

1364/2

JOHN WAIHEE
Governor



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

YUKIO KITAGAWA
Chairperson, Board of Agriculture

ILIMA A. PIIANAIA
Deputy to the Chairperson

FAX: (808) 973-9613

RECEIVED

'93 AUG -

Mailing Address:

P. O. Box 22159

Honolulu, Hawaii 96823-2159

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

August 5, 1993

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

Dear Brian:

Subject: Negative Declaration for Abandonment of the Waimanalo
Ditch Irrigation System, TMK 4-1-08,10,24-27,
Waimanalo, Oahu, Hawaii

The Department of Agriculture has reviewed the comments received during the 30-day public comment period that began on June 23, 1993. The Department has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the August 23, 1993, OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA.

Please contact Paul T. Matsuo, Administrator, Agricultural Resource Management Division, at 973-9473 if there are any questions.

Sincerely,

A handwritten signature in cursive script that reads "Yuki".

YUKIO KITAGAWA
Chairperson, Board of Agriculture

Attachments

c: ARM Div.
ParEn, Inc.



132

AUG 23 1993

1993-08-23-0A-FAA-Waimanalo Ditch Irrigation System

FILE COPY

ENVIRONMENTAL ASSESSMENT

for

**ABANDONMENT OF THE
WAIMANALO DITCH IRRIGATION SYSTEM**

Waimanalo, Oahu, Hawaii
Tax Map Key: 4-1-08, 10, 24-27

Proposing Agency: Department of Agriculture
State of Hawaii
1428 South King Street
Honolulu, Hawaii 96814

Consulted Parties: Federal:
U. S. Army Corps of Engineers
U. S. Department of Agriculture
U. S. Department of Interior

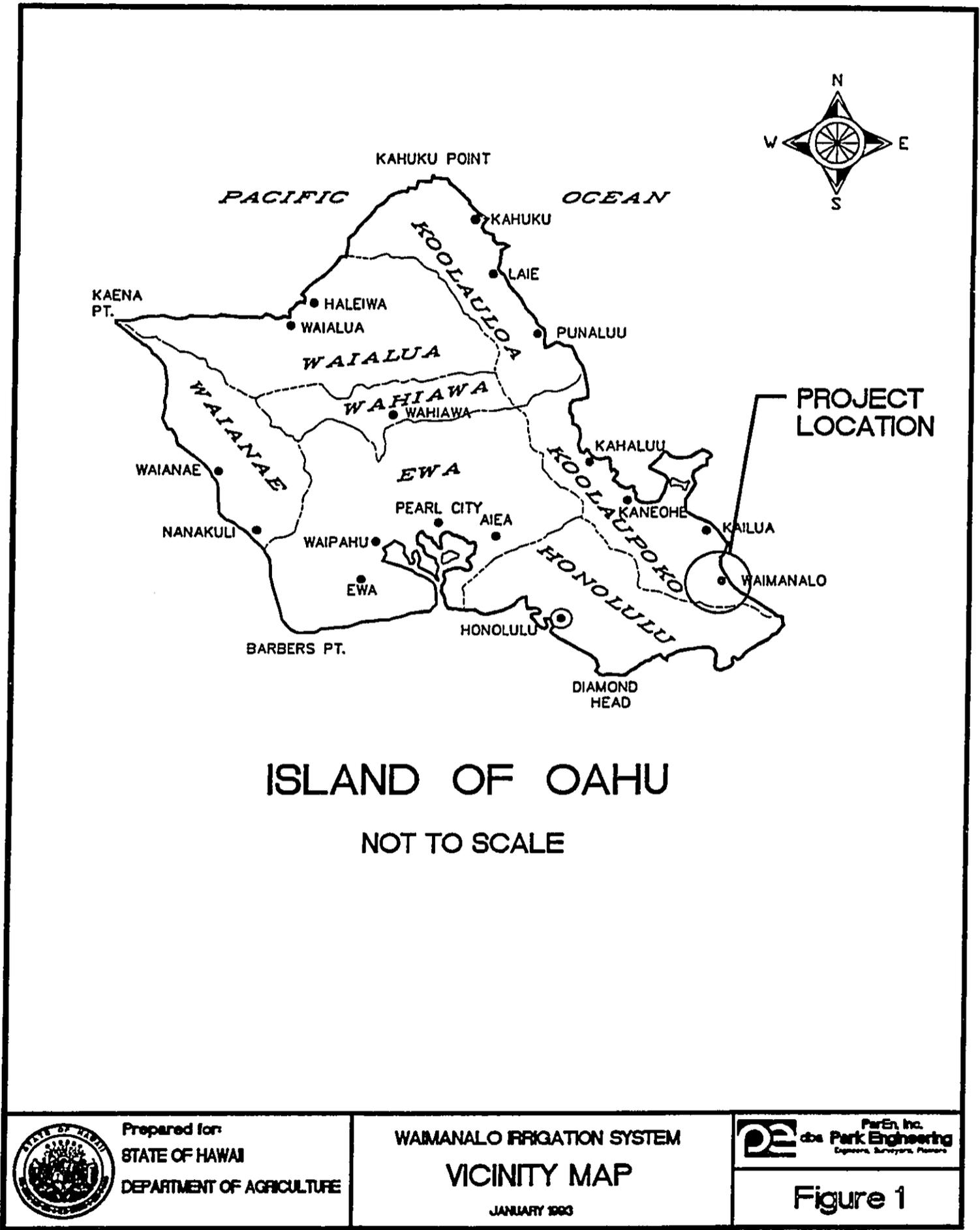
State of Hawaii:
Department of Land and Natural Resources
Department of Health
University of Hawaii
Office of Environmental Quality Control

City & County of Honolulu:
Department of Land Utilization
Department of Public Works
Department of General Planning
Department of Building and Safety

Other:
Waimanalo Neighborhood Board #32

I. PROPOSED PROJECT

For many years, irrigation water for the farmers in Waimanalo has been conveyed via a gravity system consisting of open ditches, wooden flumes and tunnels. The State Department of Agriculture has recently decided to replace the aging ditch system with a system of underground pipes. Once this pipe system is constructed, the Department plans to abandon the ditch system in place.



WAI-VII 8/2/93 KSU



Prepared for:
STATE OF HAWAII
DEPARTMENT OF AGRICULTURE

WAIMANALO IRRIGATION SYSTEM
VICINITY MAP

JANUARY 1993

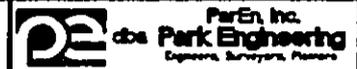
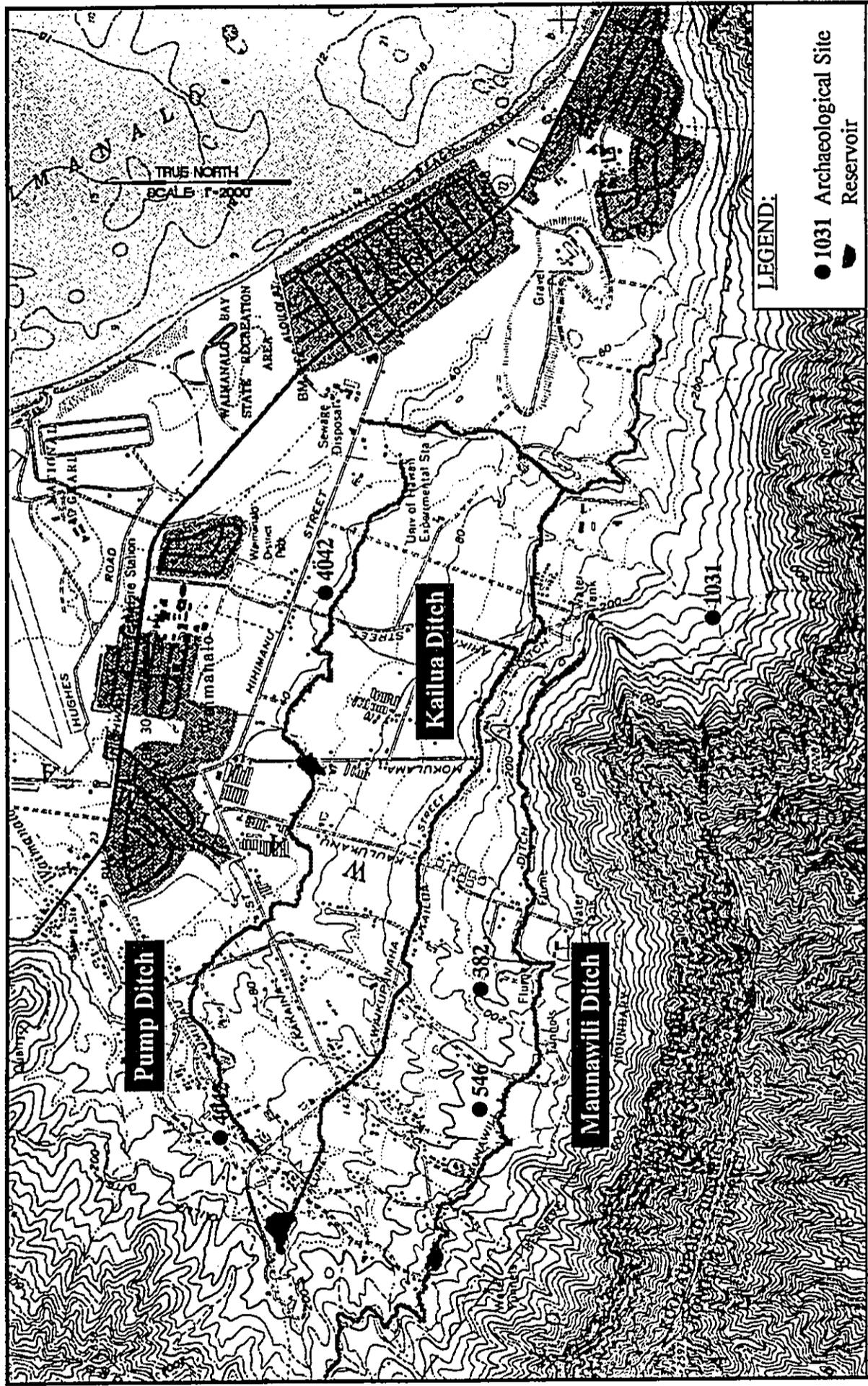


Figure 1



STATE OF HAWAII
DEPARTMENT OF AGRICULTURE

WAIMANALO IRRIGATION SYSTEM
WAIMANALO VALLEY, OAHU, HAWAII

LOCATION MAP



LEGEND:

- 1031 Archaeological Site
- ◐ Reservoir

Prepared by:
ParEn, Inc.
dba Park Engineering
Engineers, Surveyors, Planners

FIGURE 2

The ditch system provides a limited degree of storm water protection by intercepting storm runoff and releasing it at stream crossings with the use of sluice gates. To prevent any reduction in storm water protection, it has been proposed to replace approximately 20 wooden flume structures with permanent outlets to release storm water into natural drainage ways.

A. Technical Characteristic

The scope of work for the proposed project shall include the following items for Maunawili, Kailua, and Pump Ditches:

1. Demolition of wooden flumes at locations indicated on Map "A".
2. Construction of transition and drainage structures.
3. Construction of outlet structure with energy dissipators to prevent scouring.

B. Economic Characteristics

Operation and maintenance of the antiquated irrigation system have been a significant cost item for the Department of Agriculture. Projected capital improvement costs for the proposed modifications are approximately \$1,015,000. Although substantial capital improvement costs for the drainage improvements are unavoidable, these costs should be offset by the reduction in maintenance costs.

Construction of these drainage improvements should alleviate some flooding that area farmers would otherwise have been subjected to. However, these improvements will not protect against larger storms and some economic losses due to flooding are anticipated.

C. Social Characteristics

The proposed project has no significant social impacts on the community.

D. Environmental Characteristics

The proposed project has no significant impact on the environment.

II. SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT

A. Topography

Waimanalo Valley ranges from sea level at the ocean to elevation 2200 feet at its highest peak. The low lying valley floor area, which accounts for over half of the valley's area, is sloped at less than 12%. Ground slope quickly increases

up to 20% in the foothill area and approaches vertical in the highest regions of the basin.

Maunawili, Kailua, and Pump Ditches are located between elevation 40 feet to 300 feet above MSL.

B. Soils

The predominant soil types found in the project area are silty-clays of the Haleiwa, Hanalei, Pohakupu, and Waiialua series. They tend to be inorganic in origin and have a relatively high plasticity rating and moderate permeability.

C. Climate

Mean annual rainfall in Waimanalo Valley ranges from approximately 40 inches near the sea to over 100 inches in the upper regions of the basin. The temperature in the valley varies with the terrain. Average rainfall in the project area is approximately 60 to 70 inches per year.

D. Streams

Waimanalo Stream, Inaole Stream and a third, unnamed stream are the major water courses that drain the Valley into Waimanalo Bay. Waimanalo Stream is perennial while Inaole Stream is intermittent, although both streams are expected to convey flows on the order of 13,000 cfs for a 100 year storm. Major tributaries of these streams pass through the project area, two from Waimanalo Stream and three from Inaole Stream.

E. Land Use

Two of the largest landowners in Waimanalo Valley are the State and Federal Government. Of the 6132 acres in the valley the state owns 4049 acres and Bellows Air Force Base accounts for 994 acres. The remaining 1089 acres are held by private owners. Map "B" shows the breakdown of land ownership in the project area.

Approximately 50% of the valley is zoned for agricultural purposes. The project area is almost entirely in agricultural lands, with a small portion in urban and conservation zones.

F. Flood Hazard

It has long been recognized that low-lying areas of Waimanalo Valley are prone to flooding as concluded in reports prepared for the Department of Land and Natural Resources and delineated in the Flood Insurance Rate Map. Flooding

can be attributed to insufficient capacities of drainage facilities and the wide, flat floodplains found at lower elevations. Flood hazard areas are identified on Map "B".

G. Flora

The agricultural nature of Waimanalo Valley promotes a diversity of vegetation in the area. There are numerous fruit and vegetable farms as well as nurseries cultivating a variety of ornamental and landscaping plants. The Waimanalo Research Station and Experimental Farm and the Hawaii Foundation Seed Facility are located in Waimanalo Valley. These facilities are operated by the University of Hawaii's College of Tropical Agriculture and Human Resources.

H. Fauna

Domesticated farm animals include chickens, pigs, and beef and dairy cattle. The native wildlife present in the area is similar to that of many other areas on the island, which includes a variety of birds, mammals, reptiles and amphibians. There are no rare or endangered species known to inhabit the area.

I. Historic Sites and Archaeological Resources

The presence of early Hawaiian civilization in Waimanalo Valley has been documented with the identification of twelve archaeological sites, most of which are religious temples or heiaus. Although most of these sites are near the coastal area, there are several heiaus at higher elevations in the general vicinity of the project. Figure 2 includes the general location of these sites within the project area.

- ✓ On September 18, 1981, the ditch system was deemed eligible for listing in the National Register for its historic significance in Hawaii's agriculture industry. However, the State Department of Agriculture has provided numerous reasons to the Department of Land and Natural Resources and testimony before the Hawaii Historic Places Review Board for not designating the ditch system as a historic site.

III. IDENTIFICATION OF POTENTIAL IMPACTS

Construction of the drainage outlets will not have any significant, long term, adverse impacts on the project area. Increases in stream flow will be nominal relative to the anticipated flow resulting from a design storm event. The following table is a summary of the cumulative effect these drainage improvements will have at various locations along the Waimanalo Valley stream system. Locations of the nodes are indicated on Map "A".

INCREASE IN FLOW AT NODES

NODE IDENTIFICATION	INCREASE IN DISCHARGE AT NODE	
	2-YEAR STORM (CFS)	100-YEAR STORM (CFS)
A	8	27
B	8	27
C	0	0
D	8	27
E	20	20
F	22	22
G	0	20
H	5	5
I	5	5
J	5	5
K	50	50
L	10	10
M	15	15
N	15	35
O	50	50
P	15	35
Q	65	85
R	22	22
S	31	31
T	53	53
U	70	70
V	0	0
W	30	30

Impacts resulting from construction activities will be temporary with activity limited to normal daylight hours. There may be a slight increase in the amount of sediments discharged into streams and tributaries from the construction site during periods of heavy rains. However, this impact is considered minimal as most sites identified for drainage improvements are no larger than several thousand square feet.

IV. PROPOSED MITIGATION MEASURES

In order to further minimize sediment transport associated with stormwater discharge, the construction activity can be scheduled for the dryer months of the year.

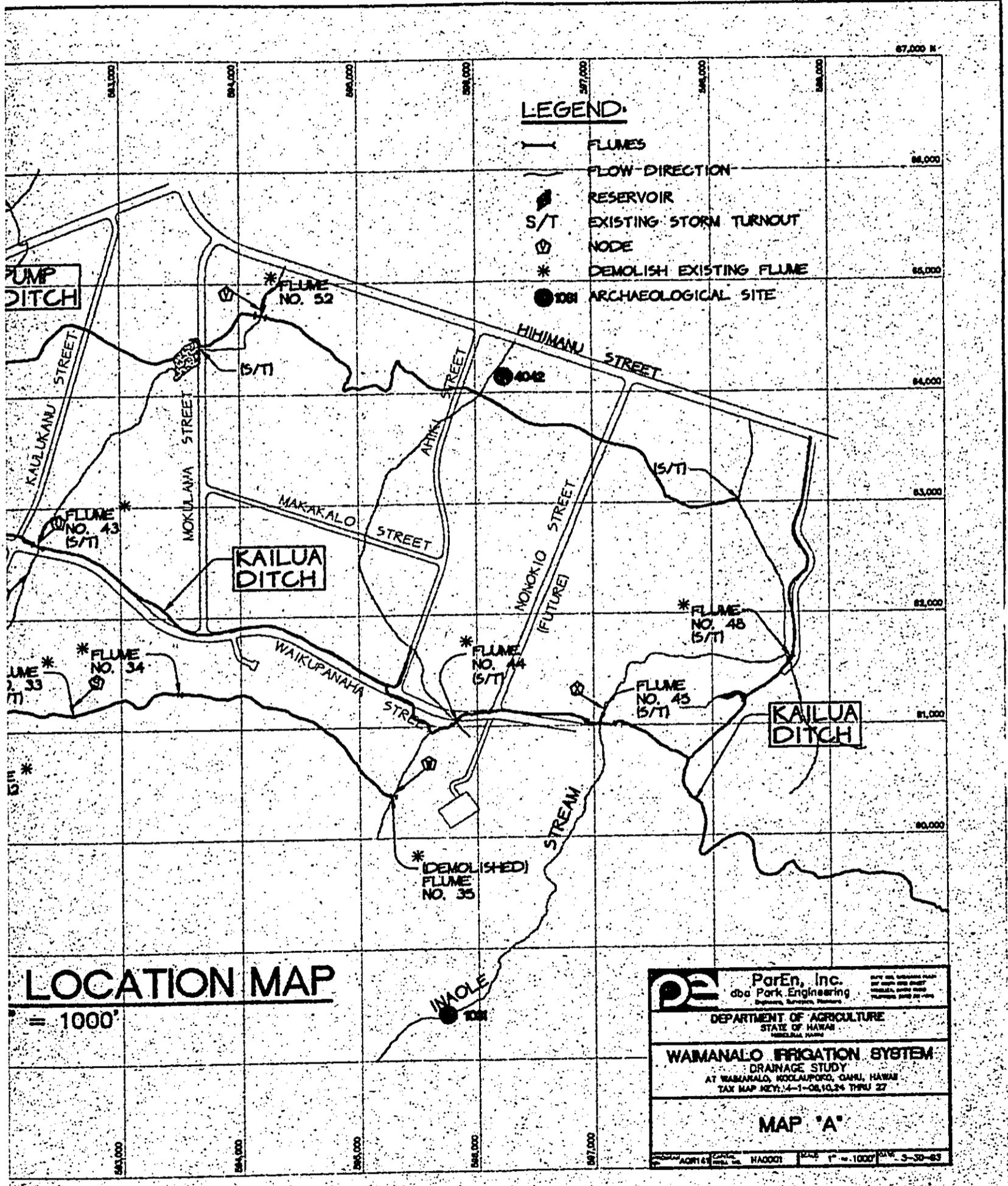
V. FINDINGS AND REASONS TO SUPPORT DETERMINATION

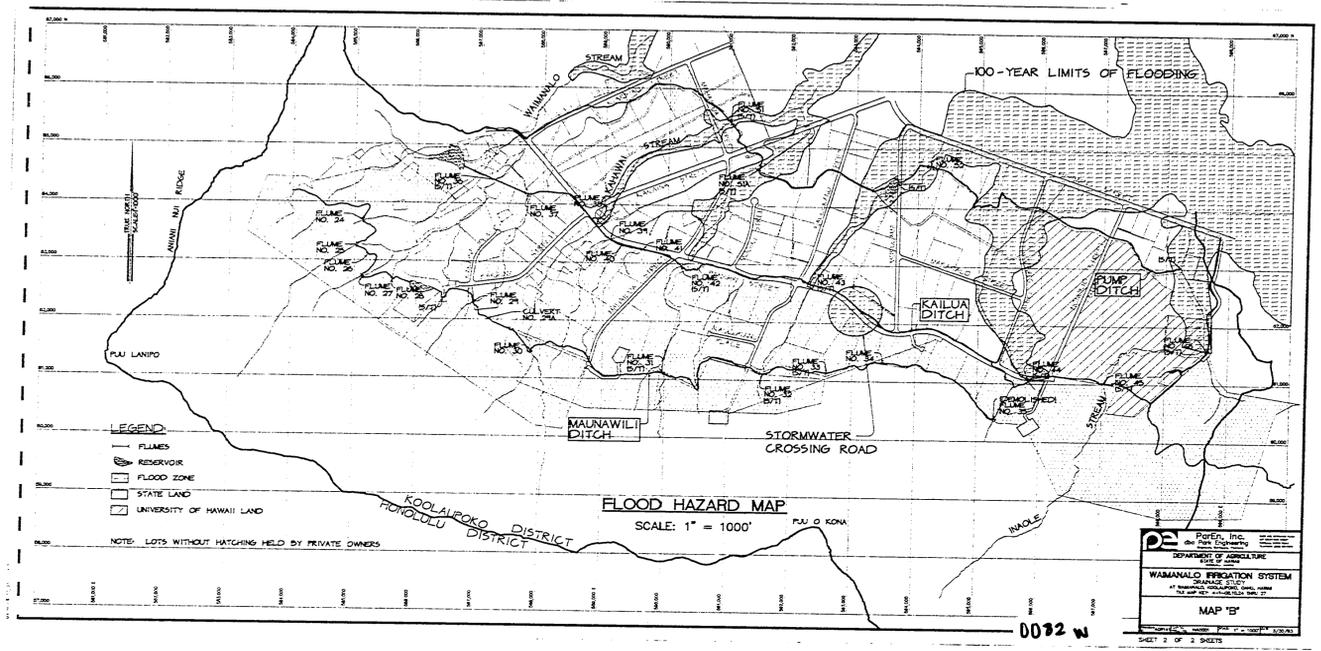
After completing an assessment of the potential environmental effects of the proposed project and consulting with other government agencies, it has been determined that an Environmental Impact Statement (EIS) is not required. Therefore, this document constitutes a Notice of Negative Declaration.

Reasons supporting the Negative Declaration determination are as follows.

- The proposed project will not result in a loss of any natural or cultural resource;
- It will not reduce the range of beneficial use of the environment;
- It will not conflict with the State's long-term goals or guidelines (Chapter 344, HRS)
- It will not substantially affect public health, or the economic or social welfare of the community;
- It will not involve substantial secondary effect or degradation of environmental quality;
- It will not affect any rare, threatened or endangered species or its habitat;
- It will not have any permanent detrimental effects on air or water quality or ambient noise levels. Any affect on environmental quality during the construction phase will be limited in area and for a short duration;
- It will not affect an environmentally sensitive area.

This Notice of Negative Declaration shall serve to meet the requirements of Chapter 343, HRS.







Suite 300, Kawa-ahao Plaza □ 567 South King Street, Honolulu, Hawaii 96813-3036 □ Telephone (808) 531-1676 □ FAX (808) 536-5996

ParEn, Inc. dba park engineering

April 20, 1993

Mr. Kisuk Cheung, Director of Engineering
Department of the Army
U. S. Army Engineer District, Honolulu
Planning Division
Fort Shafter, Hawaii 96858-5440

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Mr. Cheung:

We are forwarding for your review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure



REPLY TO
ATTENTION OF

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

May 21, 1993



Planning Division

Mr. Keith S. Uemura, Project Engineer
Park Engineering
567 South King Street, Suite 300
Honolulu, Hawaii 96813-3036

Dear Mr. Uemura:

Thank you for the opportunity to review and comment on the Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System, Oahu (TMK 4-1-8, 10, 24-27). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. A DA permit will be required for any discharge of fill material into streams or wetlands. For further information regarding permit requirements, please contact the Operations Division at 438-9258 and refer to file number P093-059. ✓

b. The flooding information presented on pages 3 and 4 of the Environmental Assessment is correct.

Sincerely,

Kisuk Cheung, P.E.
Director of Engineering



Suite 300, Kawaiahaeo Plaza □ 567 South King Street, Honolulu, Hawaii 96813-3036 □ Telephone (808) 531-1676 □ FAX (808) 536-5996

ParEn, Inc. □ dba park engineering

April 20, 1993

U. S. Department of Agriculture
Soil Conservation Service
Prince Kuhio Federal Building, Room 4316
Honolulu, Hawaii 96813

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Sir:

We are forwarding for your review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

A handwritten signature in black ink, appearing to read 'Keith S. Uemura', written over a horizontal line.

Keith S. Uemura
Project Engineer

Enclosure

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P. O. BOX 50004
HONOLULU, HI
96850-0001

May 11, 1993

Mr. Keith S. Uemura, Project Manager
Park Engineering
Suite 300, Kawaiahao Plaza
567 South King Street
Honolulu, Hawaii 96813-3036

Dear Mr. Uemura:

Subject: Environmental Assessment for Abandonment of the
Waimanalo Ditch Irrigation System

We have reviewed the Environmental Assessment for the abandonment of the Waimanalo Ditch Irrigation System as requested and have the following comments to offer.

Since the basic purpose of the project is to provide flood protection it is not clear what is the level of protection afforded to the farms presently and what will be the level of protection provided by the proposed project. Additionally, it is not clear what Department of the State of Hawaii will be responsible for the operation and maintenance after project installation. Furthermore, the operation and maintenance cost is not apparent in the assessment.

Thank you for the opportunity to provide comment.

Sincerely,

 ACTING
NATHANIEL R. CONNER
State Conservationist

cc: Michael Bajinting, District Conservationist, Honolulu Field Office



Suite 300 Kawaiahao Plaza □ 567 South King Street, Honolulu, Hawaii 96813-3036 □ Telephone (808) 531-1676 □ FAX (808) 536-5996

ParEn, Inc. □ dba park engineering

April 20, 1993

U. S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Office
300 Ala Moana Boulevard, Room 5302
Honolulu, Hawaii 96813

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Sir:

We are forwarding for you review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure



Suite 300 Kawaiahae Plaza □ 567 South King Street, Honolulu - Hawaii 96813-3036 □ Telephone (808) 531-1676 □ FAX (808) 536-5996

ParEn, Inc. □ dba park engineering

April 20, 1993

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

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Mr. Paty:

We are forwarding for you review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure

JOHN WAHEE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 621
HONOLULU, HAWAII 96809

REF:OCEA:SKK

KEITH WAHLE CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JOHN P. KEPPELER II
DONAL L. HANAHE

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

JUN 3 1993

FILE NO.: 93-569
DOC. NO.: 2816

Mr. Keith S. Uemura, Project Engineer
ParEn Inc. dba Park Engineering
567 South King Street, Suite 300
Honolulu, Hawaii 96813-3036

Dear Mr. Uemura:

SUBJECT: Draft Environmental Assessment (DEA): Abandonment of the
Waimanalo Ditch Irrigation System, Waimanalo, Oahu,
TMK: 4-1-08: 10, 24-27

We have reviewed the EA information for the subject ditch system closure project transmitted by your letter dated April 20, 1993, and have the following comments:

Brief Description:

The proposed project involves the removal of wooden sections of the Waimanalo Ditch Irrigation System, construction of drainage outlets at these locations, and replacement of the existing ditch system with underground pipes.

Historic Preservation Division

The Historic Preservation Division (HPD) comments that on September 18, 1981, the ditch system was determined eligible for listing in the National Register by the Keeper of the Register. HPD therefore believes that the proposed project will have an adverse effect on the historic character of the ditch system. This system is significant for its association with the development of the sugar industry. Prior to permitting the demolition of the wooden flumes, HPD needs to know if there are other wooden flume systems in the State and their degree of preservation. In addition, mitigative measures would need to be established.

Division of Land Management

The Division of Land Management (DLM) comments that they have no objections provided that:

- 1) The replacement of approximately 20 wooden flume structures with permanent outlets to release stormwater into materials drainage ways will sufficiently prevent flooding in the areas as they will replace the irrigation gates.
- 2) The applicant obtain all necessary Federal, State, and local permits.
- 3) The affected sites be shown to the Oahu District Land Agent so he can determine how the vacated parcels will be utilized and how the surface run-off waters that presently flow into the flumes will be managed in each area.
- 4) Information be provided on how the State parcels, where the subject flumes are located, will be utilized after the flumes are dismantled.
- 5) DLM also comments that this EA is for a piecemeal flooding affects at specific sites. DLM is interested in what will be the effect on the entire drainage plans adjacent to Inoaole Stream and Waimanalo-Kahawai Stream as the result of discharging into streams during both low and high ocean tides. DLM also notes that DLNR is a lessor to considerable agricultural operations and civic facilities, such as the Job Corps, on Hihimanu Street. DLM is interested in the effects of this project on such facilities and agricultural operations.

Division of Water and Land Development

The Division of Water and Land Development (DOWALD) comments that the EA should address the disposition of the Kailua and Tai Lee reservoirs and their maintenance. Reservoirs with capacities over 50 acre-feet or with dams or 25 feet in height must meet the requirements of the State's Dam Safety Law. DOWALD recommends that these reservoirs be breached before abandonment.

The ditches also act as drainage systems. In some areas, abandonment and backfilling or natural debris filling will prevent diversion of sheet flows and cause nuisance flooding and sediment problems which should be addressed (see attachment).

Mr. K. Uemura

-3-

File No.: 93-569

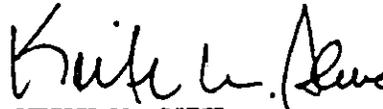
Division of Aquatic Resources

The Division of Aquatic Resources (DAR) comments that the project will not substantively change stream flows in the area. DAR has no objections to the proposed project from an aquatic standpoint.

We have no other comments to offer at this time. Thank you for the opportunity to comment on this matter.

Please feel free to call Steve Tagawa at our Office of Conservation and Environmental Affairs, at 587-0377, should you have any questions.

Very truly yours,


KEITH W. AHUE

JOHN WAIHEE
GOVERNOR OF HAWAII



KEITH W. AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JOHN P. KEPPELER, II
DONAL L. MANAIKE

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 621
HONOLULU, HAWAII 96809

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RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:OCEA:SKB

FILE NO.: 93-569a
DOC. NO.: 2882

JUN 15 1993

Mr. Keith S. Uemura, Project Engineer
ParEn Inc. dba Park Engineering
567 South King Street, Suite 300
Honolulu, Hawaii 96813-3036

Dear Mr. Uemura:

SUBJECT: Draft Environmental Assessment (DEA): Abandonment of the
Waimanalo Ditch Irrigation System, Waimanalo, Oahu,
TMK: 4-1-08: 10, 24-27

The following are the Commission on Water Resource Management (CWRM)
comments on the subject project which supplement those forwarded in our
previous letter dated June 3, 1993.

Commission on Water Resource Management

The EA does not sufficiently explain the actions which are to be taken in
constructing the drainage and outlet structures. This information is
needed by the CWRM to determine whether Stream Channel Alteration Permits
(SCAP) or amendments to the interim instream flow standard are required
for the project. CWRM asks that the project developer contact David Higa
of the Water Commission at 587-0249 to provide the needed information.

We have no other comments to offer at this time. Thank you for the
opportunity to comment on this matter.

Please feel free to call Steve Tagawa at our Office of Conservation and
Environmental Affairs, at 587-0377, should you have any questions.

Very truly yours

Handwritten signature of Keith W. Ahue in black ink.
KEITH W. AHUE



Suite 300, Kawa-nao Plaza □ 567 South King Street, Honolulu, Hawaii 96813-3036 □ Telephone (808) 531-1676 □ FAX (808) 536-5996

ParEn Inc. dba park engineering

April 20, 1993

Dr. John Lewin, Director of Health
State of Hawaii
Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Dr. Lewin:

We are forwarding for your review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure

JOHN WAIHEE
GOVERNOR OF HAWAII



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

STATE OF HAWAII
DEPARTMENT OF HEALTH

P. O. BOX 3378
HONOLULU, HAWAII 96801

May 28, 1993

In reply, please refer to:
93-122/epo

Mr. Keith S. Uemura
Project Engineer
DBA Park Engineering
567 South King Street
Honolulu, Hawaii 96813-3036

Dear Mr. Uemura:

Subject: Environmental Assessment for Abandonment of the
Waimanalo Ditch Irrigation System

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

Nonpoint Source Pollution

The increase in stormwater runoff entering the streams from the
removal of sections of the existing flume and the construction of
drainage outlets will have an impact on the streams.
The carrying capacity of these streams may not be large enough to
accept these increases in stormwater runoff, which would cause
erosion and flooding problems downstream.

During the New Year's storm of 1988, the wooden irrigation flume
failed (broke) in several sections. The increase in the volume
and velocity of stormwater runoff caused severe erosion
downstream in these drainage areas.

If you should have any questions on this matter, please contact
Ms. Shirley Nakamura of the Environmental Planning Office
at 586-4337.

Very truly yours,


JOHN C. LEWIN, M.D.
Director of Health

c: Environmental Planning Office



Suite 300 Kawaiaho Plaza □ 56th South King Street, Honolulu, Hawaii 96813-3036 □ Telephone (808) 531-1676 □ FAX (808) 536-5996

ParEn, Inc. dba park engineering

April 20, 1993

Dr. John Harrison
University of Hawaii, Environmental Center
2550 Campus Road, Crawford 317
Honolulu, Hawaii 96822

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Dr. Harrison:

We are forwarding for your review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure

1339/2

JOHN WAIHEE
Governor



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

YUKIO KITAGAWA
Chairperson, Board of Agriculture

ILIMA A. PIIANAIA
Deputy to the Chairperson

FAX: 973-9613

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96823-2159

June 8, 1993

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

Dear ^{Brian} ~~Mr. Choy~~:

Subject: Draft Environmental Assessment for Abandonment of the
Waimanalo Ditch Irrigation System, Waimanalo, Oahu

The Department of Agriculture has reviewed the Environmental Assessment of the subject project and anticipates a negative declaration determination.

Please publish Notice of Availability for this project in the June 23, 1993 OEQC Bulletin. We have enclosed a completed OEQC Bulletin Publication Form and four copies of the draft E.A.

Please contact Mr. Paul T. Matsuo, Administrator, Agricultural Resource Management Division, at 973-9473 if you have any questions.

Sincerely,


YUKIO KITAGAWA
Chairperson, Board of Agriculture

Attachments

c: ARM Div.
ParEn, Inc.



JOHN WAIHEE
GOVERNOR



BRIAN J. J. CHOY
Director

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185

June 9, 1993

The Honorable Yukio Kitagawa, Director
Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

Attention: Paul Matsuo

Dear Mr. Kitagawa:

Subject: Draft Environmental Assessment for the Waimanalo Ditch Irrigation System
Abandonment, Waimanalo, Oahu

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

- 1) A portion of the project area is within the State Conservation District. Please consult with the Department of Land and Natural Resources, Office of Conservation and Environmental Affairs regarding the Conservation District Use Application.
- 2) Please describe any impacts the project may have on the associated streams.
- 3) Does the project affect any wetlands, archaeological/historical sites, or endangered or rare flora?
- 4) Is the Waimanalo Ditch archaeologically or historically significant?
- 5) Please provide the findings and reasons to support the determination.

If you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,


Brian J. J. Choy
Director

c: Keith Uemura



Suite 300, Kawaiahoi Plaza □ 557 South King Street, Honolulu, Hawaii 96813-3036 □ Telephone (808) 531-1676 □ FAX (808) 536-5996

ParEn, Inc. dba park engineering

April 20, 1993

Mr. Donald A. Clegg, Director of Land Utilization
City and County of Honolulu
Department of Land Utilization
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Mr. Clegg:

We are forwarding for your review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure



Suite 300, Kawaiahaeo Plaza □ 567 South King Street, Honolulu, Hawaii 96813-3036 □ Telephone (808) 531-1676 □ FAX (808) 536-5996

ParEn, Inc. dba park engineering

April 20, 1993

Mr. C. Michael Street, Director and Chief Engineer
City and County of Honolulu
Department of Public Works
650 South King Street, 11th Floor
Honolulu, Hawaii 96813

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Mr. Street:

We are forwarding for your review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU HAWAII 96813

FRANK F. FASI
MAYOR



C. MICHAEL STREET
DIRECTOR AND CHIEF ENGINEER

FELIX B. LIMFIACO
DEPUTY DIRECTOR

ENV93-101

April 29, 1993

Mr. Keith S. Uemura, Project Engineer
Park Engineering
Kawaiahao Plaza, Suite 300
567 South King Street
Honolulu, Hawaii 96813

Dear Mr. Uemura:

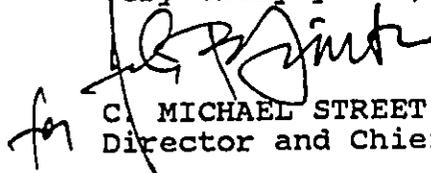
Subject: Preliminary Environmental Assessment (PEA)
Abandonment of the Waimanalo Ditch Irrigation System
TMK:4-1-08, 10, 24-27

We have reviewed the subject PEA and have the following comments:

1. The PEA should address the potential impact on storm water discharges associated with construction activities on water quality of the receiving waters.
2. The PEA should also state what structural or non-structural best management practices (BMP) will be provided to control and reduce the discharge of pollutants resulting from construction and/or dewatering operations.
3. If dewatering activity is anticipated during construction, dewatering permits will be required by the State Department of Health as well as the Department of Public Works, City and County of Honolulu.
4. Abandoned ditch within street right-of-way should be removed.

Should you have any questions, please contact Mr. Alex Ho, Environmental Engineer, at 523-4150.

Very truly yours,


C. MICHAEL STREET
Director and Chief Engineer



Suite 300, Kawaiahao Plaza □ 567 South King Street, Honolulu, Hawaii 96813-3036 □ Telephone 313 531-1676 □ FAX (808) 536-5996

ParEn, Inc. □ dba park engineering

April 20, 1993

Mr. Benjamin B. Lee, Chief Planning Officer
City and County of Honolulu
Department of General Planning
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Mr. Lee:

We are forwarding for your review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure

PLANNING DEPARTMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK FASI
MAYOR



ROBIN FOSTER
CHIEF PLANNING OFFICER
ROLAND D. LIBBY, JR.
DEPUTY CHIEF PLANNING OFFICER
LW 4/93-1058

May 24, 1993

Mr. Keith S. Uemura, Project Engineer
Park Engineering, Inc.
Suite 300, Kawaiahao Plaza
567 South King Street
Honolulu, Hawaii 96813-3036

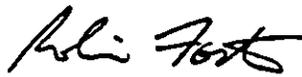
Dear Mr. Uemura:

Environmental Assessment (EA) for
Abandonment of the Waimanalo Ditch Irrigation System

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

Thank you for the opportunity to comment on this matter. Should you have any questions, please contact Lin Wong of our staff at 523-4485.

Sincerely,


ROBIN FOSTER
Chief Planning Officer

RF:js

cc: State Department of Agriculture



Suite 300 Kawaiahao Plaza □ 567 South King Street, Honolulu, Hawaii 96813-3036 □ Telephone (808) 531-1676 □ FAX (808) 536-5996

ParEn, Inc. dba **park engineering**

April 20, 1993

Director
City and County of Honolulu
Department of Building
650 South King Street
Honolulu, Hawaii 96813

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Sir:

We are forwarding for your review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure

BUILDING DEPARTMENT
CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU HAWAII 96813



FRANK F. FASI
MAYOR

HERBERT K. MURAOKA
DIRECTOR AND BUILDING SUPERINTENDENT

WILLIAM F. REMULAR
DEPUTY
PB 93-428

April 26, 1993

Mr. Keith S. Uemura
ParEn, Inc.
Suite 300, Kawaihao Plaza
567 South King Street
Honolulu, Hawaii 96813-3036

Dear Mr. Uemura:

Subject: Environmental Assessment for Abandonment of the
Waimanalo Ditch Irrigation System

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

Very truly yours,

A handwritten signature in dark ink, appearing to read "Herbert K. Muraoka", is written over the typed name.

HERBERT K. MURAOKA
Director and Building Superintendent

cc: J. Harada



Suite 300, Kawaiahao Plaza □ 567 South King Street, Honolulu, Hawaii 96813-3036 □ Telephone (808) 536-1676 □ FAX (808) 536-5796

ParEn, Inc. □ dba park engineering

April 20, 1993

Linden A. Burzell, Chairperson
Waimanalo Neighborhood Board #32
P. O. Box 440
Waimanalo, Hawaii 96795

Subject: Environmental Assessment for Abandonment of the Waimanalo Ditch Irrigation System

Dear Mr. Burzell:

We are forwarding for your review the Environmental Assessment for abandonment of the Waimanalo Ditch Irrigation System.

The proposed action consists of the removal of various sections of wooden flumes and construction of drainage outlets at these locations. The activity is proposed at various sites within Waimanalo Valley, identified by Tax Map Key 4-1-08, 10, 24-27.

If you have any questions or comments regarding this assessment, please submit them to me by May 24, 1993. Thank you for your attention on this matter.

Sincerely Yours,

ParEn Inc. dba
Park Engineering

Keith S. Uemura
Project Engineer

Enclosure

**COMMENTS ON REQUEST by DEPARTMENT OF AGRICULTURE TO
ABANDON WAIMANALO IRRIGATION SYSTEM**

TO: STATE DEPARTMENT OF AGRICULTURE

COPY: ParEn, Inc. dba Park Engineering
Office of Environmental Quality Control

FROM: Carol Wilcox *CarL Cox*
P.O. Box 10558
Honolulu, HI 96816

RE: Request to abandon Waimanalo Ditch Irrigation Sytem
Objection to Negative Declaration Determination

DATE: July 6, 1993

I am commenting on your above proposal by way of this memo and the enclosed letter dated July 6, 1993 to Keith Ahue, Chairman, BLNR.

There is significant historical and recreational value to the Waimanalo Ditch Irrigation system, and its abandonment should be carefully considered. I would recommend that alternatives be developed, most appropriately by the DLNR, which would explore these alternatives, and that they be included in the Environmental Assessment.

For these reasons, I think that:

1. a negative declaration determination is not appropriate for this project,
2. a supplement to the environmental assessment should be developed with recreational and historic preservation alternatives, and
3. care should be taken to protect the resource until a review by the DLNR takes place and decisions are made.

Thank you for the opportunity to comment.

Carol Wilcox
P.O. Box 10558
Honolulu, HI 96816

July 6, 1993

Mr. Keith Ahue, Chairman
Board of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96816

RE: Comments on Hawaii Administrative Rules transferring Ocean Recreation and Coastal Areas from Department of Transportation to Department of Land and Natural Resources as per Act 272, Session Law of Hawaii, 1991. (HRS 200).

Public Hearing Wednesday June 30, 1993. Comment deadline, July 7, 1993.

Department of Land and Natural Resources
Department of Transportation

Dear Chairman Ahue and Members of the Board,

Thank you for the opportunity to comment on the transfer of Administrative Rules cited above. My comments and proposed changes to the Administrative Rules address two separate areas of concern.

- 1) Environmental and social review of commercial boating. It is my understanding that when the legislature transferred the management of boating to the DLNR the legislative intent was to assure that environmental and social values be considered. These Rules should clarify just when during the process (between the formation and adoption of these Rules and the issuance of the permits) that the DLNR will require that certain legally mandated reviews will take place, specifically CZM compliance and Chapter 343 review.
- 2) Consistency between Chapter 256, Ocean Recreation Management Rules and Areas (ORMRA), Subchapter 2 -- North Shore Kauai Ocean Recreation Management Area, as postulated in 1988, and the Hanalei Estuary Management Plan and SMA rules adopted in 1992.

While my report on the Waimanalo Sugar Company irrigation system was exceedingly brief, nevertheless I recommended at that time that this system be considered as part of a park or recreational system. Three factors recommend your attention to its development as part of the public trust...Its proximity to the urban Oahu population, proximity to existing hiking trails, and ownership by the State. I can think of no other irrigation system which could so easily and well provide this resource to the public.

I urge you to consider the recreational education resource value of this small gem of a system, and encourage Historic Sites Division and Parks Divisions to develop an alternative to abandonment.

I would also urge you to ask for reconsideration of a negative declaration determination

Yours truly,



Carol Wilcox

cc Department of Agriculture
Par En, Inc. dba Park Engineering



JUL 1993

NATIVE HAWAIIAN ADVISORY COUNCIL

A NONPROFIT CORPORATION

1088 Bishop Street, Suite 1204, Honolulu, Hawaii 96813

Telephone (808) 523-1445

Facsimile (808) 599-4380

1993 July 23

cc: Par En

COPY

TO: Department of Agriculture
State of Hawaii
1428 South King Street
Honolulu, HI 96814

RE: Draft Environmental Assessment (DEA) for Abandonment of the
Waimanalo Ditch Irrigation System.

I. PROPOSED PROJECT

p. 1

The DEA does not address the entire project as described here. The DEA seems only to deal with replacing flumes identified on Map "A", not with completely replacing "the aging ditch system with a system of underground pipes." The entire project scope and the scope of this DEA need to be clearly identified. In particular, how would system capacities change when the changeover to pipes was completed?

p. 2

The exact number of flume structures to be replaced should be provided.

A. Technical Characteristic
pp. 2. & 3.

The number, locations, design specifications, and capacities of transition, drainage, and outlet structures should also be referenced in the text and on Map "A".

Typical construction details for transition, drainage, and outlet structures should be provided.

B. Economic Characteristics

It seems that construction of these drainage improvements would alleviate very little (rather than "some") of the flooding experienced by area farmers, and would in fact increase flood discharges and elevations in most areas under most conditions. The table on page 5 shows that 2-year storm discharge would increase at 20 out of 23 nodes under project conditions, and would not decrease

at any of them. See additional comments below under Section III., Identification of Potential Impacts.

II . SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT

p. 3

D. Streams

What is the expected 100 year storm flow conveyance for the third, unnamed stream?

F. Flood Hazard

Complete bibliographic information should be given for the flood hazard reports prepared for the Department of Land and Natural Resources referred to here.

p. 4

I. Historic Sites and Archaeological Resources

Specific locations of sites within the project area should be indicated on Map "A" for better comparison with project construction areas and better identification and assessment of potential impacts.

III. IDENTIFICATION OF POTENTIAL IMPACTS

pp. 4 & 5

From the incomplete information presented, it is difficult to assess how "nominal" increases in stream flow resulting from the proposed project would be. The table on page 5 showing Increase in Flow at Nodes should include additional columns showing the pre-project streamflow at each node for the 2 and 100 year storms, allowing assessment of percentage increase in discharge under storm conditions.

The DEA should summarize the methods and data used to perform this analysis.

In addition to flood discharge increases, the DEA should show how water levels and areas of inundation would change after project completion.

Mahalo,

David L. Martin

David L. Martin, Water Claims Manager

pc: OEQC
HHC



*Ke aloha o ke kākou 'Āina, 'O ia ka mana kū pa'a. Pānoanoa ka 'Āina, Mānoanoa ka po'a.
The Love of our land, is the power for us to stand fast. Rare is the land, many are the people.*

July 27, 1993

Park Engineering
567 South King Street, Suite 300
Honolulu, Hawaii 96813

Attention: Mr. Keith Uemura

Subject: Waimanalo Ditch Irrigation System Abandonment

Dear Mr. Uemura:

As you know per our recent telephone conversations, Hawaii's Thousand Friends is quite concerned about the proposal by the Department of Agriculture to dismantle historic irrigation flumes in Waimanalo. This system is considered by the State Office of Historic Preservation to be a good example of irrigation flumes significant for their association with the development of the sugar industry.

In 1981, the ditch system was determined to be eligible for listing in the National Register of Historic Places. Such eligibility would apparently subject this system to Section 106 of the Federal Historic Preservation Act.

In 1992, the Waimanalo flume system was nominated for the State Register of Historic Places. Placement of this system on the State Register is pending information on examples of other flume systems in the State for the purpose of comparison. Until this is accomplished it is neither appropriate nor advisable to contemplate destruction of this flume system, either in part or in its entirety.

Comments from the Department of Land and Natural Resources dated June 3, 1993 submitted to Park Engineering pertaining to the proposed demolition of this flume system clearly express the need to compare this system to others in the State respecting their degree of preservation. It is our understanding that, to date, no such information has

Mr. Keith Uomura
July 27, 1993
Page 2

been provided. We have also been informed that the project is not to proceed until consent from the State Office of Historic Preservation is secured. We encourage you to contact Ms. Carol Ogata at the State Office of Historic Preservation for additional information on this matter.

In addition, we have some concerns respecting the irrigation water pipe system planned to replace the ditch system:

- A. The flood waters of 1989 caused severe damage and repairs were extremely costly because the enclosed pipes that replaced open flumes could not support the water overflow. Will the new system be entirely encased in pipes? If so, what water escape mechanisms are being provided for flood waters?
- B. Currently the overflow from the open flumes adds water to the stream recharge. However, once the water is encased it will no longer be available. Stream channelizations and diversions as well as reconfiguration of the terrain by the Royal Hawaiian Golf Course development has not yet been fully investigated with regard to the impact on the Maunawili stream complex and the further impact to Kawainui Marsh. Is the impact of the loss of water recharge to Maunawili streams being considered in the conversion from an open to an enclosed irrigation system?

This impact as well as the impact from the golf course complex must be studied before further actions are taken which would have a negative affect on stream water flow.

We would very much appreciate being kept apprised of the status of the flume systems comparison study. We would also like to be informed of and be provided with any updated information on this proposed project as it becomes available.

Thank you for your kind consideration and attention to the above concerns.

Sincerely,


Michelle Matson, President
Hawaii's Thousand Friends

Responses to Agency Comments

United States Department of the Army

item a A DA permit will be obtained prior to construction. ✓

item b No action required.

United States Department of Agriculture

par. 2 The basic purpose of the project is not to provide flood protection but to replace the aging ditch irrigation system with an underground pipe system without decreasing the level of flood protection currently provided. Operation & Maintenance (O & M) shall consist of periodic removal of sediment and debris from the ditches, therefore, anticipated costs are small. It has not been determined what Department will be responsible for the O & M costs. ✓

United States Department of the Interior

No comment

State Department of Land and Natural Resources

Historic Preservation Division

Comments are noted in the EA.

Division of Land Management

All items are so noted.

Division of Water and Land Management

par 1 Kailua and Tai Lee Reservoirs will be maintained for the interim period but will be removed thereafter. ✓

par 2 The ditches will remain in place to intercept sheet flow which will be conveyed to the proposed outlet structures. A limited maintenance program will require occasional removal of debris that has fallen into the ditch. ✓

Division of Aquatic Resources

No comment.

Commission on Water Resource Management

All necessary permits will be obtained prior to construction.

State Department of Health

Based on information provided in the Engineering Report on Drainage Study and Improvements for Waimanalo Irrigation System prepared for the Department of Agriculture, the increase in streamflow which will result from the proposed drainage improvements is less than 5%. This is based on a flood with a recurrence interval of 100-years. The severe erosion caused by the New Years Eve storm of 1988, is most likely attributed to the unusually large flows brought on by the intense rain and the large drainage basin. In addition, flume failure probably resulted in undesirable discharge conditions which resulted in scour and erosion immediately downstream of the release. For the proposed drainage improvements, all drainage outlets will be designed with a smooth transition to the natural stream and energy dissipators will be provided if required.

University of Hawaii

No comment.

State Office of Environmental Quality Control

All comments are noted and will be incorporated into the EA.

C & C of Honolulu Department of Land Utilization

No comment.

C & C of Honolulu, Department of Public Works

Appropriate permits will be obtained and NPDES requirements will be evaluated.

C & C of Honolulu, Department of General Planning

No comment

C & C of Honolulu, Department of Building

No comment.

Waimanalo Neighborhood Board #32

No comment

Carol Wilcox

The historical and recreational value of the ditch system is questionable. Testimony contesting the historic significance of the ditch system was presented by the Board of Agriculture on July 17, 1992.

Native Hawaiian Advisory Council

- item p1 The scope of the project is for abandonment of the ditch system. Installation of the pipe system is already complete and is considered a separate issue. As for system capacities, the new pipe system is as good or better at conveying irrigation water to area farmers in an efficient manner.
- item p2 Twenty-one flume structures are affected by the proposed project.
- item A Technical characteristics of the proposed project are addressed in the Engineering Report on Drainage Study and Improvements for Waimanalo Irrigation System.
- item B Proposed drainage improvements are intended only to provide a safe way to release stormwater intercepted by the existing ditches as sheet flow. It was never intended to increase flood protection, only to maintain it at current levels. The increased discharges at the nodes reflect the increased efficiency of the drainage improvements over the existing flume storm turnouts in discharging this overland flow.
- item D The unnamed stream is outside the limits of the project and no flow information is available at this time.
- item F Comment is noted.
- item I Map "A" will be revised to include the archaeological sites.
- item III Hydrologic information for drainage subareas is provided in the Engineering Report on Drainage Study and Improvements for Waimanalo Irrigation System prepared for the State Department of Agriculture.

Hawaii's Thousand Friends

- item A The existing open ditch system in Waimanalo was designed to convey irrigation water to area farmers, not to provide flood protection. However, it

does allow for limited protection against smaller storms (up to a 2-year recurrence interval). The New Years Eve storm of 1988 had the intensity of a 100-year storm. Regardless of whether the ditches were in place or not, flooding was inevitable as ditch capacity was easily exceeded.

The proposed drainage improvements will replace wooden flumes at stream crossings to remove intercepted surface runoff from the ditch system. These new drainage outlets will be more efficient than the storm turnouts currently used and will provide a smoother transition to reduce scouring at the outlet point.

- item B There will be no loss of water from the ditch system since the concrete channel will remain in place and any water intercepted by the ditches will discharge directly into the stream.