlikely event that conclusive evidence was presented or discovered during the phased construction program, the Department would have the right and obligation to terminate or temporarily cease development until the long term risk had been resolved or eliminated.
CHAPTER X. CONSULTED PARTIES AND COMMENTS RECEIVED

10.1 Consulted Parties

The Environmental Impact Statement Preparation Notice (EISPN) for the proposed East Maui Water Development Plan was published in the OEQC Bulletin on July 8, 1992. The thirty day review period ended on August 7, 1992. In addition, the EISPN was mailed directly to 53 agencies and organizations listed below.

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<tr>
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<td>American Lung Association</td>
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<td>Ms. Meredith Ching</td>
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<td>A &amp; B Properties, Inc.</td>
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<td>C. Brewer Properties, Inc.</td>
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<td>Hawaiian Commercial &amp; Sugar Co.</td>
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<td>Hui Alanui O Makena (via Isaac Hall)</td>
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<td>Isaac Davis Hall</td>
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<td>Keauhou O Honuaula, Inc. via Isaac Hall</td>
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<td>Haiku Community Association</td>
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Kahului Town Association
Kihei Community Association
Makawao Community Association
Makena Homeowners Association
Paia Main Street Association
Pukalani Community Association
Spreckelsville Community Association
Wailea Community Association
Wailuku Heights Homeowners Assn.
Wailuku Main Street Association
Landmark Maui Properties 8-7-92
Maui Tomorrow 8-11-92
Environment Hawaii 7-12-92
Native Hawaiian Advisory Council 8-7-92

Maui County Government
Planning Dept. 7-17-92
Dept. of Parks & Recreation 8-7-92
Dept. of Public Works
Economic Development Agency
Maui County Council
The Hon. Howard Kihune, Chair
August 3, 1992

Mr. Carl K. Tahani, P.E.
Norman Saito Engineering Consultants, Inc.
Wailuku Townhouse, Suite 203
2138 Main Street
Wailuku, Hawaii 96793

Dear Mr. Tahani:

Subject: East Maui Source Development Project Environmental Impact Statement Preparation Notice (EISPN) for the East Maui Water Development Plan

We have reviewed the EISPN for the East Maui Source Development Project and have no comments to make at this time. Thank you for the opportunity to review this document.

Sincerely,

[Signature]

WARREN N. LEE
State Conservationist

August 14, 1992

Mr. Warren M. Lee
United States Department of Agriculture
Soil Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Lee:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT - EISPN

We have received your agency's advise of "No Comment" dated August 3, 1992. Thank you for your prompt review of our document.

Sincerely,

[Signature]

DAVID R. CRADICK
Director

M/C: ab
CC: Norman Saito Engineering Consultants, Inc.

"By War All Things Are Lost"
August 14, 1992

Ms. Meredith J. Ching, Vice President
A & B HAWAII, INC.
822 Bishop Street
P. O. Box 3440
Honolulu, Hawaii 96801

Dear Ms. Ching:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT - EISPN

We are in receipt of your firm’s comments dated July 20, 1992 on the proposed East Maui Water Development Plan. Thank you for combining the affected Alexander & Baldwin companies in your comments. Please be assured that your concerns on the siting of storage reservoirs, the alignment of the transmission lines, and the construction time schedules will all be coordinated with your company’s activities so that as minimum a disruption as possible to the various operations will be achieved. As the process of this environmental review continues, we will most definitely maintain continuous contact with A&B so that all concerns can be addressed.

Thank you for your timely comments and we look forward to your continuing input.

Sincerely,

[Signature]
David R. Craddick
Director

HK: ab
xc: Norman Saito Engineering Consultants, Inc.

"By Water All Things Find Life"
July 20, 1992

Mr. Carl Tokuimi
Norman Saito Engineering Consultants, Inc.
c/o Environmental Communications Inc.
P.O. Box 538
Honolulu, Hawaii 96809

Dear Carl:

RE: EISPN for the East Maui Water Development Plan

Thank you for providing us with notice of the preparation of an EIS for the Department of Water Supply's East Maui Water Development Plan. The following are the combined comments of the Alexander & Baldwin, Inc. (A&B) companies.

We fully support the Department's efforts to develop needed water supplies for Central Maui in a timely fashion. East Maui aquifers are a reasonable source for water for Central Maui and we support the Department's decision to pursue the development of these resources.

However, we do have some concerns with how this plan is to be implemented. As noted your summary (page 2), other than the governmental bodies, A&B is the only other major landowner affected. Our principal concern is the potential disruption to our agricultural operation, Hawaiian Commercial & Sugar Company (HC&S). We ask that the siting of the Department's facilities (wells, pipelines, tanks, etc.) be done so as to minimize the disruption to HC&S—both during construction and during operation. For example, pipelines should be sited outside of our heavily used roads. Public rights-of-way should be used as much as possible. If pipelines are to be located along routes used by cane haulers, the pipe should be permanently protected. HC&S should be properly compensated for any damages or inconveniences caused by the water project, and relieved of any situations of liability due to interaction with the construction or operation of the project.

Finally, it is unclear whether all of the eleven well sites have been identified. If so, on whose land? Also, is it certain that all 16 MGD can be developed within the designated "project location?" Would it not be safer to broaden the eastern boundary to Honopou in case the wells require greater spacing?


Meredith J. Ching

Very truly yours,

Meredith J. Ching

MJClnt

cc: R. L. Weisschen
August 14, 1992

Ms. Esther Ueda, Executive Officer
State Land Use Commission
Old Federal Building, Room 104
Honolulu, Hawaii 96813

Dear Ms. Ueda:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT - EISP N

We have received your office's comments dated August 4, 1992 on the proposed East Maui Water Development Plan. In response to your two comments, we offer the following:

1. We have examined the three affected Maui USGS quad maps for the area and will identify more specifically, the project parameters. There will be a State land use map indicating the various designations.

2. The Office of the State Planning was included in the July 7, 1992 distribution of the EISP N for this project. We anticipate that their comments will reflect those items listed in your comment letter.

Thank you for your prompt attention to this EISP N and we look forward to your continuing cooperation.

Sincerely,

[Signature]
David H. Craddick
Director

HK: ab
xc: Norman Saito Engineering Consultants, Inc.

"By Water All Things Find Life"
Mr. Carl K. Takumi, P.E.
August 4, 1992
Page 2

Thank you for the opportunity to comment on this matter.

If you have any questions, please call me or Steve Tagawa of my staff at 367-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:fl
cc: OECC
DSCD
DSP

Mr. Carl K. Takumi, P.E.
August 4, 1992
Page 2

August 4, 1992

Dear Mr. Takumi:

Subject: Environmental Impact Statement Preparation Notice (EISP) for the East Maui Water Development Plan

We have reviewed the information for the subject EISP transmitted by your letter dated July 2, 1992, and have the following comments:

1) It appears that the proposed Development Plan area, as shown on the Project Site Plan (Figures 2), is located within the State Land Use Urban, Agricultural, and Conservation Districts.

   We suggest that the Draft EIS include a map that delineates the Development Plan area in relation to the State Land Use Districts.

2) We note that the Office of State Planning's Draft State Land Use District Boundary Review Report for Maui includes several recommendations for the reclassification of Agricultural District lands in the vicinity of the proposed Development Plan area. This includes a Priority 1 recommendation to reclassify the East Maui Watershed, between Opaha and Honopou Gulches, from the Agricultural District to the Conservation District. As such, we suggest that the Office of State Planning be consulted in the preparation of the Draft EIS.

We have no other comments to offer at this time.
July 17, 1992

Mr. Carl K. Takumi, P.E.
Norman Saito Engineering Consultants, Inc.
Wailuku Townhouse, Suite 203
2166 Main Street
Wailuku, Hawaii 96793

Dear Mr. Takumi:

Subject: EIS Preparation Notice
East Maui Source Development Project
East Maui Water Development Plan

The Environmental Assessment for East Maui Water Development Plan describes the installation of new water transmission lines that will impact our State highway system. We ask, therefore, that all plans for work within our State highway rights-of-way be submitted to our Highways Division for review, approval, and coordination.

We appreciate this opportunity to provide comments.

Sincerely,

Rex D. Johnson
Director of Transportation

September 11, 1992

Mr. Rex D. Johnson, Director
DEPARTMENT OF TRANSPORTATION
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Johnson:

Re: EAST MAUI SOURCE DEVELOPMENT PROJECT - EIS/PA

Thank you for your agency's comments dated July 17, 1992 on the proposed EIS/PA.

Please be assured that our engineering staff and the design consultant will be in contact with the SDOT District Engineer for work within the State Highways' rights-of-way. Final drawings will be provided to the Highways Division for review and approval. Thank you for your continuing interest and cooperation.

Sincerely,

David R. Craddick
Director

"By Water All Things Find Life."
August 31, 1992

Mr. William W. Paty, Chairperson
Department of Land & Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

Re: EAST MAUI SOURCE DEVELOPMENT PROJECT - EISP

We are in receipt of your department's comments dated August 14, 1992 on the proposed East Maui Water Development Plan. We respond to the following:

1. Our preliminary studies on the hydro-geological conditions of the eleven proposed well sites indicate that the wells will be to obtain potable water from the basal aquifer and not from perched or dike water. As such, we do not anticipate significant negative impacts to streams and other surface water sources.

2. At the present time, the proposed alignment does not traverse Conservation District lands. In the event that the final selected alignment does move through Conservation District lands, we will be preparing and filing the required applications for the Conservation District Use Application.

3. A Stream Channel Alteration Permit will probably be required in view of the current alignment through Maliko Gulch. Again, we will maintain contact with your department on this subject and move accordingly to prepare and file the necessary permits.

We appreciate your agency's comments and look forward to working together with the State on a most critical project.

Sincerely,

David R. Craddick
Director

HK:ab

"By Water All Things Find Life"
August 4, 1992

Norman Saito Engineering Consultants, Inc.
Kailulu Townhouse, Suite 203
2158 Main Street
Kailulu, Maui, Hawaii 96793

Attention: Mr. Carl K. Takami

Dear Mr. Takami:

Subject: Comments on Environmental Impact Statement Preparation Notice (EISPN) for the East Maui Water Development Plan

The Office of State Planning (OSP) has reviewed the subject EISPN for the East Maui Water Development Plan. The proposed project involves the design and installation of water transmission lines, storage reservoirs and the drilling of source wells. This development is intended to meet the needs of the Central Maui Water District for the next 20 years.

We assume that the State Department of Land and Natural Resources, Division of Water Resource Management, will be commenting on the EISPN. Therefore, OSP has no comments at this time.

Thank you for the opportunity to review and comment on the subject EISPN.

Sincerely,

[Signature]

Harold S. Masunoto
Director

cc: Honorable William M. Paty

September 25, 1992

Mr. Harold S. Masunoto, Director
Office of State Planning
Office of the Governor
P. O. Box 3540
Honolulu, Hawaii 96813-3540

Dear Mr. Masunoto:

Subject: Comments on the Environmental Impact Statement Preparation Notice (EISPN) for the East Maui Water Development Plan

We have received your Office’s comments on the above project dated August 4, 1992. Your assumption that the Department of Land and Natural Resources, Division of Water Resource Management would respond is correct. Thank you for your position of no comment and we appreciate your continuing interest in our county projects.

Sincerely,

[Signature]

David A. Crandick
Director

[Signature]

cc: Norman Saito Engineering Consultants, Inc.
August 13, 1992

Mr. Carl K. Takumi, P.E.
Norman Sin Ei Engineering Consultants, Inc.
Wailuku Townhouse, Suite 203
2155 Main Street
Wailuku, Maui 96793

Dear Mr. Takumi:

Subject: Environmental Impact Statement Preparation Notice
East Maui Water Development Plan

Thank you for allowing us to review and comment on the subject project. We have no comments to offer at this time.

Yours truly,

John C. Levin, M.D.
Director of Health

August 31, 1992

Dr. John C. Levin, M.D., Director
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Levin:

Re: EAST MAUI SOURCE DEVELOPMENT PROJECT - EISPN

We are in receipt of your department's comments dated August 13, 1992 on the proposed East Maui Water Development Plan and note your position of no comments at this time. We are planning the Draft Environmental Impact Statement which will be circulated for comment, and we look forward to your review and comment at that time.

Thank you for your continuing interest and concern.

Sincerely,

David R. Craddock
Director

"By Water, All Things Find Life"
Carl K. Takuni
July 24, 1992

Please contact Ms. Annie Griffin at 587-0013 if you have any questions about these comments.

Sincerely,

DON HIRABASHI
Administrator
State Historic Preservation Division

LOG NO.: 5770
DOC NO.: 2403a

July 24, 1992

Mr. Carl K. Takumi, P.E.
Norman Salto Engineering Consultants, Inc.
Wailuku Townhouse, Suite 203
2154 Main Street
Wailuku, Maui, Hawaii 96793

Dear Mr. Takumi:

SUBJECT: Historic Preservation Review of the Environmental Impact Statement Preparation Notice (EISPAN) for the East Maui Water Development Plan

Thank you for the opportunity to comment on this document.

According to this document, the East Maui Water Development Plan will include the design and installation of water transmission lines, reservoirs, and the drilling of wells from Makawao to Wailuku District. It also states that construction will be conducted mostly within the State/Country roads right-of-way and agricultural fields, but gulch crossings will impact undisturbed areas. This document proposes to conduct archaeological surveys in these undisturbed areas. We recommend that all undisturbed areas, not only the gulch crossings for the transmission line but also the proposed locations of the reservoirs and wells, be covered in an archaeological survey to determine the presence of significant historic sites. The background research should also include an assessment of the possibility of significant subsurface deposits along the right-of-way and cultivated fields. The EIS should identify all significant historic sites, assess the effects of the proposed project on the sites, and propose measures to mitigate the effects. A copy of the final archaeology survey report should be included in the EIS. We would be willing to review the final report to resolve any problems or disagreements before it is used in the EIS.
August 14, 1992

Mr. Don Hibbard, Administrator
STATE HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND & NATURAL RESOURCES
33 South King Street
Honolulu, Hawaii  96813

Dear Mr. Hibbard:

Re: EAST MAUI SOURCE DEVELOPMENT PROJECT - EISPEN

Thank you for your agency's comments dated July 24, 1992 on the proposed East Maui Water Development Plan. We have provided your comments to the archaeological consultant for his information and use. They will be in contact with your designated Maui County staff planner to work on the specifics of the archaeological study for this project.

Your timely comments are appreciated. Be assured that we will be in contact with your agency during the planning process.

Sincerely,

[Signature]
David R. Craddick
Director

HK: ab
xc: Norman Saito Engineering Consultants, Inc.

"By Water All Things Find Life"
DEPARTMENT OF THE ARMY  
U.S. ARMY ENGINEER DISTRICT, HONOLULU  
PO BOX 1108  
FT. SHAFTER, HAWAII 96739-1108  
July 27, 1992

Planning Division

Mr. Carl K. Takumi, P.E.  
Norman Saijo Engineering Consultants, Inc.  
Wailuku Townhouse, Suite 203  
2158 Main Street  
Wailuku, Maui, Hawaii 96793

Dear Mr. Takumi:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice (EISPW) for the East Maui Water Development Plan. The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1969 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research, and Sanctuaries Act.

a. Implementation of the water development plan would involve construction of gulch crossings, source wells, and storage reservoirs. A DA permit is required for work in waters of the United States. The applicant should consult with Operations Division (telephone 438-9228) about permit requirements as the plan progresses.

b. Flood hazard information can be provided when specific project details are determined.

Sincerely,

[Signature]

Director of Engineering

DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI  
PO BOX 1108  
WAILUKU, MAUI, HAWAII 96783-1108

August 14, 1992

Mr. Hidaka Cheung, P.E.  
DEPARTMENT OF THE ARMY  
U.S. ARMY ENGINEER DISTRICT, HONOLULU  
PO BOX 1108  
FT. SHAFTER, HAWAII 96793-1108

Dear Mr. Cheung:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT - EISPW

We are in receipt of your agency's comments dated July 27, 1992 on the proposed East Maui Water Development Plan. Under the requirements of the Corps of Engineers, we will, as required, comply with the applicable permits listed in your comment letter. At this time, the construction plans for the various gulch crossings, well sites, and storage reservoirs are at the preliminary stages of engineering design. Final site selection and planned improvements will be an integral part of this document as comments are received on the proposed project. We will maintain contact with the Operations Division as the planning phase continues.

Thank you for your timely comments. We look forward to working with your agency on this project.

Sincerely,

[Signature]

Director

HIDRAI  
NORMAN SAIJO ENGINEERING CONSULTANTS, INC.  

"By Water All Things Flow Like"
Mr. Carl K. Takumi, P.E.
Norman Saito Engineering Consultants, Inc.
2150 Main Street, Suite 203
Wailuku, Maui, Hawaii 96793

Gentlemen:

Subject: East Maui Source Development Project
EIS/NEPA for East Maui Water Development Plan

Thank you for the opportunity to review the subject document. We have no comments to offer.

Should there be any questions, please have your staff contact Mr. Ralph Yumoto of the Planning Branch at 861-0480.

Very truly yours,

GORDON MATSUOKA
State Public Works Engineer

August 14, 1992

Mr. Gordon Matsuoka
DEPARTMENT OF ACCOUNTING & GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Matsuoka:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT - EIS/NEPA

We are in receipt of your agency's comments dated July 17, 1992 on the proposed East Maui Water Development Plan. Thank you for your timely response. Your stated position is on record.

Sincerely,

[Signature]

David R. Craddock
Director

HI Island

xox Norman Saito Engineering Consultants, Inc.

"By Water All Things Flow Life"
Mr. Carl K. Takumi, P.E.
Norman Salo Engineering Consultants, Inc.
2158 Main Street, Suite 203
Wailuku, HI 96793

Dear Mr. Takumi:

SUBJECT: East Maui Source Development Project Environmental Impact Statement
Preparation Notice (EISPN) for the East Maui Water Development Plan

The Department of Agriculture (DOA) has reviewed the EISPN and offers the following comments.

The East Maui Water Development Plan (EMPlan) proposes the design and construction of transmission lines, storage reservoirs, and the drilling of source wells to meet the needs of the Central Maui Water District for the next 15-20 years.

Our principal concern in the subject EISPN is whether or not the increase in water demand as determined in the EMPlan will affect the current agricultural water usage. For example, will the additional withdrawal of water in the subject area over the next five to ten years have any adverse impact on water sources feeding into the East Maui Irrigation System?

The DOA would like to be a consulted party for the Draft EIS.

Thank you for the opportunity to comment.

Sincerely,

Yuki Kitagawa, Chairperson
Board of Agriculture

Office of Environmental Quality Control

August 20, 1992

Mr. Yukio Kitagawa
BOARD OF AGRICULTURE
1426 South King Street
Honolulu, Hawaii 96814-2512

Dear Mr. Kitagawa:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT – EISPN

Thank you for your Department's comments dated July 24, 1992 on the proposed East Maui Water Development Plan. The planned improvements are to be implemented in conjunction with the MAUI COUNTY WATER USE AND DEVELOPMENT PLAN as part of the continuing planning process pursuant to the State Water Code, HRS Chapter 174C. This document is now in final review draft stage and will be finalised in 1992. The planning strategy is to make available water to the designated urban development in Wailuku-Ma'alaea, Pais-Haleiwa, and Kaanapali. The proposed wells are in the basal aquifer and will not affect water availability to the East Maui Irrigation System. We will look forward to your agency’s valuable overview on this project.

Thank you again for your timely comments. Please be assured that the Department will be in contact with your Department.

Sincerely,

David B. Craddock
Director

Norman Salo Engineering Consultants, Inc.

"R. Waiau, M. Hano, E. Lih"
Engineering Office

Mr. Carl K. Takumi
Norman Saito Engineering Consultants, Inc.
2158 Main Street, Suite 203
Wailuku, Maui, Hawaii 96793

Dear Mr. Takumi:

Subject: Environmental Impact Statement Preparation
Notice for the East Maui Water Development Plan

Thank you for providing us the opportunity to review the above mentioned environmental impact statement.

We have no comments to offer at this time regarding the project.

Sincerely,

Jerry M. Matsuda
Lieutenant Colonel
Hawaii Air National Guard
Contracting and Engineering Officer

August 14, 1992

Col. Jerry M. Matsuda
HAWAII AIR NATIONAL GUARD
DEPARTMENT OF DEFENSE
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Mr. Takumi:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT - EISPN

We are in receipt of your prompt response dated July 16, 1992 to our EISPN for the East Maui Water Development Plan. Thank you for your review and stated position on our project.

Sincerely,

Jerry M. Craddick
Director

JKD
xc: Norman Saito Engineering Consultants, Inc.
September 4, 1992

Mr. Carl T. Takuni
Norman Rolo Engineering Consultants, Inc.
Wailuku Townhouse, Suite 203
2144 Main Street
Wailuku, Hawaii 96793

Dear Mr. Takuni:

SUBJECT: East Maui Source Development Project
Environmental Impact Statement Preparation Notice
East Maui Water Development Plan

We have reviewed the subject notice and have no comment to offer at this time. The concern of the Department of Education (DOE) is that the need for new schools is associated with concerning the Community Development Plans (CDP). We request that the need for schools identified in the CDP located in the areas covered by the water development plan is correlated with the need for adequate water allocations when the schools are built.

Should there be any questions, please call the Facilities Branch at 737-4743.

Sincerely,

Charles T. Toguchi
Superintendent

CFT/By

CC: A. Hughes
L. Lindsey

[Signature]

September 28, 1992

Mr. Charles T. Toguchi
Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Mr. Toguchi:

Subject: EAST MAUI SOURCE DEVELOPMENT - EIISP

Thank you for your department's supportive comments on our proposed ENPLAN. As with all State and County agencies that will be affected by this proposed project, as each phase or segment becomes operational, your department will be advised so that Facilities Planning branch staff can incorporate their long range plans into the system.

Thank you again for your comments and continuing concern.

Sincerely,

[Signature]

[Name]

[Title]
Mr. C. Takumi

Additional phases of the DPPlan call for: 1) extending the transmission line in an easterly direction from Hakawalope into the Haiku area; 2) digging eleven (11) wells with a total anticipated well capacity of 16 million gallons per day (MGD); and 3) constructing six (6) pressure-break supply tanks with a total storage capacity of 5 million gallons.

Division of Aquatic Resources Comments:

The aforementioned EIS should describe the impact the proposed activities will have on the area's freshwater and marine resources, and proposed mitigative measures. Particular emphasis should be placed on the applicant's proposal to dig eleven new wells and pump 16 MGD.

Office of Conservation and Environmental Affairs Comments:

Chapter 183-41, HRS, and the Department's Administrative Rules (Title 13, Chapter 2) need to be addressed for the use of Conservation District lands. Specifically, the County of Maui will need to obtain a Conservation District Use Application for any portion of the project that transits conservation lands.

In addition, Stream Channel Alteration Permits may be required from the Commission on Water Resource Management for stream crossings and modifications.

Our Department's Historic Preservation Division has already responded to the County in a separate letter.

Thank you for your cooperation in this matter. Please feel free to call San Levo at our Office of Conservation and Environmental Affairs, at 587-0577, should you have any questions.

Very truly yours,

William W. Pahi
July 29, 1992

Mr. Carl Takumi
Norman Saito Engineering Consultants, Inc.
Waikuku Townhouse, Suite 203
2158 Main Street
Wailuku, HI 96792

Dear Mr. Takumi:

Subject: EAST MAUI SOURCE DEVELOPMENT PROJECT
Environmental Impact Statement Preparation Notice (EISPN) for the East Maui Water Development Plan

Thank you for the opportunity to comment on the subject EISPN. Although we do not have any comments on the EISPN document, we do want to ensure that any work required by Maui Electric Company, Ltd. (MECO) to provide electrical service to any part of the proposed waterlines that needs environmental review be included in your EIS preparation process. This will eliminate the need for MECO to prepare its own environmental document for the installation of power lines and other electrical equipment, thereby reducing the possibilities of project delays.

According to your projected phases and dates for the subject project, Phase 1 is scheduled for completion by June 1993. If any electrical service is required for this first phase (or subsequent phases), it is imperative that MECO be contacted as soon as possible with regards to the details of the project.

If you have any questions or concerns, please contact David Park at 871-2372.

Sincerely,

Edward L. Reinhardt
Manager, Engineering

August 14, 1992

Mr. Edward L. Reinhardt
MAUI ELECTRIC COMPANY, LTD.
210 West Kamehameha Avenue
F. O. Box 398
Kahului, Hawaii 96732

Dear Mr. Reinhardt:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT - EISPN

Thank you for your comment dated July 29, 1992 on the proposed East Maui Source Development Plan. While it is premature at this early juncture to determine specifically the electrical demand for our project, the typical requirements will be at the various pump and booster stations, as well as the well sources. We anticipate including these mechanical component items in the environmental discussion for the project; the availability of power source to the required location may require environmental analysis on the part of MECO since we cannot predict or plan how electricity to the various sites requiring electrical power will be provided. Please be assured that there will be adequate lead time for electrical source delivery planning and that MECO will be an integral part of the planning process.

Thank you for your timely comment. Please be assured that the Department will be in continuous contact with your agency.

Sincerely,

David L. Crandick
Director

HK: sb
RE: Norman Saito Engineering Consultants, Inc.

"By Water All Things Flow Life"
Mayor Linda Crockett Lingle
Office of the Mayor
200 S. High St.
Wailuku, HI 96793

Re: EIS Preparation Notice for the East Maui Source Development Plan

Dear Mayor Linda Crockett Lingle:

I represent various residents of the East Maui area with respect to which wells are proposed to be developed pursuant to the East Maui Source Development Plan. On their behalf, I request to become a consulted party pursuant to §13-209-15(b) of this state's "Environmental Impact Statement Rules" (hereafter "Rules"). By these Rules, the consultation process is to be used to develop a fully acceptable EIS prior to the time the Draft EIS is completed.

I have reviewed the Environmental Assessment and the Preparation Notice prepared for this project by Norman Salto Engineering. From the outset, it must be acknowledged that the Salto Engineering firm may have a conflict of interest with respect to this project because it received funds to plan this project and may receive further funds after the completion of this EIS to pursue the project. I have the comments which follow on the Environmental Assessment and the Preparation Notice:

1. Description of the project

The Maui County Water Use and Development Plan ("County Development Plan") recommends drilling between 25 and 28 wells in the Haiku area to obtain between 14 and 25 mgd and transmitting this water to Wai'ula, Pukalani, Hana, and Kahakuloa. Rural Haiku would be subsumed within the urban Wailuku water system.

At the same time, the East Maui Water Development Plan ("East Maui Plan") calls for the construction of 11 wells, with a total anticipated capacity of 16 mgd, and transmission of this water to serve the needs ascribed to the areas above.

The scope of this project should not be limited to the study of 11 wells producing 16 mgd. It must be expanded to analyze the environmental impacts of drilling between 25 and 28 wells producing between 14 and 25 mgd.

2. Multiple or phased agency actions

Groups of actions proposed by an agency must be treated as a single action when component actions or phases are increments of a larger total undertaking, when an individual project is a necessary precedent for a larger project, or when an individual project represents a commitment to a larger project. See §13-209-7 of the Rules. Members of the Board of Water Supply ("BWS") have discussed proceeding with segments of the East Maui Plan without an EIS. For example, the BWS has applied for a pump installation permit for its first well. Also, the Board has discussed installing a 12 inch pipeline from the first well to the Kamole Pipeline to supplement upcountry water demands. Both of these projects are components of the larger project and must be included within the scope of the EIS.

No action with respect to any component of the East Maui Development Plan (other than the already approved drilling of the test wells) can take place without violating our state's environmental law. The water derived from the two wells cannot be used for any purpose by the County of Maui without violating these rules.

3. Purpose of the proposed agency action

The Preparation Notice indicates that the purpose of the proposed action is simply to meet the water needs required in the Wailuku-Haikului, Kibei-Hakens and Pala-Haiku Community Plans. It is too facile to suggest that this plan has been developed simply to meet the water demand created by the "build-outs" in the three referenced community plans, for the following reasons:

First, the wells area being drilled on A&B land and some analysis should be included with regard to any agreements with A&B and on all A&B projects serviced by this new system. Second, it is widely understood that at least some of the entities entitled to water under the Joint Venture Agreement for the Central Transmission Line will have priorities to the water developed in East Maui. Third, the County Development Plan, in Table 1.45 on page 1-18, includes a chart showing the "Total Projected Increase in Demand for Wailuku System" which demonstrates that the increase in demand is being generated through ephemeral Project District in Wailuku, Haiku, and Kibei-Hakens including, for example, the Waiakeo Golf Course Project and Wailea 670. Some discussion must be
inclusion on whether these proposed uses are reasonable or
beneficial and on whether priorities should be established
for the use of the water developed in East Maui, reserving
water for such uses as Hawaiian Home lands, promoting
diversified agriculture and providing affordable housing.

4. Neither the Environmental Assessment nor the
Preparation Notice identify the significant adverse
impacts which may result from this agency action.

The Rules contain clear instructions on the types of
activities which typically have significant effects on the
environment. See §III.200-12. Neither the Environmental
Assessment nor the Preparation Notice adequately address
these criteria.

The Preparation Notice includes a statement that the
development of 16 mdp in East Maui will not be "a stimulus
for growth" but instead simply meets the water needs required
in the Wallahu-Kahului, Kiholo-Makena and Pala-Haku Community
Plans. This project's precursor, the Central Maui
Transmission Line, certainly stimulated growth in Kihei and
Makena. It is too facile to suggest that this Plan has been
developed simply to meet the water demand created by the
"build-outs" in the three referenced Community Plans, for the
following reasons.

While the Maui Water Plan requires data on the
sustainable yields for all hydrologic units, the Commission
on Water Resources Management ("CWM") has recently adopted
the term "developable yield" which means the net amount of
water which can be developed after accounts are subtracted for
other purposes such as in-stream values, when a well may
diminish stream flow. Neither Plan attempts to quantify
developable yield.

The Preparation Notice indicates that Haku will be
submerged within the area served by the Central Maui Water
System. Some discussion of the impact of this must be
included since the Pala-Haku Community Plan calls for a
primarily rural-agricultural region whereas the other areas
served by the Central Maui Water System are primarily urban
in nature.

The EA is weak not only in its description of the
technical characteristics of the project but also in its
description of its social, economic and environmental
characteristics. Likewise, its discussion of the affected
environment, summary of major impacts and mitigative measures
are wholly insufficient.

In result, only three reasons are given to support the
determination that an EIS is necessary. If the only issues
addressed in the EIS are those stated in Section V of the
Environmental Assessment, the document will be unacceptable.

Other issues must be addressed, in addition to those
already discussed above. As a primary example, what will be
the impact of drilling 11-28 wells, spread eastward across
Haku, on the many streams and springs in the area? This
issue has not even been mentioned in the EA or the
Preparation Notice. This is a primary concern of East Maui
residents. This is a subject matter about which more must be
known before the County Development Plan is adopted and
before the East Maui Plan is implemented.

If the BWS intends to implement the East Maui Plan, it
should immediately allocate funds to collect baseline data
with respect to all of the streams and springs which could be
affected by the drilling of the 11-28 wells. The availability
of this data base will be absolutely essential in assuring
that in-stream values, riparian and appurtenant water rights
are protected, as required by the State Water Code.

5. The alternatives proposed for analysis are
incomplete.

The Rules require the study of all reasonable
alternatives which could achieve the goals of the proposed
action. The Preparation Notice includes no discussion of the
feasibility of developing alternative water resources. The
County Development Plan indicates that 16 mdp can be developed
in the Waiale's Aquifer for $18.6 million. No adequate
explanation is included on why the development of this
resource has not been recommended. This is a subject which
must be discussed in the EIS.

6. Clarification of the statement of the preparer

A letter from Saito Engineering dated July 2, 1992
states:

The EIS /S is being prepared for submittal to the
Board of Water Supply for their subsequent review and
acceptance as a Full Environmental Impact
Statement (EIS).

The implication is that the EA will be transformed into an
EIS. The BWS should take this opportunity to correct this
statement. The EA does not meet the legal requirements for an
EA, much less the much more rigorous requirements for an EIS.
7. The EIS must be expanded to meet content requirements.

Finally, the Rules provide specific guidance on the content requirements for the EIS. The Environmental Assessment and the Preparation Notice are inadequate and circumscribe too narrowly the scope of an acceptable EIS. The East Maui Water Development Plan cannot be adopted until all of the significant adverse impacts of such an effort are known.

Thank you for the opportunity to comment as a consulting party.

Sincerely yours,

Isaac Hall

3H/jp

cc: County Board of Water Supply
Norman Salto Engineering Consultants, Inc.
OEoC

September 3, 1992

Mr. Isaac D. Hall
2087 Waiwai Street
Wailuku, Hawaii 96793

Dear Mr. Hall:

Re: EAST MAUI WATER SOURCE DEVELOPMENT PLAN - EIS

We have received your comments dated August 5, 1992, on the East Maui Water Development Plan and we respond to the comments as follows:

1. Your reference to the discrepancy between the number of wells to be drilled for source development is understandable. The EIS plan as well as the Maui County Water Use and Development Plan is based upon the anticipated volume of water needed in the next 20 years to serve the three Community Plans associated with our Central Maui Water System. The quantity is based on the land use policies as adopted in the Community Development Plan and mandated by the General Plan objectives which is a function of the Planning Department and Maui County Council. The number of wells needed to achieve this objective, based upon more detailed analysis, has shown that fewer wells than originally planned may be capable of producing the needed volume of water to meet the demands. Other wells may be necessary however, the number and location of other wells can only be determined after these exploratory wells are tested. The EIS will be amended accordingly should the necessity arise.

2. The reference to "Phased or Multiple" agency actions is understood and the development of the EIS document is witness to that awareness. The Board of Water Supply will not act or proceed in matters of developing water supply for Maui County consumers in violation of State or County ordinances or laws.

3. Both the Department and the Board of Water Supply are aware that there may appear to be a potential for preference to

"By water all things fail but life"
landowners and other interests. However, any agreement or relationship that would be binding on the Department must be ratified by the Board in open and public session. It is the Department's intent to develop water as a resource for the County as a whole, without specific preference or priority as to who that consumer may be.

4. The significant adverse impacts will be identified as they come to the surface in the EIS analysis being conducted by the consultants. The Department will respond to the best of its ability, and will insure that the engineering consultants provide the best technical data to respond effectively to your stated concerns. The fifteen year duration of the EIS plan permits close monitoring of the yield being realized as each pair of wells are drilled. If more wells are determined to be drilled, or fewer wells are considered necessary, this decision will be made by the Department based on engineering principles with the policy of not adversely impacting the Puna-Belau aquifer. The walls are basal aquifer walls and will not affect the surface and perched water sources.

5. Alternative alignments were discussed and evaluated by the Consultants, Department staff and the Board. The preferred alignment is what is being analyzed in the EIS currently in preparation. The Waimea Aquifer and the 8 mgd development capability for $15.6 million dollars was examined and discarded since it would not have met the total demand predicted by the Community Development Plans.

6. The matter dealing with the Board of Water Supply reviewing and determining the acceptability of the EIS documents was done with the understanding by the Mayor that the Board was the more appropriate body to make this determination. Your assumption that the EISPH or the EA would be transformed into an EIS is incorrect. As to whether the DEIS or the FEIS meets the EIS legal requirements, the Planning Department will also provide their overview expertise on this aspect.

7. The content requirements for the EIS will be set in the DEIS. Your comments are continuing food for thought; and the Department shares your concerns that the DEIS is fully reviewed and receives full discussion. As a disclosure document, the EIS will provide adequate information for the Board to arrive at a fair and just conclusion.

Sincerely,

DEPARTMENT OF WATER SUPPLY

David R. Craddick
Director

HK:ab
NC: Norman Saito Engineering Consultants, Inc.
Landmark
Maui
Properties

Mayor Linda C. Lingle
County office Building
Wailuku, HI 96793

RE: The East Maui Water Development Plan, Environmental Assessment thereof

Dear Mayor Lingle:

The Maui Board of Water Supply (BWS) is considering adopting the above plan which recommends drilling 23-28 wells to obtain 14-25 mgl, then transmitting this water from East Maui into the Central Maui Water System to supply Central & South Maui's water needs into the next century.

The Environmental Assessment (EA) prepared by Norman Engineering Consultants, Inc. is a superficial and flawed document that doesn't begin to deal with the implications of such a vast undertaking.

The EA doesn't raise the critical question as to who pays for the project and who benefits. It is obvious that developers are the chief beneficiaries and that A&B is the principal beneficiary, specifically their proposed developments in the Pala'auKiku areas. Without water, land is not so valuable; water makes the difference. We will be making developers wealthy while impoverishing the landowners, farmers and residents of E. Maui.

Far beyond the scope of this EA, but of utmost relevance is the question of this island's ability to feed itself. In the years of cheap water in California and inexpensive shipping costs, it has been possible to import food for less than it costs to grow it here. At this point we import over 70% of our food. Only modest increases in national and/or international conditions and we could find ourselves unable to feed our people. Nor could we quickly do victory gardens in the new subdivisions. We need a long-term agricultural development plan, supported by a water plan, together with a policy that supports farmers so that we have the resources to feed ourselves.

This is not a issue of any interest to developers who job is to do whatever is necessary to make their investments pay off. It is a matter of long-range vision and strategy. Yet of the utmost importance to the farmers and growers of E. Maui and the Upcountry area and all the people of Maui, especially policy makers.

Clearly, water policy, water development and allocation is critical and must conform to the growth guidelines developed in the Community Plans and in the County General Plan. Spending $50 million dollars, laying 66,000 feet of transmission line and 24,000 feet of connecting pipes is a major undertaking. Have other, more available and less expensive alternatives been pursued?

The EA dismisses the "Social and Economic Characteristics" in two paragraphs. The EA claims that the EMFPlan is "not in and of itself a stimulus for growth, but is a mandate from the Community Development Plans previously implemented as land use policies for Wailuku-Kahului, Kihei Makana, and Paia-Haiku Community Plan regions." The delivery of water is absolutely a stimulus for growth as evidenced by the dramatic growth of South Maui after the development of the Central Maui transmission line in the mid-70s.

Some social and economic impacts of such extravagant and exorbitant transfer of resources for the benefit of developers are:
* the character of rural life will be irrevocably changed in a short period of time; * the essential resources for fruit and vegetable farming and flower production will be dramatically decreased in E. Maui and throughout the Upcountry area; * appurtenant and riparian rights will be ignored in favor of making desert land very valuable to developers; * Hawaiians will, once again, have their dreams deferred; * The recommendations of the Paia-Haiku community association will be ignored as will the recommendations of the Maui County General Plan.

There is no mention of the environmental impact of drilling 23-28 wells in East Maui. Dozens of streams may be affected, along with the lifestyle of people living along those streams.
There should be further mention of what arrangements, understandings, benefits and agreements have been made with A&B regarding easements, water allocations, and proposed developments.

Given adequate rainfall and proven reserves, E. Maui is a community that would gladly share its resources with our island neighbors, especially farmers and Hawaiian Home Lands owners. But with such clear warnings signs of the limits to our scarce physical resources and further limits to our financial resources and the already known and unmet needs of our farmers and Hawaiian Homes landowners, this EA offers inadequate evidence for proceeding with the development or the proposed EMPlan.

The devastating drought of this past winter should be a wakeup call to all of us. (I walked stream beds that haven't been dry in 20 years.) Given scant knowledge of the actual water reserves in this area and the huge demand that this EMPlan proposes to satisfy together with the tremendous impact such a diversion will have on the resources of this area, I recommend that E. Maui be designated a water management area under provisions of HRS 174c-41. Grounds for such a designation may be found, I believe, in both ground water criteria and surface water criteria. See HRS 174C-44&45.

Sincerely,

Mark Sheehan(PB)

Cc: Carl Takumi
Norman Saito Engineering CONSULTANTS
August 31, 1992

Mr. Mark Sheehan

LANDMARK MAUI PROPERTIES
P. O. Box 439
Makawao, Hawaii 96768

Dear Mr. Sheehan:

Re: EAST MAUI SOURCE DEVELOPMENT PROJECT - EIS

Your recent letter to Mayor Lingle was forwarded to our office for response, and we provide the following responses to your comments:

1. **Financing of the ENPLAN**: We would point out to you and others who perhaps are not aware of the semi-autonomous status of the Department. As such, we are able to establish through formal hearings by the Board of Water Supply, operating rules and regulations that include the establishment of fees for water services. The Central Maui Source Assessment Fee has been in practice for over 15 years and the proposed ENPLAN will be financed by the Department in its entirety. Beneficiaries of water development are the consumer public, and we do not differentiate who that public is.

2. The ENPLAN is not designed to diminish or remove current sources of agricultural water to the East Maui agricultural users. Water that will be developed from the proposed well sites will have their source from the basal aquifer, and high level water will not be negatively impacted.

3. Alternative and less expensive alternatives for water development have been studied by the Department. These include desalinization, dual system for potable and non-potable, i.e. treated sewage effluent for agricultural use, and less water intensive landscaping for private and public users. Of specific interest to the project is the ability to develop the Iao aquifer to the maximum yield remaining. This alternative was examined from a cost-benefit analysis and it was concluded that the yield to be realized for the costs to be incurred were not in the public’s best interest.

"By Water All Things Find Life"

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Mr. Mark Sheehan

Re: EAST MAUI SOURCE DEVELOPMENT PROJECT - EIS

August 31, 1992

Page 2

4. Water development as a "stimulus" for growth has been a discussion item throughout the State and the four counties for many years. The Department does not and will not establish or formulate land use policy for Maui County. This planning function is with the Planning Department and approvals for proposed land uses are with the County Council in the checks and balance system. The Department will continue to provide the water supply to the consumer public where projected growth has been determined and approved, no matter what the zoning designation or who the user may be. The development of adequate source, storage and transmission facilities is not an overnight phenomenon, but takes planning, design, and construction well in advance of delivery. It does not, however, precede land use policy decisions and or formulate these policy matters. The character of the upcountry Maui communities will continue to as they are and we will continue to provide them with water as customers of the Department.

5. The environmental impact of "drilling 25-28 wells in East Maui" is the subject of a specific study by the consultant's hydrogeologist. It is their preliminary analysis that the wells to be drilled (five pairs plus a single well) are to be drilled to each and draw water from the Pala basal aquifer. High level water will not be impacted negatively by this drilling. In the event that the yield is not as anticipated, or if there is negative impact to the adjacent streams, the source will be relocated.

Your comments have been forwarded to the engineering consultants and will be included in the Draft EIS. Thank you for your sincere interest and concern.

Sincerely,

David R. Craddock
Director
In the ten year Community Plans, there is no "mandate" for a fifteen year EMPlan. In fact, the only time dimension exceeding ten years in the current Palahaku Community Plan, as regards water is the 11-20 year recommendation to "promote water conservation and awareness programs."

It has also come to our attention that the Board of Water Supply is considering adopting the County Development Plan which recommends drilling 23-28 wells in the East Maui region. By contrast, the Environmental Assessment for the EMPlan only discusses 11 wells to be drilled. This is another way in which the EA does not address the scope of source development plans in East Maui.

An inherent flaw in the EMPlan is that it does not involve scientific investigations and research or the accumulation of factual data, for determination of how the water resources in the area may be threatened by the proposed withdrawals and diversions of water.

The EMPlan makes no commitment to exploratory well drilling, but only mentions it as a proposed mitigation of a potential major impact. Without question, a project so vast in its draw on the East Maui water source should begin with testing to establish the scientific data for assessing the proposal and its impacts. Without these data, an adequate environmental impact statement cannot be constructed.

Relative to this lack of research is the potential major impact on the many streams and springs in the area. The EA entirely overlooks these important local resources. Without conducting detailed analysis on all streams and spring flows, including the decline of the EMPlan, an adequate EIS is impossible. The EIS must go farther in addressing all the issues. Without the establishment of baseline data, no EIS for this EMPlan can possibly be accurate, adequate, or sufficiently address the environmental impacts of the plan.

A final point in this correspondence is the flaw in the unsubstantiated assumption that such a demand for water resources will exist in the Central Maui Water District based on "planned growth." It is historically evident that the availability of desirable resources is among the greatest stimulants for growth and development in an area. To make such a vast quantity of East Maui water available to Central Maui will very likely encourage development beyond the guidelines of the affected Community Plans and the Maui County General Plan.

We hope to be presented with a complete, scientifically substantiated, technically accurate, and environmentally sensitive EIS for any EMPlan.

Sincerely,

Richard Jackson, Esq.
Executive Director

CC: Office of the Mayor
Dept. of Water Supply
Norman Sano Engineering Consultants
September 2, 1992

Mr. Richard Joseph LaFond, Jr.
MAUI TOMORROW
355 Hukuili Street
Kahului, Hawaii 96732

Dear Mr. LaFond:

Re: EAST MAUI SOURCE DEVELOPMENT PROJECT — EISPN

Your recent letter dated August 7, 1992 on the subject ENPLAN was received, and we respond to your comments as follows:

1. The two themes of the Maui County General Plan are:

   (1) Protect Maui County’s agricultural land and rural
       beauty is a function of the General Plan and
       Community Plan process the Department of Water Supply is
       mandated to support and willingly supports. The
       community planning function lies with the Planning
       Department, the Planning Commission and the Maui County
       Council.

   (2) Prepare a directed and managed growth plan
       The ENPLAN is a direct response by the Department of
       Water Supply to provide a directed and managed growth
       plan for the development of water for the needs of the
       Central Maui area.

2. The Community Plan are working planning documents and subject to review and revision every ten years to allow for the changing needs of the community. Socio-economic studies performed by the Maui County Planning Department for the Community Plans are based upon 20-year projections. Likewise,

Mr. Richard Joseph LaFond, Jr.
Re: EISPN — East Maui Source Development Project
September 2, 1992

Page 2

it is only prudent for the Department of Water Supply to have a long range plan such as the ENPLAN. The ENPLAN like the Community Plans is dynamic and ready to meet changes in water demand.

3. There have been other studies regarding the aquifer in this area. The wells proposed in the ENPLAN are part of the process of aquifer exploration and data gathering. The wells are to be constructed in phases and monitored. The result will allow the Department to use the water to meet the water demands of the service area while accumulating data for a better understanding of the aquifer being explored. The 11 wells in the ENPLAN is anticipated to provide water needed over a 15 to 20-year period. The wells are basal aquifer wells and will not affect the surface and perched water sources presently being used for agricultural purposes.

4. Finally, on the subject of water as a “stimulus” for growth, water is only one of many infrastructure improvements that must be realized before growth is stimulated. The phased development of 16 MGD of water is anticipated to occur over a 15-year period and not at one time. The quantity of water needed is based upon Community Plan land use zoning. The Department plans to develop the wells as the need arises.

In conclusion, the ENPLAN allows for programmed long-term water development with conscious environmental awareness to meet the needs of the Community Plans within the Central Maui Water Service area.

Sincerely,

David R. Craddock
Director

[Signature]

Norman Saito Engineering Consultants, Inc.
July 10, 1992

Mr. Carl Takumi
Norman Saito Engineering Consultants, Inc.
Wailuku Townhouse, Suite 203
2158 Main Street
Wailuku, Maui, Hawaii 96793

Dear Mr. Takumi:

Re: East Maui Source Development Project
E.I.S. Preparation Notice for the East Maui Water Development Plan

In response to your letter dated July 2, 1992 regarding the above referenced matter we have reviewed your Preparation Notice and make the following comments:

1. Although the Technical Characteristics describe Phase 1 of the Plan it fails to identify the subsequent phases except in general terms. If the E.I.S. is to address compliance with HRS 343 for all phases of the Plan then each of those phases should be identified in detail with their potential impacts and appropriate mitigation proposed.

2. Impacts relative to the diversion of water resources from the Pala-Maiku Community Plan Region to the central Maui (Wailuku-Kahului and Kihei-Makena Community Plan Regions) area should be addressed. By directing water resources to another region future development in the area where diversion is occurring will be hampered unless adequate source is available to serve both areas or a commitment is made to limit future urban development in the Pala-Maiku region. What would be the economic and social impacts on these regions as a result of this Plan? This issue should be addressed in the Environmental Impact Statement.

Also, short term impacts on the labor force and economy will occur. The project will generate construction jobs and secondary services which affect the economy. These should be addressed in the Environmental Impact Study.

3. Potential environmental impacts resulting from the major gulch crossings, undeveloped lands and agricultural lands, etc. should be identified and addressed in the environmental impact statement. The current assessment identifies only historic/cultural, air and noise and drainage and erosion impacts. However, these impacts are not evaluated in detail except to reference that standards will be met during subsequent permit reviews. The environmental impact statement should address these impacts in greater detail.

4. The various alternatives considered should be described in greater detail in the environmental impact statement.

Thank you for the opportunity to comment on the assessment and Preparation Notice for an Environmental Impact Statement. We further request that the Planning Department be included in your reviewing agencies for the draft and final environmental impact statements.

If additional clarification is required please contact my office at any time.

Very truly yours,

BRIAN MISKAE
Planning Director

cc: David Creedick, DNS
Robert Kekuana Colleen Guyana
(C:sea\letter.icid\ Elvisater)
August 31, 1992

Mr. Brian W. Hiskes
Director of Planning
County of Maui
Wailuku, Hawaii 96793

Dear Mr. Hiskes:

Re: EAST MAUI SOURCE DEVELOPMENT PROJECT, EIS PREPARATION NOTICE

We are in receipt of your agency's comments dated July 10, 1992 on the proposed East Maui Water Development Plan and we respond as follows:

1. The phasing plan and anticipated schedule for the EISPLAN will be detailed using the actual Plan as the format. The mitigation plans will also be discussed to the extent practicable.

2. The technical aspects of diverting water from the East Maui aquifer to the Central Maui Water System will be detailed as provided by the hydro-geologist retained for this project. For your information, the wells to be drilled will be to reach the basal aquifer, and the high level water which can impact the surface sources for Paia-Haiku should not be negatively impacted. Socio-economic impacts to the labor force and the economy in general have not been addressed specifically, but in general, the impacts should be positive in view of the current economic downturn.

3. The physical impacts that will result from the Plan's alignment will be discussed in detail. There is an archaeological study that is nearing completion and the impacts at the major gulch crossings will be discussed. Traffic is not expected to be a major impact item since the work will be taking place on highway or service road rights-of-way. Contractor responsibility for traffic management will be a condition in the bid award process.

"By Water All Things Flow On"
September 25, 1992

Ms. Charmaine Tavares, Director
Department of Parks and Recreation
County of Maui
1550 Kauhuma Avenue
Wailuku, Hawaii 96793

Dear Ms. Tavares:

Subject: EAST MAUI SOURCE DEVELOPMENT PROJECT
Environmental Impact Statement Preparation Notice (EISPN) for the East Maui Water Development Plan.

We have received your department's comments dated July 30, 1992 and acknowledge your no comments position. Thank you for your continuing interest in our projects.

Sincerely,

[Signature]

David M. Crockett
Director

cc: Norman Saito Engineering Consultants, Inc.

July 30, 1992

Mr. Carl Takumi
Norman Saito Engineering Consultants Inc.
2156 Main Street
Wailuku, Hawaii 96793

Subject: EAST MAUI SOURCE DEVELOPMENT PROJECT
Environmental Impact Statement Preparation Notice (EISPN) for the East Maui Water Development Plan

Dear Mr. Takumi:

We have reviewed the subject EISPN and have no comments to offer at this time.

Thank you for allowing us to comment on the project.

Sincerely,

[Signature]

Charmaine Tavares
Director
October 14, 1992

Mr. David L. Martin
NATIVE HAWAIIAN ADVISORY COUNCIL
1500 Bishop Street, Suite 1204
Honolulu, Hawaii 96813

Dear Mr. Martin:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT - EIS/P
d

We are responding to your office's comments dated August 7, 1992 on the subject project as follows:

1. Your concerns over the plight of water rights and uses for Hawaiian is correct and proper for your office to pursue. We have avoided distinguishing between types of uses but have maintained a service policy that water is available to all residents of Maui County and we will continue to provide potable water to all Maui County consumers.

2. We feel that the concerns expressed in the balance of your letter would be more suitable for the Office of Environmental Quality Control, the State Legislature, and certainly the Department of Hawaiian Home Lands. It is our position that we will comply with the overall review procedure for processing of documents under the policy of the State.

Thank you for your comments, and we look forward to your review of the DEIS.

Sincerely,

[Signature]

Donald W. Cradick
Director

Enc: NORMAN SAITO ENGINEERING CONSULTANTS, INC.

"By Water, All Things Flow & Life"
Unfortunately, our concerns about Hawaiian water rights and water uses are not being addressed at the regional level. Parties such as the National Park Service, Keola Hana Maui, Inc., East Maui Irrigation Co., The Nature Conservancy, and the Dept. of Land and Natural Resources have entered into a cooperative management agreement for East Maui watersheds, but representatives of Hawaiian concerns have been excluded from these proceedings. The DEIS must also address this lack of representation and seek means of resolving it so that Hawaiian water rights-holders and water users are involved and can more appropriately influence watershed management policy and participate in the decision-making process.

The DEIS must also consider other legal implications of the proposed project, since it would involve inter-basin transfers of water in areas not formally designated as water management areas (WMA) by the State Water Commission. While the State Water Code expressly allows such transfers within designated WMAs, it is otherwise silent on the issue. Hawaii common law currently dictates that these transfers are not allowed. Also of concern is the potential impact of proposed water source developments on instream flows.

Finally, the DEIS must consider the potential impacts of the proposed project upon the water rights reserved to Hawaiian Home Lands and other ceded lands, especially where water source development would take place on government land. These rights were reconfirmed and strengthened by Act 325 of the 1991 State legislature.

The proposing agency, Maui County, is also in the process of revising its Water Use and Development Plan (WUDP), a component of the Maui Water Plan. Act 325 mandates that the Maui Water Plan plan for uses of water on Hawaiian Home Lands by reserving water for their future use. East Maui Source Development is cited in the current draft WUDP as a part of the county planning strategy. The DEIS must therefore explain the proposed project's relationship with the Maui County Water Use and Development Plan and with the requirements of Act 325.

Finally, we would like to express our concern over the ability of the consultant to adequately address the wide range of issues confronting the EIS. Thus we reiterate our suggestion that all phases and aspects of the EIS preparation process be open to public involvement. Maui people, and especially Maui Hawaiians must be empowered to help formulate the assumptions and methodologies that will be used to perform environmental assessments, and furthermore they must be empowered to influence contractor selection and to be contracted themselves for assessment work.

Perhaps the ultimate solution to this kind of problem is similar to the California approach, in which a state agency similar to CEQIC is responsible for actually preparing all environmental assessments. This seems to relieve the inherent unfairness of allowing developers to bring in 'hired guns' for EIS formulation.

Thank you for considering our comments in preparing the DEIS. We hope that we will hear from you often before it is published.

Mahalo,

David L. Martin, Vice-President

cc: Office of the Mayor, County of Maui
    County of Maui Department of Water Supply
    Norman Salito Engineering Consultants
    Water Commissioners
    Keaau-Waikamoi Community Association
    Hana Community Association
    Keaau Taro Growers
    Ka Lehui Hauli/Maui
    Native Hawaiian Legal Corp.
October 14, 1992

Ms. Patricia Tummons
Environment Hawaii
733 Bishop Street
Honolulu, Hawaii 96813

Dear Ms. Tummons:

RE: ENPLAN DEIS - East Maui Source Development Plan

We are responding to your comments dated July 22, 1992 on the East Maui Source Development Plan Draft Environmental Impact Statement (ENPLAN DEIS). We regret that your comments were not responded to in a more timely manner and apologize for the oversight.

Your concerns have also been expressed by other concerned agencies and individuals, and we feel that we have adequately discussed these concerns in the DEIS. The well drilling methodology is described in Chapter IV, Impacts on the Physical Environment, with specific references to sub-section 4.7, Hydrology.

The premise that water source development will spur urban development that otherwise might not take place is addressed in Chapter III, Relationship of the Proposed Project to Existing Public Plans, Policies, and Controls.

Thank you again for your continuing interest and we look forward to your review of the DEIS.

Sincerely,

David H. Craddock
Director

NORMAN SAITO ENGINEERING CONSULTANTS, INC.

"By Water All Things Are Life"
CHAPTER XI PARTICIPANTS IN THE PREPARATION OF THE DEIS

The DEIS was prepared for the Department of Water Supply, Maui County by Norman Saito Engineering Consultants, Inc., and Parametrix, Inc. The following list identifies individuals who were involved in the preparation of the DEIS and their respective contributions.

Norman Saito Engineering Consultants, Inc. - Civil Engineering
*Water Resource Associates - Hydrology, Geology

Parametrix, Inc. - Environmental Impact Statement
*Aki Sinoto Consulting - Historical / Archaeological

* Subconsultant in document preparation
CHAPTER XII.  CONSULTED PARTIES AND COMMENTS RECEIVED

12.1  Consulted Parties

The DRAFT Environmental Impact Statement (DEIS) for the proposed East Maui Water Development Plan was published in the OEQC Bulletin on October 23, 1992. The forty five day review period ended on December 7, 1992. In addition, the DEIS was mailed directly to the agencies and organizations listed below. A total of twenty three comments were received.

**Federal Agencies**

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**State Agencies**

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<td>Department of Education</td>
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<td>Dept. of Hawaiian Home Lands</td>
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State Agencies

Dept. of Land and Natural Resources
State Historic Preservation Division

Department of Health
Environmental Management Div.

Dept. of Transportation
Highways Division
Airports Div. c/o Kahului Airport

Office of State Planning

Office of Hawaiian Affairs

University of Hawaii
Water Resources Research Center

Office of Environmental Quality Control

Univ. of Hawaii, Environmental Center

State Land Use Commission

Department of Budget and Finance
Housing Finance and Development Corporation

Private Sector/Community Groups

American Lung Association

Alexander & Baldwin, Inc.
Ms. Meredith Ching

A & B Properties, Inc.

C. Brewer Properties, Inc.

Central Maui SWCD

Hawaiian Commercial & Sugar Co.

Maui Electric Company, Ltd.

Maui Land & Pineapple Co.

Maui Lani Development

Hawaiian Electric Company, Inc.

Date Comment Received

12-7-92

12-7-92

11-2-92

11/9/92

11-5-92

12-7-92

12-3-92

11-6-92
<table>
<thead>
<tr>
<th>Private Sector/Community Groups</th>
<th>Date Comment Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Nature Conservancy</td>
<td>12-7-92</td>
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<tr>
<td>Hui Alanui O Makena (via Isaac Hall)</td>
<td>12-7-92</td>
</tr>
<tr>
<td>Sierra Club</td>
<td>12-7-92</td>
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<tr>
<td>Isaac Davis Hall</td>
<td>12-7-92</td>
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<tr>
<td>Keauhou O Honuaula, Inc. via Isaac Hall</td>
<td>12-7-92</td>
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<tr>
<td>Landmark Maui Properties</td>
<td>12-7-92</td>
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<tr>
<td>Maui Tomorrow</td>
<td>12-7-92</td>
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<td>Environment Hawaii</td>
<td>7-12-92</td>
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<td>Native Hawaiian Advisory Council</td>
<td>8-7-92</td>
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<td>Native Hawaiian Legal Corporation</td>
<td>12-9-92</td>
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<th>Maui County Government</th>
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<tr>
<td>Planning Dept.</td>
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<tr>
<td>Dept. of Parks &amp; Recreation</td>
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<td>Dept. of Public Works</td>
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<tr>
<td>Economic Development Agency</td>
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<tr>
<td>Maui County Council</td>
</tr>
<tr>
<td>The Hon. Howard Kihune, Chair</td>
</tr>
</tbody>
</table>
December 15, 1992

Lt. Col. Jerry H. Matsuda
Department of Defense
3109 Diamond Head Road
Honolulu, HI 96816

Dear Col. Matsuda:

We are in receipt of your agency comments dated December 3, 1992 on the Draft Environmental Impact Statement prepared for the East Maui Water Development plan. Your "No comments" position is duly noted.

Thank you for your cooperation.

Sincerely,

David M. Craddick
Director

cc: Norman Hatano, Engineering

---

December 3, 1992

Engineering Office

Mr. David Craddick
Board of Water Supply
P.O. Box 1100
Wailuku, Maui, Hawaii 96793-7109

Dear Mr. Craddick:

Subject: East Maui Water Development Plan DEIS

Thank you for providing us the opportunity to review the above mentioned environmental assessment.

We have no comments to offer at this time regarding the project.

Sincerely,

Jerry H. Matsuda
Lieutenant Colonel
Hawaii Air National Guard
Contacting and Engineering Officer
Mr. David Craddick  
Director  
Department of Water Supply  
P.O. Box 1109  
Wai'anae, HI 96795  
Dear Mr. Craddick:

Draft Environmental Impact Statement for  
East Maui Water Development Plan

Thank you for allowing us to review the subject document and we offer the following comments:

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3</td>
<td>1</td>
<td>Shouldn't the County's Water Use and Development Plan be part of the rationale?</td>
</tr>
<tr>
<td>1.9</td>
<td>4</td>
<td>A Stream Channel Alteration Permit may also be required by our Commission on Water Resource Management (CWRM) relative to the proposed Molii Gulch crossing and should be included in your listing.</td>
</tr>
<tr>
<td>2.3 &amp; 2.3.7</td>
<td>2 &amp; 4</td>
<td>The phased development of 16 MGD of water does not appear to coincide with the projected demands by the Maui County Planning Department (25 to 29 MGD) and the projected demand of 18.6 MGD noted on page 4.</td>
</tr>
</tbody>
</table>

Mr. David Craddick  
Page 2

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3.1</td>
<td>2</td>
<td>Dan Lam told us that anticipated capacity is 750,000 gpd.</td>
</tr>
<tr>
<td>4.7.2</td>
<td>7-8</td>
<td>The current proposal in the East Maui Water Development Plan (EMPLAN) of drilling eleven exploratory wells should replace the conceptual plan of 28 wells reflected in the current review draft of the Maui County Water Use and Development Plan (WUDP). This will help to reduce confusion and questions raised by the general public.</td>
</tr>
<tr>
<td>4.7.4 &amp; 7.2</td>
<td>9 &amp; 2</td>
<td>Current water withdrawal rate of 17 MGD stated in Section 4.7.1 when compared to sustainable yield figures for the Pali and Ikihi aquifers listed in Section 4.7.2.a., indicates that water use has already reached 100% of the aquifer's capacity and that further groundwater development may not be possible.</td>
</tr>
</tbody>
</table>

Use of various figures for sustainable yield of groundwater aquifers has caused confusion with the general public. The State Water Code, authorized the CWRM to establish sustainable yield figures using the best information available to be reviewed periodically. The CWRM always welcomes any information which would enhance our knowledge of water resources in the State and respectfully requests a copy of the "Central Maui Water Study" mentioned in this section.
ENVIROMENT HAWAI'I
333 Bishop Street, Suite 170-51
Honolulu HI 96813

July 12, 1992

County of Maui
Department of Water Supply
200 South High Street
Wailuku HI 96793

Dear Sir or Madam:

RE: East Maui Source Development Plan


Any EIS prepared for this project should consider the effects of source development upon the streams of the region and the welfare of native plants and animals dependent upon those streams.

I believe also that the EIS should consider the possibility that increased water supplies in the area might spur urban development that otherwise might not take place. The consistency of such possible development with community plans and county plans should be considered.

Finally, the consistency of any water source development plan with the state's ongoing revisions to the State Water Plan (mandated under Chapter 174C, HRS) must be considered.

Thank you for your attention to these concerns.

Best wishes,

Patricia Tummons, editor
Environment Hawai'i

cc: Office of the Mayor, County of Maui
Office of Environmental Quality Control

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 11032
WAILUKU, MAUI, HAWAI'I 96793

October 14, 1992

Ms. Patricia Tummons
Environment Hawai'i
333 Bishop Street
Honolulu, Hawaii 96813

RE: Exploratory Drilling (EID) - East Maui Source Development Plan

We are responding to your comments dated July 22, 1992 on the East Maui Source Development Plan Draft Environmental Impact Statement (DEIS). We regret that your comments were not responded to in a more timely manner and apologize for the oversight.

Your concerns have also been expressed by other concerned agencies and individuals, and we feel that we have adequately discussed these comments in the DEIS. The well drilling methodology is described in Chapter IV, Impacts on the Physical Environment, with specific references to sub-sections 4.7, Hydrology.

The premise that water source development will spur urban development that otherwise might not take place is addressed in Chapter III, Relationship of the Proposed Project to Existing Public Plans, Policies, and Controls.

Thank you again for your continuing interest and we look forward to your review of the DEIS.

Sincerely,

David B. Craddock
Director

HUMA ENGINEERING CONSULTANTS, INC.

"By Water All Things Flow."
October 14, 1992

Mr. David L. Martin
NATIVE HAWAIIAN ADVISORY COUNCIL
1065 Bishop Street, Suite 1204
Honolulu, Hawaii 96813

Dear Mr. Martin:

RE: EAST MAUI SOURCE DEVELOPMENT PROJECT - DEIS

We are responding to your office's comments dated August 7, 1992 on the subject project as follows:

1. Your concerns over the plight of water rights and uses for Hawaiian is correct and proper for your office to pursue. We have avoided distinguishing between types of users but have maintained a service policy that water is available to all residents of Maui County and we will continue to provide potable water to all Maui County consumers.

2. We feel that the concerns expressed in the balance of your letter would be more suitable for the Office of Environmental Quality Control, the State Legislature, and certainly the Department of Hawaiian Home Lands. It is our position that we will comply with the overall review procedure for processing of documents under the policy of the State.

Thank you for your comments, and we look forward to your review of the DEIS.

Sincerely,

Donald X. Creedick
Director

NORMAN SAITO ENGINEERING CONSULTANTS, INC.

"By Water, All Things Find Life"
Unfortunately, our concerns about Hawaiian water rights and water uses are not being addressed at the regional level. Parties such as the National Park Service, Ha'ula Hana Maui, Inc., East Maui Irrigation Co., The Nature Conservancy, and the Dept. of Land and Natural Resources have entered into a cooperative management agreement for East Maui watersheds, but representatives of Hawaiian concerns have been excluded from these proceedings. The DEIS must also address this lack of representation and seek means of resolving it so that Hawaiian water rights-holders and water users are involved and can more appropriately influence watershed management policy and participate in the decision-making process.

The DEIS must also consider other legal implications of the proposed project, since it would involve inter-basin transfers of water in areas not formally designated as water management areas (WMA) by the State Water Commission. While the State Water Code expressly allows such transfers within designated WMAs, it is otherwise silent on the issue. Hawaiian common law currently dictates that these transfers are not allowed. Also of concern is the potential impact of proposed water source developments on instream flows.

Finally, the DEIS must consider the potential impacts of the proposed project upon the water rights reserved to Hawaiian Homelands and other ceded lands, especially where water source development would take place on government land. These rights were reconfirmed and strengthened by Act 325 of the 1991 State legislature.

The proposing agency, Maui County, is also in the process of revising its Water Use and Development Plan (WUDP). A component of the Hawai`i Water Plan, Act 325 mandates that the Hawai`i Water Plan for uses of water on Hawaiian Homelands be reserved for their future use. East Maui Source Development is cited in the current draft WUDP as a part of the county planning strategy. The DEIS must therefore explain the proposed project's relationship with the Maui County Water Use and Development Plan and with the requirements of Act 325.

Finally, we would like to express our concern over the ability of the consultant to adequately address the wide range of issues confronting the DEIS. Thus we reiterate our suggestion that all phases and aspects of the DEIS preparation process be open to public involvement. Maui people, and especially Maui Hawaiians must be empowered to help formulate the assumptions and methodologies that will be used to perform assessments, and furthermore they must be empowered to influence contractor selection and to be contracted themselves for assessment work.

Perhaps the ultimate solution to this kind of problem is similar to the California approach, in which a state agency similar to DEIS is responsible for actually preparing all environmental assessments. This seems to relieve the inherent unfairness of allowing developers to bring in "hired guns" for EIS formulation.

Thank you for considering our comments in preparing the DEIS. We hope that we will hear from you often before it is published.

Mahalo,

David L. Martin, Vice-President

cc: Office of the Mayor, County of Maui
     County of Maui Department of Water Supply
     Noram Seizo Engineering Consultants
     Native Commissioners
     Keahe-Waikapu Community Association
     Ha`ula Community Association
     Ka`ahumanu Association
     Kealakekua Bay
     Maui Hawaiian Legal Corp.
December 7, 1992

David Creddick, Director
Board of Water Supply
c/o Department of Water Supply
P.O. Box 1109
Wailuku, HI 96793-7109

Dear Mr. Creddick:

SUBJECT: Draft Environmental Impact Statement for East Maui Water Development Plan

The Department of Agriculture (DOA) has reviewed the subject Draft Environmental Impact Statement and has the following comments to offer.

We understand that the planning strategy of the East Maui Water Development Plan (EMWDP) is to draw water from sources not currently used for agricultural purposes. The additional water will originate from the basal aquifer and will not affect water availability to the East Maui Irrigation System.

Thank you for the opportunity to comment.

Sincerely,

[Signature]

Yukio Kitagava, Chairperson
Board of Agriculture

Cc: Office of Environmental Control
Carl K. Takumi, Norman Saito Engineering Consultants, Inc.
January 7, 1993

Executive Board
Maui Tomorrow
233 Hakalaea Street
Wailuku, HI 96793

Gentlemen:

We have received your collective comments dated December 7, 1992 on the Draft Environmental Impact Statement prepared for the East Maui Water Development Plan. Our consultants have reviewed the comments and have provided these responses for your information:

1. There is consensus that water as a resource is not infinite if squandered and not protected. Further, to willfully destroy the East Maui sources without the benefit of advanced planning and hydrological design, would be contrary to the mandates of the County Board of Water Supply.

2. Secondary impacts that may be attributed to the provision of potable water, are no different than providing sewage treatment, refuse collection and disposal, police and fire protection. The Department does not establish planning policies in its pursuit of providing water services to the East community at large. The County Planning Department and the County Council establish future policies for long term planning and population growth.

Thank you for your continuing interest.

Sincerely,

David H. Craddick
Director

cc: Hawaiian Salto Engineering
January 7, 1993

Mr. John T. Harrison, Ph.D.
Environmental Center
University of Hawaii
2550 Campus Road
Honolulu, HI 96822

May 5, 1993

Dear Mr. Harrison:

We are in receipt of the Center's comments postmarked December 7, 1992 on the Draft Environmental Impact Statement prepared for the East Maui Water Development Plan. Our retained civil engineering consultants and the sub-consultants who prepared the DEIS, Parsons Inc., have reviewed the comments and prepared the following responses:

1. The discrepancy in the numbering of pages was an error on the part of Parsons Inc., and will be corrected in time for the FEIS.

2. The FEIS will be printed on both sides of the pages whenever possible.

3. Historic and Archaeological Sites: Please understand that the alignments discussed in the DEIS are proposed and not necessarily final in terms of alignment selection. Once the final alignment is selected and construction drawings completed and reviewed for building and grading permits, the concern over the potential presence of significant sites will not be overlooked. This will be especially true of the undisturbed sites along Kalihi Gulch. The balance of the proposed alignments which will run in existing highway and agricultural service road rights-of-way, will not be high potential sites.

4. Reallocation of Existing Resources:
   a) The Board of Water Supply will review the future long term use of water purchased at the present time from the East Maui Irrigation Company in terms of its disposition. At this time, it is premature to make this determination. This is a fifteen year project and water demand can change, availability of sustainable yield from the wells can be inadequate to meet demands, and other reasons to maintain the East Maui purchase relationship could take place.
   b) These scenarios will not be examined until a more accurate picture develops with the DEPLAN.

5. General Water Rights: The DEPLAN is a basin water development plan, and no surface water resources will be affected. The declaration and registration of existing water uses is a responsibility of the Commission on Water Resource Management (CWRM) and the CWRM will use this information in carrying out its responsibilities under the State Water Code. Therefore, the need to provide the inventory of registered East Maui residents in the FEIS is unnecessary.

6. The State Water Code:
   a) The DEPLAN is and will be in compliance with all applicable provisions of the State Water Code. This includes the required permitting process and any conditions that the Commission may impose.
   b) The DEPLAN will be consistent with the Maui County Water Use & Development plan, which is a part of the Commission's Hawaii Water Plan.

7. Native Hawaiian Rights:
   a) The DEPLAN is designed and planned to develop basin groundwater. No surface water resources will be developed or affected by DEPLAN. Therefore, surface water rights, i.e., riparian, prescriptive, or appurtenant will be affected by the DEPLAN.
   b) The DEPLAN will not adversely affect native Hawaiian water rights as determined by the Commission.

8. SUMMARY:
   The management of water resources, both surface and groundwater, and the allocation of water uses and water rights is the responsibility of the CWRM. The DEPLAN is a basin water development plan with no surface involvement. Consequently, surface water rights including appurtenant, prescriptive, surplus, and riparian, are not an issue of the DEPLAN and the FEIS. The DEPLAN recognizes that there are some existing basin groundwater uses, and the DEPLAN has and will take into consideration any potential adverse impacts on these existing uses.

Thank you for your comments and we look forward to your continuing interest and cooperation.

Sincerely,

David R. Credrick
Director

HCEC

cc: Norman Sato, Esq.
Dear Mr. Cradick:

Draft Environmental Impact Statement (EIS)
East Maui Water Development Plan
Hoakalei and Nakalele, Maui

The East Maui Water Development Plan (EMWDP) involves the design and installation of water transmission lines, storage reservoirs, and the drilling of source wells. This Plan is designed to meet the needs of the Central Maui water district for the next 20 years or to the year 2032. In the existing 16 inch transmission pipeline near the Makahiki Highway, intermediate connections to the Central Maui Water System between Paia, Pakekepa Highway, and Kulana are proposed at extended east from Kula to Akaka Road. The transmission line will also be extended to Kula and the area. Water from the Kalaiwaa area will be conveyed to the transmission line after passing through the control valve at the Kalaiwa Reservoir. The Kalaiwa Reservoir will be used for the proposed development of the water demand. The Environmental Center has reviewed this document with the assistance of Terry Naito, Archaeology: Hi-Fi Fox and Paul Daen (Preliminary) Water Resources Research Center; David Pani, Geography; and Alex Butten, Environmental Center.

Page Navigating

Although the Table of Contents refers to page numbers in terms of roman and Arabic numerals, only Arabic numbers and section designations are used.

Mr. David Cradick
Department of Water Supply
County of Maui
P.O. Box 1109
Kailua, Maui 96733

December 7, 1992

Page 2

providing on the pages of the text. The numerical system used throughout this document may make it difficult for the reader to reference different sections via either the Table of Contents. Why are different numbering conventions used for the Table of Contents and Text?

Paper Conservation

Significantly less paper would have been needed had the text been printed on both sides of each page. Incorporating this suggested format would reduce EIS bulk and production costs.

Historic and Archaeological Sites

Our reviewers wish to emphasize that the archaeological mitigation plan should be designed in conjunction with the engineering design. Final planning of the project route should take into consideration the high encouragement during the construction activities in the coastal and interior portions of the pipeline corridor, especially in phases 2 and 3 where previous findings have been recorded (Exhibit A, page 16).

Reallocation of Existing Resources

We understand that the East Maui Irrigation Company presently sells water to the County of Maui and private users.

1) Is it possible that the water presently purchased by the Maui Department of Water Supply and private users will be discontinued or reallocated after development of the proposed resources?

2) In the event that this development may cause reallocation or discontinuation of existing water resources, what potential scenarios exist for the use of such water?

General Water Rights

Any East Maui residents have declared and registered their water uses and sources with the State Commission on Water Resources Management. This was applicable to this project's area, and it should additionally disclose the socioeconomic and "natural" environmental consequences of the project. In the event that the development may affect water rights, the ability to exercise them, and how the natural environment may be impacted by the exercising of such rights.

a) How will this project impact appurtenant water rights?

b) What might be the anticipated impacts upon prescriptive water rights?

c) Might this project affect surplus water rights, and if so, how?
Mr. David Craddick  
December 7, 1992  
Page 3

4) What are the anticipated effects of this development upon riparian water rights?

5) In what ways might sovereign water rights be impacted by this development?

The State Water Code

1) What implications does this project have upon the State Water Code?

2) How might the Hawaiian Water Plan be impacted by this proposed development?

Native Hawaiians

3) What are the anticipated impacts of the proposed project upon the water rights, water uses, and affiliated spiritual, cultural, economical, and social well-being of Native Hawaiians in East and Central Maui?

4) How will this project affect Native Hawaiian water rights as prescribed in Section 16-25-101 of the State Water Code?

Summary

This document appears to adequately address many of the environmental issues pertinent to the proposed development. However, our reviewers expressed concern that this project may have profound effects upon the management and allocation of water resources and the ability of various water rights holders to exercise their rights. The DPHE also appears to have the potential to directly impact management of water resources by creating alternatives to the present distribution and transmission patterns. These new alternatives may subsequently impact the abilities of rights holders to exercise their rights, thus constituting an indirect impact. This EIS should address such indirect impacts pursuant to Title 11 EIS Rules, which require that indirect effects shall be discussed because "these secondary effects may be equally important as, or more important than, primary effects." (EIS Rules Section 11-200-17(a)). Because of emerging legal concerns over various water uses and application of rights, our reviewers expressed concern over the absence of a discussion of this project's indirect impacts upon the abilities of rights holders to exercise previously unutilized rights. This document may be challenged in court. We, therefore, suggest that the aforementioned issues be addressed in a Supplemental EIS or in the Final EIS. For more information regarding these issues, we refer you to Williamson B. C. Chang of the William & Mary School of Law. His expertise in water rights issues may be helpful in preparation of future EIS documents. Additionally, the Native Hawaiian Rights Handbook, published by OAH and the Native Hawaiian Legal Corporation (Hocenzo, 1991), provides useful information regarding various rights associated with both Hawaiian and non-Hawaiian water users.

Mr. David Craddick  
December 7, 1992  
Page 4

Thank you for the opportunity to review this document and we hope our comments are helpful.

Sincerely,

John T. Harrison, Ph. D.
Environmental Coordinator

cc: CEQC
County of Maui, Board of Water Supply
Carl Tinker, Hawaiian Salte Engineering Consultants
Roger Pujols
Terry Hart
Paul Dunn
Dave Puyu
Yu-Si Fok
Williamson B.C. Chang
Alex Retano
January 14, 1993

Ms. Charmaine Tavares, Director
Department of Parks and Recreation
County of Maui
1600 Kaniau Ave
Wailuku, HI 96793

Dear Ms. Tavares:

Subject: EAST MAUI WATER DEVELOPMENT PLAN

We are in receipt of your agency comments dated November 17, 1992 on the Draft Environmental Impact Statement prepared for the East Maui Development Plan. You "no comment" position is duly noted.

Thank you for your cooperation.

Sincerely,

David R. Craddick
Director

KK:SC

cc: Norman Saito Engineering

November 17, 1992

Board of Water Supply
C/O Department of Water Supply
P.O. Box 1109
Wailuku, HI 96793-7109

Dear Board Members:

SUBJECT: EAST MAUI WATER DEVELOPMENT PLAN

The Department of Parks and Recreation has no comment on this project.

Thank you for the opportunity to review and comment.

Sincerely,

Charmaine Tavares, Director
Department of Parks & Recreation

NO RESPONSE REQUIRED.

cc: David Craddick, Director
Department of Water Supply
Office of Environment Quality Control
220 South King Street
Honolulu, HI 96813
January 7, 1993

Mr. Lisa Hamilton
Mau'i Group Sierra Club
mau'i, HI 96793

Dear Mr. Hamilton:

We are in receipt of your group comments dated December 7, 1992 on the Draft Environmental Impact Statement prepared for the East Mau'i Water Development Plan. Our consultants have reviewed the comments and have prepared the following responses:

Your concerns over the long term impacts of the EIS/PLAN are appropriate since the phasing of the EIS/PLAN is scheduled over a fifteen year time table. As such, there is more than ample opportunity to evaluate potential impacts to the pristine water source areas of up country Mau'i and more specifically, the ground water sources that could be impacted by improper well drilling.

Present Mau'i residents that depend on surface water sources for agricultural purposes will not lose their water rights by this proposed action. Well drilling to reach the basal aquifer will be conducted under strict adherence to engineering and hydrological design controls.Grouting of the well shafts will ensure against permanent loss of perched or dike water as the well shaft penetrates through the aquifers proper. These techniques have been employed in previous water source development and are proving to be successful in their preservation of surface water sources.

Finally, the Department does not set planning guidelines or population growth; the County Planning Department and the County Council sets planning growth directions through the various Community Development Plans. The Department like other County departments provide water, refuse collection, sewage treatment, police and fire protection to meet these established growth patterns.

Thank you for your comments and continuing interest.

Sincerely,

David B. Craddock
Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 6634
WAILUKU, MAUI 96793-9634

11/14/92 10:13

SIERRA CLUB, HAWAI'I CHAPTER

MAUI GROUP

December 7, 1992

Office of Environmental Quality
220 S. King Street
Honolulu, HI 96813


Dear Sir:

Less than a century ago, in 1868, the He'eia Forest Reserve was established. It contained the water resources of the East Mau'i Water Development Plan. The original object of the establishment of the reserve was the protection of the streams and their head waters. The object was prevention of the water at its source.

The long term impact of drilling is that the public and planners alike are assured that by 2010 year from now the East Mau'i water resources shall not have been exploited such that streams and springs are depleted or diverted.

Streams are essential to any ecosystem and indigeneous species. They require undisturbed run off or stream flow from springs to the open sea. Moreover we are concerned that high standards of water quality be preserved.

Water availability is the most significant growth indicator. It is therefore essential that the East Mau'i Water Development Plan take into account all secondary impacts the plan will have on development, population and environmental degradation throughout the island.

We request complete exclusion of necessary impacts in the long term in the Final EIS.

cc: Mr. David Craddock, Director
    Board of Water Supply

Thank you

Conservation Chair,
   Maui Group, Sierra Club

Sincerely,

Mr. Charles K. Adams

Saya Ring, Consultant, Jr.
Mr. Brian Choy, Director  
Office of Environmental Quality Control  
210 South King Street, 4th Floor  
Honolulu, Hawaii 96813

Dear Mr. Choy:

Subject: Draft Environmental Impact Statement (EIS) - East Maui Water Development Plan, Kahana and Wailea Districts, Maui

We have reviewed the above EIS for the East Maui Water Development Plan and have no comments to offer at this time.

Thank you for the opportunity to review this document and we would appreciate it if we could review the Final EIS.

Sincerely,

Warren W. Lee  
State Conservationist

cc: Mr. David Craddock, Director, Board of Water Supply, c/o Department of Water Supply, P.O. Box 1500, Wailuku, Hawaii 96793-1500

Mr. Carl K. Takumi, Norman Saito Engineering Consultants, Inc., Wailuku Townhouses, Suite 303, 2158 Main Street, Wailuku, HI 96793-1473

November 23, 1993

Mr. Warren M. Lee  
U.S. Dept. of Agriculture  
Soil Conservation Service  
P.O. Box 50006  
Honolulu, HI 96854

Dear Mr. Lee:

We are in receipt of your agency comments dated November 9, 1993 on the Draft Environmental Impact Statement prepared for the East Maui Water Development Plan. Your agency position of "no comment" is duly noted.

Thank you for your timely response and continuing interest and cooperation.

Sincerely,

David A. Craddock  
Director

cc: Norman Saito Eng.
Mr. David Craddock  
Director  
Board of Water Supply  
c/o Department of Water Supply  
P. O. Box 1109  
Wailuku, HI 96793-7109

Dear Mr. Craddock:

EAST MAUI WATER DEVELOPMENT PLAN

We have reviewed the Draft Environmental Impact Statement (DEIS) and have no further comments to offer. Since we have no further use for the DEIS, it is being returned to the Office of Environmental Quality Control (OEQC). Thank you for the opportunity to review the DEIS.

Sincerely,

Copy to:
Mr. Carl K. Takumi  
c/o Norman Salto  
Engineering Consultants, Inc  
Wailuku Townhouse Suite 201  
2158 Main Street  
Wailuku, HI 96793-1671

November 25, 1992

Mr. Wileen K. Liu  
Naval Base Pearl Harbor  
NAVFAC/DECO  
P. O. Box 110  
Pearl Harbor, HI 96840-5010

Dear Mr. Liu:

We are in receipt of your agency comments dated October 26, 1992 offering "No Comment" on the draft Environmental Impact Statement prepared for the East Maui Water Development Plan.

Thank you for your timely response and continuing cooperation.

Sincerely,

Director

Wailuku, HI 96793-7109
DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96854-7440

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1108
WAILUKU, MAUI, HAWAII 96793-7108

Planning Division

October 28, 1992

Mr. David Craddick, Director
Hawaii County Department of Water Supply
P.O. Box 1108
Wailuku, Hawaii 96793-7109

Dear Mr. Craddick:

Thank you for the opportunity to review and comment on the
Draft Environmental Impact Statement for the East Maui Development
Plan (various tax map keys). The following comments are provided
pursuant to Corps of Engineers authorities to disseminate flood
hazard information under the Flood Control Act of 1960 and to
issue Department of the Army (DA) permits under the Clean Water
Act, the Rivers and Harbors Act of 1899; and the Marine
Protection, Research and Sanctuaries Act.

A. A Department of the Army (DA) permit may be required for
work in wetlands. Please contact the Operations Division at 438-
8555 prior to finalizing the route alignments.

Sincerely,

Kiauh Cheung, P.E.
Director of Engineering

Copy Furnished:

Mr. Carl K. Takumi
Norman Saito Engineering Consultants
2158 Main Street, Suite 203
Wailuku, Maui, Hawaii 96793-1671

November 23, 1992

Mr. Kiauh Cheung, P.E.
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, HI 96854-7440

Dear Mr. Cheung:

We are in receipt of your agency comments dated October 28, 1992 on the
Draft Environmental Impact Statement prepared for the East Maui Water
Plan. We respond as follows to your comments:

A. All DA permit requirements for this proposed project will be
reviewed and permit applications prepared and filed with your
agency as soon as final alignments are established. We will be
in contact with the Operations Branch prior to finalizing the
alignment corridors.

B. We understand that once the alignment corridors are final,
the flood hazard evaluation can be finalized.

Thank you for your timely response and continuing cooperation.

Sincerely,

Kiauh Cheung, P.E.
Director

“By Water, All Things Take Life”
Mr. David Craddock
Board of Water Supply
c/o Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Maui, Hawaii 96793-7109

Dear Mr. Craddock:

Subject: East Maui Water Development Plan
Mahawah and Wailuku, Maui
Draft EIS

Thank you for the opportunity to review the subject document. We have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Tukumoto of the Planning Branch at 386-0488.

Very truly yours,

Gordon Hataoka
State Public Works Engineer

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cc: Department of Water Supply, County of Hawaii
Morrin Saito Engineering Consultants, Inc.

November 25, 1992

Mr. Gordon Hataoka
State Public Works Engineer
Department of Accounting & General Services
P.O. Box 110
Honolulu, HI 96810

We are in receipt of your agency comments dated October 27, 1992 on the draft Environmental Impact Statement prepared for the East Maui Water Development Plan. Your "no comments" offer is duly noted.

Thank you for your timely response and continuing cooperation.

Sincerely,

David A. Craddock
Director

HIIac
Mr. David Craddock, Director  
Board of Water Supply  
c/o Department of Water Supply  
P.O. Box 1109  
Wailuku, Maui 96793-7103  

Dear Mr. Craddock:

Subject: East Maui Water Development Plan  
Island of Maui, Makawao & Wailuku District  
Tax Map Key Numbers: Various in Zone and Sections:  
2-6, 2-7:01, 2-7:04, 2-5:08, 2-5:09, 2-7:01, 2-7:00,  
2-7:00, 2-7:10, 2-7:11, 2-7:13, 2-7:16, 2-7:17, 2-7:18,  
2-7:19, 2-7:20, 3-0, 3-8:01, 3-8:02, 3-8:07, 3-8:15,  
3-8:56, 3-8:61, 3-8:70, 3-8:71.

We wish to inform you that we have no comments to offer on the  
subject Draft Environmental Impact Statement (DEIS). We are returning the  
DEIS with no comments.

Thank you for the opportunity to review the document.

Sincerely,

[Signature]

PPM:khe1153  
cc: Office of Environmental Quality Control  
Department of Water Supply  
Norman Saito Engineering Consultants, Inc.

November 23, 1992

Mr. Muif Haniman, Director  
Department of Business, Economic  
Development & Tourism  
Energy Division  
333 Merchant Street, Room 110  
Honolulu, HI 96813  

Dear Mr. Haniman:

We are in receipt of your agency comments dated October 23, 1992  
offering "No Comment" on the draft Environmental Impact Statement  
prepared for the East Maui Water Development Plan.

Thank you for your timely response and continuing cooperation.

Sincerely,

[Signature]

[Signature]

"By Water All Things Flow Life."
November 25, 1992

Mr. Rex D. Johnson, Director
State Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-3097

Dear Mr. Johnson,

We are in receipt of your department's comments dated November 2, 1992 on the draft Environmental Impact Statement prepared for the East Maui Water Development Plan. Your stated response of "no change" from the earlier comments made during the EIS are duly noted.

Thank you for your timely response and continuing cooperation.

Sincerely,

David H. Craddick
Director

Mr. David Craddick, Director
Board of Water Supply
Box Department of Water Supply
P. O. Box 1109
Wailuku, Hawaii 96793-7109

November 2, 1992

Dear Mr. Craddick:

Subject: Draft Environmental Impact Statement
East Maui Water Development Plan

Thank you for sending us a copy of the draft environmental impact statement for the East Maui Water Development Plan. Our July 17, 1992 comments on the earlier environmental assessment for the proposal (enclosed) are still applicable.

We appreciate this opportunity to provide comments.

Sincerely,

Rex D. Johnson
Director of Transportation

Enc.

c: OEQC
Mr. Carl K. Takanori, Norman Sato Engineering Consultants, Inc.
October 21, 1992

Mr. David Craddock, Director
Board of Water Supply
C/O Department of Water Supply
P.O. Box 1105
Wailuku, Hawaii 96793-7100

Re: East Maui Water Development Plan

Dear Mr. Craddock:

I have received a copy of the Draft Environmental Impact Statement (DEIS) for the above-referenced Development Plan. Thank you for the opportunity to review this DEIS. At this time, we have no concerns or comments on this matter.

If you have any questions, please contact Lynn J. Lee in our Land and Natural Resources Division at 386-3777.

Sincerely,

Richard K. Paglinawan
Administrator

cc: Clayton Hee
Chair, Board of Trustees

November 23, 1992

Mr. Richard E. Paglinawan
Office of Hawaiian Affairs
771 Kapiolani Boulevard, Suite 500
Honolulu, HI 96813-3149

Re: East Maui Water Development Plan

We are in receipt of your agency comments dated October 21, 1992 offering "No Comment" on the Draft Environmental Impact Statement prepared for the East Maui Development Plan.

Thank you for your timely response and continuing cooperation.

Sincerely,

David K. Craddock
Director

Enc.
Mr. David Craddock  
Director  
Board of Water Supply  
c/o Department of Water Supply  
P. O. Box 1109  
Wailuku, Hawaii  96793-7109

Dear Mr. Craddock,

SUBJECT: EAST MAUI WATER DEVELOPMENT PLAN

Thank you for the opportunity to review the Draft Environmental Impact Statement (DEIS) for the above-named project. We have no comments to offer at this time.

Sincerely,

Bilan J. J. Choy  
Director  

SCWm

NO RESPONSE REQUIRED

November 5, 1992

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Mr. Brian J. J. Choy, Director  
DEEDC  
220 S. King Street, 4th Floor  
Honolulu, HI  96813

Dear Mr. Choy:

We have received your office comments dated November 5, 1992 on the Draft Environmental Impact Statement prepared for the East Maui Water Development Plan. Your office position of "No Comment" is duly noted.

Thank you for your timely response and continuing interest and cooperation.

Sincerely,

Bilan J. J. Choy  
Director

CC: David A. Craddock

"By Water, All Things Flow Life"
December 11, 1992

Mr. Dan Nishard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
35 S. King Street, 6th Floor
Honolulu, HI 96813

Dear Mr. Nishard:

We are in receipt of your comments dated December 7, 1992 on the Draft Environmental Impact Statement (DEIS) prepared for the East Maui Water Development Plan. Our consultant firm has reviewed your comments and confirm that the archaeological consultants will comply with the request to provide a summary presenting the survey findings. This will be added to the survey and also, the section on probable impact will be added to section 4.12.

Your determination of the report as adequate and acceptable is appreciated. Thank you for your continuing interest and cooperation.

Sincerely,

[Signature]

David N. Kedik
Director

[Stamp]

 cc: Herman Sales Engineering Consultants, Inc.
     Parametrix, Inc.

"By Water All Things Indulge"
Mr. David Craddock, Director  
Board of Water Supply  
P.O. Box 1209  
Hawaii, Hawaii 96793

Dear Mr. Craddock:

Subject: Draft Environmental Impact Statement for  
East Maui Water Development Plan

Thank you for allowing us to review and comment on the subject document. We  
have the following comments to offer:

The provisions of the Department of Health Administrative Rules,  
Chapters 11-42 and 11-43 currently apply only to the Island of Oahu. However,  
navigating measures should nevertheless be implemented toward minimizing noise  
disturbances from the construction activities.

If you should have any questions, please contact Mr. Jerry Haruno of the Noise  
and Radiation Branch at 586-4701.

Very truly yours,

David R. Levin  
Director of Health

cc: Noise and Radiation Branch  
Office of Environmental Quality Control  
Norman Salto Engineering Consultants, Inc.

December 13, 1992

Dr. John C. Levin, M.D.  
Department of Health  
P.O. Box 2338  
Honolulu, Hawaii 96813

Dear Dr. Levin:

We have received your department comments dated December 7, 1992  
on the Draft Environmental Impact Statement prepared for the East  
Maui Water Development Plan. Our consultant engineers have provided  
the following responses for your information:

For those portions of the proposed alignment that may encroach  
on inhabited areas, the general contractor will be directed to  
mitigate construction-related noise to the best practicable technology.  
Fortunately, the alignment under consideration is almost entirely  
on existing State, County, and agricultural service road rights-  
of-way.

Thank you for your continuing interest.

Sincerely,

David R. Craddock  
Director

cc: Norman Salto Engineering

"By Water All Things Find Life"
December 7, 1992

Mr. William Bonnet
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, HI 96840

Dear Mr. Bonnet:

We are in receipt of your agency comments dated November 6, 1992 on the Draft Environmental Impact Statement prepared for the East Maui Water Development Plan. Your agency position of "No Comment" is duly noted.

We will be working with HECO during the design and construction plan phases of the project for service requirements.

Thank you for your timely response and continuing interest and cooperation.

Sincerely,

David A. Craddick
Director

HECO

cc: Norman Sato Engineering

Mr. David Craddick, Director
Department of Water Supply
P.O. Box 2109
Wailuku, HI 96793-7109

Dear Mr. Craddick:

Subject: Draft Environmental Impact Statement (DEIS) for East Maui Water Development Plan

County of Maui, Department of Water Supply

Wailuku, Maui, Hawaii

We have reviewed the subject DEIS, and have no comments on the proposed development plan. HECO shall reserve further comments pertaining to the protection of existing power lines bordering and servicing the project area until construction plans are finalized.

Sincerely,

[Signature]
December 2, 1992

Mr. David Craddock, Director
Board of Water Supply
P.O. Box 1109
Wailuku, Hawaii 96793-7109

Dear Mr. Craddock:

Re: Draft Environmental Impact Statement for the East Maui Water Development Plan

Thank you for the opportunity to review the subject report. We have no comments to offer.

Sincerely,

[Signature]
Executive Director

cc: Office of Environmental Quality Control
Mr. Carl Takumi

December 10, 1992

Mr. Joseph E. Conant, Executive Director
State of Hawaii
Department of Budget and Finance
Housing Finance and Development Corporation
677 Queen Street, Suite 300
Honolulu, HI 96813

Dear Mr. Conant:

We are in receipt of your agency comments dated December 2, 1992 on the Draft Environmental Impact Statement prepared for the East Maui Water Development Plan. Your agency position of "no comment" is duly noted.

Thank you for your timely response and continuing interest and cooperation.

Sincerely,

[Signature]
Director

cc: Norman Saito Engineering

"By Water All Things Flow"
Mr. David Craddick  
Page 3

Section  4.8.1.3  Page 10  
Comments

It is not clear that the proposed development will have no impact on streams. Many of the streams in East Maui are perennial, and basal groundwater as well as dikes are the sources for these streams. It is evident from the Kahina Well experience that we have fully saturated rocks and not a perched spring situation. If this is also true where the wells are being proposed, groundwater withdrawal will affect streamflow regardless of the casing depth.

We appreciate the opportunity to comment on the subject document and would like to request that the Commission on Water Resource be included in your reviewing agencies for the final environmental impact statement.

If additional clarification is required, please call Eric Hinnen of my staff at 587-0261.

Sincerely,

RAE M. LOUI  
Deputy Director

Office of Environmental Quality Control  
Mr. Carl Takumi  
c/o Mr. Norman Salo  
Engineering Consultants, Inc.

DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI  
P.O. BOX 1198  
WAILUKU, MAUI, HAWAII 96793-0198

January 29, 1993

Ms. Rae M. Loui, Deputy Director  
Department of Land and Natural Resources  
Commission on Water Resources Management  
P.O. Box 621  
Honolulu, HI 96809

Dear Ms. Loui:

Subject: DEQ/CHSW comments on the Draft Environmental Impact Statement prepared for the East Maui Water Development Plan (EMPLAN)

We have received your agency comments dated December 22, 1992 on the proposed EMPLAN DEIS and the consulting engineering firm on preparing the following responses.

Section  Page  Response

1. 1.3 1  The EMPLAN conforms to the Maui County Water Use Development Plan. The EMPLAN is a more detailed development plan for the Central Maui Water System.

2. 1.9 4  A Stream Channel Alteration Permit will be made during the design phase of the project. At that time, the Ha'iku Gulch crossing location will have been selected. The listing in Section 1.9 has been revised to include this requirement.

3. 2.3 & 2.3.7 264  The EMPLAN conforms with the Maui County Planning Department projected demand. The Maui County Planning Department projected demand of 25 to 29 MGD is in terms of average daily demand; the EMPLAN projected average daily demand is close to the unconstrained demand at 25.5 MGD. The 19.4 MGD demand projected in terms of maximum daily demand.

"By Water All Things Flow"
4. 2.3.1 2 The pumping capacity of the wells must be based upon actual test pump data and other aquifer information at the well site. The anticipated pumping capacity of the wells in the EXPLAN is based upon known hydrological and geological information based upon other wells in the area.

5. 4.7-4.72 7-8 The number of wells indicated is based on the anticipated pumping capacity and will be subjected to amendment as the exploratory wells are tested. Based on the most current information, the Maui County Water Use and Development Plan (MCWUDP) may be updated to minimize confusion.

The current withdrawal rate of 17 MGD for the Central Maui Water System is from the Iao Aquifer and not the Kula or Iao Aquifers. Therefore, a substantial portion of the sustainable yield for the Iao and Kula Aquifers as described in the State Water Protection Plan remains unused.

6. 4.7.4 9 The DEIS states that the estimated sustainable yield of the Kula Aquifer is 15 MGD. This estimate is quoted from the Central Maui Water Study, Part II, pp. 1-6 and B-3. References to sustainable yield estimate of 15 MGD and 31 MGD are also taken from pg. V-21, "Water Resources Protection Plan, Volume 1, CRDM, March 1992".

As explained in the 1990 and 1992 CRDM reports, the estimated sustainable yield of 31 MGD is based upon original hydrological conditions occurring prior to the diversions by the East Maui ditch system of pumped ground water flowing into streams. The 15 MGD is a conservative estimate derived from a water balance in which ditch flow is subtracted (Central Maui Water Study, Part II, pg. B-3).


7. 7.2 2 In the section on Alternative Source Consideration, the discussion of sustainable yield is specifically a summary of the Waihee Aquifer.

In accordance with your request, a copy of the "Central Maui Water Study" will be sent to the CRDM.

8. 4.8.1.3 10 Perennial streams in the eastern part of the Hana-Maui area are more related to the occurrence of abundant anaika rainfall and a thick (100 to 150 ft.) formation of weathered andesites and andesitic basalts (Kula volcanic series) having low to moderate permeabilities. These two hydrogeologic conditions give rise to the occurrence of significant amounts of perched ground water in the Kula formation. The streams, which have eroded into the Kula formation, serve as natural drains for the perched ground water which results in perennial streamflow. Below the Kula formation, older, permeable basalts of the Honolua volcanic series occur. Unlike the Kula volcano situation, the Kula and underlying Honolua formations (between the coast and at least three to four miles inland) are not fully saturated. This conclusion is first based upon observations of unsaturated rock conditions above a near sea level basal groundwater table in several wells in the Hana area: Haanaakoipo 1 (5430-01), Haanaakoipo 2 (5430-02), Upper Haiku (5419-01), Haiku School (5519-01), and Baldwin Manor (5519-01). Secondly, no perennial flows or seepages are known to occur in Haiku Gulch. Haiku Gulch, which has eroded some 200 feet deep into the Kula lavas, is the deepest gulch within the Project area.

In summary, the proposed water development plan will have no impact on any streamflow in the Haiku area because it consists entirely of basal water development having no effect on any perched groundwater (which feed some of the streams in the area) or any high level, diked confined ground water (which is not known to occur in the Haiku area).
Ms. Rae H. Loui, Deputy Director
January 29, 1993

Page 4

Thank you for your comments and we trust that our responses will be of help.

Sincerely,

David R. Craddick
Director

NISSC

cc: Norman Saito Eng.

December 7, 1992

County of Maui, Board of Water Supply
P.O. Box 1169
Wailuku, Hawaii 96793-1169

Re: Draft EIS for East Maui Water Development Plan

(ENVPLAN)

Gentlemen:

Comments on the above-captioned document (the "DEIS") are as follows:

§ 5.8 at p. 4. Alternatives considered; see also § 7.2, at P. 2-6. The alternatives to the project as proposed in the DEIS include: (a) Developing theWalake Aquifer; (b) Desalination; (c) Surface Water. Each of these is rejected for various reasons. With regard to alternative (c), the DEIS states that "the social unacceptability of taking [surface] water from agricultural users is not a high priority consideration for the Department. Planned sharing of basal aquifer sources is more equitable." This statement does nothing to explain the rejection of this alternative, other than to suggest that it was rejected without analysis because the Department considered it inequitable for unspecified reasons. Without a reasoned explanation, rejection of this alternative can only be regarded as arbitrary and capricious, thus rendering the DEIS unsatisfactory. This is particularly so in light of the fact that reduced sugar production over the period of the ENVPLAN may well make available for municipal use much of the private and State-owned water now obtained through the East Maui Irrigation Co. (EMI) system. The ENVPLAN Final EIS (FTEIS) should describe the current use of EMI service area and should address the use of EMI water freed up for substitute for water proposed to be obtained from new wells under the ENVPLAN. Without such an analysis, it is unreasonable, arbitrary, and capricious to reject the "no action" alternative.

§ 4.8.1.2, at p. 10. Fauna. The discussion of affected fauna is seriously deficient. The reported occurrence of the Hawaiian Haw in the study area is highly unlikely, given the fact that this listed endangered species is normally considered to be restricted in range to the Island of Hawaii. The improper
terminology used for other bird species suggests strongly that no trained biologist was involved in the preparation of this portion of the DEIS, nor does the list of "Participants in the Preparation of the DEIS" provided in Chapter XI identify any party responsible for this portion of the report. Although the DEIS states that "no endangered bird or mammal species were observed in the project's alignment," the absence of any description of the biological surveys conducted, if any, makes it impossible to determine whether these surveys were adequate to detect such species if they did in fact occur within the project area. It may be that the area is too disturbed to support endangered bird or mammal species; in the absence of any description of the manner in which the reported biological data were obtained, however, it is impossible to determine the validity of the conclusions presented. If no on-the-ground surveys were conducted, this fact should be clearly stated.

§ 4.8.1.3, at p. 10, Aquatic Resources. The DEIS concludes, based on the opinion of a consultant, Water Resources Associates ["WRA"], that the project will have no adverse effect on aquatic resources because streams will not be affected by the project. The full text of the report or other statement of WRA should be provided with the DEIS as an appendix, along with the archaeological consultant's report. Without access to the full report, it is impossible for reviewers to determine the validity of the conclusions stated in § 4.8.1.3 that no adverse effects will result.

The DEIS should also provide a description of native stream fauna in streams within the project area based on recent field survey data, including in particular the occurrence, if any, of the o'opu limu'uana, a native fish which is now under consideration for listing under the Endangered Species Act.

Chapter VIII, at 1. Irreversible and Irretrievable Commitment of Resources. This section notes that "the potential impacts of the project to high level water by the exploratory well drilling," are among the "unavoidable impacts" of the project, yet elsewhere the DEIS declares there will be no impacts on high level water. § 4.8.1.3. Aquatic Resources. If such impacts may indeed occur, contrary to the assurances contained in § 4.8.1.3, their nature and extent must be disclosed. Concern regarding the project's impacts on streamflow is heightened by the fact that, as noted above, the hydrology consultant's report is not included as an attachment to the DEIS.

1For example, the "common gray dove" is an unknown species, and nomenclature for other species (Kentucky cardinal, English sparrow) differs from that normally used for these species by professional ornithologists.
June 2, 1993

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1169
WAILUKU, MAUI, HAWAII 96793

Mr. Carl C. Christensen
NATIVE HAWAIIAN LEGAL CORPORATION
1370 Queen Emma Street, Suite 1004
Honolulu, Hawaii 96814

Dear Mr. Christensen:

SUBJECT: EAST MAUI SOURCE DEVELOPMENT PROJECT
DEIS RESPONSE

We respond to your comments as follows:

1. §1.3 at Page 5

There is no current evidence that A & B, Inc.'s sugar plantation will reduce its production within the near future so that water sources may become available for Municipal use. The ENPLAN is a feasible water development program. If water sources do become available in the future during the course of the ENPLAN, then the Department of Water Supply will evaluate whether it will be prudent to continue with the ENPLAN or pursue the then available water sources, taking into consideration cost-benefit studies, environmental issues, and socio-economic problems, quantity of then available water sources, etc.

2. §4.8.1.2 at Page 10

Botanical and Fauna Surveys have been performed and will be included as Appendix D and E of the FEIS. No endangered botanical or animal species were observed along the project's proposed alignment.

3. The report by Water Resource Associates will be attached to the FEIS. A copy of the report is enclosed herewith for your reference.

The ENPLAN proposes source development of basal ground water lens and therefore, no surface water resources will be affected including perennial streams. Hence, no description of native stress fauna is included.

“By Water All Things Take Life”

Mr. Carl C. Christensen
NATIVE HAWAIIAN LEGAL CORPORATION
May 21, 1993
Page Two

4. Chapter VIII at 1.

The probable impact of encountering high level perched water during well drilling is described in the DEIS as temporary and that each well as a precaution “will be cased with solid steel casing from the ground surface to sea level elevation and the annular space between the casing and drill hole will be grouted with cement, sealing off any high-level perched ground water...” Thus the nature and extent of the probable impacts have been disclosed.

5. Comments:

(1) Land Use District Boundary information will be included in the FEIS.
(2) The well sites in the Hāiku area have not been definitively established as yet.
(3) The ENPLAN is the only source development program in East Maui that the Department is pursuing for the Central Maui Water System.

Thank you for your comments and we look forward to your continuing interest and cooperation.

David Craddick, Director
DEPARTMENT OF WATER SUPPLY
Enclosure

cc: Norman Saito Engineering Consultants, Inc.
ISAC DAVIS HALL
ATTORNEY AT LAW
500 WEAVER STREET
WAILUKU, MAUI, HAWAII 96793
(808) 244-1217
FAX (808) 244-0521
December 7, 1992

Mayor Linda Crockett Lingle
Office of the Mayor, County of Maui
200 S. High St.
Wailuku, HI 96793

Re: Comments on the Draft EIS for the East Maui Water
Development Plan

Dear Mayor Linda Crockett Lingle:

I represent the Coalition to Protect East Maui Water
Resources ("the Coalition"), an unincorporated association
whose members are primarily residents of the East Maui area
within which wells are proposed to be developed pursuant to
the East Maui Water Development Plan ("EM Plan"). A number
of the Coalition's members have water rights registered with the
State of Hawaii which could be significantly adversely
affected by the EM Plan. On their behalf, I have the
following comments on the Draft Environmental Impact
Statement ("DEIS") for the EM Plan.

I. GENERAL COMMENTS / SUMMARY

The DEIS is totally inadequate and must be redrafted. It
flagrantly violates the content requirements for draft EISs
found within Chapter 343 HRS and this state's Environmental
Impact Statement Rules, §11-200-1 et seq. (hereafter
"Rules"). There has been no serious effort to satisfy even
the minimal requirements for a DEIS: identifying
environmental concerns, obtaining relevant data, conducting
necessary studies or proposing measures for minimizing
adverse impacts, for example. See the Rules, §11-200-14. As
such, the DEIS is meaningless and self-serving. It has not
been an early open forum for the discussion of adverse
effects and available alternatives. It cannot possibly
enlighten decision-makers to the environmental consequences
of the proposed action. See Rules, §11-200-14.

The DEIS has been prepared in great haste. The
Preparation Notice was published in the OGC En Bulletin dated
July 8, 1992. The notice of the availability of the DEIS for
comment was published in the OGC Bulletin dated November 9,
1992. The DEIS was prepared in a four month period. Most
other DEISs for projects as significant as this one take over
one year to prepare.

The length of preparation time is not, in and of itself,
a reason for declaring this DEIS inadequate. However, this
short preparation time only highlights the facts that
necessary data was not collected, necessary studies were not
conducted and there was no rigorous scientific investigation
of the costs and benefits of this proposed action.

In this regard, agencies, including the Maui County
Board and Department of Water Supply, are directed by law to
incorporate environmental analysis early in their planning
processes. This was not done in this case. A fully planned
East Maui Water Development Plan had been prepared for
approval by the Board of Water Supply ("BWS") before an
Environmental Assessment ("EA") or EIS had been prepared. A
letter objecting to this violation of Chapter 243 was
submitted on February 24, 1992. This letter is attached as
Exhibit "A".

Later, the BWS decided to prepare an EIS. Over our
objections, the BWS, without competitive bidding, hired
Norman Saito Engineering Consultants, Inc. to prepare the
DEIS even though Mr. Saito's firm had conducted most of the
planning studies to date and thereby had a conflict of
interest.

II. NO DESCRIPTION OF THE ENVIRONMENTAL SETTING

The DEIS contains no description of the environmental
setting, §11-200-17(g) of the Rules states:

The Draft EIS shall contain a description of the
environmental setting, including a description of the
environment in the vicinity of the action, as it
exists before commencement of the action, from
both a local and regional perspective.

By ignoring a description of the environmental setting, the
DEIS avoids studying the impacts of the proposed action
within the context of this environmental setting. Basic
components of this environmental setting which should have
been studied follow:

A. The existence of perennial streams
A simple drive within the area affected by the proposed
action would have disclosed the existence of perennial
streams. Anyone driving through Haliko Gulch, along the old
Haiku Road and up Pali Road would drive into and out of many
giunches which contain perennial streams.
This is important because, according to the State's "Water Resources Protection Plan," virtually all perennial streams receive base flow from groundwater. Direct runoff from rainfall is discharged in streams within two days after the rainfall. The remaining "base flow" is fed by groundwater.

The obvious conclusion is that these perennial streams may be adversely affected by wells drawing from groundwater sources in the area. To avoid this analysis, the DEIS does not inventory streams in the project area, even though their existence is shown on the USGS maps which are used as exhibits in the DEIS.

No effort was made to study the flow in these streams. This data would have disclosed that these streams are perennial and would have served as a source of baseline data for the analysis of the adverse impacts caused by pumping groundwater.

B. Early Native Hawaiian Uses

A walk up and down the gulches containing the perennial streams within the project area would have disclosed evidence of early Native Hawaiian uses of these gulch lands. Most of these gulches contain remnants of 10'1 (taro patches) and house sites. A basic study of the land tenure and uses in the area would show that Hawaiians exist within these gulches providing further evidence of the Native Hawaiian occupation of these areas.

This information is vital in the DEIS because it demonstrates the existence of long-standing riparian and appurtenant water rights with respect to the perennial streams. The BRS has an absolute constitutional and statutory duty to protect riparian and appurtenant water rights. See Article XI of the State Constitution. The DEIS has made no effort to collect data and disclose information on the existence of Native Hawaiian appurtenant and riparian water rights within these gulches.

C. Plantation stream diversions

The DEIS contains no information on the extent to which these perennial streams have already been diverted. The State Water Resources Protection Plan, Volume II, page D10, shows the major plantation stream diversions for the Koolau Aquifer System on Oahu. See Exhibit "B." It shows that East Maui streams are diverted at the 1,100 foot elevation by the Koolau Ditch; at the 1,200 foot elevation by the Waiula/Nelee Ditch; at the 1,200 foot level by the Kahikoa Ditch; at the 500 foot level by the Loa Valley. The Koolau Ditch, at the 500 foot level by the Loa Valley. This does not contain any discussion of correlative water rights. It does already diverted from East Maui Streams, including those within the project area, for irrigation uses by the HCIS Plantation and for municipal uses by the County of Maui.

It was recently discovered that the greatest impact on stream flow that occurred from pumping groundwater by the Kahikai Well in Maui was in the diminishment of the amount of water collected through these stream diversion ditch systems. One potential impact that should have been studied in the DEIS is the extent to which pumping of this groundwater will diminish the amount of water collected by the stream diversions in the project area. It may well be, as it was with respect to Kahikai Well, that the project simply increases one water source by diminishing another.

D. Groundwater development

There are existing wells within the project area. No effort has been made to analyze the impact of these ten new wells on these existing wells. The DEIS fails to disclose that there already exists a dispute between the owner of one of these wells, Mr. Gerald Hokama, and the BRS concerning the impacts of the existing Kahikai Well (and perhaps the two new proposed wells) on Mr. Hokama's well.

There has been no effort to identify the extent to which others in the project area may wish to drill wells and utilize the same water resources which the BRS wishes to take.

The DEIS contains minimal information on the extent of the groundwater resources available for development in the project area. The State's "Water Resources Protection Plan" indicates that the sustainable yield for the Haiku Aquifer System is estimated at 15 mgd. See Exhibit "B." If this estimate is correct, the EM Plan would take and transmit elsewhere virtually all of the available groundwater resources in the Haiku Aquifer System leaving none for future uses in the area.

In addition, the State Commission on Water Resources Management has begun to apply the concept of "developable yield" instead of "sustainable yield." Sustainable yield is a figure which does not take into consideration waters that must be withheld for other purposes, including but not limited to riparian appurtenant and correlative water rights and for in-stream values. Correlative water rights have been discussed to some extent above. The DEIS contains no analysis of correlative water rights.

Correlative water rights are the rights of landowners to the groundwater below their property. The DEIS does not contain any discussion of correlative water rights. It does
not analyze whether or not the BNS has any correlative water rights to take groundwater from the Ha'iku "Aquifer." It does not analyze the competing rights of other landowners in Ha'iku to the groundwater resources in the area.

Further, the DEIS states that the purpose of the project is to take between 10 and 16 mgd from the Ha'iku region to central Maui. By state law, there is no authority for such a transfer unless the area has been formally designated by the Commission on Water Resources Management. This area is not so designated.

E. Registered water rights

Upon the enactment of the State Water Code, those exercising riparian, appurtenant, correlative and other water rights were required to register these rights with the State of Hawaii. The purpose of this registration was to protect water rights and to aid the state in inventorying existing, protectable and lawful uses of water throughout the state. The DEIS makes no effort to collect data concerning those persons or entities holding registered water rights in the project area. The BNS is in no position to conclude that sufficient water resources exist in the Ha'iku Aquifer without having collected data on registered water rights in the area. Once existing, registered water rights are accounted for, there is no guarantee that there are sufficient water resources available for this project. While a "sustainable yield" might technically be available, the "developable yield" might not.

F. Existing and future proposed uses of water resources within the locality

The water resources of the Ha'iku region are to be exploited and transferred for use throughout the Central Maui Water System, providing service to the area from Makana to Hana's to Kaunaoa and back to Makana.

The East Maui Water Development Plan (9/92) estimates that the maximum day water demand (mgd) for the Ha'iku/ Pauwela, Ku'ula and Nakama/Kaupakalua service areas, by the year 2013, will be .48 mgd. Of the 10 to 16 mgd exploited, only .48 mgd will be reserved for local uses. This document states on page 4-5 that:

The totals are low when compared with the total water consumed, comprising less than 1% of the Central Maui Water System and less than 1% of the Nakavao system.

This disclosure provides a sense of scale and the minimal extent to which this project is designed to satisfy local water needs. Approximately 10-22 gallons of water will leave the Ha'iku region for every gallon of water that is reserved for uses within the region.

The DEIS does not accurately assess the existing and future needs for water in the Ha'iku region. The DEIS does not assess the extent of current reliance upon the current exercise of riparian and appurtenant water rights. It makes no effort to assess future needs for riparian, appurtenant and correlative water. No effort has been made to realistically quantify the amount of water which should be reserved for the very long-term future.

G. In-stream values

The State Water Code requires that "in-stream" values be protected. The DEIS collects no data and conducts no studies on the in-stream values for the streams within the study area.

The State Commission on Water Resource Management has adopted Interim Streamflow Protection Standards. For all of the streams within the study area, the Commission has determined that existing levels of streamflow are to be protected and cannot be diminished. The DEIS contains no information on the existing streamflow for streams in the area. The USGS has data from its gaging stations for some streams on Maui.

One study which should have been conducted as part of the DEIS process was to establish gaging stations on the potentially affected streams to determine current streamflow, to provide baseline data establishing that amount of water which must remain in these streams for in-stream purposes. The Commission on Water Resource Management, in its Water Resources Protection Plan, states that this information should be collected in the first week of October and the last week of February to provide data on high and low flows. This was not done here.

H. Marine resources

There is no discussion in the DEIS concerning marine resources in the area. A significant proportion of the 10-16 mgd which the project would remove from a relatively small area would otherwise discharge into the ocean. Marine flora and fauna rely on the availability of this fresh water for survival. Although property requested, the DEIS makes no effort to collect data or conduct studies on marine resources in the area which may be adversely affected by the project.
III. HYDROLOGIC CHARACTERISTICS OF THE PROJECT

A. Estimate of sustainable yield

The State's "Water Resources Protection Plan" makes it abundantly clear that insufficient information exists with respect to the yields in aquifers with the exception of a few aquifer systems, in particular on Oahu and West Maui (page 95). Without any reliable history of the dynamics of an aquifer, such as the Waiku "Aquifer," hydrologic budgeting is employed to provide broad approximations of water balances concerning what water flows into an aquifer and what water flows out of an aquifer.

Fundamental factors which must be addressed are: (1) the amount of rainfall, (2) the amount of stream runoff, (3) actual evapotranspiration and (4) the remaining deep infiltration to a saturated aquifer. Once rainfall, stream runoff, evapotranspiration are all assessed, the amount of infiltration into the saturated aquifer can be approximated. This document is replete with disclaimers as to the unreliability of these estimates and states, on page 122:

"The sustainable yield estimate should not be equated to feasible developable water, either technically or economically. Nevertheless, the state's conservative estimate of 15 mgd must be used "until a better water balance is derived."

B. The interrelationship between ground and surface waters

Perhaps the grossest and most far-reaching error contained in the DEIS is its unsupported conclusion in §4.6.1.3 that stream flows would not be affected by the development of groundwater resources. This conclusion has been discredited and rejected throughout the State of Hawaii. Abundant evidence exists that pumping groundwater can indeed affect stream flow. Two examples should suffice. The Honolulu Board of Water Supply decided to develop groundwater resources on the windward side of Oahu. When it did so, taro growers, relying upon stream flows, found their crops were harmed. A lawsuit was filed. It was determined that the pumping of groundwater diminished stream flows, harming the taro. See Regan v. Board of Water Supply, 65 Haw. 521 (1982).

More recently, the Commission on Water Resources Management permitted Maui Land and Pineapple Co. to install a pump and pump groundwater from the Kahului Well in Mauka. Concerned members of the public intervened. Pumping was allowed based upon monitoring of the stream flow and an assessment of information regarding stream flow by a committee of interested individuals. The data collected has indicated that the groundwater pumping has diminished stream flows diverted and transferred by the East Maui Irrigation Company in the Waiku Ditch.

The elemental principles of water budgeting provide that: some rainfall is discharged through stream runoff and the remainder percolates to groundwater aquifers. If this percolation did not take place, how would there be groundwater in the first place?

The State's "Water Resources Protection Plan" makes it absolutely clear that the base flow in streams is derived from groundwater. It states, on page 176, that:

"...the groundwater component of stream flow sustains the ecology dependent on running water, and in many regions is a vital source of irrigation supply. Most wetlands also survive because of groundwater seepage.

The existing available evidence contradicts the conclusion in the DEIS. The only support contained in the DEIS for this conclusion is the following:

"Concerns on the potentially adverse impacts to existing streams and high level water endowed areas due to the well drilling have been reviewed by Water Resources Associates, a Honolulu-based consultant. Their response to the questions of potential impacts to rivers, streams, and other sources of high level water were primarily that there would be little concern."

This is heresy. There is no written analysis by Water Resources Associates, or anyone else, supporting this conclusion. There is no citation in the DEIS for any document or study which supports this conclusion. The Rules require resources on the windward side of Oahu. When it did so, taro growers, relying upon stream flows, found their crops were harmed. A lawsuit was filed. It was determined that the pumping of groundwater diminished stream flows, harming the taro. See Regan v. Board of Water Supply, 65 Haw. 521 (1982).

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C. The Coalition's Hydrologic Consultants

Because of the myriad technical deficiencies in the information contained in the DEIS, the Coalition retained its own consultants to review the DEIS. Hydrologists Brad A. Finney and Robert Willis of Hydro Resources International (HRI) of Arcata, California were retained as consultants for the Coalition to review the hydrologic aspects of the DEIS. Their initial review has resulted in the comments which are attached as Exhibit "a."

First, HRI indicates that the DEIS provides insufficient detail on the hydrology and geology of the study area and, in result, it is not possible to make even a preliminary estimate of the degree of impact that the proposed well field will have on surface and groundwater quality and supplies.

The Coalition consultants indicate that the impact of the development on surface waters can be determined without actually pumping the groundwater by using simple models of the groundwater system.

Data from pumping the wells nearest completion in the area could also supply empirical data establishing impact on surface waters.

The State "Water Resources Protection Plan" recommends that in each aquifer system in which substantial groundwater development is under way, there should be "a deep monitoring test well" which penetrates through the fresh water lens into underlying water (page 3). A project of this magnitude must incorporate within it such a deep monitoring test well.

The Coalition consultants also express misleading with regard to the effects of the proposed well field on groundwater quality, as well as the "optimal pumping centers" actually are and the discussion on water conservation."

The report concludes:

In summary, the Draft EIS presents a groundwater development plan with very little supporting information to validate its hydrologic potential. There is (1) no quantitative discussion about the probable impacts of the development plan on groundwater or surface water. (2) no data defining the formation parameters and the potential for development and (3) no analysis indicating that the proposed 10 mgd target is at all related to the sustainable yield of the groundwater system.

This leaves even the most technical aspects of this project in question.

IV. INADEQUATE PROJECT DESCRIPTION

A. The Central Maui Water Project

The EM Plan is the outgrowth of Maui's first great public works system. A joint venture was agreed upon among several of Maui's large landowners and developers. At one million gallons a day were developed from West Maui water resources and transmitted in a 36 inch pipeline to the Kihal area. The development and transmission of these water resources played a significant role in inducing the type of growth which has taken place in the Kihal/Nakena area. A simple truth is learned here. Any area towards which a 36 inch transmission line is pointed in an area which will then experience tremendous population and growth impacts.

The Rules acknowledge the extent to which public works projects stimulate or induce secondary effects. Section 11-200-17(1)(l) states:

It should be realized that several actions, in particular those that involve the construction of public facilities or structures, e.g., highways, airports, sewer systems, water resource projects etc., may well stimulate or induce secondary impacts. These secondary effects may be equally important as, or more important than, primary effects, and shall be thoroughly discussed to fully describe the probable impact of the proposed action on the environment. (Emphasis added.)

The DEIS denies that the EM Plan will induce growth. This kind of denial is not permitted by the Rules.

The joint ventures for the Central Maui project are each entitled to a certain amount of water. Because the water transmitted to Kihal/Nakena was devoted to other projects before the joint ventures received their respective allocations, the joint ventures are now claiming publicly before the PUC an entitlement to future water resources developed, including those water resources developed through
the EM Plan. The DEIS should acknowledge this commitment of
the Waiea water resources. It is simply untrue to state that
these water resources are being developed simply to respond
to the needs created by development allowed in our community
plans.

The EMS has a duty, superior to its obligations to the
earlier joint ventures, to supply water for Hawaiian Homes
lands. There is a tremendous need for water in Kula and
Kahikinui for Hawaiian Homes lands. Why then are these water
resources directed to Kula/Hakuna instead of Kahului and
Kahikinui if this project is not being designed. In fact, to
satisfy the demands of the earlier joint ventures?

B. Development of the EM Plan

The EMS has decided to devote substantial resources to
developing East Maui waters without having fully developed
the resources available in the Waiea area. While
development of the remaining Waiea water resources is
mentioned as an alternative in the DEIS, this alternative is
not rigorously explored or objectively evaluated in the DEIS.

The full scope of the EM Plan is not disclosed. The
project was originally described as one to develop as many as
20 wells in an area moving progressively eastwards of the
Haiku "Aquifer." The EMS has modified this plan to its
current plan. However, the EMS makes it clear that as more
water resources are needed, more wells will be developed
moving in the eastward direction. The EMS, hence, has
committed itself to a policy of relying on East Maui water
resources to meet the water demands created in the area from
Haiku to Wailea to the Kula to Haiku to Hana, and perhaps
beyond.

The impacts of this agency action are nowhere discussed
in the DEIS. Through the current action, the EMS will, for
all practical purposes, monopolize the groundwater resources
of the Haiku Aquifer system. Through the implementation of
this policy, the EMS apparently intends, when more water is
necessary, to exploit the groundwater resources of the
Hanauma Aquifer system, the Wailea-Kaanapali Aquifer system
and onwards toward Haana.

This policy subjects the same areas the extensive
dewatering of its streams through the five ditch systems of
the East Maui Irrigation Company as well as the
monopolization of its groundwater resources. Separately each
have severe environmental impacts. The DEIS never
acknowledges the cumulative impacts of both systems in the
same area. The DEIS should have studied the impact of the
dewatering of the streams in the area through the surface
diversions of EMI when combined with the exploitation of the
groundwater resources as proposed here. Enough water has
already been taken from the streams in the area without
indirectly taking more of this water through groundwater
development.

V. ANALYSIS OF THE IMPACTS OF THE PROJECT IS INADEQUATE

The DEIS focuses on issues which are not significant and
neglects to study those which are significant. It has not
identified the resources which are at risk. These are those
noted in III above. It has not included enough information
about the project to allow a full evaluation of its impacts.
See Rules 112-200-17(4)(6). It then fails to state the
probable impacts of the project on these resources. See Rules
112-200-17(1).

It is not as if consulting parties did not direct
attention to these resources. See Exhibit "E".

VI. THE DISCUSSION OF ALTERNATIVES IS INADEQUATE

The DEIS does not contain a discussion of all known
alternatives which could feasibly attain the objectives of
the action. It does not contain a rigorous exploration of all
reasonable alternative actions with a review of the costs and
benefits of each of these, as is required by the Rules. The
entire discussion of alternatives, often called the "lynech
plan" of environmental analysis, is confined to 1-1/2 pages.

VII. INADEQUATE DESCRIPTION OF APPLICABLE LAND USE CONTROLS

The DEIS does contain a discussion of the consistency of
this project with a limited number of objectives and policies
contained in several state and county plans. It fails to
address major issues contained in the Maui County General
Plan regarding managing growth and "concurrence."

Its growth projections providing the basis for this
action are way beyond those which could be included in any
growth management plan adopted by the County. A project of
this magnitude should not be adopted until the County has
enacted its growth management plan.

The major flaw in this section of the DEIS is that the
system of controls which is most directly relevant to this
project -- the State Water Code and the regulations
promulgated thereunder -- have been totally ignored.

The DEIS never mentions the constitutional duty to
protect water resources found in Article XI, §7 of the Hawaii
State Constitution which provides:
The state has an obligation to protect, control and regulate the use of Hawaii's water resources for the benefit of its people.

The Legislature shall provide for a water resources agency which, as provided by law, shall set overall water conservation, quality and use policies; define beneficial and reasonable uses; protect ground and surface water resources, watersheds and natural stream environments; establish criteria for water use priorities while assuring appurtenant rights and existing correlating and riparian uses and establish procedures for regulating all uses of Hawaii's water resources.

The State Legislature subsequently enacted the State Water Code in Chapter 174C RHA. It provides, as a declaration of policy, that the Code shall be liberally interpreted and that adequate provision shall be made for the protection of traditional and customary Hawaiian rights, the protection and propagation of fish and wildlife, the maintenance of proper ecological balance and scenic beauty, and the preservation and enhancement of the waters of the state for various other purposes. See HRS §174C-2(c). Instream uses are defined in §174C-3.

The State Water Code also calls for the adoption of a Hawaii Water Plan, one component of which must be a water resources protection plan. See HRS §174C-31. The most recent draft of the "Water Resources Protection Plan," dated March, 1992, contains 28 recommendations. See attached Exhibit "A". This project must be analyzed within the framework of the recommended objectives.

It is readily apparent that this project has been planned and analyzed without any attempt to comply with a significant number of these 28 recommendations for protecting water resources.

VIII. THE DEIS FAILS TO CONSIDER MITIGATION MEASURES TO MINIMIZE PROJECT IMPACTS

The DEIS is deficient in one of its primary functions which is to help devise mitigation measures to minimize the impacts of the project. First the DEIS fails to acknowledge the impact of groundwater development on surface flow and then it fails to include mitigation measures which could prevent or minimize these adverse impacts. Primary mitigation measures might be (1) to collect baseline data concerning all potentially affected streams; (2) to collect data on these streams while test pumping takes place; (3) to establish a committee of individuals in the area with water rights and

the County to monitor these impacts and (4) to establish a system to assure that pumping will cease if stream flow is diminished.

IX. CONCLUSION

This DEIS cannot satisfy the tests for an adequate document. It must be rewritten. Necessary data must be collected; necessary studies must be undertaken. The comment period should then be reopened.

Sincerely yours,

[Signature]

[Name]

[Title]

[Contact Information]
decision-making points, suggested deadlines for decision-making and action and/or any government records indicating when an Environmental Assessment will be prepared or when and how environmental factors will be incorporated into decision-making: (1) All minutes of all meetings of the Board of Water Supply discussing which surface and groundwater resources to be developed next and/or where these water resources should be allocated and/or how these water resources should be transmitted from the source to the selected projects or areas.

5. Suggestions
Planning and decision-making for this project has clearly progressed to the point where no further meetings or hearings should be scheduled on this project until an Environmental Assessment has been prepared. To avoid duplication and later delays, environmental factors should be integrated into this process now and not later. I am taking the time now to detail the concerns of my clients because an opportunity still exists here to restructure the planning and decision-making process to avoid duplication and delay.

I do not believe that my clients' concerns are "premature." The project was described to you in great detail by your consultants. You discussed the number of wells that would be constructed, where these water resources would be transmitted and the precise location of the water transmission pipelines. These are all matters which require environmental analysis. I suspect that the negative Declaration which has been issued is limited simply to the single exploratory well which is being drilled and that no environmental analysis has yet taken place on the other issues raised above.

You may place this letter on the agenda of the Board of Water Supply if you so choose. I certainly request that this letter be placed on the Board's agenda before or at the same time the Board next places this project on its agenda or discusses this project in any way.

Thank you for your continued cooperation. If you have any questions about any of the above, please do not hesitate to contact me.

Sincerely yours,

[signature]

[Name]

[Position]

[Company]

[Address]

In cc:

[Name]

[Position]

[Company]

[Address]

EXHIBIT** B** D10

*as per EIRL*

Indicated Flows are Averages in million gallon/day.
Haleakala. Spotty accumulations of sediments along the coast do not act as a caprock.

The sustainable yield of 11 mgd is based on total natural input to the basal water portion. It refers to potable water, providing extraction is by means of small capacity wells at considerable distance inland. The estimate is speculative; no exploration has taken place beyond a mile or so from the coast.

Aquifer System: Koolau

Aquifer System: Haleakalā

Basal, high level dikes and high level perched groundwater occurs in the system. The whole of the region is covered by Kula volcanics. The principal developable groundwater in the seaward three to four miles is basal, mostly restricted to the Honomanu basin. Substantial perched water occurs in the Kula formation. Much of this water is captured by the ditch system of the East Maui Irrigation Company. High level dikes groundwater lies far below the ground surface in the Honomanu volcanics.

The estimated sustainable yield of 31 mgd (note: the estimate of 40 mgd in the original table is incorrect because of an arithmetical error) is based on original hydrological conditions before the capture of perched water by the ditch system. A more conservative estimate of 15 mgd is preferred until a better water balance is derived. All of this sustainable yield is potable and developable from the basal groundwater. The estimate is poor in spite of the fact that several wells have been drilled in the system.

Although a sedimentary caprock does not rim the coast, the Kula series locally behaves as a variably effective caprock that retards discharge from the basal lens in the underlying Honomanu volcanics.

Aquifer System: Honomanu

Only surface water resources are understood to some degree because of the collection ditches that transfer water to central Maui. No exploration has yet been done for basal groundwater. The region is covered by the Kula volcanics. However, for about a mile inland basal water is likely to saturate underlying Honomanu basalt. Sedimentary caprock is absent at the coast, but the Kula may behave as a weak caprock in places.

Perched groundwater in Kula volcanics drains to streams, which are diverted to the ditch system. High level dikes water occurs far inland in the Honomanu basin but at great depth.

For original pre-ditch conditions, estimated sustainable yield of potable basal groundwater is 29 mgd. The estimate is highly speculative.

Aquifer System: Ulupalakua

Perched high level groundwater in the Kula series, which mantles the system, extends all the way to the coast. Basal groundwater in the basement of Honomanu basalt probably occurs in
February 24, 1992

Mr. David Craddick, Director
Department of Water Supply
County of Maui
200 S. High Street
Wailuku, HI 96793

Re: Development of water resources in East Maui and their transmission to the Wailuku/Ehukai and Kihei/Ha`ena regions

Dear David Craddick:

Thank you for notifying me of the last meeting of the Board of Water Supply ("Board") during which a workshop was held on the latest draft prepared by Norman Salto Engineering Consultants ("Salto") with respect to the development of East Maui water resources and their transmission to the Central Maui and Kihei/Ha`ena regions ("the projects"). Would you kindly notify me of any further meetings of the Board during which this project will be discussed in any fashion.

1. Scope of project.
   The development of groundwater resources in Wailuku and the construction of the Central Maui Transmission Line carrying them to Central Maui and the Kihei/Ha`ena area constituted the first great expansion of the Maui water system. We were informed by your consultants at the last meeting that the Wailuku wells can currently produce for transmission around 16 million gallons per day ("mgd"). These water resources were committed, in part, to the Kihei/Ha`ena area. We have all witnessed the adverse direct and secondary impacts which have resulted from this project in the face of a construction boom in the area, population increases, competition for public recreational resources, the destruction of historic sites and traffic congestion, for just a few examples.

   The Board and Department of Water Supply ("Department") are now planning the second great expansion of this system. We all heard your consultants say that they hoped to develop another 16 mgd in groundwater resources and to construct a transmission system carrying those resources from their sources to the Central Maui and Kihei/Ha`ena areas. Board members were clearly informed that this system would double the water resources available to be transmitted in the Central Maui Transmission Line to the Kihei/Ha`ena area. The project will cost $56.5 million. Having witnessed what occurred after the first great expansion of our water system, it must be obvious to all involved that the same kind of significant direct and secondary adverse impacts will be caused by this second expansion.

   Substantial public policy and water policy issues are involved, including but not limited to the following: (a) what water resources should be developed next, e.g., should more wells be constructed in Wailuku, should the groundwater resources of the Kihei region or some other region be tapped? (b) to which regions of Maui should these water resources be transmitted, e.g., Kula, Upcountry, Central Maui, Lahaina, Kihei, Ha`ena, Wailuku-Nanakuli lands and for what purpose, e.g., resort development or affordable housing? and (c) after issues (a) and (b) are decided, where between the water sources and the areas to be served should the transmission line be located and what should its capacity be?

   This second expansion of our water system must be treated as a single action for environmental purposes. The development of the water resources, the decision to deliver them to particular areas and the construction of a transmission line are phases, increments or components of a larger total undertaking which must be treated as a single plan of action or agency action. It would violate our environmental laws to proceed with small increments of this total larger undertaking without reviewing at the earliest practicable time the significance of environmental impacts, including the overall, cumulative impact; related actions in the region; and further actions contemplated. See 314-206-9 (a) of the Environmental Impact Statement Rules of the Department of Health ("Rules").

2. The failure to integrate environmental factors into the current planning and decision-making process.
   To all those who attended the last meeting of the Board, it was apparent that the Board and the Department have progressed quite far in the planning and decision-making process for the second expansion of the water system. This is evidenced by the following: (a) the construction of a test well in the Wailuku area; (b) the contract let to Salto to study the development of water resources in the Wailuku region and their transmission to Central Maui and the Kihei/Ha`ena areas; (c) the three drafts detailing a project to develop Wailuku water resources and transmit them to Central Maui and the Board for discussion and review; (d) that each new draft has been a refinement of the earlier draft based upon
decision-making by the Department and the Board with respect to the development of the Haiku water resources and their transmission to Central Maui and the Kilu/Kauma area: (e) the draft which proposes a specific six-phase project to construct ten wells in Haiku, the construction of a transmission line in a particular location and the transmission of this water to specific locations at an estimated cost of $20.0 million and (f) full discussion by the Board on developing the anomalies which would be served by this system and the specific location of the transmission line.

Chapter 343 does not require Environmental Assessments ("EA") for feasibility or planning studies for possible future programs or projects which the agency has not yet approved, adopted, or funded. In this case, funds have been released to construct the exploratory well however the environmental impacts of the project as a whole have never been studied. Even if the Board or Department is only reviewing feasibility or planning studies for possible future programs which have not yet been implemented, the Rules clearly require that the agency...

...shall consider environmental factors and available alternatives and disclose these considerations in any assessment and subsequent statement. Rules 11-200-9(d).

The Minutes of the last Board meeting will disclose that alternatives were discussed — however, only in terms of economic factors. No social or environmental factors were considered.

Parallel federal regulations make it clear that environmental review procedures must be integrated within existing planning and decision-making procedures. This is required to avoid the delays caused by duplicating this planning and decision-making process later in order to incorporate environmental analysis.

3. Lack of public participation

The Board and Department have been perfecting their plan of action and making decisions about the water resources to be developed, the regions to be served and the particular location of the transmission line through successive refinements of a document being prepared by Saigo. I have asked to be provided with a copy of this document only to be informed that it is not available to the public. The second expansion of the Haiku water system is being planned based upon a document which members of the public are not being allowed to review.

4. Request for government records

May I formally request that your agency make available for public inspection and duplication during regular business hours any and all government records with respect to the following: (a) The contract, and any amendments thereto, between the Board or agency and Saigo; (b) Any permits or approvals applied for or obtained to construct wells, exploratory or otherwise, or to install pumping equipment in wells in the Haiku region; (c) Any applications for permits or approvals on any permits or approvals to construct a transmission line between the Haiku region and other areas; (d) The development of new surface or groundwater resources on the island of Maui to meet current and future needs for drinking water in Haiku County; (e) The development of water resources in the Haiku region; (f) Environmental Assessments, Negative Declarations or Notices to Prepare an Environmental Impact Statement for the development of water resources in the Haiku region and/or their transmission elsewhere; (g) All communications, reports, plans, in draft form or otherwise, between Saigo and the County of Maui; and (h) All descriptions of the decision-making process, critical
Dear Mr. Hall,

As requested, we have completed an initial review of portions of the Draft EIS for the County Department of Water Supply's East Maui Water Development Plan. We have also reviewed sections of the report 'Well Exploration and Development, East Maui Source Development' by Norman Saito Engineering Consultants, and the Central Maui Water Study II, that you supplied as supplemental documents.

The comments associated with the technical review of the documents are enclosed. We can summarize the review by stating that the draft EIS provides insufficient detail on the hydrology and geology of the study area. As a result, it is not possible to make even a preliminary estimate of the degree of impact that the proposed well field will have on surface and groundwater quality and supplies. It does appear that if the wells are properly constructed, surface stream flows should not be impacted at the 700 feet elevation that the proposed wells are to be constructed. However, it is possible that the well field would have an impact on the volume of surface streamflow at lower elevations nearer the ocean, where interaction between the surface and groundwater systems may be more significant.

A determination of the potential for impacts on streamflow from groundwater pumping would require more comprehensive study than the available data allows.

It is also not possible to determine the effects of the proposed well field on groundwater quality with the very limited data available. Given the financial commitment associated with the project, it would seem prudent to invest more effort initially in project planning. We suggest as a first step obtaining data that characterizes the hydrology, hydraulic, and recharge properties of the aquifer. Relational sites can then be developed that can be used to assess the hydraulic response of the aquifer to pumping. At this point, it would then be possible to evaluate how optimal the 'Optimal Pumping Centers' (Map 2, East Maui Source Development, Norman Saito Engineering) actually are.

We must also reiterate our view that the draft EIS is flawed at the outset since the alternatives considered did not include demand reduction via water conservation. Recent court rulings have upheld the concept of demand reduction as a valid alternative to increasing supply even when the community did not wish to consider such an alternative. Given the rate of growth in water demand in Maui, and the problems that the County has had with wastewater treatment, water conservation using mandatory retrofit of toilets and showerheads with low flow devices is a winner from all angles. The cost of implementing these conservation programs has been shown in other communities to be less than developing new supplies. Water quality benefits result since the demands on overloaded wastewater treatment plants are reduced. (Or the margin of growth at underloaded facilities is extended.) Since less water is needed, the potential impacts of overdrafting the groundwater basin are reduced. Finally, the citizens of Maui benefit since the low flow toilets and showerheads pay for themselves in reduced water and electric bills within three to five years.

Should you have any questions or need to discuss our comments, please do not hesitate to contact us at (707) 826-3918.

Sincerely,

[Signature]

Brad A. Finney
Senior Engineer

[Signature]

Robert Willis
Senior Engineer

December 3, 1992

EXHIBIT "D"
Review Comments on the Draft EIS for the East Maui Water Development Plan

1. The safe yield of the aquifer system is a function of the hydraulic properties and boundaries of the aquifer system (Bredle & Row, 1993). The magnitude of sustained groundwater pumping depends on how much of the natural discharge can be captured by the proposed well field development. There is only discussion in the Draft EIS and supporting documents of how the potential yield is determined based on the relatively large coastal heads in the groundwater system.

2. From a hydricologic perspective, it is useful to assess the surface and groundwater resources of the study area. However, there is little or no information regarding a water balance for the study area. The analyses of precipitation, evaporation, streamflow, and infiltration would provide baseline estimates of the magnitude and temporal variation in surface and groundwater resources (see Davis and Lepold, 1983).

3. The criteria for well site location and well design, which are discussed in more detail in the Saline consultant report, are incomplete and do not quantify the costs and benefits associated with well field development. These design criteria, discussed on page 27, are presented without any supporting data defining the aquifer's storage and transmissivity properties. These parameters, which can be determined using conventional pump tests, are crucial in assessing the feasibility of groundwater development. The results from this study are presented as "Optimal Pumping Centers," without addressing how the optimal decision was made. Interestingly, on page 2 of the Saline consultant report it is stated that Well 10A, 1B were under construction in November 1991. As such, pump test data should be available for these sites and included in the EIS.

4. The development of a well field depends on the costs of groundwater development, the benefits associated with providing the water supply, and an assessment of the potential environmental impacts. These impacts can range from well interference effects (increases in drawdown) and the decline of the hydraulic or piezometric head that could alter the hydraulic interaction between surface and groundwater. Preliminary determination of the drawdown patterns can be determined using simple models of the groundwater systems (see Willis and Yeh, 1981). For example, with the well pattern and yields stated in the consulting report, the Tied solution could be used to assess the probable variation in drawdown throughout the study area with the proposed well pattern and yields presented in the consulting report. This baseline information can then be used to analyze the impact of the development on surface waters.

5. Groundwater development in coastal areas can increase the likelihood of saltwater intrusion. The Draft EIS does not address the potential water quality problems associated with the development of the groundwater. Using the baseline map presented in the Draft EIS, it is possible to estimate the probable rise in the interface associated with groundwater pumping. This information could be used to assess the probability of upconing and contamination of the water supply wells.

In summary, the Draft EIS presents a groundwater development plan with very little supporting information to validate its hydrologic potential. There is (1) no quantitative discussion about the probable impacts of the development plan on groundwater or surface water, (2) no data defining the formation parameters and the potential for development, and (3) no analysis indicating that the proposed 10 MGD target is at all related to the sustainable yield of the groundwater system.

References
Mr. David Craddock, Director  
Department of Water Supply  
County of Maui  
PO Box 1109  
Wailuku, HI 96793-1109

Re: East Maui Water Source Development Plan - EIS/F

Dear Mr. Craddock:

On behalf of the Coalition to Protect East Maui Water Resources, I would like to submit the following comments to aid in the preparation of an adequate EIS.

1. **Water quality**
   
   A considerable number of pesticides and herbicides have been used for agriculture on lands proposed for wells in the EIS Plan. An inventory of these chemicals should be taken and tests should be implemented to assure water quality. The results of earlier tests were not stated in a clear enough way to disclose the existence of chemicals which have percolated or may percolate in the future into the groundwater resources. All tests should be undertaken at levels which allow detection of the particular chemicals being tested.

   With respect to the Hāiku well, DBCP has already been discovered in spring downstream of the well. With respect to the Hākau well, it may be that oil was used to lubricate the well-drilling bits, such that this source has, to some degree, been contaminated. This should be investigated.

   To be adequate, any testing for chemical contamination of the water resources should include testing for chemicals in the sediments or soils around the base of the wells.

2. **Related actions**
   
   It now appears that the Department has expended substantial amounts of money to construct new water tanks in the Hāiku region without any environmental analysis of the increased capacity of the water system. In the case of the Hāku well, a water tank is being built in conjunction with the uncapping of the well. The EIS must discuss all actions related to the wells, including the construction of all other improvements, such as tanks, which accompany the wells.

3. **Impacts on marine resources**
   
   The EIS must discuss what impacts this project will have upon marine resources. To a significant extent, the groundwater taken by this project otherwise travels to our coastal waters. This project will prevent as much as 16 mgd from migrating to coastal areas. The loss of this amount of fresh water and the impact of this loss on marine resources must be studied.

4. **Impacts on surface water resources**
   
   The EIS will be inadequate if it simply restates your position that there is some impenetrable shield which prevents the project from having an impact on surface and perched water resources. There has been no adequate, scientific demonstration that this impenetrable layer of rock exists. This speculation relies on the face of studies throughout Maui proving that fertilizers have found their way into our groundwater resources.

   The EIS should identify the sphere of possible impact for each proposed well; it should identify all those individuals with registered water rights within those spheres and should establish a monitoring program for all those individuals with registered rights within those spheres.

5. **Correlative water rights**
   
   The EIS should disclose the identity of the landowners upon whose land each well will be drilled. If the land is not county-owned, the EIS should disclose each and every term of any agreements reached with landowners who have allowed the county to drill wells upon their land.

   In addition, for each and every well, the EIS should disclose the source of the water rights, correlative or otherwise, held by the county which allow it to tap groundwater resources. The EIS should disclose the identities of others who have correlative water rights to the same resources being tapped and should include an analysis of whether the county has the correlative water rights to take the amount of water suggested in view of the correlative water rights of other landowners.

6. **Test and/or monitoring well**
   
   The State Water Resources Plan recommends that test and/or monitoring wells accompany all projects which call for many wells within a single region. The EIS should discuss whether it would be appropriate to include a test and/or monitoring well in this large scale water development project.

EXHIBIT "E"
7. **Study of alternatives**

Your EIS will be inadequate if it does not study alternative alignments and alternative water resources. The law does not allow consultants to reject alternatives prior to preparing the EIS.

As more issues arise, the Coalition will submit these to you to aid in the preparation of an adequate EIS. If you have any questions about any of the above, please do not hesitate to contact me.

Sincerely yours,

[Signature]

Masc Hall

IU/jp

CC: Coalition to Protect East Maui Water Resources

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**Recommendations**

1. A periodic review of sustainable yields and all pertinent hydrologic data and water quality parameters should be done at least every five years or even more frequently if circumstances warrant.

2. A Statewide resource monitoring and data collection program should be implemented with equal emphasis on surface and groundwater.

3. Each aquifer system in which substantial groundwater development is underway should have a deep monitoring test well which penetrates through the fresh water lens into underlying seawater. Salinity profiles should be taken on a minimum semi-annual basis.

One profile should be taken in the last week of February, and the other in the first week of October in order to measure the behavior of the lens during the periods of highest and lowest heads.

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**EXHIBIT "F"**

-9-
4. In those aquifer systems in which intense groundwater development is underway, simultaneous head readings should be combined twice a year, once in late February and again in early October.

5. Measurements of head at various sites should be related to a single benchmark to assure that accurate relative differences in head are obtained.

6. The current program of measuring salinity, heads, and temperature should be evaluated. A formal program for obtaining these data, especially in critical areas, should be designed and carried out.

7. The current program of data gathering should be reviewed and evaluated. The number of continuous streamflow measuring sites has declined sharply in the last decade. A study should be made to determine whether the statistical data base needs reinforcement or is already adequate.

8. Physical characteristics and parameters of stream flow need to be assessed, and a stream classification scheme based on these data should be created to serve as the framework for decisions made about in-stream values and allowable minimum stream flow. The classification should address the relationships between surface water and groundwater.

9. An inventory must be made of all the stream diversion systems in the State.

10. Initiate studies in the near future on in-stream values and various parameters leading to the establishment of permanent in-stream standards. The environmental impact of these standards must also be considered.

11. Establish the relationship between surface and groundwater and determine guidelines on conjunctive use of groundwater and surface water.

12. Develop irrigation water quality criteria for primary, secondary and tertiary effluents, and brackish water.
13. Increase the confidence levels in the determination of sustainable yields. This may include more comprehensive monitoring work, refining the water balance equation, allowance for return irrigation water and interhydrologic unit transfers.

14. Proceed vigorously on research and pilot studies on:

a. Recharge
b. Surface water recovery
c. Waste water recovery

A second-line priority would be the improving of irrigation practices, and a third priority would be desalination and weather modification as means to augment our resources.

15. Study legislative means to protect and preserve our watersheds against contamination and encroachment of intake areas.

16. Conduct studies leading to a plan for orderly delineation of areas which should be zoned as conservation lands for infiltration purposes (watersheds).

17. Develop strong and effective short-and long-term water conservation programs.

18. Expand studies on the feasibility of bulkheading dikes to create greater storage capacities.

19. Amend building and plumbing codes to require the installation of water-conserving devices and appliances including landscape irrigation control fixtures.

20. Investigate the possibilities of using waste heat resulting from the use of nuclear energy in power generation and geothermal energy in the desalination process.

21. Initiate and expand studies on the conjunctive use of surface and groundwater.

22. Investigate technology and means of reducing evapotranspiration.

23. Conduct research on the feasibility of inducing rainfall through weather modification.
24. Study feasibility of combining water and wastewater functions under single management for maximum utilization of our water resources.

25. Conduct more research and pilot studies on the desalination of brackish water by both the reverse osmosis and electrodialysis methods, with emphasis on cost reduction, particularly energy costs.

26. Expand flood control and drainage programs to increase use of our water resources for irrigation, recreational, fish propagation, and recharge purposes.

27. Plan for and initiate a comprehensive program of monitoring for water quality of both ground and surface water sources to identify types and concentrations of contaminants to comply with levels (MCL) specified by the State Department of Health. Monitoring should be conducted in such a manner as to establish relationships between the sources of contamination and points of water withdrawal.

28. Initiate development of a Statewide Water Conservation Plan with the State Water Resources Management Commission assuming a leadership role. Under present law, participation by the counties, Federal government and private business would be on a voluntary basis. Eventually, the Legislature may have to consider granting powers of enforcement to the State if a voluntary program should prove ineffective or if long-range considerations justify.
May 21, 1993

Mr. Isaac Davis Hall
Attorney at Law
2007 Hana Street
Wailuku, Hawaii 96793

Mr. Hall:

We are in receipt of your comments dated December 7, 1992 on the Draft Environmental Impact Statement (DEIS) prepared for the East Maui Water Development Plan. Our retained civil engineering consultant, Norman Salto Engineering Consultants, Inc., and the sub-consultant who prepared the DEIS, Paratrex, Inc., have reviewed the comments and prepared the following responses:

INTRODUCTION:

The registration of existing water uses is on file with the State Commission of Water Resource Management (CWRM). The CWRM list of registered water users are public files. It is not necessary to provide an inventory of registered East Maui residents which may be affected by the EMPLAN in the DEIS. The EMPLAN is a basal water development plan, and no surface water resources will be affected. The CWRM through their permit process will consider if water users will be significantly impacted before issuance of the well and pump permits.

I. GENERAL COMMENTS/SUMMARY:

We disagree with your conclusion that the DEIS is "totally inadequate and must be redrafted". The DEIS was prepared in full compliance with Chapter I142 and the Environmental Impact Statement Rules, 111-209-1 at seq. We will respond to your specific alleged deficiencies in this letter.

"By Water All Things Find Life"

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Mr. Isaac Davis Hall
May 21, 1993
Page Two

II. NO DESCRIPTION OF THE ENVIRONMENTAL SETTING:

Existing conditions have been presented in Chapter IV of the DEIS. For example climate; surrounding/adjacent land uses; existing improvements; topography; soils; hydrology; flora; fauna; noise; air quality; scenic and aesthetic resources; historic and archeological sites; land use; economy; employment; which are part of the environmental setting have been discussed.

A. Perennial Streams. You contend that perennial streams may be adversely affected and an inventory of the possible affected streams be conducted and stream flow studies performed.

The EMPLAN will develop the basal ground water lens and therefore, no surface water resources will be affected. Including perennial streams. The following is a hydrogeologic description of the streams in the area prepared with the assistance of Water Resource Associates:

Perennial streams in the east part of the Hana-Maui area are more related to the occurrence of abundant maula rainfall and a thick (100 to 150 feet) formation of weathered andesites and andesitic basalts (Kula volcanic series) having low to moderate permeabilities. These two hydrogeologic conditions give rise to the occurrence of significant amounts of perched ground water in the Kula formation. The streams which have eroded into the Kula formation serve as natural drains of the perched ground water which result in perennial flows.

Below the Kula formation, older, permeable basalts of the Honomanu volcanic series occur. Unlike the Kahoa Well situation, the Kula and underlying Honomanu formations (between the coast and at least three to four miles inland) are not fully saturated. This conclusion is based upon observations of unpatinated rock conditions above a near-sea level basal groundwater table in several wells in the Hana area: Hanakaukiwai (5120-01), Hanakaukiwai (5120-01), Upper Hana (5413-01), Hana School (5519-01), and Baldwin Manor (5519-01). Secondly, no perennial flows or seepages are
known to occur in Haliko Gulch. Haliko Gulch, which has eroded some 200 feet deep into the Pali lavas, is the deepest gulch within the Project area.

In summary, the proposed water development plan will have no long-term impact on any streamflows in the Haiku area because the plan consists entirely of basal water development having no affect on any perched groundwater (which feed some of the streams in the area) or any high level, duct-confined groundwater (which is not known to occur in the Haiku area).

Any impact due to encountering possible high-level, perched ground water during well drilling will be short-term and temporary. Rigorous procedures will be followed for monitoring water levels and constructing each well. If any high-level, perched ground water is encountered during drilling, it will be sealed off with cement grout before further drilling is allowed to continue, as was done during the drilling of Haakupuako Wall 1 (5420-02). Further, during final construction, the well will be cased with solid steel casing from the ground surface to sea-level elevation and the annular space between the casing and drill hole will be grouted with cement, securely sealing off any high-level, perched groundwater source which might possibly contribute to streamflow.

Therefore, no stream inventory or stream flow studies were conducted.

B. Early Native Hawaiian Uses and Plantation Stream Diversion

1. Again, it is reiterated that this project consists of basal ground water development and thus will have no impact upon stream flows in the Haiku area. Since no surface water resources will be affected by the EXPLAN, no surface water rights, i.e., riparian or appurtenant, nor surface water diversions will be affected by the EXPLAN.

C. Groundwater Development:

1. We have been informed that there are no requests for well drilling or pump installation permits by others in the Haiku area on file with the CRW, hence, we cannot identify any other person who plans to utilize the same water resources.

2. EXPLAN will not develop and withdraw 100% of the sustainable yield of the Pala or Haiku Aquifers. A reserve will remain for future use.

There is a misunderstanding on your part regarding the term “sustainable yield.” Simply, sustainable yield is a long term maximum rate at which water may safely be withdrawn from an aquifer and is equated with the average day demand. EXPLAN proposes to withdraw 9.3 mgd from two aquifers, the Pala Aquifer and the Haiku Aquifer.

The CRW has established a sustainable yield in the Pala Aquifer and 15 mgd in the Haiku Aquifers (“Water Resources Protection Plan, 1999”).

EXPLAN proposes that the average day withdrawal from the Pala Aquifer will be 1.3 mgd and 8 mgd from the Haiku Aquifer (based upon a 16-hour average pump day). This leaves 6.7 mgd of sustainable yield in the Pala Aquifer and 7.0 mgd of sustainable yield in the Haiku Aquifer available to others. The CRW, in all events, will make the final decision on all withdrawals from the aquifer.

3. The management of water resources, both surface and groundwater, and the allocation of water uses and water rights are the responsibility of the CRW. The EXPLAN is a basal ground water development plan with no surface water involvement. Consequently, surface water rights including riparian, appurtenant, or any other, are not involved in the EXPLAN. The EXPLAN recognizes that there are some existing basal groundwater users, and allowance have been made for these uses as explained above.
4. After the Project has been completely developed and constructed, the Paia and Haiku Aquifers will have reserve sustainable yields available to others. CWRM is aware of the correlative rights of other landowners and has accommodated their needs as much as possible. However, the final decision to allocate correlative rights and uses rests with CWRM.

D. Neither the Water Code nor any other state law prohibit the transfer of ground water from one area to another. Case law such as the Robinson cases apply to the transfer of surface water not ground water from one watershed to another.

E. Registered Water Rights:

1. As stated above, ENPLAN will issue a reserve of sustainable yield in each aquifer. The final determination of the amount of water that can be developed in the Paia/Haiku Aquifers will be made by CWRM.

F. Existing and Future Proposed Uses of Water Resources Within the Locality:

1. The projected maximum day consumption of the combined Haiku/Pauwela, Kuula, and Kokua/Kaupuakului service areas to be served by ENPLAN once the plan is fully implemented is 0.46 mgd. Generally, the areas to be serviced by ENPLAN is the area below Haiku Road. Since ENPLAN does not reach Kaupuakului Road, the eastern portion of the Kokua/Kaupuakului service area is also excluded. The total projected maximum day consumption for these areas is 1.44 mgd.

As stated above, ENPLAN will not use 100% of the sustainable yields of each aquifer. Additional agricultural/residential uses in the Paia/Haiku area in excess of the Community Plan projections can be served by the remaining water in each aquifer. CWRM will allocate the water uses.

G. In-stream Values:

1. The ENPLAN is a basin ground water development plan. No surface water resources including stream flows will be affected.

H. Groundwater Underflows:

The FIS will be revised to include the following:

The Haiku basin groundwater lens is thin near the coast, based upon a few reported heads in wells drilled near the coast. Based on an average head of 3 to 5 feet, the basin groundwater lens extends approximately 120 to 200 feet below sea level and discharges as underflow into the ocean in this interval of depth below sea level.

Underflow from the Haiku aquifer amounts to some 30 mgd (calculated as two times the sustainable yield of 15 mgd) and from the Paia aquifer, 17 mgd (Water Resources Protection Plan, June 1990). Such underflow becomes diffused or diluted with sea water as it flows through the permeable Honolua lavas capped by less permeable Kulua lavas which extend to the coast and beyond offshore.

The ultimate development of approximately 9.0 mgd from the Haiku basin aquifer and 1.3 mgd from the Paia basin aquifer, compared to an estimated diffused underflow of 30 mgd and 17 mgd, respectively, is not expected to have any significant impact on existing marine resources or conditions. Adverse impacts on marine resources resulting from similar basin groundwater developments elsewhere in the State have not, to the best of our knowledge, been reported.

III. HYDROLOGIC CHARACTERISTICS OF THE PROJECT:

A. Estimate of Sustainable Yield:

1. The CWRM has established a sustainable yield of 15 mgd in the Haiku Aquifer and 8 mgd in the Paia Aquifer. Since the required water budget analysis
of these aquifers has been performed to establish the sustainable yield values, another analysis to duplicate these studies for the DEIS and the ENPLAN is not necessary.

Further, pumping data will continually be evaluated to confirm or adjust the sustainable yield values. CRW is responsible for the determination of sustainable yields.

B. The Interrelationship Between Ground and Surface Waters:

1. Please refer to the hydrogeologic description of the relationship of the Haiku Aquifer and the streams in the area prepared by Water Resource Associates set forth in Section 31A above.

2. The Water Resource Associates report will be included in the FEIS.

C. The Coalition's Hydrologic Consultants:

1. Hydrologic and geological considerations were analyzed in the "Water Resource Protection Plan" for the CRW and confirmed in the BIS "Maui County Water Use and Development Plan, 1980." The BIS and their consultants do not dispute the sustainable yields developed by the CRW.

Further as stated in Section 4.7.2a of the DEIS, the Central Maui Water Study, Part II, prepared by Norman Saito Engineering Consultants, Inc. (February, 1981) analyzed and reported the hydrogeology of the Pali and Haiku Aquifers. The Central Maui Water Study, Part II, was also reviewed by the Coalition's Hydrologic Consultants. We believe that the draft EIS provides sufficient detail on the hydrology and geology of the study area.

2. The Coalition's Consultant's letter states "It does appear that if the wells are properly constructed, surface water flows should not be impacted at the 700 foot elevation that the proposed wells are to be constructed." ENPLAN proposes to develop basal ground water and not surface water.

The FEIS will be revised to include the following:

"Streamflow at Lower Elevations"

Most streams in the Haiku area (where the ENPLAN proposes to develop basal groundwater occurrence at sea level) have elevated profiles and generally discharge into the ocean over a steep coastal sea cliff some 50 feet above sea level. Approximately a half mile inland of the sea cliff, most stream profiles are at an elevation of 100 feet above sea level (see Interpretive Hydrogeologic Section). The intervening lava flows (Maui volcanic series) below the streams and the underlying basal groundwater table are unimpaired, otherwise, ground water would be perennially flowing out of the face of the coastal sea cliff. Some high-level ground water does occur in the near coastal area, as evidenced by sporadic seepages in the sea cliff during sustained rainy periods. Although such high-level, perched ground water may contribute to streamflows at lower elevations, neither perched ground water nor stream sources will be affected by the ENPLAN's development of the Haiku basal groundwater lens which has a base (static water level above mean sea level) of approximately 3 to 5 feet above sea level in the near coastal area."
b. The groundwater characteristics will be better understood as more pumping information and activity is conducted. There will be more reliable information to determine the sustainable yield for the Haiku Aquifer. The CRD will submit data to the CDMA which will determine whether to revise the current sustainable yield estimates.

c. The County of Maui Water Conservation Program alternative discussed in Section 7.2 of the DEIS will be revised to read as follows in the FEIS:

In addition, the County of Maui had amended the Uniform Plumbing Code to require that effective December 31, 1992, only low-flow water fixtures and devices that meet the performance requirements established by the American National Standards Institute shall be offered for sale or installed in the County of Maui. Performance standards for kitchen, lavatory and public restroom faucets, hose bibs, showerheads, urinals and toilets are specified. The Department of Water Supply anticipated that the installation of these low-flow water fixtures and devices will conserve water. Additional measures are under consideration. However, the Water Conservation Program is new and will take time before a significant amount of water is conserved. Thus, CRD must proceed with DPLAN. Otherwise there may be a gap when no additional water is available from the Iao Aquifer and the first increment of DPLAN is put into operation. Also DPLAN is flexible. If the Water Conservation Program is very successful, then the pace of development under DPLAN can slow down or even stop, e.g., if land use policies change or if the Water Conservation Program is very successful, or both.

4. The Coalition’s consultant, Hydro Resources International (HRI), suggests that more effort should be placed in project planning. The first step being to obtain data that “characterize the hydrologic, hydraulic and recharge properties of the aquifer.” We believe that the Water Resources Protection Plan and the Maui County Water Use and Development Plan, 1990 in fact includes this analysis. DPLAN will develop additional data to assist in continued planning and development of the aquifers.

The Consultants also state that the relationship can be developed to assess “the hydraulic response of the aquifer to pumping.” This means that wells must be drilled, equipped pumped and tested. This is exactly what the Project will do. Hence, the Coalition’s Consultants agree with the DPLAN.

5. We disagree with the conclusions made by Hydro Resources International, Inc. that “the Draft EIS presents a groundwater development plan with very little supporting information to validate its hydrologic potential.” As explained in this letter and the DEIS the sustainable yield values were established by CRD. Hence the analysis regarding the sustainable yield was not presented in the DEIS.

6. We disagree with your statement that a monitor well is required for the Project.

IV. INADEQUATE PROJECT DESCRIPTION:

A. The Central Maui Water Project

We submit that Chapters I and II of the DEIS adequately describe the Project in detail.
1. EMS does not determine the land use policies for the County. The County Council in adopting the General Plan and nine Community Plans for various areas of the County established the land use policies. Section 8-11.2.3 of the Charter of the County of Maui, mandates the Department of Water Supply to "implement the County’s general plan and community plans in the administration of its affairs." EMS implements the water portion of the Community Plans for Wailuku-Kahului, Kihal-Makana, and portion of Pala-Hakulo.

2. The General Plan and the Community Plans determine the growth of the County. EMS plans by itself will not induce growth. EMS plans support the policies set forth in the General Plan and the Community Plans for Wailuku-Kahului, Kihal-Makana and portions of Pala-Hakulo.

3. EMS seeks to meet the growing water demands of all water users, existing and future, within the Central Maui Water System. The need to develop additional sources, storage facilities and transmission lines is non-discriminatory. EMS will implement the General Plan and related Community Plans and provide an adequate water supply to all consumers in the Central Maui Water System including the members of the Central Maui Source Joint Venture.

4. EMS will implement the General Plan and related Community Plans within the Central Maui Water System. The Kaulalani and Kula areas are not part of the Central Maui Water System. Development of water resources for these areas will be done as separate projects apart from EMS.

V. ANALYSIS OF THE IMPACTS OF THE PROJECT IS INADEQUATE:
A. Your statements are argumentative and conclusory. We have responded previously to your alleged deficiencies.

VI. THE DISCUSSION OF ALTERNATIVES IS INADEQUATE:
A. The alternatives considered in the DEIS other than the Water Conservation Alternative were alternatives considered by the EMS as feasible and studied in the draft "Maui County Water Use and Development Plan, 1992." The DEIS only highlights the major impacts of these alternatives.

VII. INADEQUATE DESCRIPTION OF APPLICABLE LAND USE CONTROLS:
A. The FEIS will be amended in Chapter 5 to include the following:

The need to analyze the socio-economic impact due to the EXPLAN is not necessary since the intent of the EXPLAN is to conform to the same Maui County General Plan and related Community Plans.

B. The EXPLAN will be consistent with the State Water Code and the "Maui County Water Use and Development Plan", which is part of the CWRM's Hawaii Water Plan.

C. The 28 recommendations contained in the draft of the "Water Resources Protection Plan" dated March, 1992 have not been adopted by the CWRM even as recommendation. If and when all or a portion of the recommendations are adopted by CWRM and EXPLAN must comply, then adjustments will be made. However, recommendations applicable water conservation programs have been implemented as mentioned in the DEIS and this letter.

VIII. THE DEIS FAILS TO CONSIDER MITIGATION MEASURES TO MINIMIZE PROJECT IMPACTS:

A. As stated previously, the EXPLAN will have no impact upon streamflow in the Haiku area because it consists entirely of basal ground water development having no effect on any perched ground water. Any high level, dike-confined ground water is not known to occur in the Haiku area.

However, if even though remote, a "saturated" rock condition is discovered, then the Department of Water Supply will monitor the nearby stream flows during pumping tests to see if stream flows are affected. Alternative courses of action will be reviewed, including closure of the well if required. Stream flow impact will be disclosed and made available to the public.

B. Groundwater Monitoring:

Hydrogeologic conditions will be constantly monitored during the drilling and test pumping phase. Other wells in the area will be checked for salinity and water levels during the test pumping phase. Wells will be equipped with water level monitoring tubes so that water levels can be measured even with a pump in the well.
ARCHAEOLOGICAL INVENTORY SURVEY OF THE
EAST MAUI WATERLINE PROJECT
WAILUKU AND MAKAWAO, MAUI ISLAND
(TMK 2-5-03 thru 05: 2-7-03, 2-7-07 thru 11.
2-7-13, 2-7-16 thru 20: 3-3-01, 3-8-06 thru 07.
3-8-31. 3-8-59. 3-8-61. 3-8-70. 3-8-71)

By

Aki Sinoto

and

Jeffrey Pantaleo, M.A.

for

Norman Seito Engineering Consultants, Inc.
2158 Main Street
Wailuku, Maui 96793

September 1992

Aki Sinoto Consulting
2333 Kapiolani Blvd. #2704
Honolulu, Hawai‘i 96826

EXHIBIT A
INTRODUCTION

At the request of Norman Saito Engineering Consultants, Inc., of Wailuku, Maui; Aki Sinoto Consulting conducted an archaeological inventory survey for the proposed East Maui Waterline Project in Northeast Maui. The main 36" pipeline, measuring over 20 miles long, extends from East Maui sources to the existing 36" Central Maui Transmission Pipeline near Kukulani Highway. Connections to the Central Maui Water System between Hamakuapoku and the Central Maui Transmission Pipeline are proposed at Paia, Haleakala Highway, and Puunene. The pipeline also will extend east from Hamakuapoku, across Maliko Gulch, and into the Haiku area. Several 12" and 8" pipelines branch from the main 36" pipeline where it will connect to new wells. The survey was conducted during several intervals, as engineering plans were refined. An initial field assessment of Maliko Gulch and associated well locations took place in October of 1991. The current inventory survey was conducted during intermittent periods between June 17 and September 3, 1992. The survey was undertaken by the two authors of this report.

PROJECT AREA

The project area is located along coastal and inland portions of northeastern Maui and traverses various parcels in T&K 2-5-03 thru 05; 2-7-03, 2-7-07 thru 11, 2-7-13, 2-7-16 thru 20; 3-8-01, 3-8-06 thru 07, 3-8-51, 3-8-59, 3-8-61, 3-8-70 and 71. The majority of the pipeline extends over existing paved and cane roads and across several gulches (Fig. 1). Appendix A provides the pertinent Tax Maps.

The new waterline will be completed in six construction phases as follows:
Phase 1 will involve installing a new 36" waterline from the Upper Paia 12" waterline to the Hana Highway via the former Kaheka Village and Old Makawao Road. From the intersection of Sunnyside Road and Old Makawao Road, the main 36" pipeline will extend westerly across Kailua Gulch. A 16" pipeline parallel to and west of Kailua Gulch will connect the main 36" pipeline on Sunnyside Road with the existing 12" pipeline on Hana Highway.

Phase 2 will involve extending the main 36" pipeline along Hana Highway from Sunnyside Road to Haleakala Highway. A 16" pipeline will extend along Haleakala Highway from Hana Highway and connect to existing pipelines at Kahului Airport. The
Figure 1. Location of Project Area and Previously Recorded Sites
main 36" pipeline will continue along Baldwin Avenue from the Upper Paia water tank, and extend along Sunnyside Road from Kailua Gulch to Hana Highway. A 12" pipeline will extend along Kauhikoa Road from Haiku, and a 8" pipeline will connect Wells 2A and 2B.

Phase 3 will involve connecting the main 36" pipeline in Haiku Road to new wells on the East Maui Transmission Line. The 36" pipeline will extend along Hansen Road from Spanish Road to Haleakala Highway. The 36" pipeline will also extend along Spanish Road from Kahului Industrial Park to Hansen Road. A 24" pipeline will branch from the main 36" pipeline along Spanish Road from Kahului Industrial Park to Dairy Road. A 8" pipeline will connect to Wells 3A and 3B, and a 12" pipeline will connect to Well 3B to Haiku Road on West Kuiaha Road.

Phase 4 will involve continuing the main 36" pipeline west along Haiku Road from Konanui Gulch. A 12" pipeline will extend south on East Kuiaha Road from Haiku Road. A 8" pipeline will branch from the main 36" pipeline on East Kuiaha Road to Wells 4A and 4B.

Phase 5 will involve connecting the main 36" pipeline from Puunene to the Central Maui Transmission Main.

Phase 6 will involve continuing the main 36" pipeline from Konanui Gulch to Hana Highway. A 12" pipeline will branch from Hana Highway to Well 5A, and a 8" pipeline will connect wells 5A to 5B.

ENVIRONMENT
Major segments of the pipeline is located on paved and cane roads, existing sugar cane fields, and gulches. Annual rainfall averages 0-5 inches in the drier, coastal areas near Paia, and 5-10" in the higher elevations near Makawao, with most of the precipitation occurring in the winter months between November and February.

Vegetation in the project area varies, depending on specific locations along the 20 mile corridor. The majority of vegetation along the corridor is sugar cane (Saccharum officinarum). The gulches are dominated by christmasberry (Schinus terebinthifolius), mango (Mangifera indica), koa hoale (Leucaena glauca), guava (Psidium guajava), laua'e (Microsorum scolopendria), Natal redtop grass
(Tricholaena rosea), false staghorn fern (Dicranopteris linearis), and other various ferns and grasses.

The following soils are represented in the project area:
(name/slope/runoff/erosional hazard/occurrence)

Ewa Silty Clay Loam / 0-3% / very slow / slight / in basins and alluvial fans.
Haiku Clay / 3-7% / slow / slight / well drained upland soil.
Haiku Clay / 7-15% / slow to moderate / slight / uplands.
Iao Silty Clay / 0-3% / slight / slight / well drained, alluvial fans.
Iao Silty Clay Loam / 7-15% / medium / slight to moderate / smooth alluvial fans.
Iao Cobbly Silty Clay Loam / 3-7% / medium / slight to moderate / cobbles.
Jauca Sand / <7% / slight / severe wind erosion hazard / near coast.
Molokai Silty Clay Loam / 0-7% / slow to medium / moderate / well-drained uplands.
Molokai Silty Clay Loam / 7-15% / slow to medium / moderate / knolls.
Paia Silty Clay / 3-7% / slow / slight / uplands and gentle slopes.
Paia Silty Clay / 7-15% / slow / slight to moderate / uplands.
Pulehu Silt Loam / 0-3% / slow / slight / alluvial fans and basins.
Pulehu Silty Clay Loam / 0-3% / slow / slight / stream terraces.
Puunene Sand / 7-30% / slow / moderate to severe wind erosion / low uplands.
Waikoa Cobbly Silty Clay Loam / 3-7% / slow / slight / smooth low uplands.
Rockland - rocks cover 25-90% of surface - occurs in gulches.
Rough Broken Land - steep intermittent drainage - occurs in gulches.

Other than those soils that occur in gulches and sand dune areas, these soils are commonly used for pineapple, sugarcane, pasturage, and homesites.
**LAND USE HISTORY**

Other than the coastal areas included in the Phase 2 development corridor and the Kahului sand dune areas in the Phase 5 development corridor, prehistoric exploitation of much of the intermediate zones included in the Phase 1, 3, and 4 corridors was minimal according to available archaeological data.

The majority of the project area has been cultivated in sugar cane for over one-and-a-half centuries by a number of plantations including Claus Spreckels’ Hawaii Commercial and Sugar, H.P. Baldwin Company, Maui Agricultural Company, and Haiku Plantation. Thus much of the historical uses of the area were associated with the development of intensive agriculture. These included irrigation and transportation systems as well as camps for the growing population of immigrant workers. The agricultural lands are currently consolidated under Alexander and Baldwin, the major landowner in the project area, and sugar cane continues to be cultivated by the Hawaii Commercial and Sugar Company.

The project corridor passes through or runs adjacent to seven Land Commission Awards as listed on Table 1.

<table>
<thead>
<tr>
<th>L.C.A. No.</th>
<th>Awardee</th>
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<td>3336</td>
<td>Malopi</td>
<td>5.15</td>
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</tr>
<tr>
<td>3829</td>
<td>Feele</td>
<td>3.97</td>
<td>-</td>
</tr>
<tr>
<td>4133:4</td>
<td>Kaai</td>
<td>1.82</td>
<td>-</td>
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<tr>
<td>4579</td>
<td>Il</td>
<td>1.88</td>
<td>-</td>
</tr>
<tr>
<td>6510pp:1</td>
<td>Niu</td>
<td>0.40</td>
<td>-</td>
</tr>
<tr>
<td>6510xx:1</td>
<td>Kauhi</td>
<td>0.77</td>
<td>taro</td>
</tr>
<tr>
<td>11216:27</td>
<td>Kekuaoahi</td>
<td>2919.75</td>
<td>-</td>
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</table>

The documentation for only one of the awards, 6510xx:1 to Kauhi, included reference to any usage of the land. Taro in this case, although unspecified in the records, was probably dryland cultivated.
The project corridor traverses or runs adjacent to twenty-six Grants as listed on Table 2.

Table 2. Grants

<table>
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<th>Grant No.</th>
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<tr>
<td>121</td>
<td>Richard Armstrong</td>
<td>6c110f1ft</td>
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<tr>
<td>138</td>
<td>Kapina</td>
<td>39.79</td>
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<tr>
<td>165</td>
<td>M Kekuanoea</td>
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<td>220</td>
<td>William L Lee</td>
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<tr>
<td>3152</td>
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<td>Claus Spreckels</td>
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<td>H M Wells</td>
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<td>8443</td>
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Claus Spreckels the grantee of Grant 3343 was the founder of Hawaii Commercial and Sugar Company and often referred to as Hawaii’s "Sugar King."

**PREVIOUS ARCHAEOLOGY**

No archaeological investigations have been conducted within the pipeline corridor, but numerous projects have been undertaken in the vicinity.

Bordner (1982) conducted an archaeological reconnaissance for the Paia sewage system part A (Job #82-45). Results of the survey and monitoring were negative.

Mitchell (1983) investigated reports of burials exposed along a cliff-face at Paia. Results of the investigation determined that erosion along the cliff exposed human remains.
Speakman (1986) reported to Bishop Museum a petroglyph site located in Maliko Gulch (TMK 2-5-04:37). The petroglyphs are located near the stream below the area where the old railroad crossed the gulch.

Clark and Toenjes (1987) conducted archaeological monitoring of the sewer line construction from Sprecklesville to Ku'au, Maui. Results of the archaeological investigation indicated the presence of prehistoric occupation, fishing, and burials along the coast. Six archaeological sites (State Sites 50-50-05-1777-1782) were recorded during the monitoring. State Site 50-50-05-1777, an exposed cultural deposit, included charcoal, volcanic glass, marine shell, sea urchin, bird and mammal bone, and basalt and coral artifacts. Radiocarbon dates recovered from the deposit ranged from A.D. 1420-1810. State Site 50-50-05-1778, an exposed cultural deposit, included three pit features, charcoal stained soil, a charcoal concentration, an ash lens, and a burial. Radiocarbon dates recovered from the deposit ranged from A.D. 1660-1945. State Site 50-50-05-1779, an exposed cultural deposit, included a pit feature and two charcoal lenses. State Site 50-50-05-1780, an exposed cultural deposit, included three hearths, three charcoal concentrations, and four pit features. State Site 50-50-05-1781, an exposed cultural deposit, included a hearth, a charcoal concentration, and two pit features. State Site 50-50-05-1782, an exposed cultural deposit, included marine shell.

Fredericksen (1988) conducted an archaeological inventory survey on a 34 acre parcel of land in Sprecklesville, Maui. Results of the survey were negative.

Griffin (1988) conducted an archaeological surface survey of the proposed Kula water system improvements project. The survey was conducted between the Oliwa Water Treatment Plant and the Waikomai Reservoir at the 4200 ft elevation. Results of the survey were negative.

Fredericksen (1990) conducted an archaeological inventory survey of an 18 acre parcel in Kulaha-Pauwela Homesteads, Haiku, Maui. The project area is located on a plateau bounded by a gulch and Kauhihoa road. Results of the survey were negative.

Borthwick (1990) conducted an archaeological reconnaissance of a 12.4 acre parcel in Paia, Maui. Results of the survey identified several burials (State Site 50-50-05-1064).
Donham (1991) conducted a field inspection of a rock feature at Pu'u o uma (Haiku Hill), Hamakuaupo, Maui. Results of the investigation determined that the rock feature is natural.

SITE EXPECTABILITY
Recent synthesis of available data have suggested earliest settlements on Maui Island occurred between A.D. 300–600 in the windward and coastal areas, with population expansion into dry leeward areas by A.D. 1000. Initial occupation in windward and coastal areas occurred due to favorable agricultural and marine resources (Kirch 1979).

Since the project area ranges from coastal to inland regions of Northeast Maui, site expectability will vary according to location. Although the majority of the project corridor along coastal areas is covered by existing roads, potential subsurface remains may be identified during excavation for the waterline. These subsurface features may include buried cultural deposits that contain charcoal, marine shell, volcanic glass, basalt artifacts, and pit features, and burials.

The inland portions of the project corridor transects along existing paved and cane roads and crosses several gulches. Since the majority of the project corridor is located on existing roads and sugar cane fields, any remaining archaeological sites probably exist in the gulches or areas not disturbed by large scale cultivation. Site types expected in these gulches and surrounding areas include heiau trails, cairns, petroglyphs, walls, overhang shelters, and agricultural features on the gulch floors.

METHODS
The survey involved walking systematic transects along selected segments of the project corridor. Since the majority of the project corridor follows existing paved and cane roads, surface survey concentrated in the gulch areas. Machetes were used to cut through dense vegetation. The cane roads and exposed cut banks were inspected to locate potential exposures of subsurface deposits or features. Standard archaeological procedures were followed.
SURVEY RESULTS

No archaeological surface remains or other evidence of any significant cultural activities were encountered during the survey. Based on the extensive use of the project corridor for roads and sugar cane production and steepness of the gulch areas, subsurface testing was deemed unnecessary or unfeasible.

All of the gulches where the waterline crosses were inspected. Professional surveyors cleared a path into Maliko Gulch in order to provide access to the gulch bottom. The corridor is slated to cross this gulch roughly 600 feet above (south) of the Lowrie Ditch siphon. This portion of the gulch was observed to be narrow and steep with no usable stream side "gulch floor." Thus the probability for any cultural remains was very low. Several natural overhangs were found along the base of the gulch walls within the flood prone area and none exhibited evidence of cultural activity.

Other gulches surveyed, including Kanemoaala, Ohia, East Kuiaha, and West Kuiaha Gulches, exhibited extensive alteration by existing ranching or farming activities.

DISCUSSION

The majority of the project corridor have undergone extensive disturbances through large scale agricultural activities continuing for nearly a century. No surface archaeological sites remain in these areas. Although the absence of prehistoric remains may be attributed to the effects of compounded extensive alteration to the area, other archaeological surveys in the inland portions of Northeast Maui have resulted in a similar paucity of remains. This suggests that the intermediate area between the coast and further inland areas were generally not extensively used prehistorically for sedentary activities.

Previous archaeological research provides only minimal aid for predictability of subsurface remains. Pertinent data is unavailable for much of the project area.
Subsurface cultural remains, such as human burials, may be encountered during construction activities in the coastal and dune portions of the pipeline corridor, especially in the Phases 2 and 5 corridors where previous findings have been recorded by Clark and Toenjes (1987) and Rotunno and Cleghorn (1990).

RECOMMENDATIONS

Much of the final locations and alignments, such as additional well sites and location of pipeline through roadways, have not been determined at this time. When the specific locations are finalized, mitigation planning can also take place. Until such time, monitoring is recommended for those areas that manifest potential for subsurface remains. Full-time monitoring is recommended for all excavation in the corridors for Phases 2 and 5 as well as for the additional well sites. Spot checks and an archaeologist on-call is recommended for the rest of the pipeline corridors.
REFERENCES

Adler, Jacob

Armstrong, R. Warwick; ed.

Bordner, R.

Borthwick, Douglas

Clark, Stephen D. and James H. Toenjes

Donham, Theresa
1991 Field Inspection of a Rock Feature, Pu‘u o‘umu‘u (Haiku Hill), Hanakau‘ipu‘u, Maui. State Historic Preservation Division, Maui Section, Department of Land and Natural Resources.

Fredericksen, D.L.

Fredericksen, W. and D. Fredericksen

Folk, William H. and Hallett H. Hammatt

Foote, Donald E. et al.

Griffin, Agnes Esticko

Hammatt, Hallett and James Toenjes
Hawaiian Planter's Monthly
serial Hawaiian Planter's Monthly. April 1862 - December 1909. Volume 1 -

Kirch, Patrick V.

Mitchell, Muffy
1983 Burials Exposed Along Cliff Face at Paia, Maui. Maui County Planning
Department.

Neal, Marie C.
1965 In Gardens of Hawaii. Bernice P. Bishop Museum Special Publication

Speakman, Jay
1986 A Petroglyph Site in Maliko Gulch, Makawao, Maui (TMK 2-5-04:37).
Letter to Department of Anthropology. Bishop Museum, Honolulu.

Walker, Winslow
Ms. Archaeology of Maui. On file in the Anthropology Department, Bishop
Museum.
SUPPLEMENT

to

WELL EXPLORATION AND DEVELOPMENT
East Maui Source Development

Water Resources Associates
Honolulu, Hawaii
January 1993

Exhibit B
Streamflow

Perennial streams in the eastern part of the Haiku-Honopu area are more related to the occurrence of abundant mauka rainfall and a thick (100 to 150 ft.) formation of weathered andesites and andesitic basalts (Kula volcanic series) having low to moderate permeabilities. These two hydrogeologic conditions give rise to the occurrence of significant amounts of perched ground water in the Kula formation. The streams, which have eroded into the Kula formation, serve as natural drains of the perched ground water which result in perennial streamflows.

Below the Kula formation, older, permeable basalts of the Honomanu volcanic series occur. Unlike the Kukiwā Well situation, the Kula and underlying Honomanu formations (between the coast and at least three to four miles inland) are not fully saturated. This conclusion is first based upon observations of unsaturated rock conditions above a near-sea level basal groundwater table in several wells in the Haiku area: Hamakuapoko 1 (5420-02), Hamakuapoko 2 (5320-01), Upper Haiku (5419-01), Haiku School (5519-01), and Baldwin Manor (5519-03). Secondly, no perennial flows or seepages are known to occur in Maliko Gulch. Maliko Gulch, which has eroded some 200 feet deep into the Kula lavas, is the deepest gulch within the Project area.

Any impact due to encountering possible high-level, perched ground water during well drilling will be short-term and temporary. Rigorous procedures will be followed for monitoring water levels and constructing each well. If any high-level, perched ground water is encountered during drilling, it will be sealed off with cement grout before further drilling is allowed to continue, as was done during the drilling of Hamakuapoko Well 1 (5420-02). Further, during final construction, the well will be cased with solid steel casing from the ground surface to sea-level elevation and the annular space between the casing and drill hole will be grouted with cement, securely sealing off any high-level, perched groundwater source which might possibly contribute to streamflow.
In summary, the proposed water development plan will have no long-term impact on any streamflows in the Haiku area because the plan consists entirely of basal water development having no effect on any perched groundwater (which feed some of the streams in the area) or any high-level, dike-confined ground water (which is not known to occur in the Haiku area).

Streamflow at Lower Elevations

Most streams in the Haiku area (where the EMPLAN proposes to develop basal groundwater at sea level) have elevated profiles and generally discharge into the ocean over a steep coastal sea cliff some 80 feet above sea level. Approximately a half mile inland of the sea cliff, most stream profiles are at an elevation of 200 ft. above sea level (see Interpretive Hydrogeologic Section). The intervening lava flows (Kula volcanic series) below the streams and the underlying basal groundwater table are unsaturated (otherwise, ground water would be perennially flowing out of the face of the coastal sea cliff. Some high-level ground water does occur in the near coastal area, as evidenced by sporadic seepages in the sea cliff during sustained rainy periods. Although such high-level, perched ground water may contribute to streamflows at lower elevations, neither perched ground water nor stream sources will be affected by the EMPLAN’s development of the Haiku basal groundwater lens which has a head (static water level above mean sea level) of approximately 3 to 5 feet above sea level in the near coastal area.

Groundwater Underflow

The Haiku basal groundwater lens is thin near the coast, based upon a few reported heads in wells drilled near the coast. Based on an average head of 3 to 5 feet, the basal groundwater lens extends approximately 120 to 200 feet below sea level and discharges as underflow into the ocean in this interval of depth below sea level.

Underflow from the Haiku aquifer amounts to some 30 mgd (calculated as two times the sustainable yield of 15 mgd) and from the Paia aquifer, 17 mgd (Water Resources Protection Plan, June 1990). Such underflow becomes diffused or diluted with
sea water as it moves through the permeable Honomanu lavas capped by less permeable Kula lavas which extend to the coast and beyond offshore.

The ultimate development of approximately 8.0 mgd from the Haiku basal aquifer and 1.3 mgd from the Paia basal aquifer, compared to an estimated diffused underflow of 30 mgd and 17 mgd, respectively, is not expected to have any significant impact on existing marine resources or conditions. Adverse impacts on marine resources resulting from similar basal groundwater developments elsewhere in the State have not, to the best of knowledge, been reported.
WELL EXPLORATION AND DEVELOPMENT

East Maui Source Development

Prepared for

Norman Saito Engineering Consultants, Inc.

Water Resource Associates

Honolulu, Hawaii
November 1991

EXHIBIT B
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- Wells to have anticipated pump capacities of one to two mgd each.
- Wells to be cased and tested at a depth of -30 ft., msl, before drilling any open hole. Maximum open hole depth of -60 ft., msl (if required by field conditions).
- Sites to be located along existing road or rights-of-way.

### WELL EXPLORATION AND DEVELOPMENT PLAN

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</tr>
<tr>
<td>2</td>
<td>IIA</td>
<td>This site, located on State land, is recommended for the first well to be drilled east of Mallko Gulch. It is hydrologically well-located to initially test and develop the Haiku aquifer. The anticipated pump capacity is 1.0 to 1.5 mgd, from a basal lens with an expected head of 5 ft. or more. Primarily, because this site is expected to be readily available and is accessible by existing roads, it is a prime candidate for initial exploration and development. Test results at Site IIA will provide a more definitive hydrologic assessment of Site IIB before acquisition of the site. If aquifer conditions are sufficiently favorable to allow a well spacing of less than 2000 ft., a second well might also be possible as a standby and/or supplemental source on this 3.9-acre parcel. This site approximates Pumping Center 2.</td>
</tr>
<tr>
<td>3</td>
<td>IIB</td>
<td>This site, located in Haiku Lani Subdivision, approximates Pumping Center 1. It approaches the 2,000 ft. optimum spacing, being situated 1,500 ft. west of Site IIA. It is accessible from Kauhikoa Road, but would involve acquisition of a lot in the Haiku Lani Subdivision. The anticipated pump capacity at this site is 1.0 to 1.5 mgd.</td>
</tr>
<tr>
<td>Priority</td>
<td>Well Site</td>
<td>Remarks</td>
</tr>
<tr>
<td>----------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>IIIA</td>
<td>This site, located on West Kuiiha Road, is recommended for the first well approximating Pumping Center 3. Exploration and development at this site would be expected to proceed after Sites IIIA and IIB have been developed. However, drilling at IIIA could be advanced at any time. The anticipated pump capacity is 1.5 mgd.</td>
</tr>
<tr>
<td>5</td>
<td>IIB</td>
<td>Depending upon favorable groundwater conditions at Site IIIA, a second well may be hydrologically feasible located about 400 ft. from the well at Site IIIA. The anticipated pump capacity is 1.5 mgd. It should be noted that the priority between IIIA and IIB may be reversed if desired. Site IIB approximates Pumping Center 3.</td>
</tr>
<tr>
<td>6</td>
<td>IVA</td>
<td>This site is recommended for the first well approximating Pumping Center 4. It is favored by its location on East Kuiiha Road. The anticipated pump capacity is 2.0 mgd.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>first alternate to Site IIB would be a site (not shown on map 2) located 500 to 1000 ft. further west on the west side of Lilikoi Gulch. Such a site would be on one of several privately owned parcels with access to existing roadways being required. A second alternate to Site IIB is a 0.25-acre tank site shown as TMK 2-7-11:13 on Map 1, but not shown on Map 2. It is located 0.3 mile makai of the 700-foot elevation contour and a well at this site would be expected to have a pump capacity of 1/2 to 1 mgd. Based upon office investigations, a suitable well site with access does not seem to be available in Lilikoi Gulch. All of the above sites approximate Pumping Center 1.</td>
</tr>
</tbody>
</table>
WELL EXPLORATION AND DEVELOPMENT
East Maui Source Development

OBJECTIVES

The plan for development of East Maui sources includes the exploration and
development of wells in the Paia and Haiku aquifers of East Maui. Initial development
consists of drilling and testing two wells west of Maliko Gulch in the Paia aquifer, with
pump capacities of one mgd each. Subsequently, additional wells are to be located and
developed east of Maliko Gulch in the Haiku aquifer which lies primarily within the
northwest rift zone of East Maui. Exploratory drilling is expected to proceed
incrementally eastward toward an increasingly water-rich area.

HYDROGEOLOGIC REVIEW

The hydrogeology of the Paia and Haiku aquifers has been previously studied and
reported in the Central Maui Water Study, Part II, prepared for the Maui Department of
aquifer in the Hamakuapoko area consists of a thin basal lens with a mauka-to-makai
water table gradient of 1.6 ft./mile, based upon a reported head of 4.3 ft. in the upper
Haiku well (see Table 1). The sustainable yield of the Paia aquifer has been estimated at
2 to 3 mgd (Central Maui Water Study, Part II).

The Haiku aquifer lies mostly within a 2.7-mile wide rift zone defined by two
separate alignments of volcanic vents. Although no surface exposures have been
discovered, associated dikes with a northwesterly trend presumably occur beneath these
two alignments and, if so, may have an influence on groundwater conditions and
directions of flow. However, evidence of any groundwater conditions affected by dikes
in the rift zone must await further exploratory drilling. Reported heads of 3.4 ft. in the
Haiku School (Pauwela) well and 5.0 ft. in the Baldwin Manor well, indicate a higher
water table gradient in the Haiku aquifer than in the Paia aquifer which in turn suggest
greater groundwater recharge as would be expected in a higher rainfall area (see Table 1
and Map 1). A sustainable yield of 15 mgd has been estimated for the Haiku aquifer
which extends from Maliko Gulch eastward along the coast to Kakipi Gulch, a distance of about 5½ miles (Central Maui Water Study, Part II).

The Haiku School and Baldwin Manor wells are the only wells which tap the Haiku basal aquifer. They are located a little over a mile inland from the coast (see Map 2) and yield ground water with a chloride content of 120 and 150 ppm, respectively. Their heads and chloride content indicate that the western part of the Haiku aquifer consists of a thin, unconfined basal lens of fresh water. No wells have been drilled in the eastern part of this aquifer, but based upon rainfall occurrence (see Map 1), it is reasonable to conclude that significantly more ground water should be available in that area. Assuming similar geologic conditions, the basal lens in the eastern part of the aquifer should be thicker, allowing larger capacity wells to be developed.

CRITERIA FOR WELL LOCATION AND DESIGN

Based upon experience and an analysis of all available hydrogeologic data, development of the Haiku basal aquifer can best be achieved by: (1) establishing an alignment of pumping centers located approximately two miles inland from the coastline, and (2) spacing the centers approximately 2,000 feet apart. At each pumping center, one and possibly two wells with pumping capacities of one to two mgd each, are contemplated (see Map 2). Hopefully, other site selection criteria, such as land ownership, accessibility, and other engineering factors can be incorporated without causing any major deviation from the two criteria listed above. The fundamental design criteria for well construction and testing are based upon achieving minimum aquifer penetration and maximum pumping capacity appropriate to the sustainable yield and thickness of the aquifer.

The criteria for well site location and well design are summarized as follows:

- Sites to be located approximately two miles inland from coast.
- Sites to be spaced approximately 2,000 feet apart.
- Sites to be located at an elevation of approximately 700 feet.
<table>
<thead>
<tr>
<th>Priority</th>
<th>Well Site</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>IVB</td>
<td>This site is considered hydrologically favorable for a well which would be located midway between Pumping Centers 3 and 4. The anticipated pump capacity for a well on this site is 2.0 mgd.</td>
</tr>
<tr>
<td>8</td>
<td>VA</td>
<td>This site is recommended as a favorable well site. It is readily accessible along an existing road and is suitably located midway between Pumping Centers 5 and 6. Hydrologic conditions are expected to be favorable and the anticipated pump capacity is 2.0 mgd.</td>
</tr>
<tr>
<td>9</td>
<td>VB</td>
<td>This site approximates Pumping Center 6 and is, therefore, well-located in terms of optimum well spacing. The anticipated pump capacity is also 2.0 mgd.</td>
</tr>
</tbody>
</table>

**SUMMARY**

In summary, two well sites have been located in the Paia aquifer for an anticipated total pumping capacity of 2.0 mgd, and eight prospective well sites have been located in the Haiku aquifer east of Maliko Gulch for an anticipated total Haiku aquifer pumping capacity of 14 mgd (see Map 2 and Table 2). This planned 14-mgd capacity is based upon present knowledge of the Haiku Aquifer as a thin basal lens which presumably becomes thicker and receives greater recharge east of Maliko Gulch toward an increasingly water-rich area a few miles away. The planned capacity is also based upon the aquifer's estimated sustainable yield of 15 mgd.

Selection of prospective well sites in the Haiku aquifer has been based upon an alignment of pumping centers located two miles inland from the coast and spaced 2000 ft. apart, modified by other considerations such as land ownership (for availability), accessibility, and other engineering factors.

Because well data in the Haiku aquifer is limited, the proposed exploration and development plan has depended upon general knowledge and experience in exploring and developing basal aquifers elsewhere in the State. Therefore, the well exploration plan
presented herein should be considered a dynamic one; well locations, pumping quantities, and dates of establishment can be expected to be subject to change as each new well is drilled and pumping test results are evaluated.
<table>
<thead>
<tr>
<th>Name or Location</th>
<th>State Well No.</th>
<th>Year Drilled</th>
<th>Ground Elev. (ft.)</th>
<th>Ceg. Dia. (in.)</th>
<th>Ceg. Depth (ft.)</th>
<th>Well Depth (ft.)</th>
<th>Static Head (ft.)</th>
<th>Pump Cap. (mgd)</th>
<th>Chl (ppm)</th>
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<tr>
<td>Feehan #2</td>
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<td>12</td>
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<td>Maui High School</td>
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<td>1964</td>
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<td>Peahi Gusher</td>
<td>5515-01</td>
<td>1972</td>
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<tr>
<td>Pump 11 (Maiko Sh 32)</td>
<td>5520-01</td>
<td>1898</td>
<td>30</td>
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<tr>
<td>Pump 12 (Kaua)</td>
<td>5522-01</td>
<td>1933</td>
<td>156</td>
<td></td>
<td></td>
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<td>6.80</td>
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<td>Pump 13 (Pua Koli)</td>
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<td>3.8</td>
<td>13.39</td>
<td>186-453</td>
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<td>Pump 17 (Paia)</td>
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<td>1938</td>
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<td>6.2</td>
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<td>115-780</td>
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<td>Pump 18 (Kahakai)</td>
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<td>4.0</td>
<td>11.61</td>
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</table>

Source of Data: Division of Water Resource Management, Department of Land and Natural Resources.
Table 2. Preliminary Well Design Criteria

<table>
<thead>
<tr>
<th>Site</th>
<th>IA</th>
<th>IB</th>
<th>IIA</th>
<th>IIB</th>
<th>IIIA</th>
<th>IIIB</th>
<th>IVA</th>
<th>IVB</th>
<th>VA</th>
<th>VB</th>
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</thead>
<tbody>
<tr>
<td>Ground elevation, approximate (ft)</td>
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<td>648</td>
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<tr>
<td>Casing I.D. (inches)</td>
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<td>14</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>14</td>
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<tr>
<td>Solid casing depth (ft)</td>
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<td>650</td>
<td>690</td>
<td>670</td>
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<td>638</td>
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<td>670</td>
</tr>
<tr>
<td>Perforated casing depth (ft)</td>
<td>730</td>
<td>690</td>
<td>650</td>
<td>690</td>
<td>730</td>
<td>710</td>
<td>740</td>
<td>670</td>
<td>710</td>
<td>710</td>
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<td>Open hole* depth (ft)</td>
<td>760</td>
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<td>680</td>
<td>720</td>
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<td>740</td>
<td>770</td>
<td>690</td>
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<tr>
<td>Anticipated pump capacity (mgd)</td>
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<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>2.0</td>
<td>2.0</td>
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</tr>
</tbody>
</table>

*If required by field conditions.
EXHIBIT C

TAX MAP KEYS
BOTANICAL SURVEY REPORT FOR THE PROPOSED
EAST MAUI WATER DEVELOPMENT PLAN RIGHT-OF-WAY

for
PARAMETRIX, INC.
1164 Bishop Street, Suite 1600
Honolulu, Hawaii 96813

by
Evangeline J. Funk, Ph.D.
Botanical Consultants
Honolulu, Hawaii
1993

EXHIBIT D
BOTANICAL STUDY
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<th>Page</th>
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<td>RESULTS</td>
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<td>8</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>16</td>
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</tbody>
</table>

**FIGURES**

- FIGURE 1 LOCATION MAP: 2
INTRODUCTION

A botanical survey of the proposed East Maui Water Development Plan right-of-way was conducted in April, 1993. The purpose of the East Maui Water Development Plan is to harvest water in the Haiku area then funnel it westward to users as far away as the junction of Kuihelani and Honoapiilani Highways. This project is envisioned to be completed in six phases (Figure 1). The vegetation of each phase along the right-of-way will be described separately.

METHODS

Data collection for this survey was carried out by two and three person teams. In some sections of the right-of-way, observations were made from a slow moving vehicle with frequent stops for on the ground forays and inspections. In other areas such as Maliko Gulch and other lesser gulches, on the ground searches were made. Ten man days were spent in the examination of this thirty mile corridor.

RESULTS

Phase I. The first phase of this six phase project begins just west of Maliko Gulch at two well sites on Upper Hamakuapoko Road. At the junction of Hamakuapoko Road and Holomua Road the line turns westward and follows Holomua Road to Baldwin Avenue and to the end of Old Makawao Road, a distance of about five and three quarter miles. A small section where Old Makawao Road intercepts Baldwin Avenue will be included in Phase II.

All of Phase I follows cane haul roads through working sugarcane fields (Saccharum officinarum L.). The weed community which develops along openings in the fields, such as roads, is kept under control by the use of herbicides. The area around the two proposed well sites on Upper Hamakuapoko Road has been cleared, but more aggressive, woody species such as koa haole
(Leucaena leucocephela (Lam.) de Wit), castor bean (Ricinus communis L.), Christmas berry (Schinus terebinthifolius Raddi), and yellow guava (Psidium guajava L.) and many sorts of introduced grasses and weeds are beginning to fill the space.

Two small gorges cross the Holomua Road section of the right-of-way. In these gorges can be found a wide variety of planted trees. The most common are Java plum (Syzygium cumini (L.) Skeels), Chinaberry tree (Melia azedarach L.), Eucalyptus (Eucalyptus robusta Sm.), coffee (Coffea arabica L.), yellow guava (Psidium guajava L.), mango (Mangifera indica L.), Rose apple (Syzygium jambos (L.) Alston) and Christmasberry. The dense understory in the gulches is primarily made up of grasses such as molasses grass (Melinis minutiflora P. Beauv.) and California grass (Brachiaria mutica (Forssk.) Stapf), along with numerous adventives (weeds).

Phase II of the East Maui Water Development Plan consists of two sections of line and the upper Paia Tank Site. Section One of Phase II includes a half mile of line along Kauhikoa Road, sections of Haiku and Kokomo Roads, a short distance through pineapple fields to Maliko Gulch and westward to Hamakua Road - a distance of about three and one half miles.

Kauhikoa Road is a paved, country road along which considerable development has occurred. The adjoining properties are landscaped and the lawns and road shoulders are kept mowed. This is a wet, lush locale and the surrounding vegetation is robust and all introduced. Eucalyptus, ironwood (Casuarina equisetifolia L.), guava, and avocado (Persea americana Mill.) trees. The under story vegetation is ferns (Nephrolepis exaltata (L.) Schott., Blechnum occidentale L.), shrubs (Lantana camara L.), and a variety of grasses.
Westward from Kauhikoa Road, the line follows Haiku Road through a densely populated section of Haiku Town. At Kokomo Road the line turns mauka for a short distance, then again goes westward to the pineapple fields and on to Maliko Gulch. Except for the pineapple fields, this part of the route is through a mostly urbanized area with landscaped yards and paved roads with mowed and trimmed shoulders.

Beyond the pineapple field, the line crosses Maliko Gulch just mauka of the siphon. Maliko Gulch is heavily vegetated. The canopy is twenty meters above the gulch floor and is made up of Kukui (Aleurites moluccana (L.) Willd.), chicle (Manilkara zapota L.), Java plum, and banyan trees (Ficus microcarpa L.). The understory contains a scant population of coffee trees and saplings of the canopy trees. The ground layer is almost non-existent except for some scattered ferns (Adiantum hispidulum, Adiantum cueatum Langs. & Fisch., Blechnum occidentale L., and Dryopteris denata (Frosk.) C. Chr.) and tree seedlings. On the banks of the stream some taro (Calocasia esculenta (L.) Schott) and ginger (Hedychium spp.) plants were found.

Section two of Phase II traverses working sugar cane fields by way of Sunnyside Road. This is a broad, paved road with shoulders which vary from even with the road to very steep on either side. Along part of Sunnyside Road there is a line of mature monkey pod trees (Samantha saman (Jacq.) Merr.), but generally, the wayside plant community is kept under control by the use of herbicides.

Phase III is also composed of two sections, one, in the Haiku area includes West Kula ha Road and Haiku Road as far as Kauhikoa Road. The second section is along Hana Highway from Haleakala Highway to Dairy Road by way of Hansen and
Spanish Roads.

The portion which includes West Kulaha Road to Kauhikoa Road along Haiku Road or Part 1, Phase III is approximately two miles long. All of these roads are paved and considerable development has taken place in the area. The road shoulders are mowed or have been landscaped with a variety of trees and shrubs.

In one place, where Ohia Gulch crosses Haiku Road, deep cuts were made for the road right-of-way leaving steep banks on the mauka side. In this area the most common vegetation is Eucalyptus spp., mango, African tulip (SpaMhodia campanulata P. Beauv.), and Norfolk island pine (Araucaria heterophylla (Salisb.) Franco) trees. The understory is almost completely missing or consists of Christmasberry, Ti (Cordyline fruticosa (L.) A. Chev.), Hibiscus, Bougainvillea, and other types of cultivars. The ground layer is common ferns, grasses and adventives.

Phase III, Section 2. From the junction of Haleakala Highway to the junction of Hansen Road, Hana Highway, the path of the line, is a major highway with broad, mowed shoulders which passes through sugarcane fields. Many common weeds species such as puncture vine (Tribulus terrestris L.), wild bean (Macroptilium lathroides (L.) Urb.), prickly lettuce (Lactuca serriola L.), Pualele (Sonchus oleraceus L.), pigweed (Portulaca oleracea L.), yellow poppy (Argemone mexicana L.), buffel grass (Cenchrus ciliaris L.) and Bermuda grass (Cynodon dactylon (L.) Pers.) are all part of the vegetation community which is kept mowed.

Along Hansen Road the vegetation community includes African tulip, ironwood, monkey pod, and earpod (Entrolobium cyclocarpum (Lacq.) Griseb.) trees. Long stretches in this area are filled with Castor bean (Ricinus communis L.), koa haole, wild tomato (Lycopersicon pimpinellifolium (Just.) Mill. bushes
and buffel grass.

**Phase IV** is quite short, only one and one half miles. It includes East Kuiaha Road and the short stretch of Haiku Road from East Kuiaha Road to West Kuiaha Road. All of the roads are paved and the road shoulders are either mowed or landscaped. In those places where development has not taken place the vegetation is Eucalyptus, mango, Java plum, rose apple, and guava trees. Ferns and grasses such as palm grass (*Setaria palmifolia* (Koen.) Stapf.) and elephantgrass (*Pennisetum purpureum* Schumach) are common.

**Phase V** includes the right-of-way along the connector between Spanish Road and Puunene Avenue, a short portion of Puunene Avenue and Kuihelani Highway to Honoapiilani Highway.

The connector between Spanish Road and Puunene Avenue is a service road through sugarcane fields. The berms on either side of the road have recently been treated with herbicide. Some very hardy plants such as bitter melon (*Momordica charantia* Crantz), Alena (*Boerhavia repens* L.), Chinese violet (*Asystasia gangetica* (L.) T. Anders), and buffel grass have survived the weed killer.

Puunene Avenue is a main thoroughfare and its most striking feature is the line of large, windswept, monkey pod trees between it and the surrounding sugarcane fields. Some grasses such as buffel grass and *Chloris barbata* and lowland weeds such as Australian saltbush (*Atriplex semibaccata* R. Br.), prickly lettuce (*Lactuca serriola* L.), Alena, and nut grass (*Cyperus rotundus* L.) can also be found.

Kuihelani Highway from Puunene Road to Honoapiilani Highway is a four lane, heavily travelled road. The shoulders are broad and the vegetation is kept low. Inspite of the regular care a fair number of weedy species persist.
Indigo (*Indigo suffruticosa* Mull.), smooth rattle box (*Crotonaria pallida* Aiton), Partridge pea (*Chamaecrista nictitans* (L.) Moench), sensitive plant (*Mimosa pudica* L.), wild bean, Spanish needle (*Bidens pilosa* L.), and beggar's tick (*Desmodium triflorum* (L.) DC), and several grass species to name a few.

Phase VI includes Peahi Road from the wells to Haiku Road and a short distance along Haiku Road to East Kuiaha Road - one and one quarter miles in all. Even though Peahi Road is the most remote section of the proposed project, the street is paved and the shoulders are trimmed. The wayside vegetation includes Siris (*Albizia lebbeck* (L.) Benth.), Eucalyptus, and Christmasberry trees. Introduced grasses and ferns are common. A variety of weeds fill all of the space. Near the houses, quite often, dense mats of *Wedelia trilobata* (L.) Hitchc. abut Peahi Road.

The section of Haiku Road to East Kuiaha Road is paved and passes through a developed area with landscaped properties on either side.

During this survey, three native taxa, Ulei (*Osteomeles anthyllidifolia* (Sm.) Lindl.), Moa (*Psilotum nudum* L.), and Koali or blue morningglory (*Ipomoea indica* (J. Burm.) Merr.) were found. The remainder of the vegetation is made up of introduced species.

ENDANGEROSED SPECIES

SPECIES LIST

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

1. An asterisk before the plant name indicates a plant introduced to The Hawaiian Islands since Cook or by the aborigines.

2. The scientific name.

3. The Hawaiian name and or the most widely used common name.

4. Abundance ratings are for this site only and they have the following meanings:
   - Uncommon = a plant that was found less than five times.
   - Occasional = a plant that was found between five to ten times.
   - Common = a plant considered an important part of the vegetation.
   - Locally abundant = plants found in large numbers over a limited area. For example the plants found in grassy patches.

This species list is the result of an extensive survey of these areas during the beginning of the growing season (April 1993) and it reflects the vegetative composition of the flora during a single season. Minor changes in the vegetation will occur due to introductions and losses and a slightly different species list would result from a survey conducted during a different season.
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSILOTAACEAE - Psilotum Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Psilotum nudum</em> L.</td>
<td>Moa</td>
<td>Uncommon</td>
</tr>
<tr>
<td>POLYPODIACEAE - Common Fern Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Adiantum hispidulum</em></td>
<td></td>
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<tr>
<td><em>Adiantum cryptum</em> Langs. &amp; Fisch.</td>
<td></td>
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</tr>
<tr>
<td><em>Blechnum occidentale</em> L.</td>
<td></td>
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</tr>
<tr>
<td><em>Dryopteris dentata</em> (Forsk.) C. Chr.</td>
<td></td>
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</tr>
<tr>
<td><em>Polypodium scolopendrium</em> Burm. f.</td>
<td></td>
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<tr>
<td><em>Sphenomeris chusanana</em> (L.) Copel.</td>
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</tr>
<tr>
<td><em>Nephrilepis exaltata</em> L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MONOCOTYLEDONES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARACEAE - Arum family</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Calocasia esculenta</em> (L.) Schott</td>
<td>Taro</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Xanthosoma roseum</em> Schott</td>
<td></td>
<td>Uncommon</td>
</tr>
<tr>
<td>ARAUCARIACEAE - Araucaria Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Araucaria heterophylla</em> (Salisb.) Franco</td>
<td>Norfolk Island pine</td>
<td>Uncommon</td>
</tr>
<tr>
<td>ARECACEAE - Palm Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cocos nucifera</em> L.</td>
<td>Coconut</td>
<td>Occasional</td>
</tr>
<tr>
<td>BROMELIACEAE - Pineapple Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ananas comosus</em> (Stickm.) Merr.</td>
<td>Pineapple</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>COMMELINACEAE - Spiderwort Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Commelina diffusa</em> N. L. Burm.</td>
<td>Honohono</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>CYPERACEAE - Sedge Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cyperus rotundus</em> L.</td>
<td>Nut grass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>GRAMINEAE - Grass Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bambusa vulgaris</em> Schrad ex Wendl</td>
<td>Bamboo</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Brachytrichium mutica</em> (Forsk.) Staph</td>
<td>Paragrass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Cenchrus ciliarris</em> L.</td>
<td>Buffel grass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Cenchrus echinatus</em> L.</td>
<td>Sandbur grass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Scientific Name</td>
<td>Common Name</td>
<td>Abundance</td>
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<tr>
<td>-----------------</td>
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</tr>
<tr>
<td>Chloris barbata Swartz</td>
<td>Swollen fingergrass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Chloris divaricata R. Br.</td>
<td>Stargrass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Chloris inflata Link</td>
<td>Bermuda grass</td>
<td>Occasional</td>
</tr>
<tr>
<td>Cynodon dactylon (L.) Pers.</td>
<td>Henry's crabgrass</td>
<td>Occasional</td>
</tr>
<tr>
<td>Digitaria ascendentis (HBK) Henr.</td>
<td>Smooth crabgrass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Digitaria violascens Link</td>
<td>Sourgrass</td>
<td>Occasional</td>
</tr>
<tr>
<td>Digitaria insularis (L.) Ness</td>
<td>Jungle rice</td>
<td>Occasional</td>
</tr>
<tr>
<td>Echinochloa colomum (L.) Link</td>
<td>Wiregrass</td>
<td>Common</td>
</tr>
<tr>
<td>Eleusine indica (L.) Gaertn.</td>
<td>Stinkgrass</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Eragrostis ciliaris (All.) Link</td>
<td>Molasses grass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Melinis minutiflora P. Beauv.</td>
<td>Basketgrass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Opismenus hirtellus (L.) P. Beauv.</td>
<td>Guinea grass</td>
<td>Common</td>
</tr>
<tr>
<td>Panicum maximum Jacq.</td>
<td>Blue panic grass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Panicum coloratum L.</td>
<td>Hilo grass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Paspalum conjugatum Bergius</td>
<td>Dallis grass</td>
<td>Occasional</td>
</tr>
<tr>
<td>Paspalum dilatatum Poiret</td>
<td>Rice grass</td>
<td>Occasional</td>
</tr>
<tr>
<td>Pennisetum purpureum Schumach</td>
<td>Napier grass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Rhynchospermum repens C.E.Hubb</td>
<td>Natal redtop</td>
<td>Common</td>
</tr>
<tr>
<td>Setaria glauca (L.) Beauv.</td>
<td>Yellow foxtail</td>
<td>Occasional</td>
</tr>
<tr>
<td>Setaria palmifolia (Koen.) Stapf</td>
<td>Palm grass</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Sporobolus diander (Retz.) Robyns &amp; Tournay</td>
<td>Smutgrass</td>
<td>Occasional</td>
</tr>
</tbody>
</table>

**LILIACEAE - Lily Family**

| *Cordyline fruticosas (L.) A. Chev. | Ti | Occasional |
| *Hymenocallis littoralis* (Jaq.) Salisb. | Spider lily | Uncommon |

**PANDANACEAE - Screw pine Family**

| *Pandanus tectorius* S. Parkinson ex Z | Screw pine | Uncommon |

**ZINGIBERACEAE - Ginger Family**

| *Hedychium spp.* | Ginger | Occasional |

**DICOTYLEDONES**

**ACANTHACEAE - Acanthus Family**

<p>| *Ayystasia gangrentica (L.) T. Anders | Chinese violet | Common |
| <em>Justica betonica L.</em> | White shrimp plant | Uncommon |
| <em>Thunbergia alata</em> Bojer | Black-eyed Susan vine | Common |
| <em>Thunbergia fragrans</em> Rostb. | White thunbergia | Common |</p>
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AMARANTHACEAE - Amaranth Family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Alternanthera pungens</em> Kunth</td>
<td>Khaki weed</td>
<td>Occasional</td>
</tr>
<tr>
<td><em>Amaranthus spinosus</em> L.</td>
<td>Spiny amaranth</td>
<td>Common</td>
</tr>
<tr>
<td><em>Amaranthus viridis</em> L.</td>
<td>Slender amaranth</td>
<td>Common</td>
</tr>
<tr>
<td><strong>ANACARDIACEAE - Mango Family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Mangifera indica</em> L.</td>
<td>Mango</td>
<td>Occasional</td>
</tr>
<tr>
<td><em>Schinus terebinthifolius</em> Raddi</td>
<td>Christmas berry</td>
<td>Occasional</td>
</tr>
<tr>
<td><strong>APIACEAE - Parsley Family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Centella asiatica</em> (L.) Urb.</td>
<td>Asiatic pennywort</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Daucus pusillus</em> Michx.</td>
<td>American carrot</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><strong>ASTERACEAE - Sunflower Family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ageratum conyzoides</em> L.</td>
<td>Maile honohono</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Bidens alba</em> (L.) DC</td>
<td>Spanish needle</td>
<td>Common</td>
</tr>
<tr>
<td><em>Bidens pilosa</em> L.</td>
<td>Canadian fleabane</td>
<td>Common</td>
</tr>
<tr>
<td><em>Coryza canadensis</em> Cronq.</td>
<td>False daisy</td>
<td>Uncommon</td>
</tr>
<tr>
<td><em>Crassocephalum crepidioides</em> (Benth.)</td>
<td>Flora's paint brush</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Eclipta alba</em> (L.) Hask</td>
<td>Purple cudweed</td>
<td>Common</td>
</tr>
<tr>
<td><em>Elephantopus spicatus</em> Juss. ex. Aubl.</td>
<td>Prickly lettuce</td>
<td>Occasional</td>
</tr>
<tr>
<td><em>Emilia sonchifolia</em> (L.) DC</td>
<td>Soursob</td>
<td>Occasional</td>
</tr>
<tr>
<td><em>Gnaphalium purpureum</em> L.</td>
<td></td>
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<tr>
<td><em>Lacuca serriola</em> L.</td>
<td></td>
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<tr>
<td><em>Pluchea symphytifolia</em> (Mill.) Gillis</td>
<td></td>
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<tr>
<td><em>Sigieszbeckia orientalis</em> L.</td>
<td>Small yellow crown-beard</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Sonchus oleraceus</em> L.</td>
<td>Pualele</td>
<td>Occasional</td>
</tr>
<tr>
<td><em>Synedrella nodiflora</em> (L.) Gaertn.</td>
<td>Nodweeds</td>
<td>Occasional</td>
</tr>
<tr>
<td><em>Tridax procumbens</em> L.</td>
<td>Coat buttons</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Verbesina encelioides</em> Cav.</td>
<td>Golden crown-beard</td>
<td>Occasional</td>
</tr>
<tr>
<td><em>Vernonia cinerea</em> (L.) Less.</td>
<td>Little ironweed</td>
<td>Occasional</td>
</tr>
<tr>
<td><em>Wedelia trilobata</em> (L.) Hitchc.</td>
<td>Hawksbeard</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Youngia japonica</em> (L.) DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BIGNONIACEAE - Bignonia Family</strong></td>
<td><em>Spathodea campanulata</em> P. Beauv.</td>
<td>African Tulip tree</td>
</tr>
<tr>
<td><strong>BORAGINACEAE - Borage Family</strong></td>
<td></td>
<td>Uncommon</td>
</tr>
<tr>
<td><strong>BRASSICACEAE - Mustard Family</strong></td>
<td><em>Heliotropium procumbens</em> Mill.</td>
<td>Locally abundant</td>
</tr>
<tr>
<td><em>Lepidium virginicum</em> L.</td>
<td></td>
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</tr>
<tr>
<td>Scientific Name</td>
<td>Common Name</td>
<td>Abundance</td>
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</tr>
<tr>
<td>CACTACEAE - Cactus Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Hylocereus undatus (Haw.) Britton &amp; Rose</td>
<td>Night-blooming cactus</td>
<td></td>
</tr>
<tr>
<td>CAPPARIDACEAE - Caper Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Gynandropsis gynandra (L.) Briq.</td>
<td>Wild spider flower</td>
<td>Common</td>
</tr>
<tr>
<td>CARICACEAE - Papaya Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Carica papaya L.</td>
<td>Papaya</td>
<td>Occasional</td>
</tr>
<tr>
<td>CASUARINACEAE - Casuarina Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Casuarina equisetifolia L.</td>
<td>Ironwood</td>
<td>Occasional</td>
</tr>
<tr>
<td>CHENOPODIACEAE - Goosefoot Family</td>
<td></td>
<td></td>
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<tr>
<td>*Atriplex suberecta L.</td>
<td>Salt bush</td>
<td>Occasional</td>
</tr>
<tr>
<td>CONVOLVULACEAE - Moringglory Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Ipomoea batatas (L.) Lam.</td>
<td>Sweet potato</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Ipomoea indica (J. Burm.) Merr.</td>
<td>Koali</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Ipomoea obscura (L.) Ker-Gawl</td>
<td>Little Bell</td>
<td>Occasional</td>
</tr>
<tr>
<td>CRASSULACEAE - Opine Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Kalanchoe pinnata (Lam.) Pers.</td>
<td>Air plant</td>
<td>Uncommon</td>
</tr>
<tr>
<td>CUCURBITACEAE - Cucumber Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Momordica charantia Crantz</td>
<td>Balsam apple</td>
<td>Occasional</td>
</tr>
<tr>
<td>EUPHORBIACEAE - Spurge Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Aleurites moluccana (L.) Willd.</td>
<td>Kukui</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Chamaesyce hirta L.</td>
<td>Hairy spurge</td>
<td>Common</td>
</tr>
<tr>
<td>*Chamaesyce hypericifolia Melsp.</td>
<td>Graceful spurge</td>
<td>Common</td>
</tr>
<tr>
<td>*Chamaesyce hyssopifolia (L.) Small</td>
<td>Prostrate spurge</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>*Chamaesyce prostrata (Ait.) Millsp.</td>
<td>Mexican fire plant</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>*Euphorbia cyathophora J. A. Murray</td>
<td>Niruri</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Phyllanthus debils Klein &amp; Willd.</td>
<td>Castor bean</td>
<td>Occasional</td>
</tr>
<tr>
<td>** Fabaceae - Bean Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Albizia lebbeck (L.) Benth.</td>
<td>Siris tree</td>
<td>Locally abundant</td>
</tr>
</tbody>
</table>

-12-
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>FABACEAE - Bean Family con't</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Albizia vaginata (L.) DC.</td>
<td>One-leaved Clover</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>*Caesalpinia sp.</td>
<td>Mounaloa vine</td>
<td>Uncommon</td>
</tr>
<tr>
<td>*Canavalia cathartica Thouars</td>
<td>Japanese tea</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Cassia leschenaultiana DC.</td>
<td>Fuzzy rattle-pod</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Croalaria incana L.</td>
<td>Smooth rattle-pod</td>
<td>Common</td>
</tr>
<tr>
<td>*Croalaria mucronata L.</td>
<td>Virgate mimosa</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Desmanthus virgatus Willd.</td>
<td>Florida beggar weed</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Desmodium tortuosum (Sw.) DC</td>
<td></td>
<td>Common</td>
</tr>
<tr>
<td>*Desmodium triflorum (L.) DC</td>
<td>Earpod</td>
<td>Uncommon</td>
</tr>
<tr>
<td>*Glycine wightii (Wight &amp; Arnott) Verde.</td>
<td>Locally abundant</td>
<td></td>
</tr>
<tr>
<td>*Indigofera suffruticosa Mill.</td>
<td>Indigo</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Leucaena leucocephala deWit</td>
<td>Koa-haole</td>
<td>Common</td>
</tr>
<tr>
<td>*Macroptilium lathyroides (L.) Urb.</td>
<td>Wild bean</td>
<td>Common</td>
</tr>
<tr>
<td>*Medicago polymorpha L.</td>
<td>Bur clover</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>*Mellilus indicus (L.) All.</td>
<td>Clover</td>
<td>Common</td>
</tr>
<tr>
<td>*Mimosa pudica L.</td>
<td>Sensitive plant</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>*Pithecellobium dulce Benth.</td>
<td>Madras thorn</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Samanea saman (Jacq.) Merr.</td>
<td>Monkeypod</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Seneca occidentalis (L.) Link</td>
<td>Coffee senna</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Cassia pendula (Humb. &amp; Bonpl. ex Willd.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Senna surattensis H. Irwin &amp; Barn.</td>
<td>H. Irwin &amp; Barneby</td>
<td></td>
</tr>
<tr>
<td>*Persea americana Mill.</td>
<td>Avacado</td>
<td>Uncommon</td>
</tr>
<tr>
<td>LAURACEAE - Laurel Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MALVACEAE - Hibiscus Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Abutilon grandifolium Sweet</td>
<td>Hairy abutilon</td>
<td>Uncommon</td>
</tr>
<tr>
<td>*Malvastrum coromandelianum Garcke</td>
<td>False marrow</td>
<td>Common</td>
</tr>
<tr>
<td>*Sida fallax Walp.</td>
<td>'Ilima</td>
<td>Common</td>
</tr>
<tr>
<td>*Sida rhombifolia L.</td>
<td>Cuba jute</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Sida spinosa L.</td>
<td>Prickly sida</td>
<td>Occasional</td>
</tr>
<tr>
<td>MELIACEAE - Mahogany Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Melia azedarach L.</td>
<td>Neem tree</td>
<td>Occasional</td>
</tr>
<tr>
<td>MORACEAE - Fig Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Ficus microcarpa L. fil.</td>
<td>Chinese banyan</td>
<td>Uncommon</td>
</tr>
<tr>
<td>MYRTACEAE - Myrtle Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Eucalyptus citriodora Hook.</td>
<td>Lemon-scented gum</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Eucalyptus robusta Sm.</td>
<td>Swamp mahogany</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>Scientific Name</td>
<td>Common Name</td>
<td>Abundance</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>MYRTACEAE - Myrtle Family Con’t</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Psidium guajava L.</td>
<td>Guava</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Syzygium cumini L.</td>
<td>Java plum</td>
<td>Common</td>
</tr>
<tr>
<td>*Syzygium jambos (L.) Alston</td>
<td>Rose apple</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>*Tristania conferta R. Br.</td>
<td>Brisbane box</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>NYCTAGINACEAE - Four-o’clock Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Boerhavia repens L.</td>
<td>Alena</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Mirabilis jalapa L.</td>
<td>Four-o’clock</td>
<td>Occasional</td>
</tr>
<tr>
<td>OLEACEAE - Olive Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Olea europaea L.</td>
<td>Olive</td>
<td>Uncommon</td>
</tr>
<tr>
<td>OXALIDACEAE - Wood sorrel Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Oxalis corniculata L.</td>
<td>Yellow wood sorrel</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Oxalis corymbosa DC</td>
<td>Pink wood sorrel</td>
<td>Uncommon</td>
</tr>
<tr>
<td>PAPAVERACEAE - Poppy Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Argemone mexicana L.</td>
<td>Mexican poppy</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>PASSIFLORACEAE - Passionflower Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Passiflora edulis Sims</td>
<td>Lilikoi</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Passiflora suberosa L.</td>
<td>Huehue haole</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Passiflora foetida L.</td>
<td>Love-in-a-mist</td>
<td>Occasional</td>
</tr>
<tr>
<td>PHYTOLACCACEAE - Pokeweed Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Rivina humilis L.</td>
<td>Coral berry</td>
<td>Occasional</td>
</tr>
<tr>
<td>POLYGONACEAE - Buckwheat Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Polygonum aviculare L.</td>
<td></td>
<td>Common</td>
</tr>
<tr>
<td>PORTULACACEAE - Purslane Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Portulaca oleracea L.</td>
<td>Pigweed</td>
<td>Occasional</td>
</tr>
<tr>
<td>Portulaca pilosa L.</td>
<td>Akulikuli</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>PRIMULACEAE - Primrose Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Anagalis arvensis L.</td>
<td>Scarlet pimpernel</td>
<td>Occasional</td>
</tr>
<tr>
<td>Scientific Name</td>
<td>Common Name</td>
<td>Abundance</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>PROTEACEAE - Silk Oak Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Grevillea robusta A. Cunn</td>
<td>Silk oak</td>
<td>Occasional</td>
</tr>
<tr>
<td>ROSACEAE - Rose Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osteomeles anthylidifolia (Sm) Lindl.</td>
<td>Ulei</td>
<td>Uncommon</td>
</tr>
<tr>
<td>*Rubus rosifolius Sm.</td>
<td>Thimbleberry</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>RUBIACEAE - Coffee Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Coiffea arabica L.</td>
<td>Arabian coffee</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>SAPOTACEAE - Sapodilla Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Manilkara zapota L.</td>
<td>Chicle tree</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>SOLANACEAE - Tomato Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Lycopersicon pimpinellifolium (Jusl.) Mill.</td>
<td>Wild tomato</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Solanum americanum Mill.</td>
<td>Popolo berry</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Solanum linnaeum Hepper &amp; P. Jaeger</td>
<td>Apple of sodom</td>
<td>Uncommon</td>
</tr>
<tr>
<td>STERCULIACEAE - Stink tree Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Waltheria indica L.</td>
<td>Hi’aloa, uha-loa</td>
<td>Locally abundant</td>
</tr>
<tr>
<td>TILIACEAE - Linden Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Triumfetta semiriloba Jacq.</td>
<td>Sacramento bur</td>
<td>Uncommon</td>
</tr>
<tr>
<td>VERBENACEAE - Verbena Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Citharexylum caudatum L.</td>
<td>Fiddlewood tree</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Lantana camara L.</td>
<td>Lantana</td>
<td>Occasional</td>
</tr>
<tr>
<td>*Stachytarpheta jamaicensis Vahl.</td>
<td>Vervain</td>
<td>Common</td>
</tr>
<tr>
<td>*Verluna litoralis L.</td>
<td>Owi</td>
<td>Occasional</td>
</tr>
<tr>
<td>ZYGOPHYLLACEAE - Creosote bush Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Tribulus terrestrisL.</td>
<td>Puncture vine</td>
<td>Occasional</td>
</tr>
</tbody>
</table>
Bibliography


AVIFAUNAL AND FERAL MAMMAL SURVEY OF LANDS INVOLVED IN THE EAST MAUI WATER DEVELOPMENT PROJECT, MAUI

Prepared for
Norman Saito Engineering Consultants, Inc.
by

Phillip L. Bruner
Assistant Professor of Biology
Director, Museum of Natural History
BYU-H
Environmental Consultant - Faunal (Bird & Mammal) Surveys

5 May 1993

EXHIBIT E

AVIFAUNAL SURVEY REPORT
INTRODUCTION

The purpose of this report is to summarize the findings of a three day (30 April, 1-2 May 1993) bird and mammal field survey of lands proposed for the East Maui Water Development Project, Maui (see Fig. 1,2). Also included are references to pertinent literature as well as unpublished reports.

The objectives of the field survey were to:

1- Document what bird and mammal species occur on the property or may likely be found there given the type of habitats available.

2- Provide some baseline data on the relative abundance of each species.

3- Determine the presence or likely occurrence of any native fauna, particularly any that are considered "Endangered" or "Threatened". If such occur or may likely be found on the property identify what if any features of the habitat may be essential for these species.

4- Determine if the property contains any special or unique habitats that if lost or altered by development might result in a significant impact on the fauna in this region of the island.
GENERAL SITE DESCRIPTION

Figure One and Two indicate the proposed alignment and area of development. Sugar cane fields dominate this region of the island. Irrigation ditches, brush and weeds occur along the edges of fields and roads. Several gulches with large trees and dense undergrowth traverse the area. The largest and deepest of these is Maliko Gulch. The stream in this gulch was not running in the region of the survey. The large size of the stream bed indicates that when there is water moving down the gulch the flow is significant. Lands east of Maliko Gulch include residential property and pasture lands. Rainfall in this area is higher, judging from the amount of vegetation.

Weather during the survey was overcast and cool with passing light showers in the morning. Winds were gusty NE tradewinds (20-25 mph).

STUDY METHODS

Field observations were made with the aid of binoculars and by listening for vocalizations. These observations were concentrated
during the peak bird activity periods of early morning and late afternoon.

At various locations and in all representative habitats (see Fig. 1,2) eight minute counts were made of all birds seen or heard. Between these count stations observations of birds were also kept. These data provide the basis for the relative abundance estimates given in this report. Unpublished reports of birds known from this region were also reviewed in order to acquire a more complete picture of possible avifaunal activity (Bruner 1981, 1990, 1991). Observations of feral mammals were limited to visual sightings and evidence in the form of scats and tracks. No attempts were made to trap mammals in order to obtain data on their relative abundance and distribution. Two evenings were devoted to searching for the presence of owls and the Hawaiian Hoary Bat (Lasiurus cinereus semotus).

Scientific names used herein follow those given in Hawaii's Birds (Hawaii Audubon Society 1989); A field guide to the birds of Hawaii and the Tropical Pacific (Pratt et al. 1987) and Mammal species of the World (Honacki et al. 1982).
RESULTS AND DISCUSSION

**Resident Endemic (Native) Land Birds:**

No endemic species were recorded. One possible species which may occur occasionally in this area is the Hawaiian Owl or Pueo (Asio flammeus sandwichensis). Pueo are reasonably common in agricultural lands on Maui, particularly on the upper slopes of Haleakala but are seen less frequently in more urban habitat (Hawaii Audubon Society 1989).

**Resident Endemic (Native) Waterbirds:**

No endemic waterbirds were discovered on the field survey. Two species, Black-necked Stilt (Himantopus mexicanus knudseni) and American Coot (Fulica americana alai), may use the ditches and irrigations ponds found in the area. These two species are listed as endangered. Stilt are particularly opportunistic and will forage in flooded fields as well as in more permanent wetlands. Kanaha Pond and Kealia Pond are the two most important and heavily used sites on Maui for both stilt and coot.

**Migratory Indigenous (Native) Birds:**

Migratory shorebirds winter in Hawaii between the months of August through late April. Some juveniles will stay over the summer months as
well (Johnson et al. 1981, 1983, 1989). Of all the shorebird species which winter in Hawaii the Pacific Golden Plover (*Pluvialis fulva*) is the most abundant. Plovers prefer open areas such as mud flats, lawns, pastures, plowed fields and roadsides. They arrive in Hawaii in early August and depart to their arctic breeding grounds during the last week of April (Johnson et al. 1981). Bruner (1983) has also shown plovers are extremely site-faithful on their wintering grounds and many establish foraging territories which they defend vigorously. Such behavior makes it possible to acquire a fairly good estimate of the abundance of plovers in any one area. These populations likewise remain relatively stable over many years (Johnson et al. 1989). A total of only three plovers were recorded on the survey. An earlier survey would have undoubtedly found more birds. The majority of the population migrated around the third week of April.

Ruddy Turnstone (*Arenaria interpres*) is another common migrant that forages in plowed fields as well as in wetlands and intertidal habitat. No turnstone were recorded on this survey.

**Resident Indigenous (Native) Birds:**

This category includes only those species which are native but not endemic such as the Black-crowned Night Heron (*Nycticorax nycticorax*).
Night heron are common around irrigation ponds and along ditches. Twelve heron were counted on the survey. This is the only native, resident waterbird not listed as endangered.

**Resident Indigenous (Native) Seabirds:**

This site is totally unsuitable for nesting or roosting seabirds. Several species can be seen offshore but would not utilize this property. Ground predators such as dogs, cats, rats and the Small Indian Mongoose (*Herpestes auropunctatus*) prevent seabirds from nesting on the main Hawaiian Islands in all but a few isolated or protected locations.

**Exotic (Introduced) Birds:**

A total of 15 species of exotic birds were recorded during the field survey. Table One shows the relative abundance of each species. In addition to these species other exotic birds which potentially could occur on the property include: Common Barn Owl (*Tyto alba*) and Eurasian Skylark (*Alauda arvensis*) (Bruner 1981, 1988, 1990; Pratt et al. 1987; Hawaii Audubon Society 1989).

**Feral Mammals:**

Wild (feral) cats were seen as well as Small Indian Mongoose (*Herpestes auropunctatus*). No rats or mice were recorded, however,
it would be highly unusual if these ubiquitous animals did not occur on the property. Without a trapping program it is difficult to conclude much about the relative abundance of these species, but it is likely that their numbers do not differ dramatically from similar habitat elsewhere in the region.

Maui records of the endemic and endangered Hawaiian Hoary Bat are sketchy (Tomich 1986; Kepler and Scott 1990). None were observed on this field survey despite two evening searches. This species generally roosts solitarily in trees. Much remains to be known about the natural history of this bat and its ecological requirements here in Hawaii. Kepler and Scott (1990) suggest that this bat occurs on Maui only as a "migrant, probably from the Big Island". Duvall and Duvall (1991) question this idea and suggest that the bat is more common on Maui than reported by Kepler and Scott (1990).

CONCLUSION

A brief field survey can at best provide only a limited perspective of the wildlife present in any given area. Not all species will necessarily be observed and information on their use of the site must be sketched together from brief observations and the available literature. The number of species and the relative abundance of each species may vary
throughout the year due to changing food resources and reproductive success. Species which are migratory will quite obviously be an important part of the faunal picture only at certain times during the year. Exotic species sometimes prosper for a time only to later disappear or become a less significant part of the faunal community (Williams 1987, Moulton et al. 1990). Thus only long term studies can provide an in-depth view of the bird and mammal populations in a particular area. The following are some general conclusions related to bird and mammal activity in the area surveyed.

1- The lands involved in this proposal project provide a limited range of habitats which are utilized by the typical array of exotic species of birds one would expect in this region of the island. No unusual concentrations of any exotic species were discovered. However, some species typically found in this area were not recorded. This could have been due to a number of reasons such as: the survey was too brief, their numbers were so low that they went undetected or a combination of these and other factors.

2- The only native birds recorded were the Pacific Golden Plover and Black-crowned Night Heron. The low number of plover was due to time of year (most birds had migrated to the arctic by the third
week of April. Irrigation ditches and reservoirs are attractive foraging habitat for night herons.

3- Data on feral mammals were limited to observations. No unusually large concentrations were noted. No endangered species were recorded. Records of the Hawaiian Hoary Bat on Maui are limited.

4- No particularly unusual or unique habitat for wildlife was found on the survey. Sugarcane lands are common in this sector of the island as are gulches with dense second growth vegetation. The proposed project should have little or no long term measurable effect on the populations of exotic birds on Maui. The scope of the project, likewise, should not pose a serious threat to native birds like plover and night heron.
**TABLE 1**

Exotic species of birds recorded on a survey of lands involved with the proposed East Maui Water Development Project, Maui.

<table>
<thead>
<tr>
<th>COMMON NAME</th>
<th>SCIENTIFIC NAME</th>
<th>RELATIVE ABUNDANCE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle Egret</td>
<td>Bubulcus ibis</td>
<td>C = 7</td>
</tr>
<tr>
<td>Ring-necked Pheasant</td>
<td>Phasianus colchicus</td>
<td>R = 3</td>
</tr>
<tr>
<td>Black Francolin</td>
<td>Francolinus francolinus</td>
<td>U = 4</td>
</tr>
<tr>
<td>Gray Francolin</td>
<td>Francolinus pondicerianus</td>
<td>C = 8</td>
</tr>
<tr>
<td>Spotted Dove</td>
<td>Streptopelia chinensis</td>
<td>C = 7</td>
</tr>
<tr>
<td>Zebra Dove</td>
<td>Geopelia striata</td>
<td>A =13</td>
</tr>
<tr>
<td>Common Myna</td>
<td>Acridotheres tristis</td>
<td>A =15</td>
</tr>
<tr>
<td>Northern Mockingbird</td>
<td>Mimus polyglottus</td>
<td>R = 2</td>
</tr>
<tr>
<td>Northern Cardinal</td>
<td>Cardinalis cardinalis</td>
<td>C = 6</td>
</tr>
<tr>
<td>Red-crested Cardinal</td>
<td>Paroaria coronata</td>
<td>R = 2</td>
</tr>
<tr>
<td>Hwamei</td>
<td>Garrulax canorus</td>
<td>C = 6</td>
</tr>
<tr>
<td>Japanese White-eye</td>
<td>Zosterops japonicus</td>
<td>A =14</td>
</tr>
<tr>
<td>Nutmeg Mannkin</td>
<td>Lonchura punctulata</td>
<td>A =15</td>
</tr>
<tr>
<td>House Finch</td>
<td>Carpodacus mexicanus</td>
<td>C = 9</td>
</tr>
<tr>
<td>House Sparrow</td>
<td>Passer domesticus</td>
<td>C = 7</td>
</tr>
</tbody>
</table>

(see page 13 for key to symbols)
KEY TO TABLE 1

Relative abundance = number of times observed during survey or frequency on eight minute counts in appropriate habitat.

A = abundant (ave. 10+)
C = common (ave. 5-10)
U = uncommon (ave. less than 5)
R = recorded (seen or heard at times other than on 8 min. counts. number which follows is the total individuals seen or heard).
SOURCES CITED


