ALAN. M. ARAKAWA
Mayor

DAVID TAYLOR, P.E.
Director

PAUL J. MEYER
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

May 7, 2012

Gary Hooser, Director
Office of Environmental Quality Control
Department of Health, State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Mr. Hooser:

RE:	**Project Name:**	**Proposed Waikamoi Flume Replacement Project**
	Applicant:	**County of Maui, Department of Water Supply**
	Project I.D.	**Draft Environmental Assessment and Anticipated Finding of No Significant Impact**
	TMKs:	**(2) 2-3-005:004 and 025 (pors.), (2) 2-4-015:029 (por.), and (2) 2-4-016:001, 002, 003, and 004 (pors.)**

With this letter, the County of Maui, Department of Water Supply hereby transmits the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI) for the proposed Waikamoi Flume Replacement Project, situated at Tax Map Key Nos. (2) 2-3-005:004 and 025 (pors.), (2) 2-4-015:029 (por.), and (2) 2-4-016:001, 002, 003, and 004 (pors.) in the Makawao and Hana Districts on the island of Maui, for publication in the next available edition of the Environmental Notice.

Enclosed is a completed OEQC Publication Form, two (2) copies of the DEA-AFONSI, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to your office.

If there are any questions, please contact Thomas Ochwat, P.E. at (808) 270-7553 or email thomas.ochwat@co.maui.hi.us.

Sincerely,

DAVID TAYLOR, P.E.
DIRECTOR

Enclosures
cc: Mark Alexander Roy, AICP, Munekiyo & Hiraga, Inc.

"By Water All Things Find Life"

Printed on recycled paper

Agency Action EA
Chapter 343, HRS
Publication Form

Project Name: Proposed Waikamoi Flume Replacement Project - DEA-AFONSI

Island: Maui

District: Makawao and Hana

TMK: (2) 2-3-005:004 and 025 (pors.), (2) 2-4-015:029 (por.), and (2) 2-4-016:001, 002, 003, and 004 (pors.)

Permits: Conservation District Use Permit (Departmental Permit)

Proposing/Determination Agency: County of Maui, Department of Water Supply, 200 South High Street, 5th Floor, Wailuku, Hawaii 96793, Contact: Thomas Ochwat, P.E., (808) 270-7835

Consultant: Munekiyo & Hiraga, Inc., 305 High Street, Suite 104, Wailuku, Hawaii 96793, Contact: Mark Alexander Roy, AICP, Vice President, (808) 244-2015

Status: 30-day comment period; Anticipated Finding of No Significant Impact

Summary: The County of Maui, Department of Water Supply (DWS) proposes the replacement of the existing Waikamoi Flume which is situated within the Koolau Forest Reserve in East Maui. The flume stretches approximately 1.1 miles from its intake at Haipuaena Stream in the east to its termination in the vicinity of Waikamoi Stream in the west. The subject project will affect a corridor of land approximately 1.1 miles long by 30 feet wide.

As an integral component of the DWS Upper Kula System, freshwater conveyed by the Waikamoi Flume provides irrigation and domestic potable water to the residents of Kula, Waiakoa, Keokea, Ulupalakua, and Kanaio in Upcountry Maui. The existing flume consists of a redwood box section that measures 2 feet wide by 13 inches deep. Redwood timber bridges support the flume over gulches and gullies where abrupt changes in ground elevation preclude maintaining a constant slope for the flume. Continuous weathering of the timbers over the years has resulted in substantial leakages along the flume's entire length, and the bridges have become dangerous for maintenance personnel to traverse.

The purpose of this project is (1) to provide an aluminum replacement flume that will increase system efficiency by eliminating leakages and (2) to give maintenance workers a safe platform for accessing the flume along its entire length. Construction-related improvements include re-graveling portions of the existing access road and the establishment of a temporary construction staging area.

Applicable triggers for the preparation and processing of an Environmental Assessment (EA), pursuant to Chapter 343, Hawaii Revised Statutes (HRS) include the use of the Conservation District, State and County funds, and State and County lands.

Revised February 2012

ALAN. M. ARAKAWA
Mayor

DAVID TAYLOR, P.E.
Director

PAUL J. MEYER
Deputy Director

DEPARTMENT OF WATER SUPPLY
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	Applicant:	**County of Maui, Department of Water Supply**
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Sincerely,

DAVID TAYLOR, P.E.
DIRECTOR

Enclosures
cc: Mark Alexander Roy, AICP, Munekiyo & Hiraga, Inc.

"By Water All Things Find Life"

Printed on recycled paper

Draft Environmental Assessment

PROPOSED WAIKAMOI FLUME REPLACEMENT PROJECT, MAUI, HAWAII

Prepared for:

County of Maui,
Department of Water Supply

May 2012

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by Munekiyo & Hiraga, Inc.

MUNEKIYO HIRAGA, INC.

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Executive Summary

Project Name:	Proposed Waikamoi Flume Replacement Project
Type of Document:	Draft Environmental Assessment
Legal Authority:	Chapter 343, Hawaii Revised Statutes
Agency Determination:	Anticipated Finding of No Significant Impact (FONSI)
Applicable Environmental Assessment Review "Trigger":	Use of County Funds Use of Conservation District Use of State and County Lands
Location:	Island of Maui TMK Nos. (2) 2-3-005:004 and 025 (pors.); (2) 2-4-015:029 (por.); (2) 2-4-016:001, 002, 003 and 004 (pors.)
Landowner of Waikamoi Flume Site:	East Maui Irrigation Company, Ltd. (TMK (2) 2-4-016:004)
Proposing Agency:	County of Maui, Department of Water Supply 200 South High Street, 5th Floor Wailuku, Hawaii 96793 Contact: Thomas Ochwat, P. E. Phone: (808) 270-7835
Approving Agency:	County of Maui, Department of Water Supply 200 South High Street, 5th Floor Wailuku, Hawaii 96793 Contact: Thomas Ochwat, P. E. Phone: (808) 270-7835
Consultant:	Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793 Contact: Mark Alexander Roy, AICP, Vice President Phone: (808) 244-2015
Project Summary:	The County of Maui, Department of Water Supply (DWS) proposes the replacement of the existing Waikamoi Flume which is situated within the Koolau Forest Reserve in East Maui. The flume stretches approximately 1.1 miles from its

intake at Haipuaena Stream in the east to its termination in the vicinity of Waikamoi Stream in the west. The subject project will affect a corridor of land approximately 1.1 miles long by 30 feet wide.

As an integral component of the DWS Upper Kula System, freshwater conveyed by the Waikamoi Flume provides irrigation and domestic potable water to the residents of Kula, Waiakoa, Keokea, Ulupalakua, and Kanaio in Upcountry Maui. The existing flume consists of a redwood box section that measures 2 feet wide by 13 inches deep. Redwood timber bridges support the flume over gulches and gullies where abrupt changes in ground elevation preclude maintaining a constant slope for the flume. Continuous weathering of the timbers over the years has resulted in substantial leakages along the flume's entire length, and the bridges have become dangerous for maintenance personnel to traverse.

The purpose of this project is (1) to provide an aluminum replacement flume that will increase system efficiency by eliminating leakages and (2) to give maintenance workers a safe platform for accessing the flume along its entire length. Construction-related improvements include re-graveling portions of the existing access road and the establishment of a temporary construction staging area.

The proposed project will involve the use of the Conservation District, State and County funds, and State and County lands, all of which are triggers for the preparation and processing of an Environmental Assessment (EA), pursuant to Chapter 343, Hawaii Revised Statutes (HRS). Thus, this EA is being prepared pursuant to Chapter 343, HRS. DWS is serving as the Approving Agency for the EA. Given the use of lands within the Conservation District, it is noted that processing of a Conservation District Use Application for a Departmental Permit will also be required for project implementation, pursuant to §13-5-22, Hawaii Administrative Rules.

I. PROJECT OVERVIEW

I. PROJECT OVERVIEW

A. PROJECT LOCATION, EXISTING USE, AND LAND OWNERSHIP

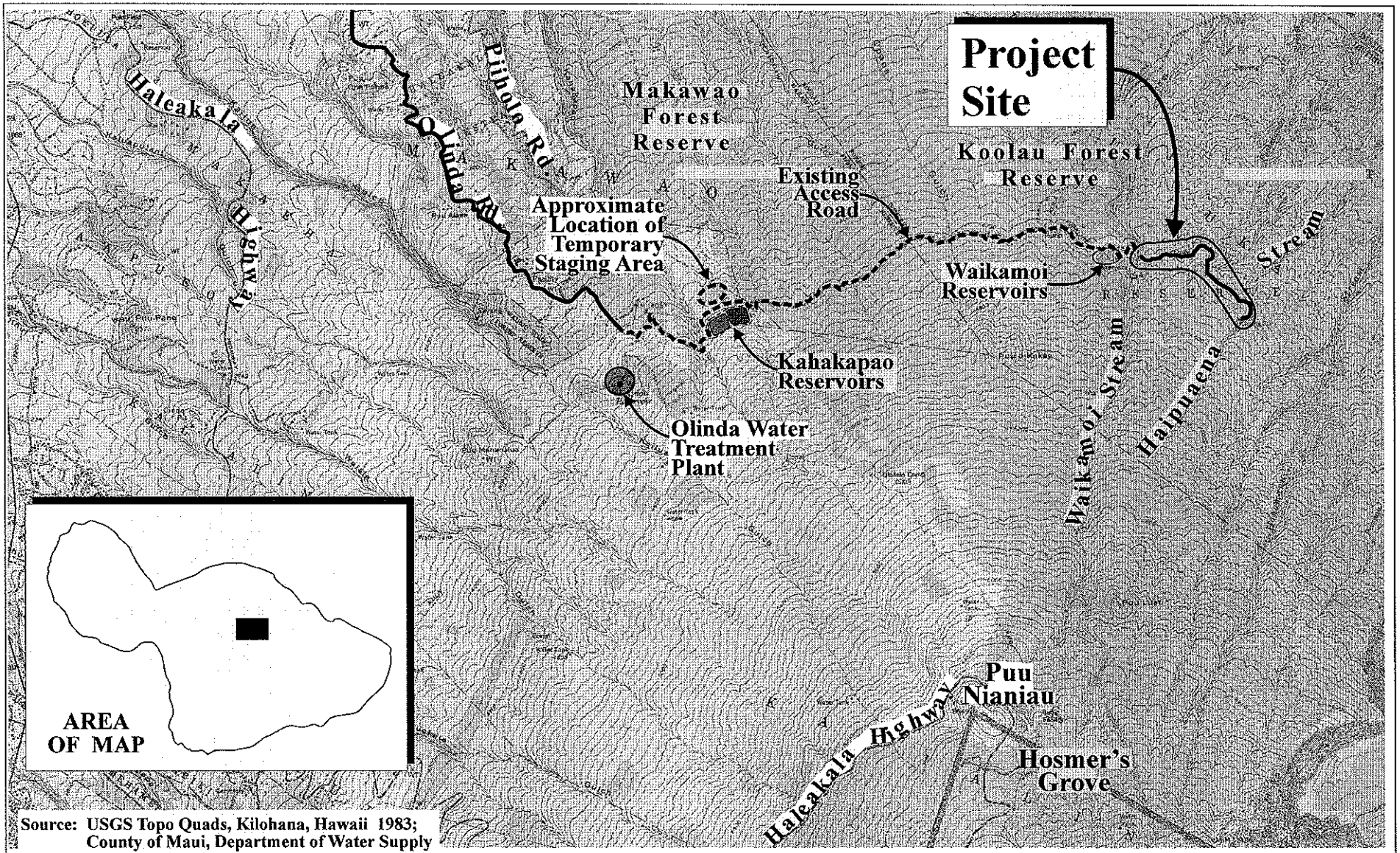
The County of Maui, Department of Water Supply (DWS) proposes the replacement of the existing Waikamoi Flume and various construction-related improvements (hereinafter referred to collectively as the "subject project" or "proposed action"). The existing flume, which is situated within the Koolau Forest Reserve, is located within a portion of Tax Map Key (TMK) parcel (2) 2-4-016:004 (Parcel 4) in East Maui, Hawaii. The existing flume stretches approximately 1.1 miles from its intake at Haipuaena Stream in the east to its termination in the vicinity of Waikamoi Stream in the west. The flume replacement will affect a corridor of land (hereinafter referred to as the "project site") approximately 1.1 miles long by 30 feet wide, spanning 15 feet to either side of the existing flume. Access to the project site is provided via an unimproved dirt and gravel road that extends approximately 3.9 miles east from the mauka (upland) terminus of Olinda Road. See **Figure 1** and **Figure 2**.

The Waikamoi Flume is an integral component of the DWS Upper Kula system, supplied by water produced by Waikamoi Forest in the East Maui watershed. Freshwater collected by the Waikamoi Flume from Haipuaena Stream and small tributary streams is conveyed to the nearby Waikamoi Reservoirs and then to the Kahakapao Reservoirs for storage. After being treated at the Olinda Water Treatment Plant, this water is delivered to Kula, Waiakoa, Keokea, Ulupalakua, and Kanaio in Upcountry Maui for domestic and irrigation purposes. Refer to **Figure 2**. The subject project is designed to provide an improved and more efficient water system that will ensure the continued supply of potable water to existing Upcountry Maui residents for domestic and irrigation purposes.

While Parcel 4 is owned by East Maui Irrigation Company, Limited (EMI), the Waikamoi Flume is located within an easement that was granted to the County of Maui by EMI in 1945.

B. PROJECT NEED

The existing Waikamoi Flume is approximately 1.1 miles long and consists of a redwood box section that measures 2 feet wide by 13 inches deep. The flume travels over rough terrain and meanders along the upland windward Haleakala mountainside. Timber bridges



Source: USGS Topo Quads, Kilohana, Hawaii 1983; County of Maui, Department of Water Supply

Figure 1 Proposed Waikamoi Flume Replacement Project

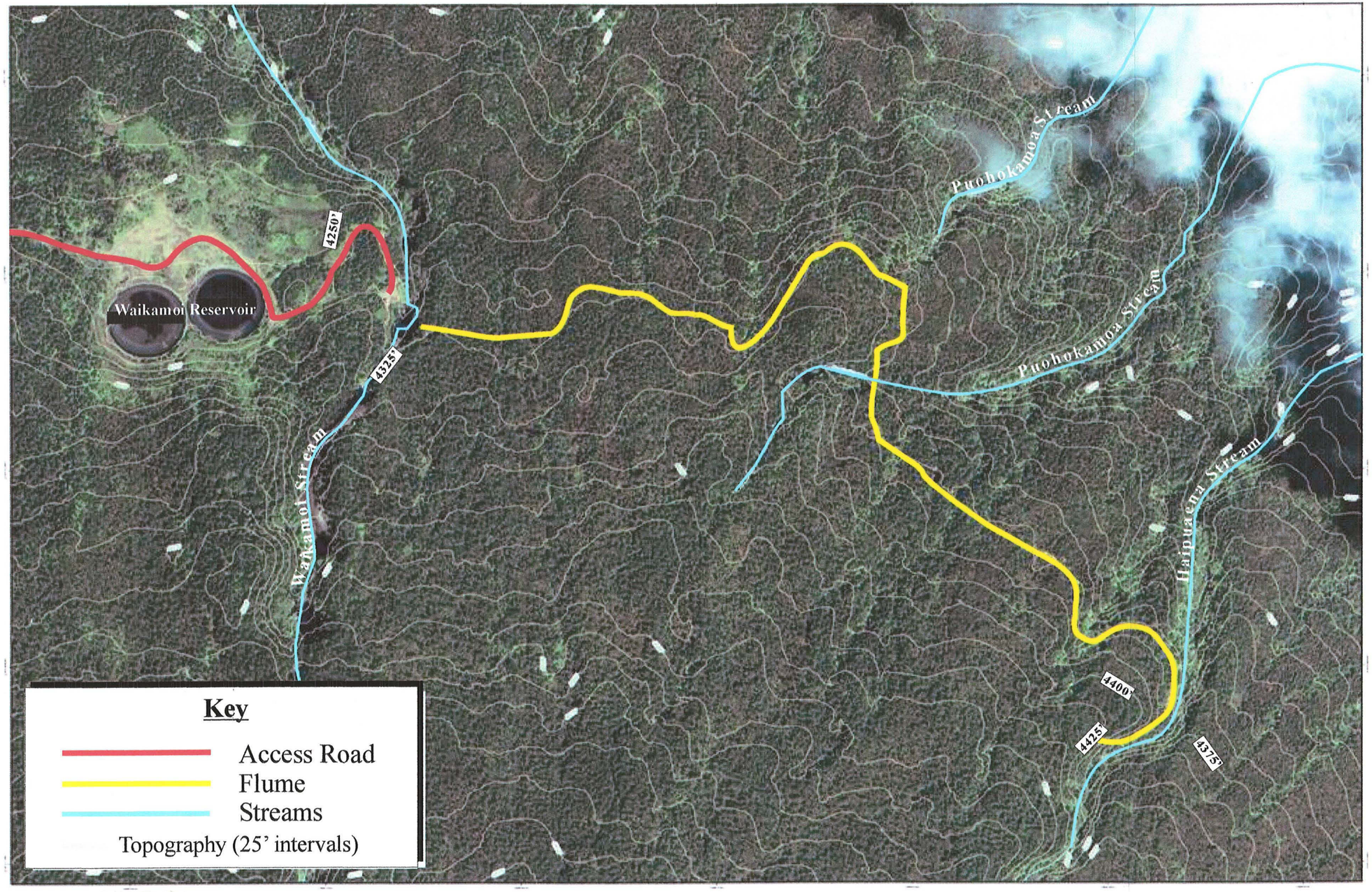
Regional Location Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\RegMap



Source: County of Maui, Department of Water Supply

Figure 2

Proposed Waikamoi Flume Replacement Project

Aerial Photo of Waikamoi Flume

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

K:\Hi\WaikamoiFlume\aerialmap

support the flume over gulches and gullies where abrupt changes in ground elevation preclude maintaining a constant slope for the flume. A topographic survey and site photos of the existing flume system are presented in **Appendix "A"** and **Appendix "B"**, respectively.

The Waikamoi Flume was originally constructed in the 1930s out of redwood timbers and rock and concrete masonry foundations. Later, in 1974 and 1975, the flume box was replaced with new redwood planking, although portions of the timber bridges that were constructed in the 1930s were maintained in place. Today, due to years of weathering, the flume box and timber bridges are in poor condition. The timber flume box itself has been worn to the point where DWS estimates that during peak flows, approximately 40 percent of the water being carried by the flume is lost through various cracks and holes along the length of the timber box. Meanwhile, the timber bridges have become very dangerous for maintenance personnel to cross over.

The purpose of the subject project is two-fold: (1) to provide an improved and more efficient flume, free of leakages, that will be designed to carry approximately the same volume of water as the existing flume; and (2) to provide maintenance workers with a safe platform for accessing the flume along its entire length to perform routine maintenance.

The subject project is being undertaken in compliance with a directive issued by the State of Hawaii, Commission on Water Resource Management (CWRM) on May 25, 2010 that requires DWS to replace the Waikamoi Flume structure in order to reduce waste and system loss. See **Appendix "C"**. The subject project is also consistent with the recommendations of the Draft Upcountry Water Use and Development Plan regarding continued leak detection and repair of DWS systems (Freedman 2009). Completion of the project will, therefore, enable the County to install a higher level of efficiency into the existing Upper Kula water system to ensure reliable provision of potable water service to existing Upcountry Maui residents for domestic and irrigation purposes.

C. PROPOSED ACTION

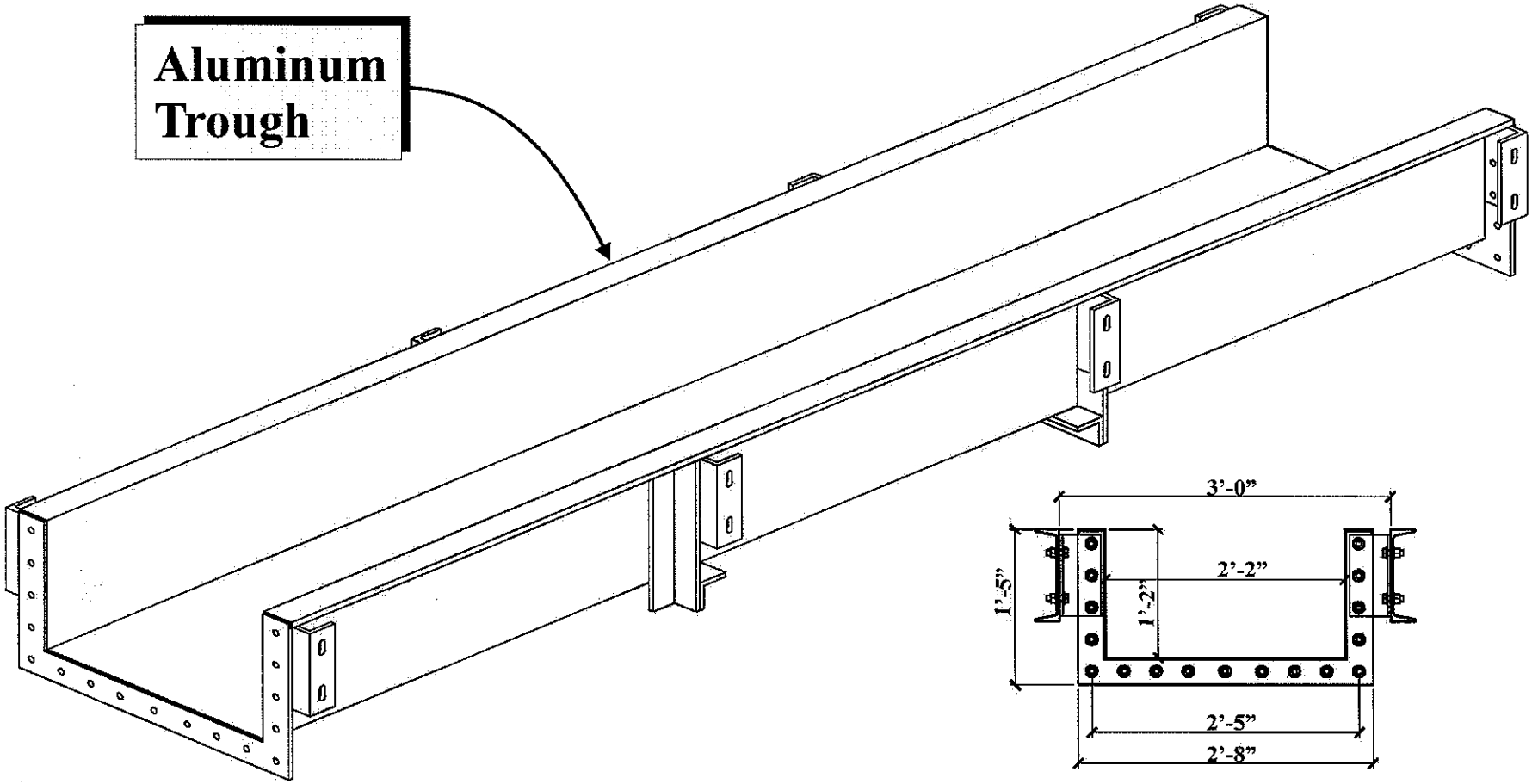
The proposed action consists of the Waikamoi Flume replacement as well as various construction-related improvements.

The conceptual design of the new flume structure consists of an aluminum trough (or channel) that will be supported on an aluminum space frame truss. The truss will be

supported on concrete pedestal foundations. The foundations will be placed at locations along the flume length and will provide a level and stable support for the flume. Where the flume runs along level ground, the foundations will be spaced approximately 25 feet apart. See **Figure 3**, **Figure 4**, and **Figure 5**. Where the flume crosses over a gulch or gully, the foundations may be spaced between 25 and 75 feet apart. In order to avoid sediment entering streams, the foundations will be located above the ordinary high water mark (OHWM) of any stream or tributary along the length of the flume, with the exception of Haipuaena Stream. At Haipuaena Stream, one (1) existing support footing below the OHWM will be reused and reinforced with concrete. A Best Management Practices (BMPs) plan, including soil erosion control measures, will be implemented to ensure the containment of project-related sediment within the project corridor. Copies of the preliminary development plans for the project are provided in **Appendix "D"** and **Appendix "D-1"**.

A continuous catwalk will be mounted to the flume support structure to provide access along the entire length of the flume for DWS maintenance personnel. The catwalk will be constructed of fiberglass grating. Aluminum handrails, three (3) feet in height, will provide safety for maintenance personnel over the bridge crossings.

Ancillary construction-related improvements in the Conservation District include repairs to the existing access road and the establishment of small secondary equipment lay down areas along the existing flume corridor. The existing access road is an unimproved dirt and gravel roadway that extends a distance of approximately 3.9 miles from the mauka terminus of Olinda Road, eastward to Waikamoi Stream. The road passes through both State Agricultural District and Conservation District lands and crosses portions of TMKs (2) 2-3-005:004 and 025, (2) 2-4-015:029, and (2) 2-4-016:001, 002, 003 and 004. The underlying landowners are listed in **Table 1** below. To facilitate access for construction vehicles and equipment, minor repair work, such as the placement of gravel in specific locations, will be undertaken along the access road. Minor grading may be necessary in specific areas of the access road; however, it is anticipated that the existing roadway will not require lengthening or widening.



Source: KAI Hawaii, Inc.

Figure 3 Proposed Waikamoi Flume Replacement Project

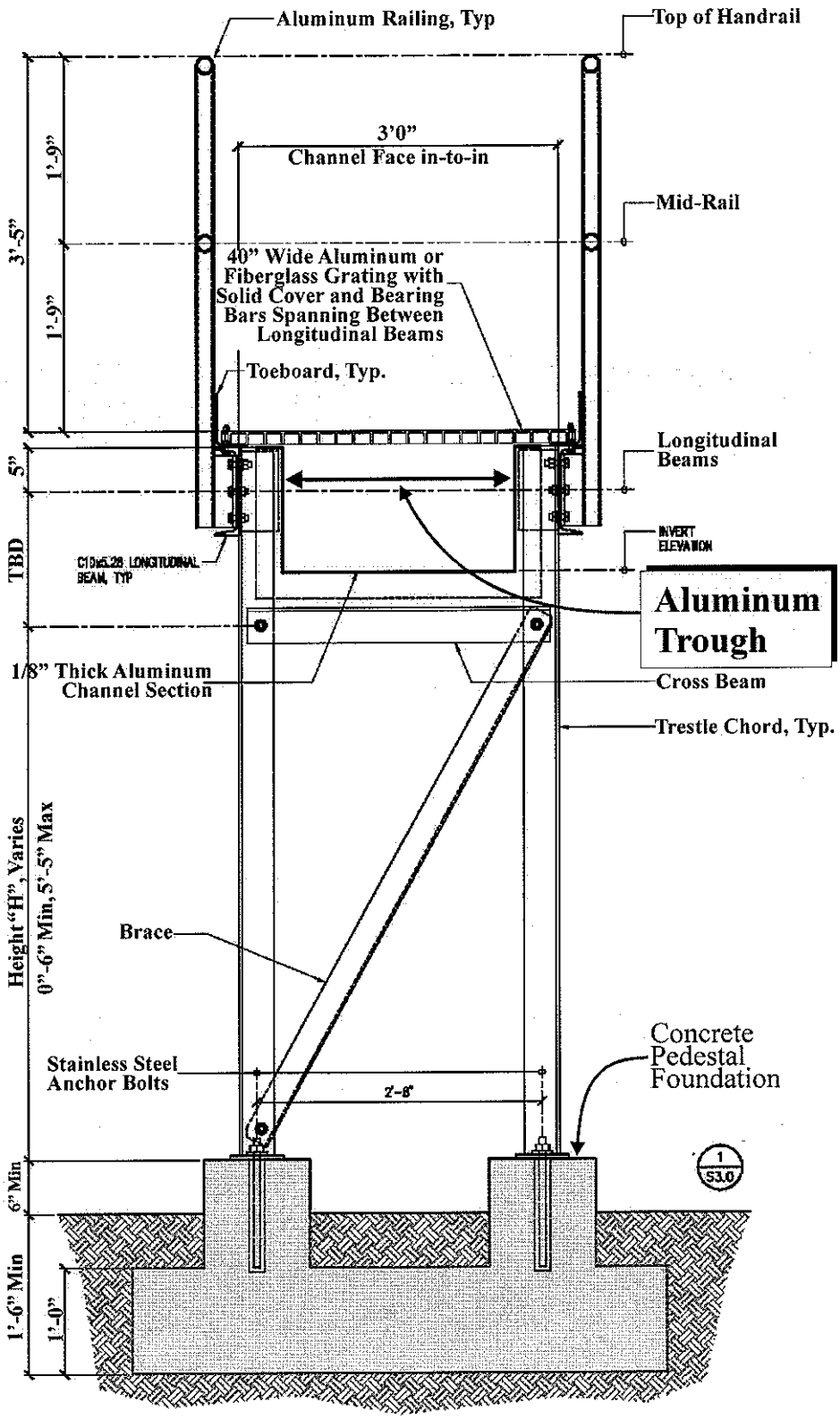
Typical Aluminum Trough Section

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\TypicalAluminumTrough



Source: KAI Hawaii, Inc.

Figure 4 Proposed Waikamoi Flume Replacement Project

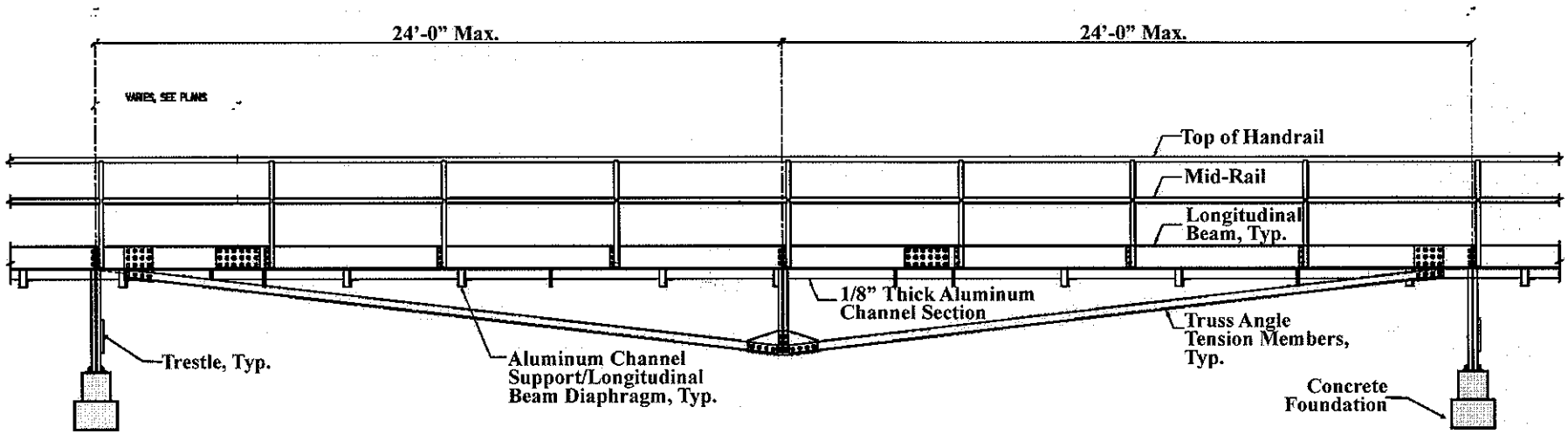
Typical Trestle Cross Section

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\TypicalTrestleCrossSection



Source: KAI Hawaii, Inc.

Figure 5 Proposed Waikamoi Flume Replacement Project

Typical Bridge Longitudinal Elevation

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\TypicalBridgeLongitudinalElevation

Table 1. Landownership

TAX MAP KEY	LANDOWNER	Proposed Use
(2) 2-3-005:004	Haleakala Ranch	Access Road Improvements
(2) 2-3-005:025	County of Maui	Access Road Improvements
(2) 2-4-015:029	Edward C. Baldwin Trust	Access Road Improvements
(2) 2-4-016:001	State of Hawaii	Access Road Improvements Primary Construction Staging Area
(2) 2-4-016:002	State of Hawaii	Access Road Improvements
(2) 2-4-016:003	A&B Hawaii, Inc.	Access Road Improvements
(2) 2-4-016:004	East Maui Irrigation Company, Ltd.	Access Road Improvements Waikamoi Flume Replacement

It is noted that a temporary construction staging area will also be necessary, given the remote location and unique terrain of the project site. This staging area will be located to the immediate north of the existing Kahakapao Reservoirs in the State Agricultural District (outside of the Conservation District) on a portion of TMK (2) 2-4-016:001. Refer to **Figure 1**.

D. REGULATORY REQUIREMENTS

The project site is located within the State Conservation District and the project will utilize State and County funds, and State and County lands. The use of Conservation District lands, County funds, and State and County lands are triggers for the preparation and processing of an Environmental Assessment (EA), pursuant to Chapter 343, Hawaii Revised Statutes (HRS) and Chapter 200, Hawaii Administrative Rules (HAR), Environmental Impact Statement Rules. The EA will evaluate the subject project's technical characteristics, environmental impacts, mitigation measures, and alternatives, and will also advance findings relative to the significance of the project in terms of consistency with State and County environmental plans, policies, and controls. DWS is serving as the Approving Agency for the EA.

Conservation District lands are under the jurisdiction of the State of Hawaii, Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL).

The use of Conservation District lands is regulated by Chapter 183C, HRS and by Chapter 13-5, HAR. To enable project implementation, processing of a Conservation District Use Application (CDUA) for a Departmental Permit will be required.

E. PROJECT FUNDING AND SCHEDULING

The total cost of the subject project is estimated to be between $10 million and $15 million. Pending all necessary approvals, construction is anticipated to commence in the fourth quarter of 2012 and span approximately 24 months.

II. DESCRIPTION OF THE EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES

II. DESCRIPTION OF THE EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES

A. PHYSICAL SETTING

1. Surrounding Land Uses

a. Existing Conditions

The project site is located in the Koolau Forest Reserve in the Hana Community Plan region of Maui, stretching approximately 1.1 miles east from Waikamoi Stream. Refer to **Figure 1**. The Koolau Forest Reserve is part of the Hawaii Forest Reserve System, which was established by the Territorial Government of Hawaii on April 25, 1903 through Act 44. Through public-private partnerships, the Forest Reserve System was created in recognition of the need to protect mauka (upland) forests in order to provide the water necessary to support lowland agricultural and residential demands.

The lands underlying and surrounding the Waikamoi Flume and portions of the access road are State Conservation District lands which are heavily forested with native trees, ferns, shrubs, and mosses. Current uses are limited to the collection of freshwater for domestic potable water supply purposes and the management and preservation of the surrounding forest environment.

Lands underlying and surrounding the temporary construction staging area and remaining portions of the access road are within the State Agricultural District. Current uses of the surrounding lands include the Kahakapao Reservoirs and cattle ranching.

b. Potential Impacts and Proposed Mitigation Measures

The project site has been previously disturbed by the construction and ongoing maintenance of the existing Waikamoi Flume. Construction activities associated with the proposed action will be confined to the existing,

established corridor, thereby preventing further impacts to the surrounding landscape. Construction-related access road improvements will be confined to the existing access road corridor. The temporary construction staging area site was previously disturbed during its use for the construction of the Kahakapao Reservoir. Use of this staging area site will be temporary and limited to the construction period. The subject project, in providing for the continued use of the Waikamoi Flume, is consistent with the intended function of the Forest Reserve System and is not anticipated to result in adverse impacts to surrounding land uses.

2. Climate

a. Existing Conditions

Hawaii's location in the tropics results in uniform weather conditions throughout the year. Moderated by the Pacific Ocean, climatic conditions on Maui are characterized by mild and consistent year-round temperatures, moderate humidity, and steady northeasterly tradewinds. Variations in Maui's weather patterns are attributable to topographic and isolated microclimates.

The project site is situated on the northern, windward uplands of Haleakala at an elevation of approximately 4,300 feet. Here, prevailing northeasterly trade winds lift warm, moist air from the ocean up the mountain slopes, into the higher, cooler elevations. Frequent and heavy precipitation then occurs where the moist air condenses into clouds, a result of the orographic effect. The area between the elevations of 1,970 feet and 6,560 feet is referred to as the fog drip zone, where cloud height is limited by the temperature inversion layer, such that cloud water droplets form, rather than rain drops, and come into contact with vegetation (CWRM, 2009). The project site, being located within the fog drip zone, receives a substantial amount of orographic rainfall.

The intermediate slopes of the Haipuaena hydrologic unit receive orographic rainfall as high as 276 inches per year, while the intermediate slopes of the Waikamoi hydrologic unit receive orographic rainfall as high as 240 inches per year. In the Haipuaena hydrologic unit, precipitation is highest during March and April when the average monthly rainfall is 17 inches; precipitation is lowest during June and September. In the Waikamoi hydrologic unit, the

wettest months are March, April, and December in which average monthly rainfall is 14 inches; the driest months are May and June (CWRM, 2009).

Average daily temperatures in this area of Maui Island range from the mid-50 degrees Fahrenheit during the cooler months of January and February, to the mid-70 degrees Fahrenheit during the warmer months of August and September (County of Maui, OED, 2011).

b. Potential Impacts and Proposed Mitigation Measures

Due to its small scale, the proposed action is not anticipated to affect local microclimates. The proposed action will involve minimal, if any, removal of vegetation. Impacts to precipitation and temperature are not anticipated to occur as a result of project implementation.

3. Topography and Soils

a. Existing Conditions

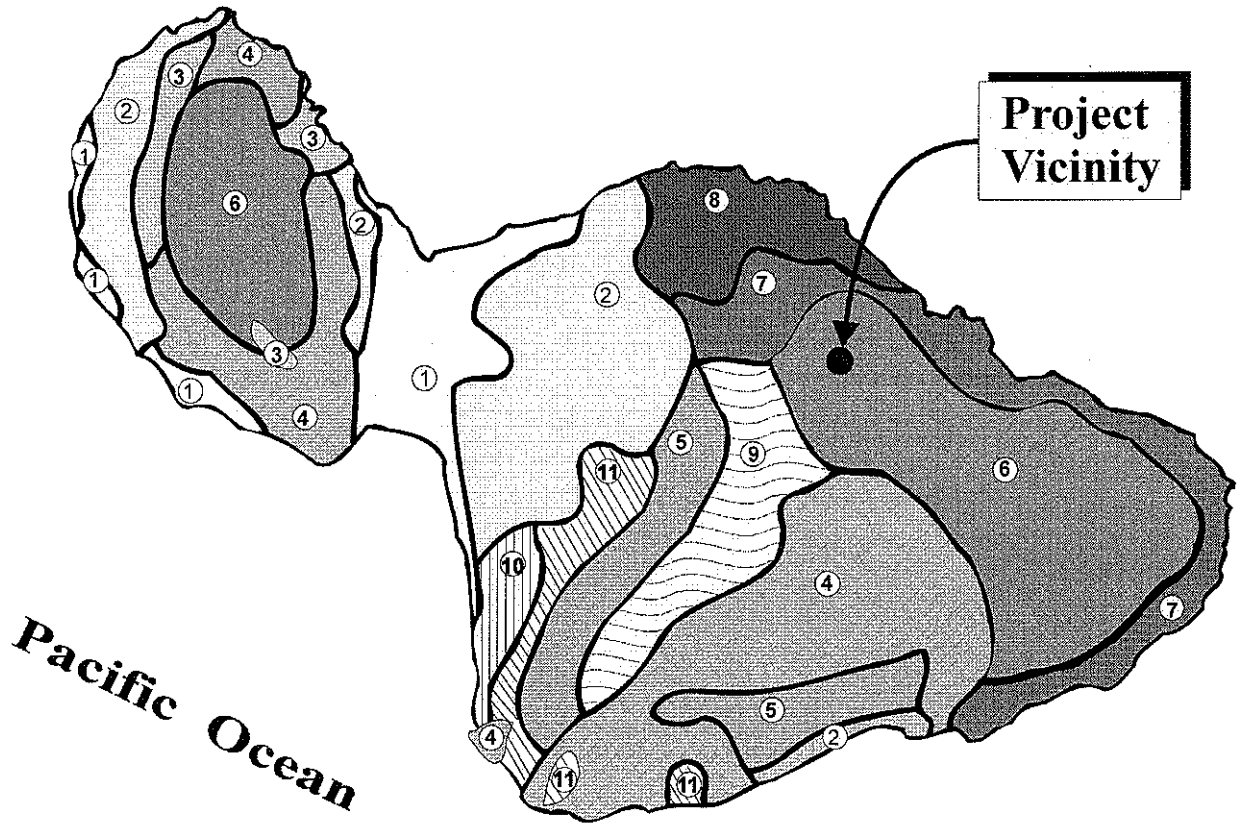
The existing flume runs generally along the 4,300-foot elevation contour line. Within the project site, the terrain crossed by the flume includes a number of gulches that range from approximately 8 to 50 feet deep.

Underlying the project site are soils belonging to the Hydrandepts-Tropaquods association. See **Figure 6**. This soil association consists of well-drained to poorly-drained soils on gently sloping to sleep slopes on the intermediate to high uplands of East and West Maui. These soils have moderately fine or fine textured subsoil, having developed in material weathered from volcanic ash, cinders, and basic igneous rock. This soil association composes approximately 10 percent of the island (USDA SCS, 1972).

The project site is underlain by soils from the Amalu Peaty Silty Clay, 3 to 20 percent slopes (rAMD) and the Rough Mountainous Land (rRT) classifications. See **Figure 7**. In a typical profile, rAMD soils consist of peat to a depth of eight (8) inches; silty clay to a depth of 16 inches; cemented material to a depth of 17 inches; and very cobbly silty loam to a depth of 68 inches. This soil type is poorly drained with a depth to the water table of

LEGEND

- (1) Pulehu-Ewa-Jaucas association
- (2) Waiakoa-Keahua-Molokai association
- (3) Honolua-Olelo association
- (4) Rock land-Rough mountainous land association
- (5) Puu Pa-Kula-Pane association
- (6) Hydrandepts-Tropaquods association
- (7) Hana-Makaalae-Kailua association
- (8) Pauwela-Haiku association
- (9) Laumaia-Kaipoipoi-Olinda association
- (10) Keawakapu-Makena association
- (11) Kamaole-Oanapuka association



Map Source: USDA Soil Conservation Service

Figure 6

Proposed Waikamoi Flume Replacement Project

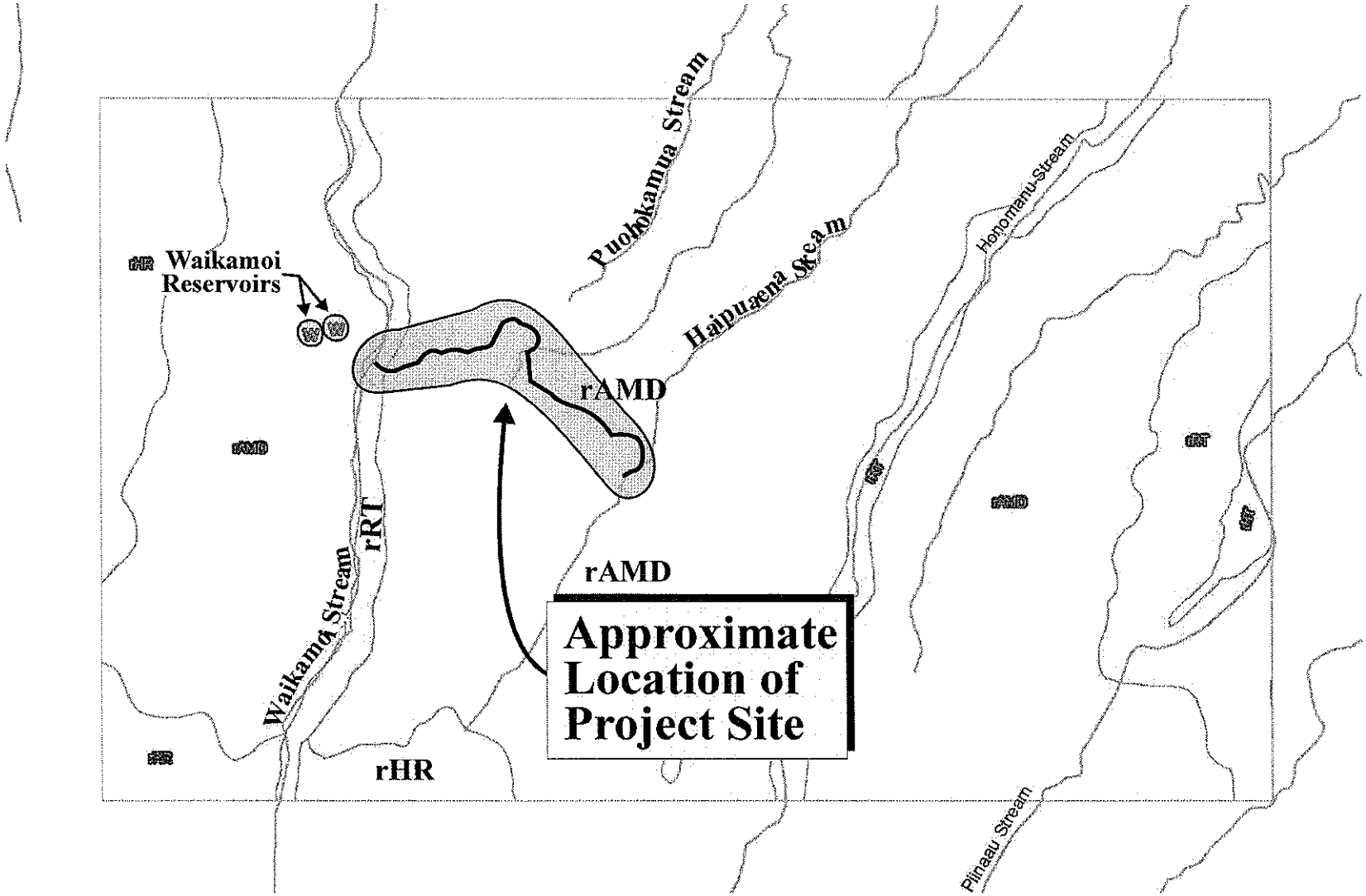
Soil Associations Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHI/WaikamoiFlume/SOILS



Source: Soil Survey Staff 2010

Figure 7 Proposed Waikamoi Flume Replacement Project

Soil Classifications Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\SoilClassification

about two (2) to six (6) inches. This soil type is found on plateaus at elevations between 2,000 and 5,500 feet (Soil Survey Staff, 2010).

Rough Mountainous Land (rRT) is found in gulches, on slopes from 50 to 99 percent, at elevations between 0 and 6,000 feet. In a typical profile, rRT consists of silty clay loam to a depth of five (5) inches; very cobbly clay loam to a depth of 25 inches; and bedrock at a depth of 25 to 29 inches. This soil type is well drained, with a depth to the water table greater than 80 inches (Soil Survey Staff, 2010).

A Geotechnical Engineering Exploration report was prepared by Geolabs, Inc. in November 2011. This report documented findings and geotechnical recommendations derived from field exploration, laboratory testing, and engineering analyses. According to the geotechnical report, surface conditions within the project site consist of basalt rock or a thin layer of organic clay with varying amounts of vegetation and roots. The organic layer is relatively thin, ranging from two (2) to six (6) inches thick, and lies over basalt rock or residtual/saprolitic soils. The residual/saprolitic soils consist of stiff clayey silt and extended to depths of approximately one-half (0.5) to three (3) feet below the surface. Portions of the project site may exhibit basalt rock deeper than four (4) feet below the existing ground surface. Given the subsurface conditions and geology of the project site, the potential for soil liquefaction was not determined to be a design consideration. See **Appendix "E"**.

In regards to suitability of the land for agricultural purposes, the State Department of Agriculture has established three (3) categories of Agricultural Lands of Importance to the State of Hawaii (ALISH). The ALISH system classifies lands into "Prime", "Unique", and "Other Important Agricultural Land". The remaining lands are "Unclassified". Utilizing modern farming methods, "Prime" agricultural lands have the soil quality, growing season, and moisture supply needed to produce sustained crop yields economically, while "Unique" agricultural lands possess a combination of soil quality, location, growing season, and moisture supply currently used to produce sustained high yields of a specific crop. "Other Important Agricultural Land" includes those which have not been rated as "Prime" or "Unique". Being

situated in the State Conservation District, lands underlying the existing flume corridor have not been classified by the ALISH rating system.

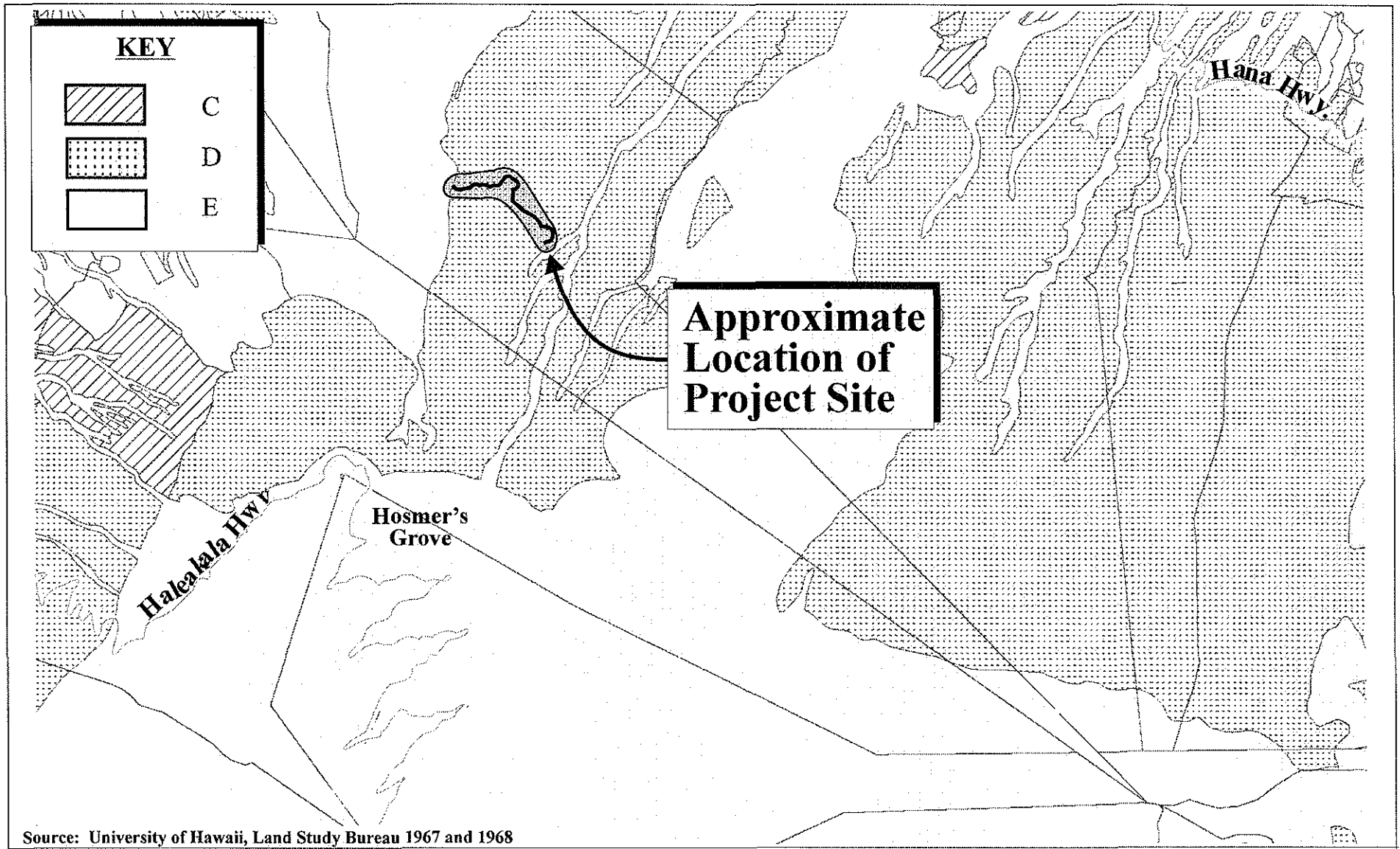
In addition, the University of Hawaii, Land Study Bureau (LSB) classifies productivity characteristics on a scale of "A' through "E", with lands designated as "A" reflecting the highest productivity and "E" representing lands with the lowest productivity. These letters are followed by numbers which further classify the soil types and convey information such as texture, drainage, and stoniness (University of Hawaii Land Study Bureau, 1967). Lands underlying the project site have generally been classified "D" by the LSB. See **Figure 8**. Lands classified "D" are poorly suited for agriculture and are primarily used for grazing and forest.

b. <u>Potential Impacts and Proposed Mitigation Measures</u>

The underlying soils do not pose constraints on construction of the proposed replacement flume. Limited excavation work will be necessary at certain points along the entire length of the flume to install structural support footings and foundations for bridge structures. According to the geotechnical report, the flume structure will be supported by shallow foundations that bear on the basalt rock at relatively shallow depths. Where basalt rock is anticipated at deeper depths, the shallow foundations will be designed to bear on the underlying residual/saprolitic soils. In areas with steeper slopes near the top of the flume (towards Haipuaena Stream), the flume structure may be supported on vertical rock anchors. Refer to **Appendix "E"** and see **Figure 9**.

Construction-related improvements to the existing access road will be limited to graveling and will not involve excavation, although minimal grading may be necessary at certain points along the route. Grading will not be required for the temporary staging area as the area was previously graded and filled during construction of the Kahakapao Reservoirs.

As a whole, the replacement flume will occupy the same or a smaller footprint than the existing flume. To the extent practicable, excavated areas in the project site will be kept to a minimum so as to minimize impacts on the affected land area. In addition, Best Management Practices (BMPs) will be implemented to minimize siltation and runoff. Refer to **Appendix "D"**,



Source: University of Hawaii, Land Study Bureau 1967 and 1968

Figure 8 Proposed Waikamoi Flume Replacement Project

Land Study Bureau Productivity Rating Map

0 3,125 Feet
1,562.5 6,250

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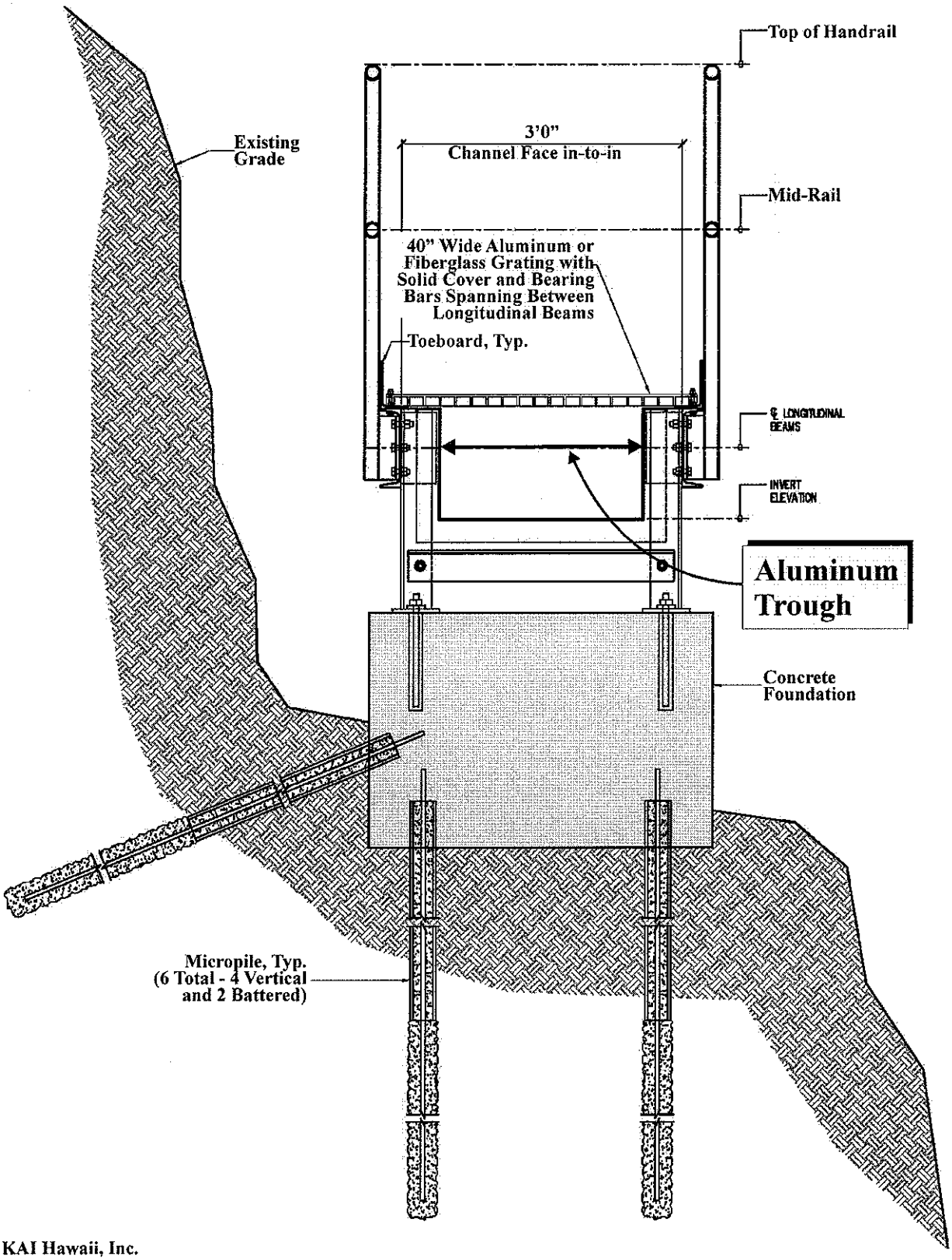
KAHi\WaikamoiFlume\LandStudyBureau



Source: KAI Hawaii, Inc.

Figure 9 Proposed Waikamoi Flume Replacement Project

NOT TO SCALE

Trestle Cross Section with Micropile Foundation

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\MicropileFoundation

Sheet S0.1. As such, significant adverse impacts to topography and soil conditions are not anticipated with implementation of the proposed action.

4. Flood and Tsunami Conditions

a. Existing Conditions

The project site is located in Flood Zone X, an area of minimal flooding located outside the 0.2 percent annual chance floodplain (FEMA 2009). The project site is located well upland and outside of the tsunami evacuation zone.

b. Potential Impacts and Proposed Mitigation Measures

The proposed action is limited in scope to the replacement of the existing flume system between Waikamoi and Haipuaena Streams along with the construction-related improvements identified herein. The proposed action is not anticipated to alter the drainage conditions or flood zone characteristics of the surrounding area. Adverse impacts on flood or tsunami parameters are, therefore, not anticipated.

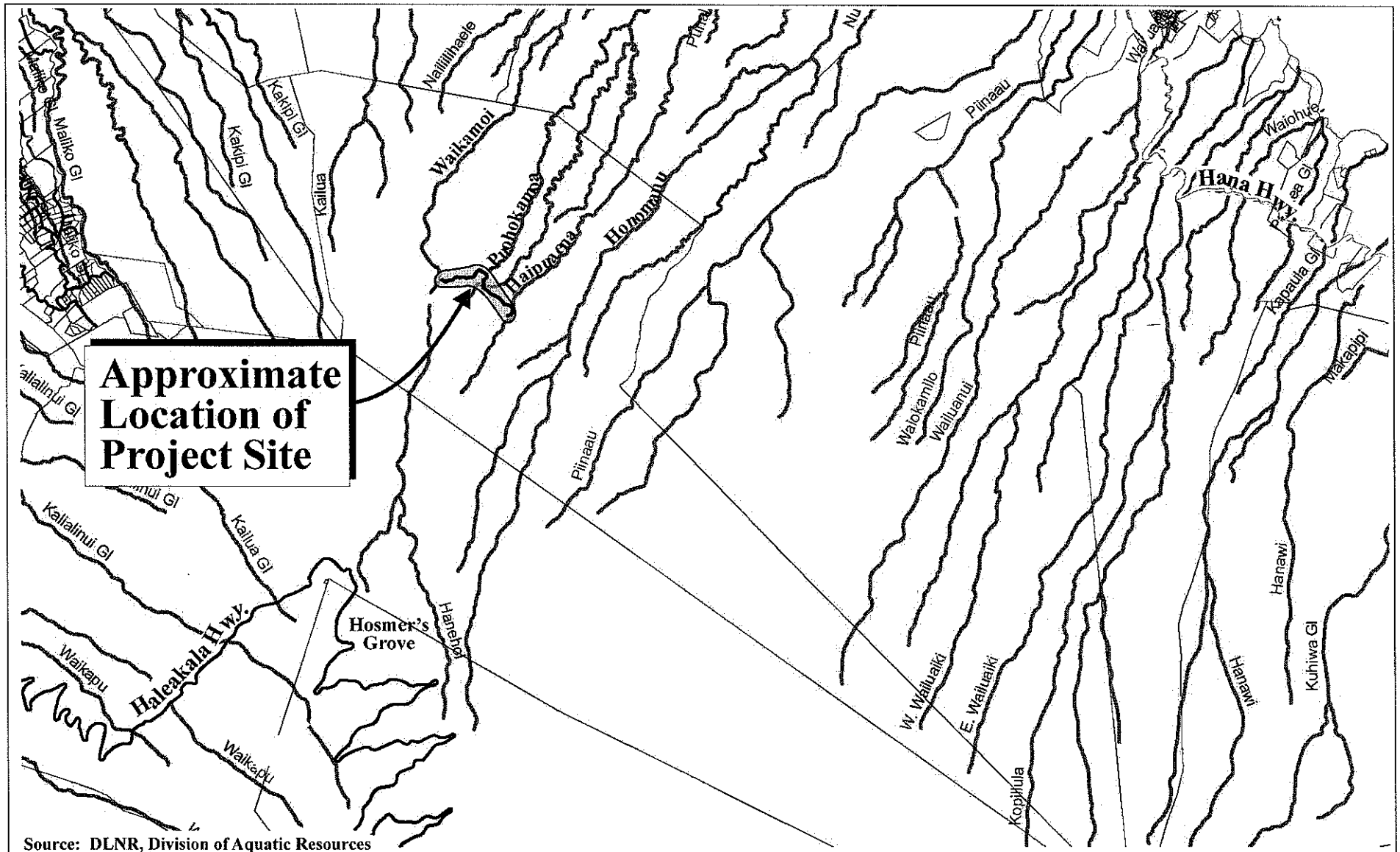
5. Streams, Wetlands, and Reservoirs

a. Existing Conditions

The Waikamoi Flume runs from its intake at Haipuaena Stream in the east to its terminus in the vicinity of Waikamoi Stream in the west. Between Haipuaena and Waikamoi Streams, the flume crosses Puohokamoa Stream and a number of smaller unnamed tributaries. See **Figure 10.**

Haipuaena Stream stretches 7.7 miles down the slopes of Haleakala from its headwaters near the 5,100-foot elevation to the Pacific Ocean. United States Geological Survey (USGS) gaging station 5310 is located at an elevation of 4,320 feet, near the Upper Kula Pipeline (i.e., the Waikamoi Flume). During the period of record from 1947 through 1967, USGS gaging station 5310 measured an average annual streamflow of 0.97 million gallons per day (mgd); and an average annual base flow of 0.14 mgd (CWRM 2009).

Waikamoi Stream stretches 8.5 miles from the headwaters of its tributaries at the 6,560-foot elevation to the Pacific Ocean. Waikamoi Stream has two



Source: DLNR, Division of Aquatic Resources

Figure 10 Proposed Waikamoi Flume Replacement Project

Streams Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\Streams

(2) major tributaries, Alo Stream and Wahinepee Stream. USGS gaging station 5528 is located just upstream of the Upper Kula Pipeline (i.e., the Waikamoi Flume), at an elevation of 4,487 feet. During the period of record from 1953 through 1968, USGS gaging station 5528 measured an average annual streamflow of 1.33 mgd and an average annual base flow of 0.05 mgd (CWRM 2009).

There are two (2) dams on Waikamoi Stream, one holding 1.5 million gallons and the other holding 10 million gallons of water. From this point, freshwater is then transferred to the two (2) 15-million gallon Waikamoi Reservoirs which are at an elevation of 4,240 feet. Freshwater is then received by the two (2) 50-million gallon Kahakapao Reservoirs before being fed to the Olinda Water Treatment Plant. Refer to **Figure 1**.

It is noted that the Waikamoi Flume structure does not enter Waikamoi Stream. In Haipuaena Stream, one (1) of the stone footings that supports the flume box, nearest to the flume intake, is situated below the stream's ordinary high water mark (OHWM). Refer to **Appendix "D-1"**. Waikamoi Flume crosses Puohokamoa Stream and 13 smaller tributaries, but no work is proposed to occur below the OHWM of these water bodies.

During the early consultation period for the preparation of the Draft EA document, coordination was initiated with the Department of the Army (DA) to secure a jurisdictional determination (JD) for the streams, gulches, and gullies that are crossed by the existing flume. The DA concluded that Waikamoi, Haipuaena, and Puohokamoa Streams are navigable waters of the U.S. subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE). See **Appendix "F"**.

As part of early consultation with the DA, environmental consultant Robert W. Hobdy completed an aquatic resources study of the project site in May 2011. See **Appendix "G"**. As mentioned above, aside from Haipuaena Stream and Puohokamoa Stream, the flume crosses 13 tributaries that periodically flow with water. Meanwhile, the mountainside underlying the project site exhibits certain wetland characteristics. Given these conditions, the objectives of the aquatic survey were (1) to determine the potential for the forested lands between the gulches and gullies along the flume to be

jurisdictional wetlands per the DA criteria; and (2) to determine whether the 13 tributaries along the flume qualify as jurisdictional waters of the U.S.

In assessing wetland conditions, a total of ten (10) sampling points along the flume corridor were analyzed for the aquatic survey. Vegetation within a 30-foot radius of each sampling point was evaluated for hydrophytic character. In addition, a pit was dug at each point to test the soil for hydric character, and the water regime was tested for wetland hydrology. Vegetation, soil characteristics, and hydrology at each of the 10 sampling locations tested positive for wetland characteristics. Due to the uniformity of vegetation and soil conditions of the mountain slope surrounding the flume corridor, no wetland boundaries were delineated by the survey. Furthermore, the aquatic survey determined that the wetlands merge seamlessly with the Haipuaena, Puohokamoa, and Waikamoi Stream corridors, such that these wetlands are adjacent to and directly abutting the streams.

As determined by the DA, Haipuaena Stream, Puohokamoa Stream, and Waikamoi Stream are perennial streams that flow directly into the Pacific Ocean, making them navigable waters of the U.S. subject to USACE jurisdiction. Refer to **Appendix "F"**. The aquatic resources study conducted by Robert Hobdy completed a separate JD form for each of the 13 unnamed tributaries. Channel width, depth, and flow were evaluated, as were physical, chemical, and biological characteristics, the size of the drainage area, and the presence and effect of adjacent wetlands. Of the 13 tributaries, nine (9) were found to be perennial, while the remaining four (4) were found to have substantial seasonal flow due to high rainfall. Thus, all 13 tributaries were determined to be subject to USACE jurisdiction. Refer to **Appendix "G"**.

b. <u>Potential Impacts and Proposed Mitigation Measures</u>

The proposed action is limited to the replacement of the existing Waikamoi Flume. The proposed action does not involve any work within Waikamoi Stream, nor does the proposed action entail any alterations to the Waikamoi Dams or the Waikamoi or Kahakapao Reservoirs. No work will take place below the OHWM of Puohokamoa Stream. Neither the flume intake at Haipuaena Stream nor the intakes at the unnamed tributaries along the flume's length will be altered. The amount of water collected at the flume intakes will not increase above current levels, and the capacity of the

replacement flume will be approximately the same as the existing flume. In effect, adverse impacts to stream flows are not anticipated.

A minimal amount of work will occur below the OHWM of Haipuaena Stream. In this area, existing stone footings supporting the flume structure will be maintained in place, and these footings will be encased in concrete for added stability. One (1) of these footings, the one closest to the flume intake, is situated below the OHWM of Haipuaena Stream. Refer to **Appendix "D-1"**.

As determined by the aquatic survey, the entire flume corridor encompassed by the project site is subject to USACE jurisdiction under the provisions of Section 404 of the Clean Water Act. However, the DA has determined that the proposed project is exempt from the need to obtain a Section 404 Permit from the DA under the provisions of Section 404(f)(1)(c) of the Clean Water Act and 40 Code of Federal Regulations (CFR) 232.3(c)(3) relating to discharges of dredged and/or fill material associated with construction or maintenance of irrigation ditches. As the Waikamoi Flume conveys water for both domestic and irrigation purposes, the USACE has determined by letter dated December 5, 2011 that no DA permit is required for the project. See **Appendix "F-1"**.

6. Flora and Fauna

a. Existing Conditions

A Flora and Fauna Survey and Assessment report was prepared by biological consultant Robert W. Hobdy in November 2010. See **Appendix "H"**. The botanical survey consisted of a walk-through survey of the existing 30-foot-wide flume corridor. Plant species present within the project site were inventoried, with special focus on endangered, threatened, and rare species. In conjunction with the botanical survey, a fauna survey of the project site and adjacent fringes was also conducted. Species, abundance, activities, and locations were noted, along with observations of trails, tracks, and signs of feeding. An evening survey was also conducted to determine the presence of the Hawaiian hoary bat.

The environment within which the project site is situated is characterized as a native *ohia*-fern cloud forest of which vegetation includes an abundance of ferns and mosses. The survey report explains that within the project site itself, initial disturbances caused by the construction of the original flume and access road, as well as the ongoing maintenance of the existing flume, have precipitated the introduction of many non-native weed species. The continual use of herbicides along the flume has created an open, weedy corridor along the length of the flume structure. Meanwhile, feral pigs have damaged the forest understory and soil layers throughout the forest.

The botanical survey located a total of 90 plant species, 66 of which are native Hawaiian species. The forest surrounding the project site is dominated by *ohia* (*Metrosideros polymorpha*), 40- to 60-foot tall trees that form the forest matrix. Prominent fern species include *uluhe* (*Dicranopteris linearis*), *kilau* (*Dryopteris glabra*), *hapuu pulu* (*Cibotium glaucum*), and *hapuu ii* (*Cibotium menziesii*). Common sub-canopy trees and shrubs include *pukiawe* (*Leptecophylla tameiameiae*), *ohelo* (*Vaccinium calycinum*), *puahanui* (*Broussaisa arguta*), *kukae moa* (*Melicope clusiifolia*), and the invasive weeds Florida blackberry (*Rubus argutus*) and Andean blackberry (*Rubus glaucus*). Three (3) rare lobeliads, the *oha wai* (*Clermontia grandiflora* subsp. *grandiflora*), the *haha* (*Cyanea aculeatiflora*), and another variety of *haha* (*Cyanea macrostegia*), were found growing in the undisturbed fringes that straddle the disturbed corridor of the project site. No endangered or threatened native species were found within the project site, although a number of such species are known to occur within a 2-mile radius. Refer to **Appendix "H"** for a complete listing of species observed during the botanical survey, as well as a description of the species known to occur within the 2-mile radius.

The fauna survey observed two (2) species of mammals: wild pigs (*Sus scrofa*) and mongoose (*Herpestes auropunctatus*). The pigs were observed in a gulch along the project site, and extensive diggings were noted throughout the forest understory. A mongoose was seen in the underbrush along the flume. No other mammals were observed, although a significant population of rats, a number of mice, and a small number of cats may be expected to occur. The Hawaiian hoary bat (*Lasiurus cinereus semotus*) was not observed; however, it is known that this mammal may utilize this habitat

during the warmer months of the year during the emergence of flying insect populations.

Four (4) avifauna species were observed during the survey, including two (2) endemic forest birds, *apapane* (*Himatione sanguinea*) and *iiwi* (*Vestaria coccinea*), and two (2) non-native species, red-billed leiothrix (*Leiothrix lutea*) and Japanese white-eye (*Zosterops japonicus*). Two (2) endangered native birds, the *akohekohe* (*Palmeria dolei*) and *kiwikiu* (*Pseudonestor xanthrophrys*) were not observed, though they are known to occur in this forest. Similarly, the native *uau,* Hawaiian petrel, may fly over this environment in evenings and morning hours to reach their burrows on the Haleakala summit, yet no sightings or signs of this bird were observed during the survey. Five (5) non-native bird species that are known to occur in this area include the Japanese bush warbler (*Cettia dophone*), house finch (*Carpodacus mexicanus*), house sparrow (*Passer domesticus*), common mynah (*Acridotheres tristis*), and the migratory *kolea*, Pacific golden plover (*Pluvialis fulva*).

Aside from the mammals and avifauna, three (3) insect species were identified, and one (1) type of mollusk was observed. The insects identified include Blackburn's damselfly (*Megalagrion blackburni*), Hawaiian crane fly (*Limonia sp.*), and *Dyscritomyia sp.*, which has no common name. The mollusk found during the survey was a native snail of the genus *Succinea.* These snails are fairly common on understory plants in wet forests at the elevation of the project site. Refer to **Appendix "H"** for a complete listing of the mammal, avifauna, insect, and mollusk species observed during the fauna survey.

The temporary construction staging area site adjacent to the Kahakapao Reservoirs was historically used for cattle ranching and was previously disturbed by grading and filling activities during construction of the reservoirs. The area is currently vegetated largely by pasture grasses and contains no habitat for native forest birds or the Hawaiian hoary bat.

b. <u>Potential Impacts and Proposed Mitigation Measures</u>

No threatened or endangered species of flora or fauna were found within the project site, although three (3) rare lobeliads were found growing along the

undisturbed edges of the project site. The Flora and Fauna Survey Assessment report acknowledges that endangered and threatened species of flora and fauna are known to occur within the forest environment that surrounds the project site, yet these species are found over one (1) mile away from the existing flume corridor and are not anticipated to be impacted by the proposed action.

The Flora and Fauna Survey Assessment explains that the corridor immediately straddling the existing flume structure has been heavily impacted by human activity associated with the physical maintenance of the structure. Machetes, chainsaws, and herbicides are used periodically to clear vegetation, and these activities, combined with foot traffic, have created a series of holes and mud bogs along the flume. Nevertheless, this narrow disturbed corridor is immediately abutted by the surrounding intact native forest. Nearly all of the 66 native species identified were located within this peripheral area alongside the disturbed corridor.

Recommended mitigation measures set forth by the Flora and Fauna Survey Assessment report relate to the protection of the native forest habitat as a whole, rather than focusing on individual components. Refer to **Appendix "H"**. In this respect, the proposed action will implement the following measures:

- Confine demolition and construction activity to the 30-foot wide project corridor.
- Remove all debris and waste materials from the project site.
- Ensure materials and equipment are sanitized to prevent the introduction of alien and/or invasive species into the project site and surrounding area.

In addition, the report recommends a specific measure to protect the three (3) above mentioned rare lobeliad species that were found growing along the flume corridor. While these plants were found outside of the disturbed area that straddles the flume structure, they are within the 30-foot-wide project corridor. To prevent damage to these plants during construction activity, individual plants will be flagged to ensure they are avoided by construction crews.

Significant adverse impacts to the Hawaiian hoary bat and native avifauna species that may fly within vicinity of the project site are not anticipated, as the proposed flume structure does not include any guy wires, moving parts, or lighting.

The temporary construction staging area site was previously disturbed during historic ranching activities and construction of the Kahakapao Reservoir. As such, the temporary use of this site for construction staging purposes is not anticipated to have an adverse impact on native flora, fauna, or avifauna.

7. Historic and Archaeological Resources

a. Existing Conditions

An archaeological inventory survey (AIS) of the project site was carried out by Xamanek Researches LLC. See **Appendix "I"**. Fieldwork for the AIS was carried out in the summer of 2011 with follow-up work carried out in December 2011 as well as in January and February 2012. Fieldwork consisted of a 100 percent pedestrian survey with systematic sweeps at 5-meter intervals. No subsurface testing was conducted due to safety considerations associated with topographic and soil conditions along the project corridor.

The project site is situated in the *ahupuaa* of Haiku Uka, within a dense native forest habitat consisting of *ohia* and native ferns and mosses. The ancient Hawaiians regarded this upland forest region as the *Wao Akua*, a realm inhabited only by gods and spirits. For this reason, entry into the forest region was rare. Rather, habitation was spread across the lowlands and coastal areas where flat plains and deep gullies allowed for cultivation of taro, sweet potato, breadfruit, and other crops, while bays like Makilo enabled fishing and access to marine resources.

Little archaeological work has been carried out in Haiku Uka. In the vicinity of the project site, a reconnaissance survey was carried out in 1988 for the DWS Kula 36-inch Water Line Project. No historic or cultural sites were documented by this survey. In 1990, a reconnaissance survey was conducted for the proposed Kahakapao Reservoirs. Two old water pipeline and cut rock

and cement support structures were noted by this survey; however, no State Inventory of Historic Places (SIHP) numbers were assigned.

According to the AIS, the original Waikamoi water conveyance system was developed in 1908. Due to weathering, the structure was twice upgraded and replaced, once in the 1930s and again in 1974 and 1975. The 1930s upgrade effectively brought the wooden flume to its present form and location, while the 1974 and 1975 upgrade consisted of a major replacement of the wooden structure. The existing flume, which is now constructed of redwood timbers, begins at its intake at a check dam on Haipuaena Stream and conveys water to Waikamoi Stream. The Waikamoi Dam on Waikamoi Stream was completed in 1961. Water contained by the Waikamoi Dam is conveyed to the nearby Waikamoi Reservoirs which were constructed in 1963.

Two (2) post-Contact historic sites consisting of multiple features were documented by the AIS. These sites were assigned SIHP numbers of 50-50-06-7193 and 7194. Site 7193 is the 1.1-mile long Waikamoi Flume and associated masonry foundation features. The wooden flume structure was constructed in the 1930s by the Territorial Government to deliver water to upcountry farmers and residents. The wooden components of the flume were replaced in 1974 and 1975, but the cut rock and concrete masonry foundations from the 1930s construction were retained in place. In total, there are 24 such foundation features along the 1.1-mile long length. These features are generally in "good" condition, although three (3) have been repaired in recent years with the addition of concrete, and they are still in use today. Photographs of these 24 features of Site 7193 are provided in **Appendix "I"**.

Site 7194 is the 3.9-mile long dirt and gravel road that provides access to the flume. This site contains a total of eight (8) component features, all of which are culvert crossings composed of concrete and/or metal pipe with rock and concrete supports. Two (2) of these features have been partially repaired, and one (1) of the features was damaged and is no longer in use.

The temporary construction staging area site adjacent to the Kahakapao Reservoirs was historically used for cattle ranching and was previously disturbed by grading and filling activities during construction of the

reservoirs. Historic and archaeological resources have not been recorded in this area.

b. <u>Potential Impacts and Proposed Mitigation Measures</u>

As discussed above, two (2) sites were documented by the AIS. Site 7193 consists of the Waikamoi Flume remnant and component support foundation features, while Site 7194 consists of the flume access road and related culvert crossing features. Both sites were assessed for significance in terms of the broad criteria established for the State and National Register of Historic Places, provided in §13-275-6, Hawaii Administrative Rules and listed below:

- Criterion "a"—Be associated with events that have made an important contribution to the broad patterns of our history;
- Criterion "b"—Be associated with the lives of persons important in our past;
- Criterion "c"—Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
- Criterion "d"—Have yielded, or is likely to yield, important information for research on prehistory or history;
- Criterion "e"—Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts – these associations being important to the group's history and cultural identity.

Site 7193 (flume remnant and support foundations) was deemed significant under Criterion "a" for its function as a key water delivery system for Upcountry Maui. Site 7194 (dirt and gravel access road) was deemed significant under Criterion "a" for its association with the Waikamoi Flume. Both sites were also deemed significant under Criterion "d" for their information content. Refer to **Appendix "I"**.

The proposed action will maintain all component features of Site 7193 and 7194 in place. Only one (1) feature, Feature X of Site 7193, which is the stone and concrete footing that is closest to the flume intake on Haipuaena Stream, will be improved and encased in concrete. Refer to **Appendix "D-1"**. Given this scope of work, the AIS recommends that the Architecture Branch of the State Historic Preservation Division (SHPD) be consulted to determine appropriate mitigation measures for the two (2) sites. Beyond this, the AIS also recommends precautionary archaeological monitoring during construction activities. In this respect, should any archaeological resources be encountered during construction activity, all work in the vicinity of the find will cease immediately, and SHPD will be contacted to determine appropriate mitigation measures. Accordingly, the AIS report has been submitted to both the SHPD Archaeology Branch and the SHPD Architecture Branch for review and determination. See **Appendix "I-1"**.

The proposed temporary construction staging area site was previously disturbed and graded during construction of the Kahakapao Reservoirs, such that archaeological and cultural resources are not anticipated to occur. Additional grading will not be required for this site to be used as a staging area. The use of this site, therefore, is not anticipated to result in any adverse impacts to historic resources.

8. Cultural Resources

a. Existing Conditions

A Cultural Impact Assessment (CIA) for the proposed project was prepared by Hana Pono, LLC in June 2011. See **Appendix "J"**. The CIA was conducted in accordance with protocols set forth by Chapter 343, HRS and by the Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts. Research involved an investigation of archival and historical documents and literature including land court records, previously published ethnographic interviews, and historic maps and photographs. This investigation was complemented by oral interviews with persons having either lineal or cultural ties to the project site and surrounding region. The objectives of the CIA were to compile and identify historic and current cultural uses, beliefs and practices associated with the project site and

surrounding region and to subsequently assess potential impacts of the proposed action on the identified uses, beliefs, and practices.

The Waikamoi Flume is situated amidst a native cloud forest on the *mauka*, upland regions of Haleakala. In terms of ancient Hawaiian land use perspectives, the project site is located in the *moku*, traditional land district(s) stretching from mountaintop to ocean, of Koolau and Hamakualoa. Each Hawaiian Island contains a ridgeline called Koolau. *Koo* refers to a support staff, crutch or cane, and *lau* represents the leaves of a plant, such that Koolau signifies the ridgeline against which clouds rest (*koo*) and break open to rain upon the forests below, thus sustaining greenery (*lau*). Within Koolau Moku, the flume originates at Haipuaena Stream, crosses Puohokamoa Stream, and terminates near Waikamoi Stream. Literally translated, Puohokamoa is the startled (*puoho*) chicken (*moa*). Waikamoi Stream acquires its name in association with a variety of taro that was named for the *moi* fish. The naming of Waikamoi indicates that at the lower elevations, the stream fed *loi kalo*, taro patches, of *moi* taro which was a favorite of the people living in that area. The significance of Haipuaena has been lost through the ages, and none of the CIA interviewees could recall its meaning. Nevertheless, the CIA offers the following literal translations of the words that comprise this name: *hai* is to offer or to sacrifice, while *ha`I* is to break or snap like a stick, to say, tell or mention, an edge or border, or to act flirtatious; *pua* is flower, to bloom or spring forth, or a child or descendant; and *ena* is red-hot or glowing, figuratively meaning angry or raging.

Aside from the *moku* and *ahupuaa* land divisions that run *mauka* to *makai*, mountain to sea, the islands were also divided transversely into levels. The *kahakai*, shoreline, and the lowlands were the *Wao Kanaka,* the realm of people, where fishing, farming, and activities of daily life took place. Further inland was the *Wao Kele*, the inland forest region, and above this was the *Wao Akua*, the realm of the gods. The project site is located within the *Wao Akua*. In ancient Hawaii, the *Wao Akua* was accessible only by trained professionals for specific purposes, after respects were paid and permission was granted. For instance, medicinal practitioners gathered specific plants, and bird men caught birds for their vibrant feathers. Even then, however, entry into the *Wao Akua* was seldom. It was recognized that the health of the watershed in the *Wao Akua* was essential to the health of the *Wao Kanaka*,

such that if a resource could be acquired elsewhere, entry into the *Wao Akua* was avoided.

In the post-Contact period, livestock was introduced to the islands by Western travelers and settlers. Initially presented as gifts to the *alii*, the ruling chiefs, goats, cattle, pigs, and sheep were allowed free reign of the islands. These hoofed animals trampled seedlings, dug up roots, and transformed dense forests into mud bogs. Large tracts of forests were thus destroyed, prompting legislators to see to the protection of remaining forest lands. In 1876, the territorial legislature enacted Act 44 which precipitated the establishment the Forest Reserve System, the largest public-private conservation partnership in the history of the state. The forest that encompasses the project site is located within the Koolau Forest Reserve. Notably, the Koolau Forest Reserve and the majority of windward East Maui are also protected by the East Maui Watershed Partnership, a partnership between Federal, State, County, and private entities.

Today, as in pre-Contact Hawaii, entry into the *Wao Akua*, the upland forest region that encompasses the project site, is rare. Few, if any, cultural practitioners visit this area to gather resources such as wood, ferns, and other greenery that can be found in more accessible parts of the island that do not require strict entry protocols. Despite eradication efforts, wild pigs still cause destruction of the forest habitat, such that hunters are allowed by landowners to hunt in the area. Otherwise, due to the inaccessibility of the project area and surrounding forest lands, the area is largely devoid of human development, with the exceptions of the flume and reservoirs.

b. <u>Potential Impacts and Proposed Mitigation Measures</u>

The only modern day practices recalled by the CIA interviewees included bird watching, hunting, and maintenance and upkeep of the flume structure. All acknowledged the pristine state of the native forest that surrounds the flume, although some noted the presence of wild pigs, rats, and mongoose. The interviewees understood and recognized the need for the proposed action and its objective of providing a more efficient and reliable water supply for Upcountry Maui residents. Some expressed skepticism as to how construction would be carried out, due to the remote location and difficult terrain. Concerns relating to the proposed project centered on the

introduction of alien and invasive species into the native forest ecosystem during construction activities and the potential destruction caused by any use of large, heavy construction machinery.

In discussing recommendations for mitigating potential impacts to cultural resources, the CIA emphasizes the cultural significance of *Wao Akua*, the realm of the gods, within which the project site is situated. Out of respect for the *Wao Akua* and in the interest of preserving the pristine condition of the surrounding native forest, the CIA recommends that manipulation of the intact native forest that surrounds the flume corridor be avoided. To the extent practicable, work by hand should take precedence over work by large machinery, and activity should be confined to the existing flume corridor. Meanwhile, building materials, equipment, tools, and the clothes and shoes of construction workers should be thoroughly checked and rid of soil and seeds daily, prior to entering the project site. To foster reverence and respect for the *Wao Akua*, the CIA further recommends a cultural orientation for all construction workers along with cultural advice for protocols regarding any inadvertent finds. Refer to **Appendix "J"**.

9. Air and Noise Quality

a. Existing Conditions

Due to the lack of development in the pristine forest environment where the project site is located, air and noise quality are excellent. Being situated in a remote location at a distance from local roadways, there are no sources of airborne emissions that affect the project site or surrounding area. Similarly, there are no significant noise generators in the vicinity of the project site.

b. Potential Impacts and Proposed Mitigation Measures

Any impacts to air quality resulting from project construction are anticipated to be minimal and temporary in nature. Due to the moist climate in the area, soils underlying the project site, access road, and temporary construction staging area are relatively moist, such that windblown dust and soil are not anticipated to occur. In addition, because of the remote location of the project site, heavy equipment such as bulldozers, front-end loaders, and dump trucks that tend to generate airborne exhaust and other emissions, will not be

utilized. Grading of the access road, if deemed necessary, will be kept to a minimum. The temporary construction staging area will not be graded, although minimal grubbing may occur. Nevertheless, a program of Best Management Practices (BMPs) for dust control will be implemented. A list of BMPs to be implemented during project construction is provided in **Appendix "D"**, Sheet S0.1.

Following project completion, there will be no long-term impacts to air quality generated by operation of the flume system.

As with air quality, any impacts to ambient noise conditions resulting from project construction are anticipated to be minimal and temporary in duration. As discussed above, due to the remote location and challenging terrain of the project site, heavy construction equipment will not be utilized. Additionally, sections of the new flume structure will be prefabricated offsite, thereby lessening the amount of noise-generating construction activities. Following construction, operation of the flume will not generate long-term impacts to ambient noise conditions.

10. Scenic and Open Space Resources

a. Existing Conditions

The project site is located on the northern slopes of Haleakala, amid a dense native cloud forest. The project site is not visible from any roadway, and due to the forest canopy, is not readily visible from the air. The project site is not situated within any designated scenic view corridor.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project will not present adverse impacts on any scenic view corridor. The replacement flume will be similar in scale to the existing flume structure, and the new structure will not be visible from any public roadway. Given the remote location and the dense vegetation that surrounds the existing flume, adverse impacts to scenic and open space resources are not anticipated.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Population and Economy

a. Existing Conditions

The population of the County of Maui has exhibited relatively strong growth over the past decade. The County's resident population grew by 20.9 percent between 2000 and 2010, compared to a 12.3 percent increase in the State of Hawaii as a whole during the same time period. Maui County's population increased from 128,094 residents in 2000 to 154,834 residents in 2010. Population on the island of Maui exhibited even stronger growth than the County as a whole, with a 22.8 percent population increase over the decade. Approximately 144,444 residents lived on the island of Maui in 2010 (U.S. Census Bureau, 2000 and 2010). Maui County's resident population is projected to rise to 174,450 people in 2020 and to 199,550 people in 2030 (County of Maui, 2006).

Just as Maui County and Maui Island's populations have grown, the resident population of the Makawao-Pukalani-Kula region has also increased. The estimated population of the Makawao-Pukalani-Kula region in 2000 was 21,571, which comprised approximately 18.3 percent of the island's population (County of Maui, 2006). According to the 2010 Census, the resident population for the region was approximately 25,561, an increase of 18.5 percent over 10 years (U.S. Census, 2010). The population of the Makawao-Pukalani-Kula region is projected to increase to 27,640 people in 2020 and to 30,880 people in 2030 (County of Maui, 2006).

As discussed previously, the Waikamoi Flume is an integral component of the DWS Upper Kula system. The Upper Kula system services the Upcountry Maui region, specifically residents of Kula, Waiakoa, Keokea, Ulupalakua, and Kanaio. Similar to the Maui County and Maui Island populations, the population of the Kula region (including Ulupalakua and Kanaio) has grown over time. As of 2001, the population of Kula numbered 6,659 persons (County of Maui, OED, 2010). As of 2010, the population of Kula numbered 7,836 persons, an increase of 17.7 percent (U.S. Census Bureau, 2010).

As of March 2012, the non-seasonally adjusted unemployment rates for Maui County and Maui Island were 7.1 percent and 6.9 percent, respectively. These numbers represent respective decreases of 0.9 percent and 1.0 percent from March 2011 (DLIR, 2012).

b. Potential Impacts and Proposed Mitigation Measures

Short-term economic benefits resulting from the proposed action include construction-related jobs and expenditures. The proposed project is not a population generator, nor does it entail new water source development. The stream intakes will not be altered, such that the replacement flume will have approximately the same water transmission capacity as the existing flume. In the long term, the proposed flume replacement will provide an improved and more efficient water transmission system that will enhance the ability of the County to provide reliable service to existing residents of Upcountry Maui.

C. PUBLIC SERVICES

1. Police and Fire Protection

a. Existing Conditions

The County of Maui Police Department headquarters are located in Wailuku. There are three (3) patrol divisions on the island of Maui, the Wailuku, Lahaina, and Hana divisions. The Wailuku division covers Central Maui, Paia-Haiku, Kihei-Makena, and Upcountry Maui. Currently, the Wailuku division employs 146 patrol officers and 11 motorized beats.

Fire prevention, suppression, and protection services in the region are provided by the County Department of Fire and Public Safety's Makawao and Kula fire stations.

b. Potential Impacts and Proposed Mitigation Measures

As a flume replacement project, the subject project is not a population generator. Thus, the proposed action will not affect existing service limits for police or fire protection services. Adverse impacts to police and fire protection services are, therefore, not anticipated.

2. Medical Facilities

a. Existing Conditions

Maui Memorial Medical Center, located in Wailuku, is currently the only major medical facility on the island. Acute, general, and emergency care services are provided by this 231-bed facility. A number of medical and dental offices and pharmacies are located throughout Makawao and Pukalani.

b. Potential Impacts and Proposed Mitigation Measures

As a flume replacement project, the proposed action will not have adverse impacts on medical facilities or services. Emergency service limits will also not be affected by the subject project.

3. Solid Waste

a. Existing Conditions

In general, single-family residential solid waste collection service is provided by the County of Maui on a weekly basis. Solid waste collected by County refuse collection crews is disposed of at the Central Maui Landfill in Puunene. Commercial waste from private collection companies and greenwaste are also accepted at the Central Maui Landfill.

Residential and commercial construction and demolition materials are accepted by the privately-operated Maui Demolition & Construction Landfill, which is located in Maalaea.

b. Potential Impacts and Proposed Mitigation Measures

Solid waste resulting from demolition and construction activities will be completely removed from the project site and disposed of at a Department of Health permitted facility. Where feasible and practicable, wood and aluminum material resulting from the removal of the timber flume and construction of the replacement flume will be diverted away from the landfill for reuse or recycling. The construction contractor will be required to prepare a construction waste management plan prior to construction.

After the completion of construction, the proposed project will not generate any solid waste. As such, long-term, adverse impacts to existing solid waste services and facilities are not anticipated.

4. Recreational Resources

a. Existing Conditions

There are a range of recreational facilities distributed throughout the Makawao-Pukalani-Kula region. Recreational facilities in nearby Makawao Town include the Oskie Rice roping arena and the Eddie Tam Memorial Center, which offers a gymnasium, tennis courts, soccer fields, and baseball fields. Recreational facilities in Pukalani include the Pukalani Country Club Golf Course, as well as the Mayor Hannibal Tavares Community Center which offers an aquatic center, playground, soccer and baseball fields, and a community center facility. Parks and other facilities further afield in Kula include Waiakoa Gymnasium, Rice Park, which provides picnic facilities, and Kula Park, which offers soccer fields, playgrounds, and picnic facilities.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is not a population generator and will not have an adverse impact on recreational resources in the region.

5. Educational Facilities

a. Existing Conditions

The State of Hawaii, Department of Education operates seven (7) public schools in Upcountry Maui. They are Makawao Elementary School, Kalama Intermediate School, Pukalani Elementary School, Kula Elementary School, Haiku Elementary School, Paia Elementary School, and King Kekaulike High School.

The region is also served by the privately operated Montessori School, Doris Todd Memorial Christian School, Haleakala Waldorf School, Seabury Hall, and the Maui Campus of Kamehameha Schools.

b. Potential Impacts and Mitigation Measures

The proposed project is not a population generator and will not adversely impact existing education facilities or services in Upcountry Maui.

D. INFRASTRUCTURE

1. Roadways

a. Existing Conditions

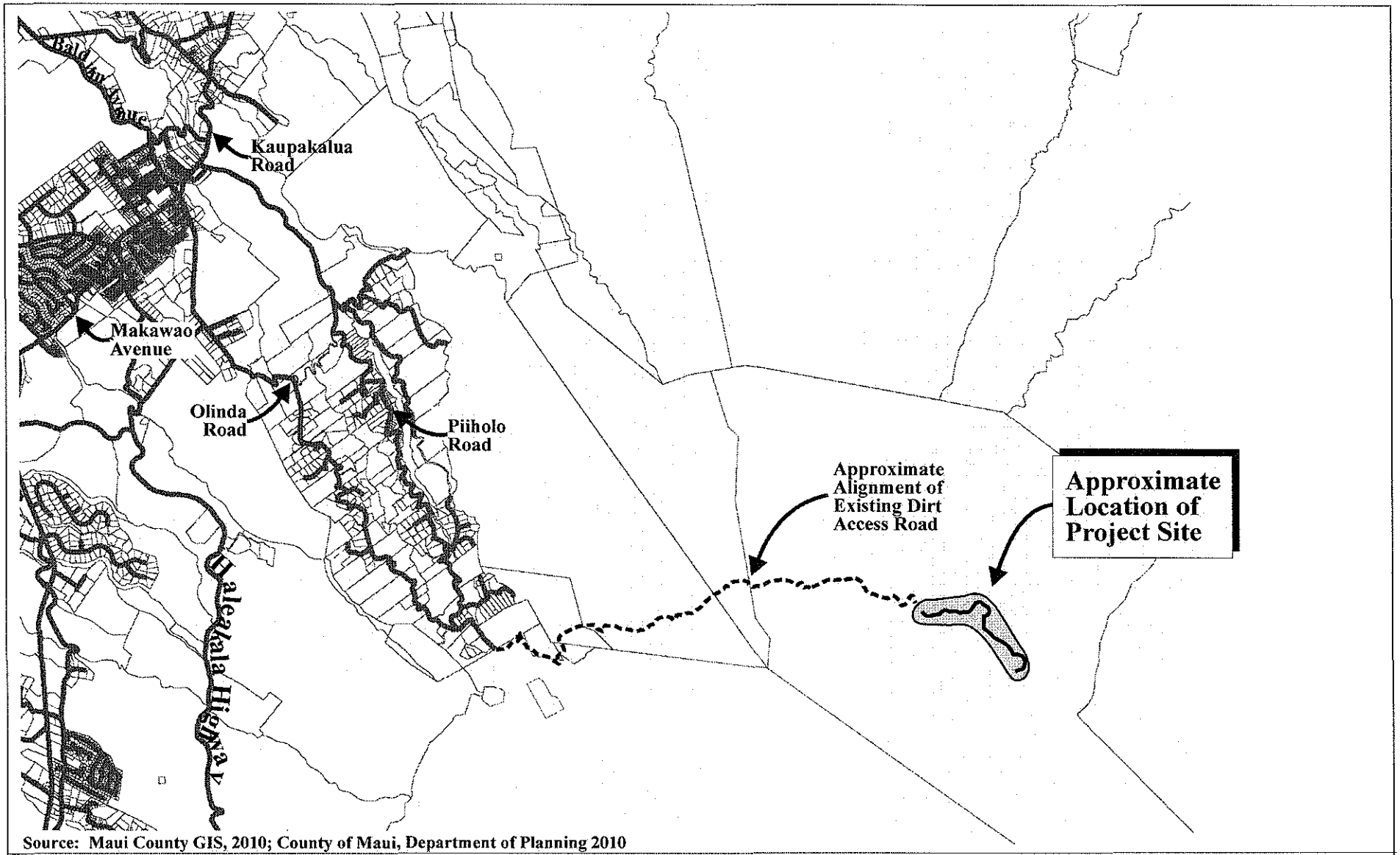
The project site is accessed via an unimproved dirt and gravel roadway that extends approximately 3.9 miles east from the southern (upland) terminus of Olinda Road. Refer to **Figure 1**. Olinda Road is a two-lane, two-way County-owned roadway that generally runs in a north-south direction. At its northern terminus, Olinda Road intersects Makawao Avenue, Baldwin Avenue, and Kaupakalua Road. See **Figure 11**.

The nearby town of Makawao and the Olinda Road area are rural and agricultural in character. Due to this characteristic, traffic is generally light, and traffic congestion is minimal.

b. Potential Impacts and Proposed Mitigation Measures

During the construction period, access to the project site will be provided by the existing dirt access road. Portions of the access road may be re-graveled to facilitate construction access. Although a minimal amount of grading on portions of the road may be undertaken, the alignment of the roadway will not be altered and the roadway corridor will not be widened or extended.

Following the completion of construction, maintenance personnel will continue to use the existing access road. An EMI truck will travel to the project site once per week, while a DWS maintenance truck will travel to the site on an as-needed basis, averaging once per month. Thus, in the long term, the proposed project is not anticipated to have an adverse impact on traffic conditions along surrounding roadways, including Olinda Road.



Source: Maui County GIS, 2010; County of Maui, Department of Planning 2010

Figure 11 Proposed Waikamoi Flume Replacement Project

Site Access Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\AreaRoadways

2. Water System

a. Existing Conditions

The Waikamoi Flume is an integral component of the DWS Upper Kula System. From the intake at Haipuaena Stream in the east, the Waikamoi Flume channels freshwater 1.1 miles westward to the Waikamoi Dams on Waikamoi Stream, generally following the 4,300-foot contour line. Freshwater collected by the Waikamoi Flume and Dams is stored at the two (2) adjacent 15-million-gallon (MG) Waikamoi Reservoirs which are situated at an elevation of 4,240 feet. Refer to **Figure 2**. A number of small laterals also divert freshwater from small tributary streams to Waikamoi Dam and the two (2) Waikamoi Reservoirs. Freshwater is then transported to the two (2) nearby 50-MG Kahakapao Reservoirs before reaching the Olinda Water Treatment Plant (WTP), which is situated at an elevation of 4,136 feet. Refer to **Figure 1**. Freshwater treated at this facility serves residents of Kula, Waiakoa, Keokea, Ulupalakua, and Kanaio.

The average year-round supply capability of the DWS Upper Kula System (i.e., the Olinda WTP) is 0.8 million gallons per day (MGD), while the drought period supply capability is 0.6 MGD. According to records kept by USGS Gage 5310, flows at the Haipuaena intake of Waikamoi Flume average 0.39 MGD (BCA 1985). Due to years of wear on the existing timber flume, DWS estimates that during peak flows, approximately 40 percent of the water carried by the flume is lost due to leakages within the system.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is being undertaken in compliance with a directive issued by the Commission on Water Resource Management (CWRM) on May 25, 2010 that requires DWS to replace the leaking Waikamoi Flume in order to reduce waste and system loss. Refer to **Appendix "C"**. The proposed action is also being pursued in accordance with the recommendation of the Draft Upcountry Water Use and Development Plan for a continued leak detection and repair program (Freedman, 2009).

The replacement flume will be designed to carry approximately the same volume of water as the existing flume. The intakes at Haipuaena Stream and

smaller tributaries will not be replaced, such that the volume of water collected by the flume will not increase above existing conditions. The proposed project does not involve any work within Waikamoi Stream.

Water flow into the flume will be temporarily and intermittently suspended during construction activities occurring on the eastern, upper half of the flume, between Haipuaena Stream and Puohokamoa Stream. Construction on this portion of the flume is anticipated to take approximately 18 months. During this period, water flow will not be suspended for more than a few hours at a time. This temporary and intermittent suspension of flow into the flume is not anticipated to have a substantial adverse impact on the Upper Kula Water System due to the presence of other water sources that can be diverted to serve the system.

Water flow into the flume will not be suspended during construction on the western half of the flume between Puohokamoa Stream and Waikamoi Stream. During construction on this half of the flume, water flow will either be bypassed into the existing aluminum pipe that parallels this portion of the flume, or a temporary bypass pipe will be installed atop this existing aluminum pipe.

By eliminating leakages in the Waikamoi Flume system, the proposed project will provide an improved and more efficient conveyance system that will enhance the County's ability to deliver potable water to existing Upcountry Maui residents. In addition, replacement bridges along the new flume will provide DWS maintenance crews with a sturdy platform that will allow safe access to the elevated sections of the flume for repair and maintenance work.

3. Wastewater System

a. Existing Conditions

Because the Olinda area is sparsely populated, there are no County wastewater treatment facilities serving the area surrounding the project site. Wastewater disposal for residences along Olinda Road is accommodated via cesspools or individual wastewater treatment systems such as septic tanks and leach fields.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project will not generate any wastewater and, therefore, will not impact County wastewater system infrastructure. During the construction period, the construction contractor will be required to provide portable toilets for construction workers at the temporary staging area and the end of the access road near Waikamoi Stream.

4. Drainage

a. Existing Conditions

From Haipuaena Stream to the vicinity of Waikamoi Stream, the existing Waikamoi Flume runs along the 4,300-foot contour line. Along its 1.1-mile long length, the flume crosses a number of streams, gulches, and gullies. Refer to **Appendix "A"** and **Appendix "B"**. Runoff along the project corridor generally sheet flows into these natural drainage ways.

b. Potential Impacts and Proposed Mitigation Measures

The flume replacement work will not involve any alterations to natural landforms. With the exception of the concrete reinforcement of one (1) existing stone footing below the OHWM of Haipuaena Stream adjacent to the flume intake, no work will occur within any of the streams, gulches, or gullies that naturally collect runoff within the project site. Improvements to the existing dirt access road will involve re-graveling of the surface and may involve minimal grading, if any. The establishment of the temporary staging area adjacent to the Kahakapao Reservoirs will also not involve any grading. A program of appropriate BMPs will be implemented during the project to ensure downstream properties are not affected by construction activities. Refer to **Appendix "D"**, Sheet S0.1. As such, the proposed action will not have significant adverse impact on natural drainage conditions in the area.

5. Electrical, Telephone, and Cable Television Services

a. Existing Conditions

Electrical service to the Olinda Road area is provided by Maui Electric Company, Ltd. (MECO). Telephone and cable services in the area are provided by Hawaiian Telcom and Oceanic Time Warner Cable, respectively.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project will not require electrical, telephone, or cable television service. Adverse impacts to the provision of these services are, therefore, not anticipated.

E. CUMULATIVE AND SECONDARY IMPACTS

Cumulative impacts are defined as the impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

The proposed project is a repair and maintenance project that is not part of a larger action. The flume replacement action is being pursued in accordance with a directive issued by the Commission on Water Resource Management (CWRM) for the replacement of the Waikamoi Flume to reduce waste and system loss due to leakages. Refer to **Appendix "C"**. The proposed project is also consistent with recommendations set forth by the Draft Upcountry Water Use and Development Plan (WUDP), which in turn is being prepared in accordance with the CWRM Statewide Framework for Updating the Hawaii Water Plan. In particular, a program recommended by the Draft Upcountry WUDP is a continued and accelerated leak detection and repair program. While the Draft Upcountry WUDP recommends larger actions relating to water source development and storage, these actions would augment the Lower Kula system, rather than the Upper Kula system which includes the Waikamoi Flume. Furthermore, the Draft Upcountry WUDP states that this strategy for leak detection and repair functions independently of any water source development or storage project (Freedman, 2009). In this context, the project is not considered part of a larger action.

Secondary impacts are those which have the potential to occur later in time or are farther in distance, but are still reasonably foreseeable. They can be viewed as actions of others that are taken because of the presence of the subject project.

The proposed project is limited to the repair and maintenance of an existing water conveyance system and is not considered a water source development venture. Secondary impacts associated with the proposed project relate to the change in the volume of water carried by the Waikamoi Flume that would result from the elimination of leakages. As previously discussed, DWS estimates that approximately 40 percent of the water conveyed by the existing flume is lost through leakages in the flume timbers that have resulted from wear and tear over time. Although the flume's Haipuaena and tributary intakes will not be altered, and although the capacity of the reconstructed flume will be approximately equal to that of the existing flume, the elimination of leakages may result in an increased volume of water being conveyed to the Waikamoi Reservoirs than under current conditions. This additional volume will provide enhanced water service reliability for existing residents in the Upcountry area, as it would reduce the need for DWS to issue temporary water use restrictions during times of drought when reservoir levels become low.

The subject project is, therefore, anticipated to generate positive secondary impacts by increasing the reliability of the DWS Upper Kula System. The proposed project is not a water source development venture and it will not allow for the issuance of new water meters in the Upper Kula service area. There are no significant adverse secondary impacts associated with the proposed flume replacement project.

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES AND CONTROLS

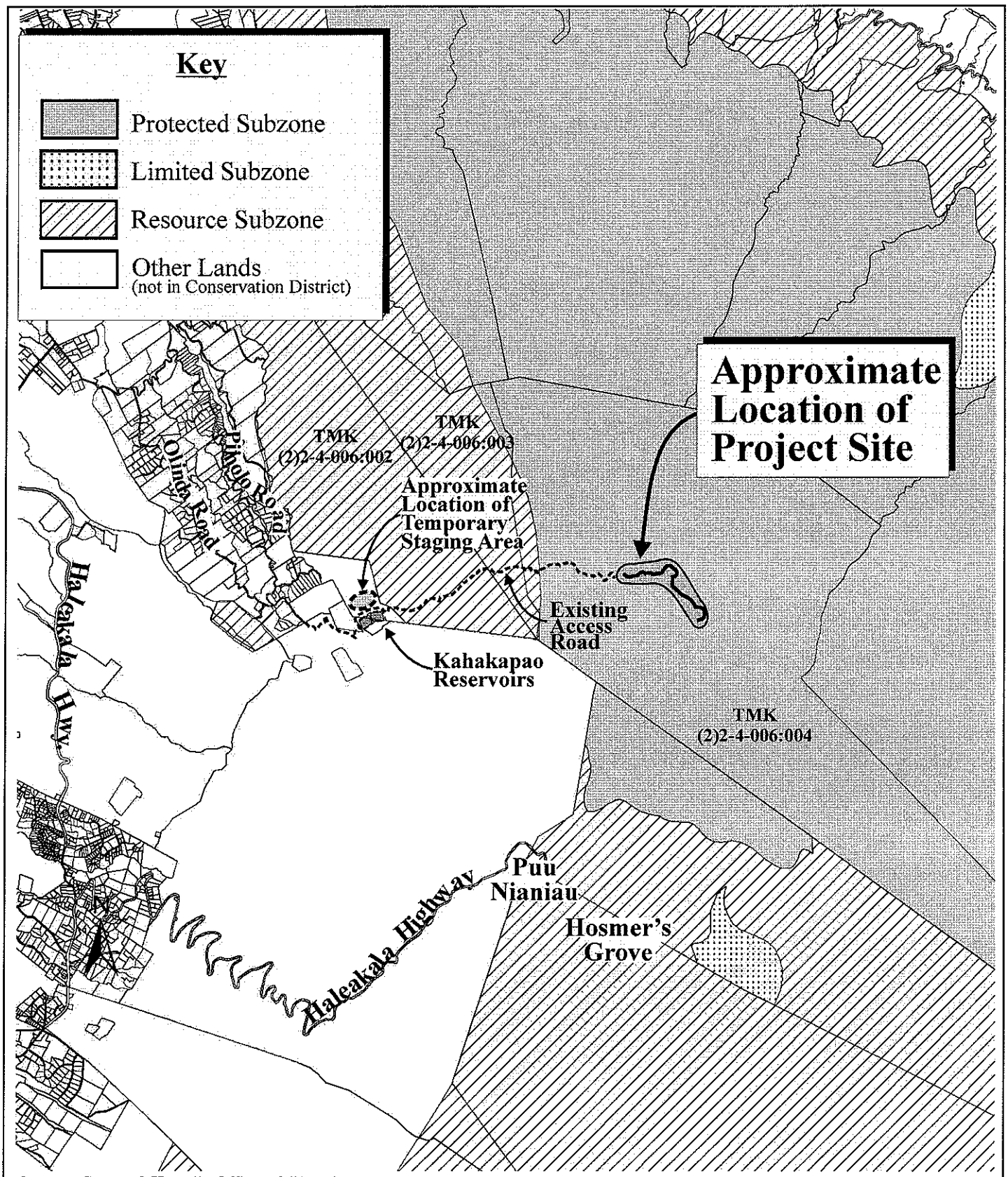
III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES AND CONTROLS

A. STATE LAND USE DISTRICTS

Chapter 205, Hawaii Revised Statutes (HRS), relating to the State Land Use Commission (SLUC), establishes the four (4) major land use districts into which all lands in the State are classified. Referred to as the State Land Use Districts, these four (4) classifications are "Urban", "Rural", "Agricultural", and "Conservation". The project site is located within the State Conservation District. The Conservation District is divided into five (5) subzones, Protective, Limited, Resource, General, and Special. The project site is specifically located within the Protective subzone. The existing access road crosses State Agricultural District and State Conservation District (Resource Subzone and Protected Subzone) lands. See **Figure 12**. The temporary construction staging area site is located in the State Agricultural District, directly north of the Kahakapao Reservoir. It is anticipated that the temporary construction staging area will be deemed to be an allowable use in the State Agricultural District.

The approximately two (2) million acres of public and private land statewide that are encompassed by the Conservation District are overseen by the State Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL). Chapter 13-5, Hawaii Administrative Rules (HAR) sets forth permitted uses within each of the five (5) subzones, along with corresponding permitting requirements. By letter dated January 10, 2012, OCCL has determined that the proposed flume replacement project is an identified land use within the Conservation District, Protective subzone, pursuant to §13-5-22, HAR, and that the proposed action requires the processing of a Conservation District Use Application (CDUA) for a Departmental Permit. See Chapter VIII of this Environmental Assessment (EA) for the OCCL determination letter.

With respect to the proposed project's consistency with the intended purposes of the Conservation District, the Conservation District use criteria set forth by §13-5-30 (c), HAR are addressed below:



Source: State of Hawaii, Office of Planning

Figure 12

Proposed Waikamoi Flume Replacement Project

State Conservation District Map

0 3,125 1,562.5 6,250 Feet

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\CDUA\ConservationDistrict.DEA

1. **<u>The proposed land use is consistent with the purpose of the conservation district:</u>**

As stated by §15-15-20, HAR, lands encompassed by the State Conservation District include "lands necessary for protecting watersheds, water resources, and water supplies." In recognition of the surface water resources in the area, the Waikamoi Flume was constructed to convey water to Upcountry Maui. The flume was constructed in the 1930s, prior to the establishment of the State Conservation District. While portions of the timber flume were replaced in 1974 and 1975, the purpose of the facility remains the same.

The proposed project is designed to provide an improved, more efficient flume that will convey water to the County Department of Water Supply (DWS) Upper Kula system. Over time, the continuous flow of water through the timber flume has caused deterioration in the timbers, such that DWS estimates that during peak flows, approximately 40 percent of the water carried by the flume is lost through leakages. The proposed action will eliminate these leaks with the construction of a replacement flume; however, it is noted that the amount of water collected by the replacement flume will not increase beyond existing levels.

Best Management Practices (BMPs) will be implemented to ensure that storm water runoff from the project site during construction has no adverse impact on downstream resources. Refer to **Appendix "D"**, Sheet S0.1. Furthermore, all waste associated with demolition and construction activities will be completely removed from the project site. It is recognized that the project site is located amidst a designated forest reserve that is home to a variety of native, rare, threatened, and endangered species of flora and fauna. As recommended by the Flora and Fauna Survey Assessment report, mitigation measures will be implemented to ensure the protection of the forest ecosystem. Appropriate steps will be taken to ensure that vehicles, equipment, and personnel do not introduce alien species to the project site. Such steps would include cleaning of vehicles, equipment, construction materials, clothing and footwear prior to their movement to the work site. Protocol will be in line with measures specified by the DLNR, Division of Forestry and Wildlife (DOFAW). See correspondence from DOFAW in Chapter VIII of this EA. Also, rare species of plants that were identified along the outer edges of the flume corridor will be flagged to ensure they are not disturbed during construction activities. Refer to **Appendix "H"**.

In summary, the proposed project is consistent with the purpose of the Conservation District.

2. **<u>The proposed land use is consistent with the objectives of the subzone of the land on which the use will occur:</u>**

As indicated above, the project site is located within the Protective subzone. As stated by §13-5-11, HAR, the objective of the Protective subzone is to:

> *Protect valuable resources in designated areas such as restricted water-sheds, marine, plant, and wildlife sanctuaries, significant historic, archaeological, geological, and volcanological features and sites, and other designated unique areas.*

Under the provisions of §13-5-22, HAR, and as confirmed by OCCL, the Waikamoi Flume is an identified land use in the Protective subzone. The moderate alteration of existing structures, facilities, uses and equipment is listed as a permitted use within the Protective subzone.

As discussed above, measures will be taken to ensure the rare plants, habitat, and watershed surrounding the project site will not be adversely impacted by construction activities. Appropriate BMPs will be implemented during the construction period to ensure downstream areas are not affected.

The two (2) sites that were documented by the Archaeological Inventory Survey (AIS) were assessed in terms of the broad criteria established for the State and National Register of Historic Places. The Waikamoi Flume remnant, Site 7193 was deemed significant under Criterion "a" for its function as a key water delivery system for Upcountry Maui. Site 7194 was deemed significant under Criterion "a" for its association with the Waikamoi Flume. Both sites were also deemed significant under Criterion "d" for their information content. Refer to **Appendix "I"**.

The proposed action will maintain all component features of Site 7193 and 7194 in place. Feature X of Site 7193, the stone and concrete footing that is closest to the flume intake on Haipuaena Stream, will be encased in concrete. Refer to **Appendix "D-1"**. Given this scope of work, the AIS recommends that the Architecture Branch of the State Historic Preservation Division (SHPD) be consulted to determine appropriate mitigation measures for the two (2) sites. Beyond this, the AIS also recommends precautionary archaeological monitoring during construction activities.

In this respect, should any archaeological resources be encountered during construction activity, all work in the vicinity of the find will cease immediately, and SHPD will be contacted to determine appropriate mitigation measures. The AIS report has been submitted to the SHPD Archaeology Branch and the SHPD Architecture Branch for review and determination.

The proposed action, therefore, is consistent with the objectives of the subzones affected by the proposed project.

3. **The proposed land use complies with provisions and guidelines contained in Chapter 205A, HRS, entitled "Coastal Zone Management," where applicable:**

The proposed action is in compliance with the provisions and guidelines of Chapter 205A, HRS. The project site is located well inland of the Special Management Area (SMA). An evaluation of the proposed action with respect to the coastal zone management criteria is provided in Section F of this chapter.

4. **The proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community or region:**

The proposed project will not cause any substantial adverse impact to the natural resources of the surrounding area or region. The proposed action is limited to the replacement of the existing Waikamoi Flume. While a new aluminum structure will replace the existing timber structure, the capacity of the new flume will be approximately the same as the existing flume. The Haipuaena and tributary intakes will not be altered, the amount of water collected by the flume will not increase, and there will be no intensification of use. The replacement flume will eliminate leakages that result in substantial losses of water, thereby providing an improved and more efficient water system for upcountry users. Measures will be taken to prevent the introduction of alien species into the project site and to ensure that no rare species are adversely impacted. In addition, BMPs for sediment and erosion control will be implemented during construction to ensure that downstream areas are not affected. Refer to **Appendix "D"**, Sheet S0.1.

5. **<u>The proposed land use, including buildings, structures and facilities, shall be compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels:</u>**

The proposed flume replacement action is listed under §13-5-22, HAR as a permitted use in the Protective subzone of the Conservation District. The Waikamoi Flume was constructed in the 1930s, in order to deliver water to Upcountry Maui for domestic and irrigation purposes. The replacement flume will serve the same purpose as the existing flume. In addition, the existing flume corridor will be utilized so as not to affect any of the undisturbed lands and native forest environment that surround the project site. The proposed action will not alter any of the existing topography. Inasmuch as the proposed action entails the continuation of an existing use, the proposed project is compatible with the locality and surrounding areas, and is appropriate to the physical conditions of the underlying lands. Additionally, as discussed previously, the flume land use is consistent with the objectives of the Conservation District.

6. **<u>The existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon, whichever is applicable:</u>**

In the interest of preserving the native forest environment that surrounds the project site, measures will be taken to prevent the introduction of alien species and to ensure that no forest habitat is damaged during project implementation. As previously noted, all vehicles, equipment, and construction materials, as well as clothing and footwear of construction personnel, will be cleaned of all mud and debris prior to entry to the project site. Rare plants that were identified along the outer edges of the flume corridor will also be flagged to ensure they are avoided during construction activities. Refer to **Appendix "H"**. Furthermore, all debris resulting from demolition and construction activities will be removed from the project site. Due to the low profile of the flume, dense surrounding vegetation and remote location, the proposed project will not adversely affect open space resources. The replacement flume will utilize the existing flume corridor, such that the existing physical and environmental aspects of the land will be preserved.

7. **Subdivision of land will not be utilized to increase the intensity of land uses in the conservation district:**

The proposed action does not involve the subdivision of land, nor are there any plans to subdivide the subject property in the future.

8. **The proposed land use will not be materially detrimental to public health, safety, and welfare:**

The Waikamoi Flume is an integral component of the DWS Upper Kula system. The Waikamoi Flume collects freshwater that is conveyed to existing residents of Kula, Waiakoa, Keokea, Ulupalakua, and Kanaio for domestic and irrigation purposes. The proposed project will provide a more reliable and efficient water system, such that the proposed project will positively contribute to public health, safety, and welfare.

In summary, the proposed project is consistent with the Conservation District use criteria as set forth in §13-5-30 (c), HAR.

B. CHAPTER 226, HRS, HAWAII STATE PLAN

Chapter 226, HRS, also known as the Hawaii State Plan, is a long-range comprehensive plan which serves as a guide for the future long-range development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms.

The proposed action is consistent with the following goal of the Hawaii State Plan:

- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.

The proposed project is consistent with the following objectives and policies of the Hawaii State Plan:

§226-5, HRS, Objective and Policies for Population.

§226-5 (b)(7), HRS: Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.

§226-7, HRS, Objectives and Policies for the Economy—Agriculture.

§226-7 (b)(2), HRS: Encourage agriculture by making best use of natural resources.

§226-7 (b)(10), HRS: Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.

§226-11, HRS, Objectives and Policies for the Physical Environment—Land-Based, Shoreline, and Marine Resources.

§226-11 (a)(1), HRS: Prudent use of Hawaii's land-based, shoreline, and marine resources.

§226-11 (a)(2), HRS: Effective protection of Hawaii's unique and fragile environmental resources.

§226-11 (b)(1), HRS: Exercise an overall conservation ethic in the use of Hawaii's natural resources.

§226-11 (b)(3), HRS: Take into account the physical attributes of areas when planning and designing activities and facilities.

§226-11 (b)(4), HRS: Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.

§226-11 (b)(5), HRS: Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.

§226-11 (b)(8), HRS: Pursue compatible relationships among activities, facilities, and natural resources.

§226-12, HRS, Objective and Policies for the Physical Environment—Scenic, Natural Beauty, and Historic Resources.

§226-12 (b)(1), HRS: Promote the preservation and restoration of significant natural and historic resources.

§226-13, HRS, Objectives and Policies for the Physical Environment—Land, Air, and Water Quality.

§226-13 (a)(1), HRS: Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.

§226-13 (b)(2), HRS: Promote the proper management of Hawaii's land and water resources.

§226-14, HRS, Objective and Policies for Facility Systems—in General.

§226-14 (b)(1), HRS: Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.

§226-14 (b)(2), HRS: Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.

§226-14 (b)(3), HRS: Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.

§226-16, HRS, Objective and Policies for Facility Systems—Water.

§226-16 (a), HRS: Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.

§226-16 (b)(1), HRS: Coordinate development of land use activities with existing and potential water supply.

§226-16 (b)(2), HRS: Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.

§226-16 (b)(4), HRS: Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.

C. GENERAL PLAN OF THE COUNTY OF MAUI

As indicated by the Maui County Charter, the purpose of the general plan shall be to:

> *... indicate desired population and physical development patterns for each island and region within the county; shall address the unique problems and*

needs of each island and region; shall explain opportunities and the social, economic, and environmental consequences related to potential developments; and shall set forth the desired sequence, patterns and characteristics of future developments. The general plan shall identify objectives to be achieved, and priorities, policies, and implementing actions to be pursued with respect to population density; land use maps, land use regulations, transportation systems, public and community facility locations, water and sewage systems, visitor destinations, urban design, and other matters related to development.

As reflected in the Draft Maui Island Plan, Chapter 2.80B of the Maui County Code, relating to the General Plan and Community Plans, implements the foregoing Charter provision through enabling legislation which calls for a Countywide Policy Plan and a Maui Island Plan. The Countywide Policy Plan was adopted as Ordinance No. 3732 on March 24, 2010. The draft Maui Island Plan, which delineates areas for future urban and rural growth as part of a Directed Growth Strategy, is currently in the process of review and formulation by the Maui County Council.

With regard to the Countywide Policy Plan, Section 2.80B.030 of the Maui County Code states the following:

The countywide policy plan shall provide broad policies and objectives which portray the desired direction of the County's future. The countywide policy plan shall include:

1. *A vision for the County;*
2. *A statement of core themes or principles for the County; and*
3. *A list of countywide objectives and policies for population, land use, the environment, the economy, and housing.*

Core principles set forth in the Countywide Policy Plan are listed as follows:

1. Excellence in the stewardship of the natural environment and cultural resources;
2. Compassion for and understanding of others;
3. Respect for diversity;
4. Engagement and empowerment of Maui County residents;

5. Honor for all cultural traditions and histories;

6. Consideration of the contributions of past generations as well as the needs of future generations;

7. Commitment to self-sufficiency;

8. Wisdom and balance in decision making;

9. Thoughtful, island appropriate innovation; and

10. Nurturance of the health and well-being of our families and our communities.

Congruent with these core principles, the Countywide Policy Plan identifies goals objectives, policies and implementing actions for pertinent functional planning categories, which are identified as follows:

1. Natural environment

2. Local cultures and traditions

3. Education

4. Social and healthcare services

5. Housing opportunities for residents

6. Local economy

7. Parks and public facilities

8. Transportation options

9. Physical infrastructure

10. Sustainable land use and growth management

11. Good governance

With respect to the proposed Waikamoi Flume Replacement Project, the following goals, objectives, policies and implementing actions are illustrative of the project's compliance with the Countywide Policy Plan:

PROTECT THE NATURAL ENVIRONMENT

Goal: Maui County's natural environment and distinctive open spaces will be preserved, managed, and cared for in perpetuity.

Objective:

- Improve the quality of environmentally sensitive, locally valued natural resources and native ecology of each island.

Policies:

- Mitigate the negative effects of upland uses on coastal wetlands, marine life, and coral reefs.

Objective:

Improve the stewardship of the natural environment.

Policies:

- Preserve and protect natural resources with significant scenic, economic, cultural, environmental, or recreational value.

- Improve communication, coordination, and collaboration among government agencies, nonprofit organizations, communities, individuals, and land owners that work for the protection of the natural environment.

- Evaluate development to assess potential short-term and long-term impacts on land, air, aquatic, and marine environments.

IMPROVE PHYSICAL INFRASTRUCTURE

Goal: Maui County's physical infrastructure will be maintained in optimum condition and will provide for and effectively serve the needs of the County through clean and sustainable technologies.

Objective:

- Improve water systems to assure access to sustainable, clean, reliable, and affordable sources of water.

Policies:

- Develop and fund improved water-delivery systems.
- Ensure a reliable and affordable supply of water for productive agricultural uses.
- Retain and expand public control and ownership of water resources and delivery systems.
- Improve the management of water systems so that surface-water and groundwater resources are not degraded by overuse or pollution.

In summary, the proposed project is consistent with Countywide Policy Plan.

D. HANA COMMUNITY PLAN

There are nine (9) community plan regions within Maui County, each of which is governed by a unique community plan. In the context of the County General Plan, each community plan is formulated to guide the implementation of the General Plan within that specific region of the County. The community plans set forth desired land use patterns together with goals, objectives, policies, and implementing actions for a number of functional areas, including infrastructure-related parameters.

Being situated on the eastern side of Waikamoi Stream, the project site is located within the Hana Community Plan region. As reflected by the Hana Community Plan land use map, the project site is situated within lands designated "C, Conservation". The purpose of this land use designation is to recognize lands within the State Conservation District and to protect and preserve wilderness areas, scenic areas, and watersheds, among other natural resources. Inasmuch as the proposed action is a permitted use within the State Conservation District, the proposed project is compatible with the underlying Hana Community Plan designation.

The proposed project is consistent with the following goals, policies, and objectives of the Hana Community Plan:

ENVIRONMENT

Goal

Protection and management of Hana's land, water and ocean resources to ensure that future generations can enjoy the region's exceptional environmental qualities.

Objectives and Policies

- Manage, protect, and where appropriate, restore areas which have significant indigenous flora and fauna habitat resource value.

- Protect, restore and preserve native aquatic habitats and resources within and along all streams within the Hana District by (1) protecting existing instream flows, and (2) regulating diversions of stream waters.

- Ensure that groundwater and surface water resources are preserved and maintained at capacities and levels to meet the current and future domestic, agricultural, commercial, ecological and traditional cultural demands of each area in the Hana District.

CULTURAL RESOURCES

Goal

Identification, preservation, protection, and where appropriate, restoration of significant cultural resources and practices, that provide a sense of history and identity for the Hana region.

Objectives and Policies

- Identify, preserve and protect historically, archaeologically and culturally significant areas, sites, and features within the Hana District.

  Implementing Actions

  - Require development projects to identify all cultural resources within or adjacent to the project area as part of the County development review process. Further require that all proposed development include appropriate mitigation measures including site avoidance, adequate buffer areas and interpretation.

E. MAUI COUNTY ZONING

Lands underlying the project site are within the State Conservation District, which is solely governed by DLNR, pursuant to Section 205-5, HRS. As such, there is no County zoning designation for these lands. Lands underlying the temporary construction staging area are within the County Agricultural zoning district. Per a policy issued by the County Planning Department on January 27, 1998, and as confirmed by said Department via letter dated April 24, 2012, the temporary construction baseyard is an allowable use within the "Agricultural" zoning district. See **Appendix "K"**.

F. COASTAL ZONE MANAGEMENT OBJECTIVES AND POLICIES

The Hawaii Coastal Zone Management Program (HCZMP), as formalized in Chapter 205A, HRS, establishes objectives and policies for the preservation, protection, and restoration of natural resources of Hawaii's coastal zone. Being situated on the upland slopes of Haleakala, the project site lies well inland (mauka) of the County of Maui's Special Management Area (SMA), the boundary of which follows the ocean side of the right-of-way of Hana Highway.

Although an SMA Use Permit is not required for the proposed project, this section addresses the project's relationship to applicable coastal zone management considerations set forth by Chapter 205A, HRS.

1. Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

(A) Improve coordination and funding of coastal recreational planning and management; and

(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

(ii) Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;

(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

(v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

(vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of Section 46-6.

Response: Due to the upland location of the project site, the proposed project will not result in adverse impacts to existing coastal or inland recreational resources. The project will not limit or compromise any existing shoreline recreational activity.

2. Historic Resources

Objective:

Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

(A) Identify and analyze significant archeological resources;

(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and

(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: An Archaeological Inventory Survey (AIS) for the project was completed in April 2012. Refer to **Appendix "I"**. The AIS identified two (2) post-Contact sites, including remnant stone footings of the Waikamoi Flume (Site 7193) and the flume access road and associated culvert crossings (Site 7194). Both these structures were deemed significant under Criterion "a" for their association with the historic Waikamoi water delivery system and under Criterion "d" for their information content. The proposed action will retain the stone footing features of Site 7193 in place, although the footing closest to the Haipuaena Stream intake will be encased in concrete to enhance the structural support of this element. Refer to **Appendix "D-1"** . Improvements to the access road, Site 7194, will generally involve grading to improve the road surface. The route and width of the road will not be altered, and the culvert crossings will not be affected either. The AIS recommends that precautionary archaeological monitoring take place during ground altering activity in the construction period. Should any archaeological resources be encountered during construction activity, all work in the vicinity of the find will cease immediately, and SHPD will be contacted to determine appropriate mitigation measures. The AIS report has been submitted to the SHPD Archaeology Branch and the SHPD Architecture Branch for review and determination.

The proposed temporary construction staging area site was previously disturbed and graded during construction of the Kahakapao Reservoirs, such that archaeological and cultural resources are not anticipated to occur. Additional grading will not be required for this site to be used as a staging area. The use of this site, therefore, is not anticipated to result in any adverse impacts to historic resources.

Notwithstanding, the foregoing conditions, should any cultural or historic materials be uncovered during construction-related activities related to the flume replacement project, work in the area of the find will cease and SHPD will be notified for determination of appropriate mitigation measures.

3. Scenic and Open Space Resources

Objective:

Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

(A) Identify valued scenic resources in the coastal zone management area;

(B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

(C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and

(D) Encourage those developments that are not coastal dependent to locate in inland areas.

Response: The project site is located within a dense upland cloud forest in the Koolau Forest Reserve. The project site is located well inland of the shoreline and is not part of a scenic view corridor to or from the shoreline. No substantive adverse impacts to scenic or open space resources are anticipated to result from implementation of the proposed action.

4. Coastal Ecosystems

Objective:

Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

(A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

(B) Improve the technical basis for natural resource management;

(C) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

(D) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

(E) Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Response: The proposed action is not anticipated to result in substantive, adverse impacts to coastal ecosystems. The capacity of the replacement flume will be approximately the same as the existing flume, and the amount of water collected by the new flume will not increase beyond current levels. The existing Haipuaena and tributary intakes will not be altered and the proposed action will not affect Waikamoi Stream. Further, implementation of BMPs during construction will mitigate potential drainage-related impacts to downstream areas and the coastal environment. Refer to **Appendix "D"**, Sheet S0.1.

5. Economic Uses

Objective:

Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

(A) Concentrate coastal dependent development in appropriate areas;

(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

(i) Use of presently designated locations is not feasible;

(ii) Adverse environmental effects are minimized; and

(iii) The development is important to the State's economy.

Response: The proposed project will occur well inland from the shoreline and is not a coastal dependent development. The project will provide short-term economic benefits during the construction-phase. In the long term, the proposed project will provide improved, more efficient water transmission infrastructure for the DWS Upper Kula system.

6. Coastal Hazards

Objective:

Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

Policies:

(A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint pollution hazards;

(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

(D) Prevent coastal flooding from inland projects.

Response: The project site is not located in a tsunami zone. The project site is located in Flood Zone X, an area of minimal flooding that has no developmental restrictions. The proposed action will not involve any alterations to the natural drainage patterns of the existing landscape. With the implementation of appropriate BMPs, no adverse impacts to downstream properties resulting from stormwater runoff are anticipated.

7. Managing Development

Objective:

Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

(A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

(B) Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit requirements; and

(C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Response: Opportunities for public involvement are being provided as part of the Chapter 343, HRS EA and CDUA permitting processes.

8. Public Participation

Objective:

Stimulate public awareness, education, and participation in coastal management.

Policies:

(A) Promote public involvement in coastal zone management processes;

(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and

(C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Response: As discussed above, public awareness and participation are being facilitated through the Chapter 343, HRS EA and CDUA permitting processes.

9. Beach Protection

Objective:

Protect beaches for public use and recreation.

Policies:

(A) Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;

(B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and

(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Response: The proposed project is located well inland of the shoreline area and will not impact natural beach processes.

10. Marine Resources

Objective:

Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies:

(A) Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

(B) Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

(C) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

(D) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

(E) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Response: The project is not located in the vicinity of the shoreline. The use of appropriate BMPs will mitigate any potential impacts to downstream marine and coastal resources.

In addition to the foregoing objectives and policies, Section 205A-30.5, HRS, Prohibitions, provides specifications for the limitation of lighting in coastal shoreline areas in relation to the granting of SMA permits:

> *(a) No special management area use permit or special management area minor permit shall be granted for structures that allow artificial light from floodlights, uplights, or spotlights used for decorative or aesthetic purposes when the light:*
>
> > *(1) Directly illuminates the shoreline and ocean waters; or*
> >
> > *(2) Is directed to travel across property boundaries toward the shoreline and ocean waters.*
>
> *(b) Subsection (a) shall not apply to special management area use permits for structures with:*
>
> > *(2) Artificial lighting provided by a government agency or its authorized users for government operations, security, public safety, or navigational needs; provided that a government agency or its authorized users shall make reasonable efforts to properly position or shield lights to minimize adverse impacts.*

Response: The proposed project does not involve the installation of any permanent lighting fixtures. Construction activity will be limited to daylight hours, such that flood lights will not be utilized.

G. HAWAII DRINKING WATER STATE REVOLVING FUND ENVIRONMENTAL CROSSCUTTERS

The proposed project will be funded in part by the Hawaii Drinking Water State Revolving Fund (DWSRF). As such, the project must comply with the Environmental Cross-Cutters and Federal Requirements for DWSRF projects. **Table 2** below provides a listing of the environmental cross-cutters as well as the documentation received for the proposed Waikamoi Flume Replacement project in addressing the requirement criteria.

Table 1. Environmental Cross-Cutters and Project Documentation

Environmental Authority	Procedure	Responsible Agency	Response	Project Documentation
Archaeological and Historical Preservation Act of 1974	Obtain review for all projects	State Historic Preservation Division (SHPD)	AIS completed in April 2012 and submitted to SHPD for review. Consultation with the SHPD Architecture Branch will be ongoing regarding appropriate mitigation options for Site 7193 and Site 7194.	Refer to **Appendix "I".**
Clean Air Act	Coordinate to assure project conforms with State Implementation Plan (SIP)	State Department of Health, Clean Air Branch	The Draft EA will be provided to the Department of Health for review and comment.	See Chapter II (Section A-9) of Draft EA for discussion of potential air quality impacts and mitigation measures.
Coastal Barrier Resources Act	Obtain review if project is located on a coastal barrier island	State Coastal Zone Management Agency	Not applicable. Project site is not located on a coastal barrier island.	Not applicable.
Coastal Zone Management Act	Obtain review if project is located in coastal zone	State Coastal Zone Management Agency	Pursuant to Chapter 205A-1, the project site is within the Coastal Zone Management Area. The project site is, however, outside of the Special Management Area (SMA). A SMA permit is not required.	See Chapter III (Section F) of this EA document for discussion of the Coastal Zone Management Program review criteria.
Endangered Species Act	Obtain review by U.S. Fish and Wildlife Service for all projects	U.S. Fish and Wildlife Service (USFWS)	Comments from USFWS were received in the early consultation process during the preparation of the Draft EA. As recommended, appropriate measures will be implemented to ensure that endangered species and critical habitat are not affected by the proposed action.	See Chapter VIII of this EA document for a copy of the USFWS early consultation comment letter.
Environmental Justice	Are low income and minority groups affected?	U.S. Environmental Protection Agency	No low-income or minority groups will be adversely affected as a result of the proposed flume replacement. The Draft EA will be provided to the the U.S. Environmental Protection Agency for review and comment.	Refer to Chapter II (Section B) of this EA document for a discussion of socioeconomic and demographic parameters.

Environmental Authority	Procedure	Responsible Agency	Response	Project Documentation
Floodplain Management	Obtain review if project is located in or affects 100-year flood plain	Federal Emergency Management Agency	Not applicable. Project site is located in Flood Zone X and is not located in nor will it affect a 100-year flood plain.	See comment letter from DLNR (Engineering Division) in Chapter VIII of this EA document.
Protection of Wetlands	Obtain review if project area contains wetlands	U.S. Army Corps of Engineers (COE)	An Aquatic Resources Study determined that the project site contains wetlands. Consultation with the U.S. Army Corps of Engineers (USACE) was carried out to obtain a Jurisdictional Determination of the wetlands that are traversed by the flume. The USACE determined that the wetlands are jurisdictional; however, because Waikamoi Flume conveys water for domestic and irrigation purposes, the project is exempt from Section 404 permitting requirements.	See letters contained in Chapter VIII of this EA document and refer to **Appendix "F-1"** and **Appendix "G"**.
Farmland Protection Policy Act	Obtain review if project area contains prime farmland	Natural Resources Conservation Service (NRCS)	Not applicable. The project site does not contain prime farmland.	Refer to Chapter II (Section A-3) of this EA document for a discussion of soil conditions and agricultural resources.
Fish and Wildlife Coordination Act	Obtain review for all projects	USFWS	Comments from USFWS were received in the early consultation process during the preparation of the Draft EA.	Refer to Chapter VIII of this EA document for the early consultation comments from USFWS.
National Historic Preservation Act	Obtain review for all projects	SHPD	AIS completed in April 2012 and submitted to SHPD for review. Consultation with the SHPD Architecture Branch will be completed to determine the appropriate level of mitigation for Site 7193 and Site 7194.	Refer to **Appendix "I"**.
Safe Drinking Water Act	Obtain review if project could affect sole source aquifer	State Department of Health, Safe Drinking Water Branch (SDWB)	The proposed project will not affect a sole source aquifer. The Draft EA will be provided to the Department of Health for review and comment.	Refer to Chapter II (Section A-5 and Section D-4) of this EA document for a discussion of water quality mitigation measures.

Environmental Authority	Procedure	Responsible Agency	Response	Project Documentation
Wild and Scenic Rivers Act	Obtain review if project is located in area with Wild and Scenic Rivers	National Park Service	The project site is not located in an area with Wild or Scenic Rivers. There are no Wild or Scenic Rivers in the State of Hawaii.	Not applicable.
Consultation Process Under the Magnuson-Stevens Fishery Conservation and Management Act	Obtain review if it will affect essential fish habitat	National Marine Fisheries Service	Not applicable. The project site is located approximately 11 miles inland of the nearest coastline. The proposed project will not affect essential fish habitats.	Not applicable.

IV. SUMMARY OF UNAVOIDABLE IMPACTS ON THE ENVIRONMENT AND RESOURCES

IV. SUMMARY OF UNAVOIDABLE IMPACTS ON THE ENVIRONMENT AND RESOURCES

Unavoidable impacts associated with the proposed action involve the commitment of fuel, labor, funding, and material resources. Land resources were previously committed in the construction of the flume structure in the 1930s. This commitment of resources necessary for project implementation is seen to be justified, given the improved and more efficient water system that is to be realized through the proposed flume replacement project.

In the long term, the proposed Waikamoi Flume Replacement project is not anticipated to result in any significant, long-term adverse environmental impacts.

V. ALTERNATIVES TO THE PROPOSED ACTION

V. ALTERNATIVES TO THE PROPOSED ACTION

A. PREFERRED ALTERNATIVE

The proposed replacement of the Waikamoi Flume, which was described and evaluated in the preceding chapters, represents the preferred alternative. The redwood timber box that comprises the existing flume has been in service since 1975 when the previous Waikamoi Flume reconstruction project was completed. Due to years of weathering, numerous holes have been worn into the timbers, and DWS estimates that during peak flows, approximately 40 percent of the water carried by the flume is lost through leakages. Furthermore, the deteriorated condition of the flume structure and timber bridges is hazardous for DWS maintenance workers. In the demolition of the existing flume and the subsequent construction of a replacement flume, the leakages in the system would be eliminated and safe access to the entire flume would be ensured for DWS maintenance workers.

The proposed action is being undertaken in compliance with a directive issued by the Commission on Water Resource Management (CWRM) that requires DWS to reduce waste and system loss through the replacement of the leaking Waikamoi Flume. Refer to **Appendix "C"**. Furthermore, the subject project is also consistent with a recommendation set forth by the Draft Upcountry Water Use and Development Plan (WUDP) regarding the continued detection and repair of leaks in the DWS water system (Freedman, 2009). For these reasons, the proposed action as described and analyzed in Chapters I and II, was identified as the preferred alternative for the purposes of this EA document.

B. NO ACTION ALTERNATIVE

The "no action" alternative would have the Waikamoi Flume continue to function in its current weathered condition. The existing leakages in the flume would persist and presumably worsen over time, and the efficiency of the Waikamoi Flume segment of the DWS Upper Kula system would be compromised. Similarly, hazardous conditions encountered by DWS maintenance personnel would also deteriorate over time as the timber bridges are further weakened by extreme weather conditions. The "no action" alternative would also result in non-compliance with the CWRM directive. In that event, the CWRM may be obligated by law to reduce the amount of water DWS is permitted to intake, due to waste. Refer to **Appendix "C"**. Additionally, the "no action" alternative would not carry

out the recommendation of the Draft Upcountry WUDP for a continued leak detection and repair program. In consideration of the foregoing, the "no action" alternative was not pursued.

C. DEFERRED ACTION ALTERNATIVE

Similar to the "no action" alternative, the "deferred action" alternative would leave the Waikamoi Flume in its current weathered condition in which leakages result in the loss of approximately 40 percent of the water that is carried by the flume during peak flows. Hazardous conditions encountered by DWS maintenance personnel would also persist, and these conditions would worsen over time as the replacement project is delayed. The deferral of the replacement project would result in non-compliance with the CWRM directive, in which case the CWRM would be obligated to reduce the amount of water DWS is permitted to intake. Refer to **Appendix "C"**. In consideration of the foregoing, the deferred action course was not considered to be a feasible alternative.

D. LIFELINE SYSTEM DESIGN ALTERNATIVE

Prior to the conception of the preferred alternative, a previous alternative under consideration was the installation of a lifeline system that would run along the entire length of Waikamoi Flume. This project was developed in recognition of the dangerous conditions experienced by DWS maintenance personnel. The lifeline system was designed to provide a safety system that would allow the workers to be harnessed when crossing and repairing the flume's timber bridges. Steel crossbars supported by sizable concrete foundations were to be erected at both ends of each of the 13 timber bridges along the flume's length. A steel cable stretched between the crossbars would then provide anchorage for personnel on the bridges.

After further analysis of the potential costs and benefits, this alternative was not pursued. Although the lifeline system would provide safer working conditions for DWS maintenance personnel, the timber flume itself would continue to deteriorate, and further expenditures would be required to repair the flume structure and timber bridges. Furthermore, the lifeline project would do nothing in the way of eliminating leakages in the flume, such that this alternative would not support the recommendation of the Draft Upcountry WUDP for the continued detection and repair of leakages in the DWS water system, nor would it satisfy the above-noted CWRM directive.

VI. SIGNIFICANCE CRITERIA ASSESSMENT

VI. SIGNIFICANCE CRITERIA ASSESSMENT

The significance criteria of Section 12, of the Hawaii Administrative Rules Title 11, Chapter 200, "Environmental Impact Statement Rules", were reviewed and analyzed to determine whether the proposed project will have a significant adverse impact on the environment. The following analysis is provided:

1. **Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.**

   The Waikamoi Flume was originally constructed in the 1930s to convey freshwater to agricultural and domestic users in Upcountry Maui. Since the flume box was replaced between 1974 and 1975, a number of cracks and holes have been worn into the flume by years of weathering. The proposed project will address this maintenance issue by eliminating these leakages and providing an improved, more efficient flume. The capacity of the replacement flume will be approximately the same as the existing, and the Haipuaena and tributary intakes will not be altered.

   It is recognized that the project site is surrounded by a native cloud forest that contains a number of rare, threatened, and endangered plants. Although there are no threatened or endangered species within the project site, three (3) rare lobeliad species were observed along the periphery of the flume corridor. Refer to **Appendix "H"**. These plants will be tagged prior to the start of construction to ensure they are avoided during project implementation. Further, mud and debris will be removed from vehicles, equipment and construction materials, as well as from clothing and footwear of construction personnel, prior to entering the project site to ensure no alien species are introduced to the project site and surrounding areas.

   The AIS identified two (2) post-contact sites, including remnant masonry foundations of the Waikamoi Flume (Site 7193) and the flume access road and associated culvert crossings (Site 7194). Refer to **Appendix "I"**. Both these structures were deemed significant under Criterion "a" for their association with the historic Waikamoi water delivery system and under Criterion "d" for their information content. The proposed action will retain the foundation features of Site 7193 in place, although the footing closest to the Haipuaena Stream intake will be encased in concrete. Refer to **Appendix "D-1"**. Improvements to the access road, Site 7194, will generally

involve grading to improve the road surface. The route and width of the road will not be altered, and the culvert crossings will not be affected either. The AIS recommended that precautionary archaeological monitoring take place during ground altering activity in the construction period. Should any archaeological resources be encountered during construction activity, all work in the vicinity of the find will cease immediately, and SHPD will be contacted to determine appropriate mitigation measures. The AIS report has been submitted to the SHPD Archaeology Branch and the SHPD Architecture Branch for review and determination.

Alongside the Flora and Fauna Survey and the AIS, the Cultural Impact Assessment (CIA) for the proposed project also highlighted the significance of the native cloud forest that surrounds the Waikamoi Flume. In the context of cultural resources, the CIA emphasized the cultural significance of this upland forest environment which is regarded as *Wao Akua*, the realm of the gods. In seeking to maintain the integrity of the native forest, the CIA also recommends that measures be taken to remove all soil and debris from construction equipment and that personnel take appropriate steps to clean footwear and clothing prior to entry into the project site. The CIA further recommends a cultural orientation for all construction personnel to foster understanding and respect for the cultural resources that surround the project site. Refer to **Appendix "J"**.

The temporary primary construction staging area site was previously disturbed by cattle ranching activities and the construction of Kahakapao Reservoirs. The site is vegetated by pasture grasses and contains no native flora, fauna, or avifauna habitats. Grading of this site will not be required for the proposed temporary construction staging area.

In effect, the proposed project will not result in an irrevocable commitment to loss or destruction of any natural or cultural resource.

2. <u>Curtails the range of beneficial uses of the environment.</u>

The proposed action represents a beneficial use of the environment. The Waikamoi Flume is an integral component of the County Department of Water Supply (DWS) Upper Kula system which provides freshwater to residents of Kula, Waiakoa, Keokea, Ulupalakua, and Kanaio for domestic and irrigation purposes. Since the reconstruction of the flume in 1974 and 1975, a number of holes and cracks have been worn into the flume timbers, resulting in substantial leakage of water from the

system. In providing a replacement flume, the proposed project will eliminate these leaks and provide an improved and more efficient water system for upcountry residents. Importantly, the replacement flume will provide approximately the same capacity as the existing flume. Because the Haipuaena and tributary intakes will not be altered, the amount of water collected from these streams will not increase. The proposed action is limited in scope to replacement of an existing water conveyance system and will not compromise the range of beneficial uses of the surrounding environment.

3. **Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.**

The proposed project involves the replacement of the Waikamoi Flume which is located in the Koolau Forest Reserve. The replacement flume will utilize the same corridor as the existing flume so as not to disturb the surrounding watershed environment. Moreover, the replacement flume will collect and convey approximately the same amount of water as the existing flume. While eliminating leakages, the replacement flume will provide an improved, more efficient system that will continue to provide potable water for existing Upcountry Maui residents. As discussed previously, measures will be taken to prevent the introduction of alien species and to ensure that no rare species of flora, fauna or avifauna are affected during project implementation. In addition, Best Management Practices (BMPs) will be implemented to mitigate potential impacts to downstream resources. Refer to **Appendix "D"**, Sheet S0.1. In sum, the proposed project is in consonance with the policies, goals, and guidelines of Chapter 344, Hawaii Revised Statutes (HRS), the State's Environmental Policy.

4. **Substantially affects the economic welfare, social welfare, and cultural practices of the community or State.**

The proposed action would provide a direct, short-term economic benefit to the community during the construction phase, and an enhanced water system for existing Upcountry Maui residents during the operational phase. There are no adverse long-term impacts on economic, social welfare, or cultural practices associated with the proposed action.

5. **Substantially affects public health.**

The subject project will provide a more reliable and efficient water system for Upcountry Maui. As such, the proposed project is not anticipated to result in any adverse impact to public health.

6. **Involves substantial secondary impacts, such as population changes or effects on public facilities.**

Secondary impacts associated with the proposed action would relate to the increased volume of water conveyed by the flume to the Waikamoi Reservoirs that would result from the elimination of leakages. This increased volume of water within the reservoirs will increase the efficiency of the Upcountry water system for existing users and will reduce the need for DWS to impose temporary water use restrictions during times of drought. It is highlighted that the proposed action is limited to repair and maintenance of an existing water conveyance facility and is not a new water source development initiative.

As such, the subject project is not anticipated to result in substantial secondary impacts or population changes. No adverse impacts to public facilities are anticipated to occur as a result of project implementation; rather, the proposed action will improve the reliability and efficiency of the DWS Upper Kula system.

7. **Involves a substantial degradation of environmental quality.**

Appropriate BMPs will be implemented as part of the proposed action to ensure no impacts to downstream areas result from project implementation. Measures recommended by the Flora and Fauna Survey Assessment report will also be implemented to prevent the introduction of alien species to the project site and to ensure that no rare species or critical habitat will be adversely impacted. Further, the replacement flume will not collect any more water than is collected by the existing flume, and the replacement flume will utilize the same corridor as the existing flume, such that surrounding watershed and forest habitat will not be disturbed. As such, no substantial degradation of environmental quality is anticipated to result from project implementation.

8. **Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.**

The proposed project is in line with recommendations set forth by the Draft Upcountry Water Use and Development Plan (WUDP), particularly the recommendation for a continued and accelerated leak detection and repair program. It is noted that the Draft Upcountry WUDP also recommends larger actions relating to water source development and storage; however, these actions would specifically augment the Lower Kula system, rather than the Upper Kula system of which the Waikamoi Flume is a component. Furthermore, the Draft Upcountry WUDP states that the program for leak detection and repair functions independently of any water source development or storage project (Freedman, 2009). In this context, the project is not part of a larger action, nor would it occur within the context of such actions.

The subject project is intended solely to eliminate leaks in the Waikamoi Flume. The intakes at Haipuaena Stream and smaller tributary streams will not be changed, and the capacity of the replacement flume will be approximately the same as the existing flume. Additionally, the replacement flume will utilize the same corridor of land that is occupied by the existing Waikamoi Flume structure. In sum, the subject project is not anticipated to cause any adverse effects on the surrounding environment. Furthermore, it is not a water source development project nor does it involve a commitment for larger actions.

9. **Substantially affects a rare, threatened, or endangered species, or its habitat.**

The Flora and Fauna Survey Assessment located three (3) rare species of flora within the periphery of the existing flume corridor. Endangered and threatened species of flora and fauna are known to occur within a 2-mile radius of the flume corridor, yet none were observed within the specific project site. It is recognized that lands within and surrounding the project site provide habitat for rare, threatened, and endangered species. As recommended by the Flora and Fauna Survey Assessment report and DOFAW, measures will be taken to prevent introduction of alien species to the project site and surrounding forest habitat and to ensure that the rare species and habitat found within and nearby the project site are not disturbed. Refer to **Appendix "H"**. With the implementation of these measures, no adverse impacts to rare, threatened, or endangered species or their habitats are anticipated to occur as a result of the proposed action.

Outside the project site, the temporary construction staging area is generally vegetated by pasture grasses. This area contains no rare, threatened or endangered species, nor does it contain critical habitat for such species. As such, use of this site as a staging area is not anticipated to present any adverse impacts on significant biological resources.

10. Detrimentally affects air or water quality or ambient noise levels.

Due to the moist microclimate and remote location of the project site, temporary, short-term impacts to air and noise quality occurring during the construction period are anticipated to be minimal. Exposed soils will be kept to a minimum by limiting areas of disturbance, and the moist soils are not anticipated to generate dust-related impacts to air quality. Heavy machinery that produce excessive noise and exhaust will not be utilized. Nevertheless, appropriate BMPs will be implemented to mitigate any potential noise or air quality impacts. In addition, appropriate BMPs will also be implemented to ensure that no adverse impacts to water quality or downstream areas occur as a result of the proposed action. Refer to **Appendix "D"**, Sheet S0.1.

11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

The project site is not located within and would not affect any environmentally sensitive areas. The Flood Insurance Rate Map (FIRM) for this region indicates that the project is located in Flood Zone X, an area of minimal flooding. In addition, the project site is located well beyond the reaches of the nearest tsunami inundation zone. Appropriate BMPs will be implemented to ensure there are no impacts to downstream areas. Refer to **Appendix "D"**, Sheet S0.1.

12. Substantially affects scenic vistas and viewplanes identified in county or state plans or studies.

The project site is not located within a viewplane identified by any County or State plans or studies. The project site is not visible from any residence, public roadway, coastal, or upland area, nor is it readily visible from the air. Thus, impacts to scenic vistas or viewplanes are not anticipated to occur with project implementation.

13. **Requires substantial energy consumption.**

The proposed action will require the short-term commitment of fuel for equipment, vehicles, and machinery. However, the total amount of energy consumed during project implementation is not anticipated to be substantial. When in operation, the replacement flume will not be a consumer of energy.

In conclusion, based on the foregoing analysis and findings, the proposed action is anticipated to result in a Finding of No Significant Impact (FONSI).

VII. LIST OF PERMITS AND APPROVALS

VII. LIST OF PERMITS AND APPROVALS

The following permits and approvals will be required prior to the implementation of the project.

State of Hawaii

1. Conservation District Use Permit (Departmental Permit)
2. National Pollutant Discharge Elimination System (NPDES) Permit, as applicable
3. Community Noise Permit, as applicable

County of Maui

1. Construction Permits (Building, Grubbing and Grading)

VIII. AGENCIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

VIII. AGENCIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

The following agencies were consulted during the preparation of the Draft Environmental Assessment. Comment letter received, as well as responses to substantive comments, are contained in this chapter.

1. Larry Yamamoto, State Conservationist
U.S. Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96850-0001

2. Ranae Ganske-Cerizo, Soil Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
77 Hookele Street, Suite 202
Kahului, Hawaii 96732

3. George Young
Chief, Regulatory Branch
U.S. Department of the Army
U.S. Army Engineer District, Honolulu
Regulatory Branch
Building 230
Fort Shafter, Hawaii 96858-5440

4. Patrick Leonard
Field Supervisor
U.S. Fish and Wildlife Service
300 Ala Moana Blvd., Rm. 3-122
Box 50088
Honolulu, Hawaii 96813

5. Alec Wong, P.E., Acting Chief
Clean Water Branch
State of Hawaii
Department of Health
919 Ala Moana Blvd., Room 300
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6. Laura H. Thielen, Chairperson
State of Hawaii
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

7. Dr. Puaalaokalani Aiu, Administrator
State of Hawaii
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, Hawaii 96707

8. Katherine Kealoha, Director
Office of Environmental Quality Control
235 S. Beretania Street, Suite 702
Honolulu, Hawaii 96813

9. Abbey Seth Mayer, Director
State of Hawaii
Office of Planning
P. O. Box 2359
Honolulu, Hawaii 96804

10. Dan Davidson, Executive Officer
State of Hawaii
State Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804

11. Charmaine Tavares, Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

12. Milton Arakawa, Director
County of Maui
Department of Public Works
200 South High Street
Wailuku, Hawaii 96793

13. Cheryl Okuma, Director
County of Maui
Department of Environmental Management
One Main Plaza
2200 Main Street, Suite 100
Wailuku, Hawaii 96793

OCT 15 2010

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

REPLY TO
ATTENTION OF:

October 13, 2010

Regulatory Branch

File Number POH-2010-00283

Munekiyo & Hiraga, Inc.
Attention: Kimberly Skog
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

We have received your letter dated October 8, 2010 requesting the Department of the Army review and comment on the proposed Waikamoi Timber Flume Reconstruction at TMK (2) 2-4-016:004, Makawao, Island of Maui, Hawaii. We have assigned the project the reference number **POH-2010-00283**. Please cite the reference number in any future correspondence concerning this project. We completed our review of the submitted document pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404).

Section 10 requires that a Department of the Army (DA) permit be obtained from the U.S. Army Corps of Engineers (Corps) prior to undertaking any construction, dredging and other activities occurring in, over, or under navigable waters of the U.S. The line of jurisdiction extends to the Mean High Water Mark (MHWM) for tidal waters. Section 404 requires that a DA permit be obtained for the discharge (placement) of dredge and/or fill material into waters of the U.S., including wetlands. The line of jurisdiction extends to the Mean Higher High Water Mark (MHHWM) for tidally influenced waters, the Ordinary High Water Mark (OHWM) for non-tidal waters and the approved delineated boundary for wetlands.

Based on the submitted documents, the project site appears to be absent of navigable waters subject to Corps jurisdiction. Therefore, Section 10 authorization will not be required. The Waikamoi Stream is a perennial stream which discharges into the Pacific Ocean, a traditionally navigable water. As such, the Waikamoi Stream is a water of the U.S., subject to Corps jurisdiction and will require a DA permit for any discharge of dredged and/or fill material into the stream. Based on resources available to the Corps, the project site appears to be located within a wetland. Be advised that a DA permit will also be required for any discharge of fill into wetlands adjacent to waters of the U.S.

There is insufficient information provided to the Corps to determine if the proposed flume reconstruction will involve activities which require either permanent or temporary discharge of fill into the Waikamoi Stream. To avoid unintentional violation to federal regulation and law, we advise the property owner contact our office requesting an approved jurisdictional determination including a thorough aquatic resource survey of the project site, describing any wetlands, drainage ditches, gulches, gullies, streams, etc., on-site, especially those that may be impacted by any of the proposed project components. The survey should include descriptions of aquatic features proposed for impact,

flow duration of each feature and the flow path of each feature into navigable waters. In addition, include sufficient information concerning the scope of work, including the use of Best Management Practices, i.e. silt fences and sandbag berms within the vicinity and in close proximity to potentially regulated bodies of water.

If any water bodies are determined to be waters of the U.S., the applicant must obtain authorization from the Corps prior to discharge of dredged or fill material into these water bodies. Fill material, permanent or temporary, may include, but is not limited to: rock, dirt, sand, sandbags, silt fences or concrete. The applicant should contact the Corps to determine if any of the proposed work constitutes a "discharge of fill" and submit an application and associated drawings that meet our drawing recommendations found at *http://poh.usace.army.mil/EC-R/EC-R.htm*. The Corps will then review the application to ensure it complies with all necessary federal laws and regulations. Note that if the fill results in the loss of waters of the U.S. and/or associated functions, the applicant may be required to provide compensatory mitigation for any unavoidable impacts. A request for an approved JD can be submitted prior to, or concurrently with, an application for the proposed work.

Thank you for contacting us regarding this project and providing us with the opportunity to comment. Should you have any questions, please contact Ms. Jessie Pa'ahana at *808.438.0391* or via email at *Jessie.K.Paahana@usace.army.mil*. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at *http://per2.nwp.usace.army.mil/survey.html*.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

ALAN M. ARAKAWA
Mayor

DAVID TAYLOR, P.E.
Director

PAUL J. MEYER
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

March 22, 2011

George P. Young, P.E.
Chief, Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Young:

RE: Project Name: Proposed Waikamoi Timber Flume Replacement Project, Makawao, Maui, Hawaii (File No. POH-2010-00283)
TMK: (2) 2-4-016:004 (por.)

We are in receipt of your letter, dated October 13, 2010, providing early consultation comments on the Draft Environmental Assessment (EA) that is currently being prepared by the County of Maui, Department of Water Supply (DWS) for the Waikamoi Timber Flume Replacement project. We offer the following information in response to the comments noted in your letter:

1. We note the determination from your office that Section 10 authorization will not be required for the project.

2. We note the determination from your office that Waikamoi Stream is a water of the U.S. and is subject to U.S. Army Corps of Engineers (USACE) jurisdiction. The subject project will not involve any improvements within Waikamoi Stream and, as such, will not result in the direct placement/discharge of dredged and/or fill material into the water body of the stream.

3. In regards to the repair and replacement activities proposed along the length of the existing flume between the Waikamoi and Haipuaena streams, we are writing to you today to formally request jurisdictional determinations for Haipuaena Stream and the 14 gulches and gullies that are traversed by the existing flume structure along the project corridor. To facilitate the USACE review process, we have attached a topographic survey of the existing flume as **Exhibit "A"**; a Site Assessment Report, as **Exhibit "B"**, describing existing climate, soils, geography, and flora/fauna conditions within the vicinity of the project; and a

Flora and Fauna Survey report as **Exhibit "C"**. The Site Assessment Report includes the locations and photos of the Haipuaena Stream, as well as the 14 aforementioned gulch and gully crossings along the project corridor.

We can assist in the scheduling of a site visit should during the course of evaluating jurisdiction the USACE determines that one is necessary. Right-of-entry authorizations will need to be secured from the landowner (East Maui Irrigation Company) prior to the site visit taking place. Please contact us at (808) 244-2015 should you wish to schedule a site visit.

4. We acknowledge that should jurisdictional waters be determined by USACE to be affected by project implementation that a Department of Army (Section 404) Permit will need to be processed for applicable work elements, which may also need to include compensation mitigation for unavoidable development actions. We, therefore, look forward to receiving a jurisdictional determination from your office on this matter so that project planning can proceed on a timely basis.

Should you have any questions or require additional information, please feel to contact our planning consultant, Mark Alexander Roy of Munekiyo & Hiraga, Inc. at (808) 244-2015.

Sincerely,

DAVID TAYLOR, DIRECTOR
Enclosures

cc: Mike Hunnemann, KAI Hawaii, Inc. (w/enclosures)
Tom Ochwat, Department of Water Supply (w/enclosures)
Mark Alexander Roy and Kimberly Skog, Munekiyo & Hiraga, Inc. (with enclosures)

K:\DATA\KAIHi\WaikamoiFlume\Email\Dept. of Army Response Letter.doc

EXHIBIT A.

Topographic Survey of Project Corridor

(Refer to Appendix "A" of this EA Document)

EXHIBIT B.

Site Assessment Report

SITE ASSESSMENT REPORT

The following is an assessment of conditions relating to and surrounding the Waikamoi Flume project site. The following provides a description of the existing Waikamoi Flume together with descriptions of the physical setting, including climate, underlying topography and soils, flood zones and streams, and flora and fauna.

A. PROJECT LOCATION AND EXISTING USE

The Waikamoi Flume is situated within the Koolau Forest Reserve in Maui, Hawaii. See **Figure 1**. It is located within the Hana Community Plan region on a portion of Tax Map Key (TMK) parcel (2) 2-4-016:004 (Parcel 4). The existing flume stretches approximately 1.1 mile from its intake at Haipuaena Stream in the east to its termination in the vicinity of Waikamoi Stream in the west. Access to the flume is provided via an unimproved dirt and gravel road that extends east from the mauka (upland) terminus of Olinda Road.

The Waikamoi Flume is an integral component of the County of Maui, Department of Water Supply's (DWS) Upper Kula system and is supplied by water produced by Waikamoi Forest in the East Maui watershed. Freshwater collected by the Waikamoi Flume from Haipuaena Stream and small tributaries is conveyed to the nearby Waikamoi Reservoirs and then to the Kahakapao Reservoirs for storage. After being treated at the Olinda Water Treatment Plant, this water is delivered to residents of Kula, Waiakoa, Keokea, Ulupalakua, and Kanaio in Upcountry Maui.

The Waikamoi Flume was originally constructed in the 1930s. In 1974 and 1975, the flume box was replaced with new redwood planking, although the supporting truss that was constructed in the 1930s was maintained in place. The existing Waikamoi Flume is approximately 1.1 mile long and consists of a redwood box section that measures 2 feet wide by 13 inches deep. The flume travels over rough terrain and meanders along the upland windward Haleakala mountainside within an approximately 10-foot wide corridor. Timber bridge structures support the flume over 14 gulch and gully crossings and where abrupt changes in ground elevation preclude maintaining a constant slope for the flume. A reference map (including site photos) identifying, the location of Haipuaena Stream and the 14 gulches and gullies that are traversed by the flume is presented in **Figure 2**.

B. *RAINFALL AND TEMPERATURE*

The project site is situated on the northern, windward uplands of Haleakala at an elevation of approximately 4,300 feet. Here, prevailing northeasterly trade winds lift warm, moist air from the ocean up the mountain slopes, into the higher, cooler elevations. Frequent and heavy precipitation then occurs where the moist air condenses into clouds, a result of the orographic effect. The area between the elevations of 1,970 feet and 6,560 feet is referred to as the fog drip zone, where cloud height is limited by the temperature inversion layer, such that cloud water droplets form, rather than rain drops, and come into contact with vegetation (CWRM, 2009).

The intermediate slopes of the Haipuaena hydrologic unit receive orographic rainfall as high as 276 inches per year, while the intermediate slopes of the Waikamoi hydrologic unit receive orographic rainfall as high as 240 inches per year. In the Haipuaena hydrologic unit, precipitation is highest during March and April when the average monthly rainfall is 17 inches; precipitation is lowest during June and September. In the Waikamoi hydrologic unit, the wettest months are March, April, and December in which average monthly rainfall is 14 inches; the driest months are May and June (CWRM, 2009).

Temperatures in this area of Maui Island range from the mid-50 degrees Fahrenheit during the cooler months of January and Feburary, to the mid-70 degrees Fahrenheit during the warmer months of August and September (Maui County OED, 2010).

C. *SOILS AND TOPOGRAPHY*

The existing flume generally runs along the 4,300-foot elevation contour line. Underlying the project site are soils belonging to the Hydrandepts-Tropaquods association. See **Figure 3**. This soil association consists of well-drained to poorly drained soils on gently sloping to sleep slopes on the intermediate to high uplands of East and West Maui. Soils of this association have moderately fine or fine textured subsoil, having developed in material weathered from volcanic ash, cinders, and basic igneous rock. This soil association composes approximately 10 percent of the island (USDA SCS, 1972).

The project site is underlain by soils from the Amalu Peaty Silty Clay (rAMD) and the Rough Mountainous Land (rRT) classifications. See **Figure 4**. In a typical

profile, rAMD soils consist of peat to a depth of eight (8) inches; silty clay to a depth of 16 inches; cemented material to a depth of 17 inches; and very cobbly silty loam to a depth of 68 inches. This soil type is poorly drained with a depth to the water table of about two (2) to six (6) inches. This soil type is found on plateaus at elevations between 2,000 and 5,500 feet (NRCS, 2010).

Rough Mountainous Land (rRT) is found in gulches, on slopes from 50 to 99 percent, at elevations between 0 and 6,000 feet. In a typical profile, rRT consists of silty clay loam to a depth of five (5) inches; very cobbly clay loam to a depth of 25 inches; and bedrock at a depth of 25 to 29 inches. This soil type is well drained, with a depth to the water table greater than 80 inches (NRCS, 2010).

D. FLOOD ZONES AND STREAMS AND RESERVOIRS

The project site is located in Food Zone X, an area of minimal flooding located outside the 0.2 percent annual chance floodplain (FEMA, 2009).

The Waikamoi Flume runs from its intake at Haipuaena Stream in the east to its terminus in the vicinity of Waikamoi Stream in the west. See **Figure 5**. Between Haipuaena and Waikamoi Streams, the flume crosses fourteen (14) smaller gulches and gullies. Refer to **Figure 2**.

Haipuaena Stream stretches 7.7 miles down the slopes of Haleakala from its headwaters near the 5,100-foot elevation to the ocean. United States Geological Survey (USGS) gaging station 5310 is located at an elevation of 4,320 feet, near the Upper Kula Pipeline (i.e. the Waikamoi Flume). During the period of record from 1947 through 1967, USGS gaging station 5310 measured an average annual streamflow of 0.97 million gallons per day (mgd); a lowest daily streamflow of 0.01 mgd; and an average annual base flow of 0.14 mgd (CWRM, 2009).

Waikamoi Stream stretches 8.5 miles from the headwaters of its tributaries at the 6,560-foot elevation. Waikamoi Stream has two (2) major tributaries, Alo Stream and Wahinepee Stream. USGS gaging station 5528 is located just upstream of the Upper Kula Pipeline (i.e. the Waikamoi Flume), at an elevation of 4,487 feet. During the period of record from 1953 through 1968, USGS gaging station 5528 measured an average annual streamflow of 1.33 mgd; a lowest daily streamflow of 0 mgd; and an average annual base flow of 0.05 mgd (CWRM 2009).

E. ***FLORA AND FAUNA RESOURCES***

A Flora and Fauna Survey and Assessment report was prepared by biological consultant Robert W. Hobdy in November 2010. The botanical survey consisted of a walk-through survey of the 30-foot-wide by 1.1 mile long project site. A complete inventory was made of the plant species present within the project site, with special focus on endangered, threatened, and relatively rare species. In conjunction with the botanical survey, a fauna survey of the project site and adjacent fringes were also conducted. Species, abundance, activities, and locations were noted, along with observations of trails, tracks, and signs of feeding. An evening survey was also conducted to determine the presence of the Hawaiian hoary bat.

The environment within which the project site is situated is characterized as a native *ohia*-fern cloud forest whose vegetation includes an abundance of ferns and mosses. The survey report explains that within the project site itself, initial disturbances caused by the construction of the original flume and access road, as well as the ongoing maintenance of the existing flume, have precipitated the introduction of many non-native weed species. The continual use of herbicides along the flume has created an open, weedy corridor along the length of the flume structure. Meanwhile, feral pigs have damaged the forest understory and soil layers throughout the forest.

The botanical survey located a total of 90 plant species, 66 of which are native Hawaiian species. The forest surrounding the project site is dominated by *ohia* (*Metrosideros polymorpha*), 40- to 60-foot tall trees that form the forest matrix. Prominent fern species include *uluhe* (*Dicranopteris linearis*), *kilau* (*Dryopteris glabra*), *hapuu pulu* (*Cibotium glaucum*), and *hapuu ii* (*Cibotium menziesii*). Common sub-canopy trees and shrubs include *pukiawe* (*Leptecophylla tameiameiae*), *ohelo* (*Vaccinium calycinum*), *puahanui* (*Broussaisa arguta*), *kukae moa* (*Melicope clusiifolia*), and the invasive weeds Florida blackberry (*Rubus argutus*) and Andean blackberry (*Rubus glaucus*). Three (3) rare lobeliads, the *oha wai* (*Clermontia grandiflora* subsp. *grandiflora*), the *haha* (*Cyanea aculeatiflora*), and the *haha* (*Cyanea macrostegia*), were found growing in the undisturbed fringes that straddle the disturbed corridor of the project site. No endangered or threatened native species were found within the project site, although a number of such species are known to occur within a 2-mile radius.

The fauna survey observed two (2) species of mammals: wild pigs (*Sus scrofa*) and mongoose (*Herpestes auropunctatus*). The pigs were observed in a gulch along the project site, and extensive diggings were noted throughout the forest understory. A mongoose was seen in the underbrush along the flume. No other mammals were observed, although a significant population of rats, a number of mice, and a small number of cats may be expected to occur. The Hawaiian hoary bat (*Lasiurus cinereus semotus*) was not observed; however, it is known that this mammal may utilize this habitat during the warmer months of the year during the emergence of flying insect populations.

Four (4) avifauna species were observed during the survey, including two (2) endemic forest birds, *apapane* (*Himatione sanguinea*) and *iiwi* (*Vestaria coccinea*), and two (2) non-native species, red-billed leiothrix (*Leiothrix lutea*) and Japanese white-eye (*Zosterops japonicus*). Two (2) endangered native birds, the *akohekohe* (*Palmeria dolei*) and *kiwikiu* (*Pseudonestor xanthrophrys*) were not observed, though they are known to occur in this forest. Similarly, the native *uau,* Hawaiian petrel, may fly over this environment in evenings and morning hours to reach their burrows on the Haleakala summit, yet no sightings or signs of this bird were observed during the survey. Five (5) non-native bird species that are known to occur in this area include the Japanese bush warbler (*Cettia dophone*), house finch (*Carpodacus mexicanus*), house sparrow (*Passer domesticus*), common mynah (*Acridotheres tristis*), and the migratory *kolea*, Pacific golden plover (*Pluvialis fulva*).

Aside from the mammals and avifauna, three (3) insect species were identified, and one (1) type of mollusk was observed. The insects identified include Blackburn's damselfly (*Megalagrion blackburni*), Hawaiian crane fly (*Limonia sp.*), and *Dyscritomyia sp.*, which has no common name. The mollusk found during the survey was a native snail of the genus *Succinea*. These snails are fairly common on understory plants in wet forests at the elevation of the project site.

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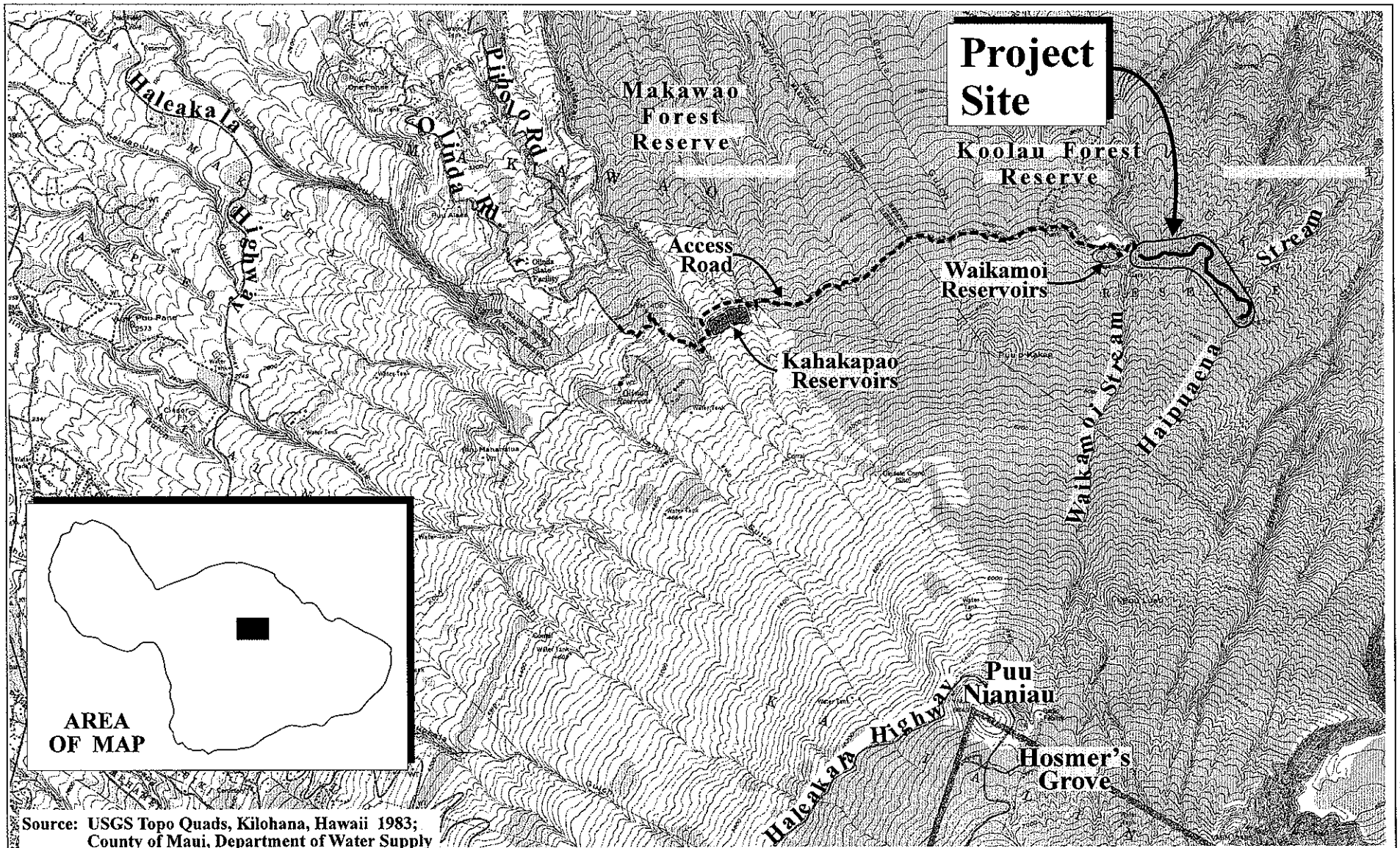


Source: USGS Topo Quads, Kilohana, Hawaii 1983; County of Maui, Department of Water Supply

Figure 1 Proposed Waikamoi Flume Replacement

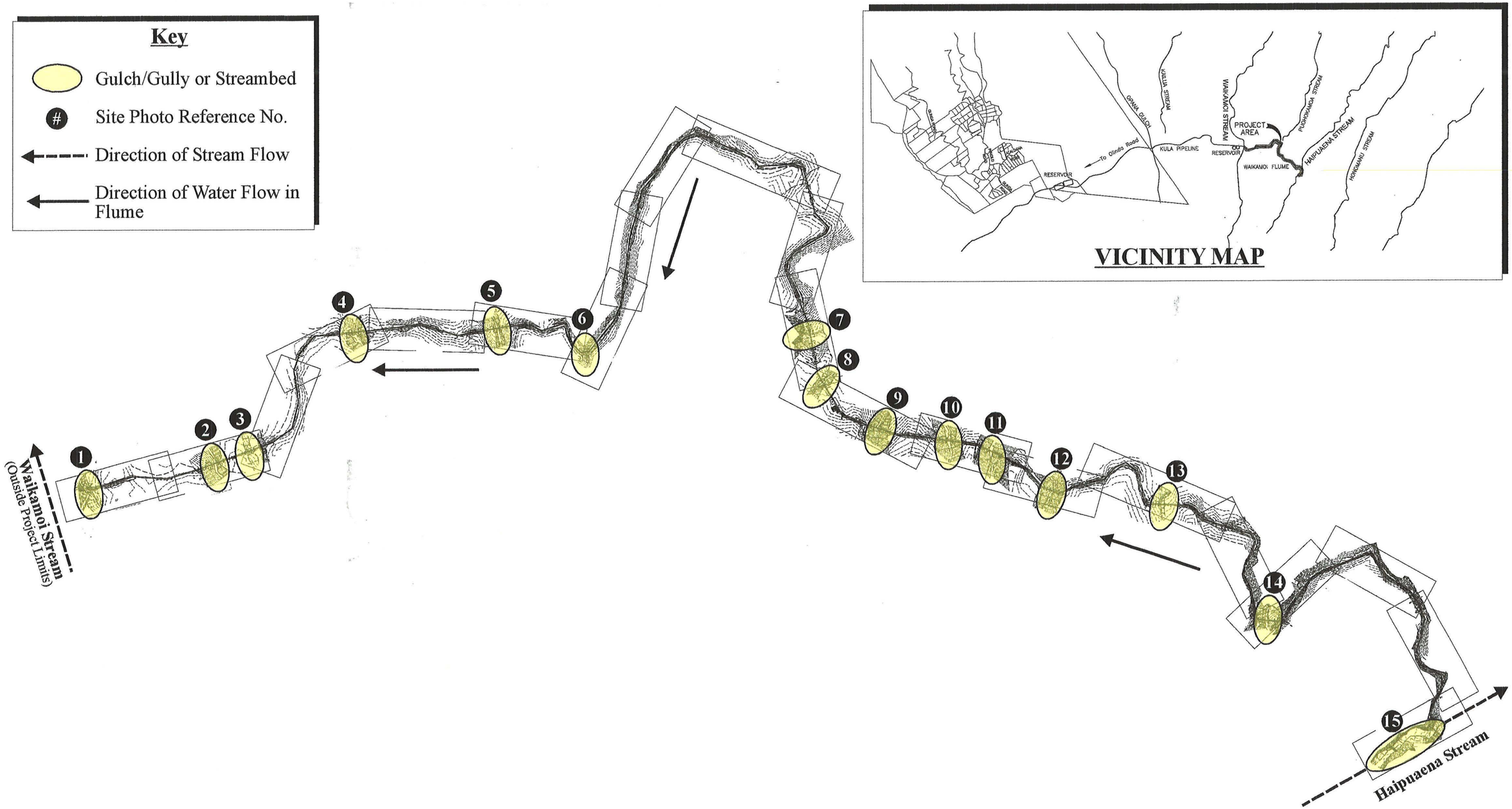
Regional Location Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\regionalmap



Source: Austin, Tsutsumi & Associates, Inc.

Figure 2

Proposed Waikamoi Flume Replacement

Site Photographic Reference Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

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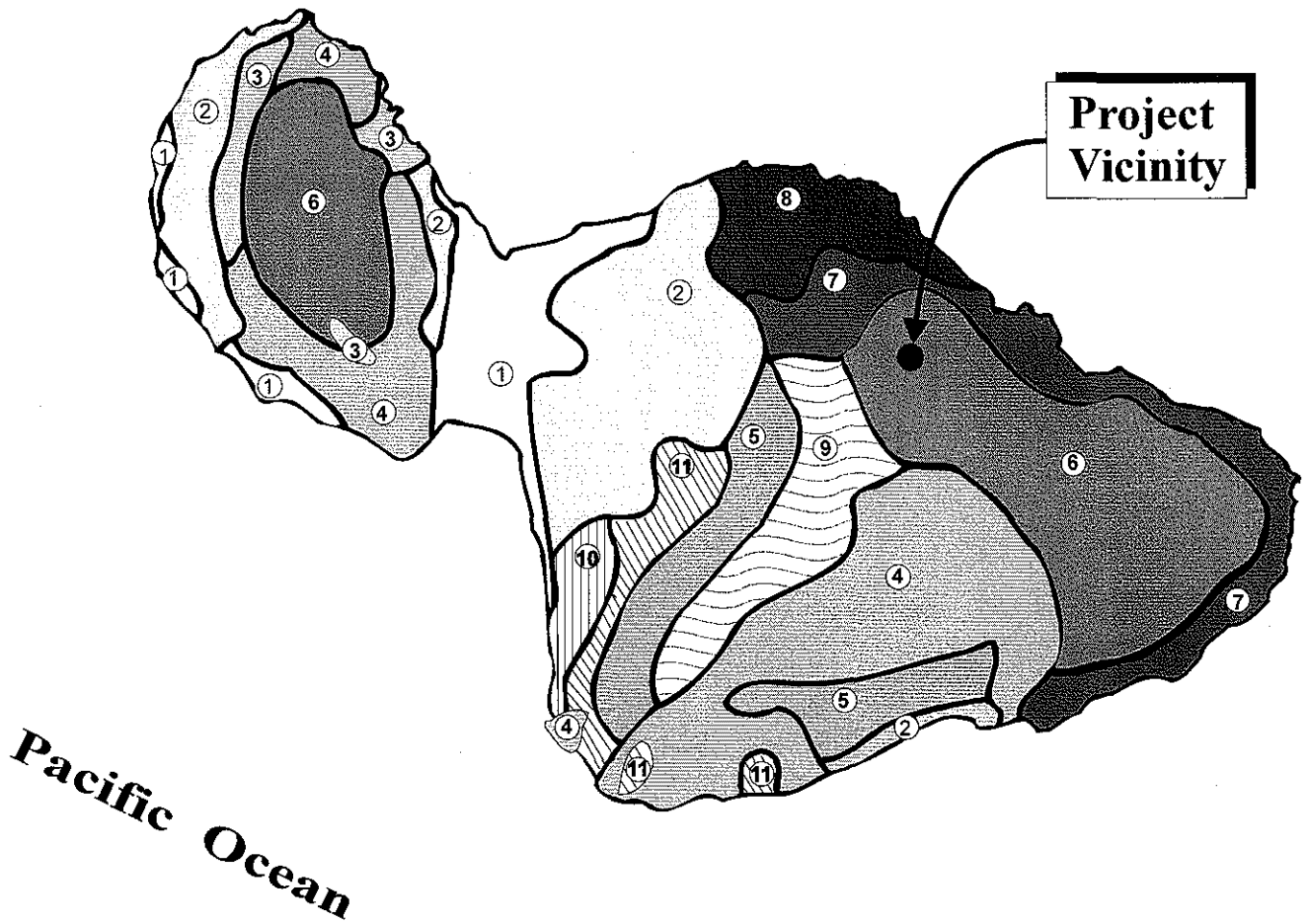
LEGEND

- ① Pulehu-Ewa-Jaucas association
- ② Waiakoa-Keahua-Molokai association
- ③ Honolua-Olelo association
- ④ Rock land-Rough mountainous land association
- ⑤ Puu Pa-Kula-Pane association
- ⑥ Hydrandepts-Tropaquods association
- ⑦ Hana-Makaalae-Kailua association
- ⑧ Pauwela-Haiku association
- ⑨ Laumaia-Kaipoipoi-Olinda association
- ⑩ Keawakapu-Makena association
- ⑪ Kamaole-Oanapuka association



Map Source: USDA Soil Conservation Service

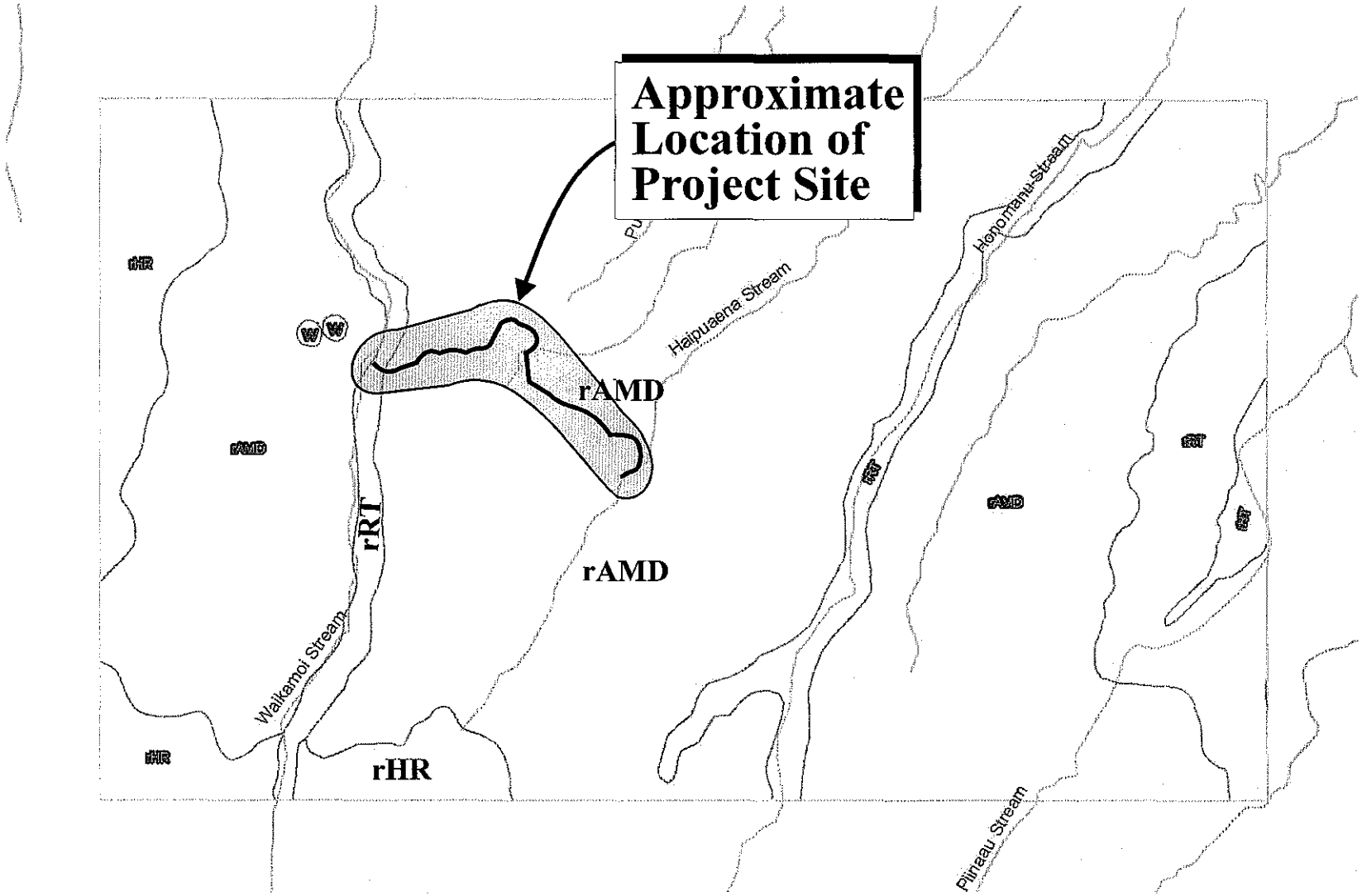
Figure 3 Proposed Waikamoi Flume Replacement Project
Soil Association Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHI/WaikamoiFlume/SOILS.DOA



Source: USGS Web Soil Survey

Figure 4 Proposed Waikamoi Flume Replacement Project

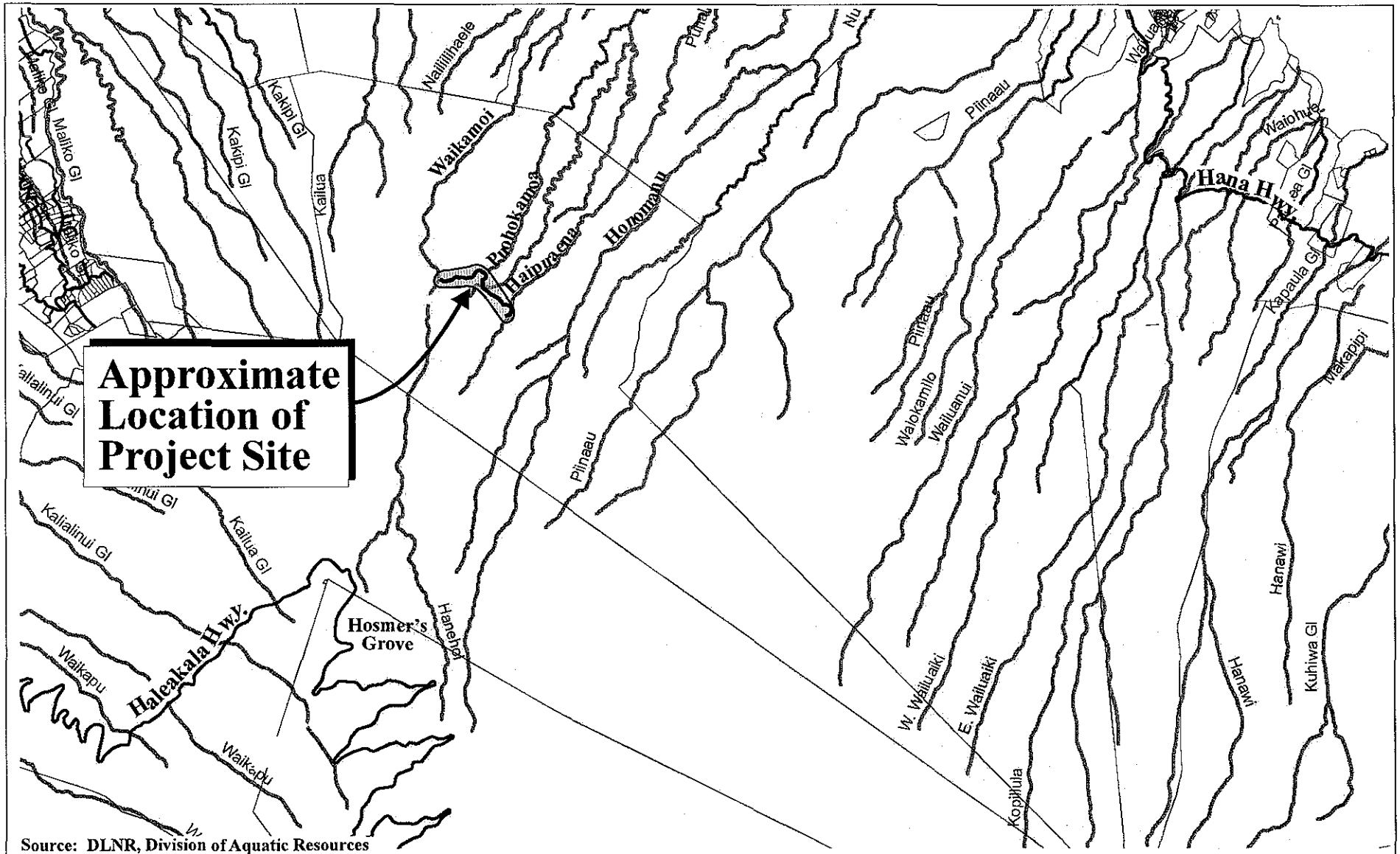
Soil Classification Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\SoilClassification



Source: DLNR, Division of Aquatic Resources

Figure 5 Proposed Waikamoi Flume Replacement Project

Streams

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\Streams.DOA

REFERENCES

Commission on Water Resources Management (CWRM), Department of Land and Natural Resources, Instream Flow Standard Assessment Report Island of Maui Hydrologic Unit 6049 Haipuaena, December 2009.

Commission on Water Resources Management (CWRM), Department of Land and Natural Resources, Instream Flow Standard Assessment Report Island of Maui Hydrologic Unit 6047 Waikamoi, December 2009.

County of Maui, Office of Economic Development (OED), Maui County Data Book 2009, March 2010.

Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map Community-Panel Number 1500030445E, September 25, 2009.

Soil Survey Staff, Natural Resources Conservation Service (NRCS), United States Department of Agriculture. Web Soil Survey. Available at http://websoilsurvey.nrcs.usda.gov/, Accessed December 20, 2010.

USDA Soil Conservation Service (SCS), Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, U.S. Government Printing Office, 1972.

EXHIBIT C.

Flora and Fauna Survey

(Refer to Appendix "H" of this EA Document)

APR 04 2011

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

REPLY TO
ATTENTION OF:

March 31, 2011

Regulatory Branch

File Number(s): POH-2010-00283
POH-2011-00091
POH-2011-00092

Munekiyo & Hiraga, Inc.
Attention: Mark A. Roy
305 South High Street, Suite 104
Wailuku, Hawaii 96793

APPROVED JURISDICTIONAL DETERMINATION

Dear Mr. Roy:

This letter is in response to your letter dated March 22, 2011 requesting Department of the Army (DA) review and comment on the requested additional information for the proposed Waikamoi Timber Flume Replacement Project at TMK (2) 2-4-016:004, Makawao, Island of Maui, Hawaii.

We completed our review of the submitted documents pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404) and have determined that **the submitted documents, accurately identify waters of the U.S. under the regulatory jurisdiction of U.S. Army Corps of Engineers (Corps).**

Section 10 requires that a DA permit be obtained from the Corps prior to undertaking any construction, dredging, or other activity occurring in, over, or under or affecting navigable waters of the U.S. For tidal waters, the shoreward limit of the Corps' jurisdiction extends to the Mean High Water Mark. Section 404 requires that a DA permit be obtained for the discharge (placement) of dredged and/or fill material into waters of the U.S., including wetlands. For tidally influenced waters, in the absence of adjacent wetlands, the shoreward limit of the Corps' jurisdiction extends to the High Tide Line, which in Hawai'i may be approximated by reference to the Mean Higher High Water Mark. For non-tidal waters, the lateral limits of the Corps' jurisdiction extend to the Ordinary High Water Mark (OHWM) or the approved delineated boundary of any adjacent wetlands.

The perennial Waikamoi, Puohokamoa and Haipuaena Streams discharge terminally into Nuaailua Bay (a navigable water). As such, **the Waikamoi, Puohokamoa and Haipuaena Streams are waters of the U.S., subject to Corps jurisdiction.** Please cite the reference number **POH-2010-00283** for the jurisdictional determination associated with the Waikamoi Stream, **POH-2011-00091** for the Puohokamoa Stream and **POH-2011-00092** or the Haipuaena Stream, respectively, in future correspondence regarding this project.

In addition to the 14 gully, gulch and stream crossings identified in the submitted documents, we have reason to believe the project site also traverses potential palustrine wetlands as identified in the U.S. Fish & Wildlife Service's National Wetland Inventory and as indicated by the hydric soils depicted by the U.S. Department of Agriculture, Natural Resources Conservation Service's Soil

Survey of the area. There is insufficient site-specific information to complete our jurisdictional determination as to whether these potential wetlands are adjacent to any waters of the U.S., or whether they are proposed for impact. We suggest the landowner survey the project site for the presence of adjacent wetlands in accordance with the Corps Wetland Delineation Manual, 1987. Please reference the Public Notice dated July 30, 2010, found at *http://www.poh.usace.army.mil/PA/PublicNotices/PN20100730_DelinMan.pdf*, regarding the Regional Supplement for the Pacific, found in the Public Notice and at *http://www.usace.army.mil/CECW/Pages/reg_supp.aspx.*

The submitted documents contain insufficient information to allow the Corps to determine if construction of the proposed timber flume replacement will involve the discharge of fill material waterward of the OHWM of these waterbodies or the approved delineated boundary of these wetlands. We are concerned especially with the nature of the support structures relative to the three streams and whether reconstruction of the existing support structures will result in the discharge of fill material below the OHWM of these waters of the U.S. **If the proposed flume replacement results in either the temporary or permanent discharge of fill material below the OHWM of either the Waikamoi, Puohokamoa or Haipuaena Stream or below the approved delineated boundary of adjacent wetlands, a DA permit will be required.** Fill material, permanent or temporary, may include, but is not limited to: rock, dirt, sand, sandbags, silt fences or concrete.

Upon finalization of construction plans, we advise your client contact the Corps to determine if any of the proposed work constitutes a "discharge of fill" by submitting a DA Permit application and associated drawings that meet our drawing recommendations found at *http://www.poh.usace.army.mil/EC-R/EC-R.htm* to the Corps. In addition, supporting information submitted with the permit application should include sufficient information concerning the scope of work, including the use of Best Management Practices, i.e. silt fences and sandbag berms within the vicinity and in close proximity to potentially regulated bodies of water. The Corps will at that time review the application to ensure it complies with all necessary federal laws and regulations. Be advised, if the fill results in either temporary or permanent loss of waters of the U.S. and/or associated function, your client may be required to provide compensatory mitigation for any unavoidable impacts to the aquatic environment.

This letter contains an approved JD for the property in question and is valid for a period of five (5) years unless new information warrants revision of the determination before the expiration date. If you object to this determination, you may request an Administrative Appeal under Corps regulations at 33 Code of Federal Regulations (CFR) Part 331. We have enclosed a Notification of Appeal Process and Request for Appeal (NAP/RFA) form. If you request to appeal this determination you must submit a completed RFA form, according to instructions in the RFA, to the Corps' Pacific Ocean Division office at the following address:

Thom Lichte, Appeals Review Officer
U.S. Army Corps of Engineers
Pacific Ocean Division, ATTN: CEPOD-PDC
Building 525
Fort Shafter, HI 96858-5440

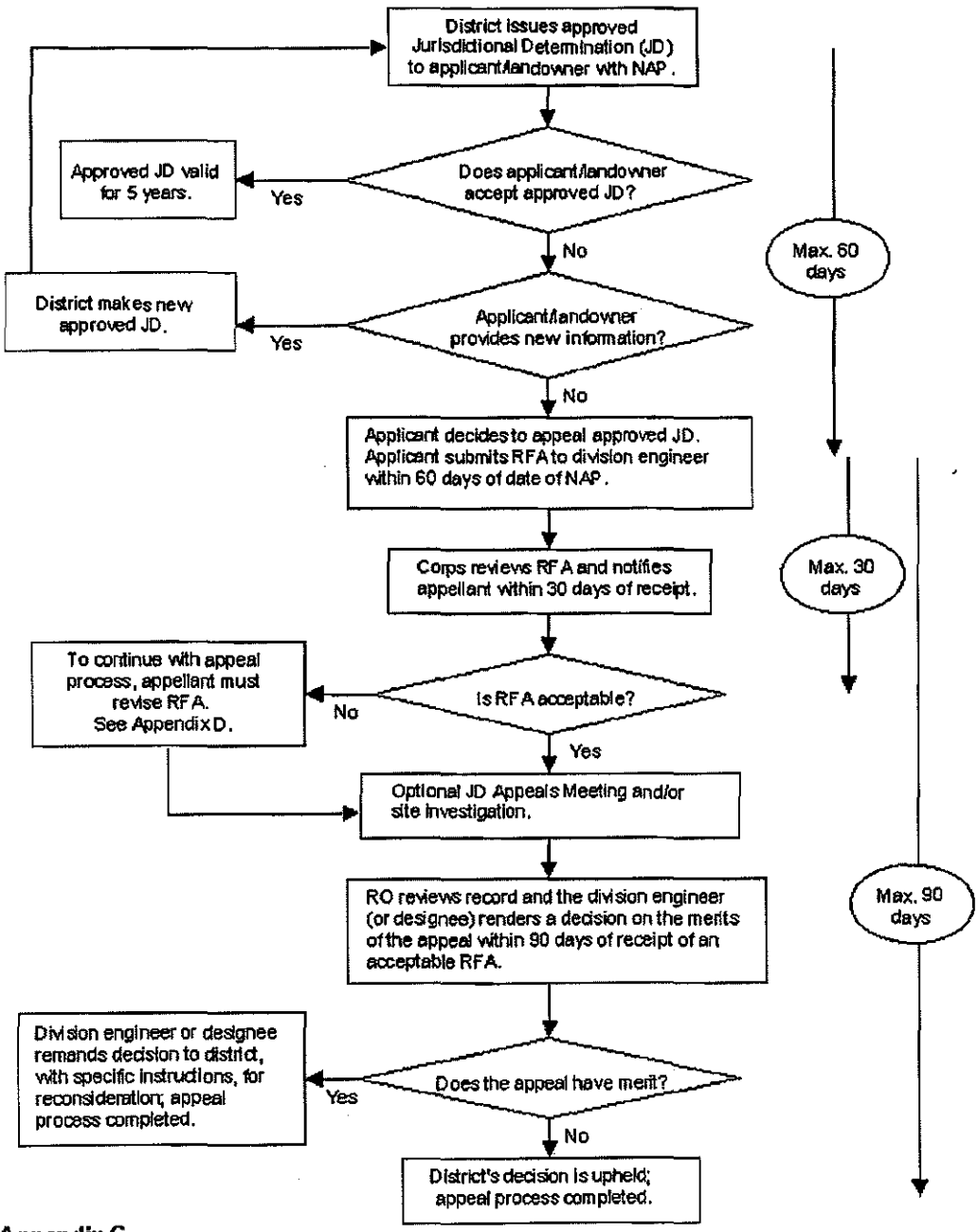
Thank you for contacting us regarding this project and providing us with the opportunity to comment. Should you have any questions, please contact Ms. Jessie Pa'ahana at *808.438.0391* or via email at *Jessie.K.Paahana@usace.army.mil*. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at *http://per2.nwp.usace.army.mil/survey.html*.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Copy furnished:
County of Maui, Dept. of Water Supply, David Taylor, 200 South High St., Wailuku, HI, 96793

Administrative Appeal Process for Approved Jurisdictional Determinations



Appendix C

Applicant: County of Maui, Board of Water Supply	File Number:	Date: March 31, 2011
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
XX	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at https://www.usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL OR OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
Jessie K. Paahana, Project Manager US Army Corps of Engineers, Honolulu District ATTN: CEPOH-EC-R Building 214 Fort Shafter, HI 96858-5440 Ph: (808) 438-0391	Thom Lichte, Appeal Review Officer US Army Corps of Engineers, Pacific Ocean Division ATTN: CEPOD-PDC Building 525 Fort Shafter, HI 96858-5440 Ph: (808) 438-0397

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

	Date:	Telephone number:
_____ Signature of appellant or agent.		

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 31 Mar 2011

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:CEPOH-EC-R, Waikamoi Timber Flume Replacement; Puohokamoa Stream Xing, POH-2011-00091

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State:Hawaii County/parish/borough: Maui County City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.80771° [redacted], Long. -156.22400° [redacted].
Universal Transverse Mercator: UTM Zone 4 North NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Nuaailua Bay, Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):

[redacted] Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
[redacted] Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

[redacted] Office (Desk) Determination. Date: 31 Mar 2011
[redacted] Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There [redacted] "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

[redacted] Waters subject to the ebb and flow of the tide.
[redacted] Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There [redacted] "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   [redacted] TNWs, including territorial seas
   [redacted] Wetlands adjacent to TNWs
   [redacted] Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   [redacted] Non-RPWs that flow directly or indirectly into TNWs
   [redacted] Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   [redacted] Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   [redacted] Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   [redacted] Impoundments of jurisdictional waters
   [redacted] Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: linear feet: width (ft) and/or acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: [redacted]
   Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   [redacted] Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain:

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain:
- ☐ Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):
- Average width: feet
- Average depth: feet
- Average side slopes: [redacted].

Primary tributary substrate composition (check all that apply):
- ☐ Silts
- ☐ Sands
- ☐ Concrete
- ☐ Cobbles
- ☐ Gravel
- ☐ Muck
- ☐ Bedrock
- ☐ Vegetation. Type/% cover:
- ☐ Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain:
Tributary geometry: [redacted]
Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: [redacted]
Estimate average number of flow events in review area/year: [redacted]
Describe flow regime:
Other information on duration and volume:

Surface flow is: [redacted]. Characteristics:

Subsurface flow: [redacted]. Explain findings:
- ☐ Dye (or other) test performed:

Tributary has (check all that apply):
- ☐ Bed and banks
- ☐ OHWM[6] (check all indicators that apply):
  - ☐ clear, natural line impressed on the bank
  - ☐ changes in the character of soil
  - ☐ shelving
  - ☐ vegetation matted down, bent, or absent
  - ☐ leaf litter disturbed or washed away
  - ☐ sediment deposition
  - ☐ water staining
  - ☐ other (list):
  - ☐ the presence of litter and debris
  - ☐ destruction of terrestrial vegetation
  - ☐ the presence of wrack line
  - ☐ sediment sorting
  - ☐ scour
  - ☐ multiple observed or predicted flow events
  - ☐ abrupt change in plant community
- ☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
- ☒ High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- ☒ Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain:
Identify specific pollutants, if known:

---

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: Puohokamoa is perennial, w/terminus in Nuaailua Bay(TNW) (DLNR-DAR Atlas of Hwn Watersheds).
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

Provide estimates for jurisdictional waters in the review area (check all that apply):
- ■ Tributary waters: linear feet width (ft).
- ■ Other non-wetland waters: acres.
  - Identify type(s) of waters: .
- ■ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
- ■ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- ■ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- ■ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- ■ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
- ■ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ■ Lakes/ponds: acres.
- ■ Other non-wetland waters: acres. List type of aquatic resource: .
- ■ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
- ■ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ■ Lakes/ponds: acres.
- ■ Other non-wetland waters: acres. List type of aquatic resource: .
- ■ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:requested add'l info rcv'd 25 Mar 2011.
- ■ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ■ Data sheets prepared by the Corps: .
- ■ Corps navigable waters' study: .
- ■ U.S. Geological Survey Hydrologic Atlas: .
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☒ U.S. Geological Survey map(s). Cite scale & quad name:1:24000 (ORM website, retv'd 13 Oct 2010).
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation:NRCS Web Soil Survey conducted 31 Dec 2006.
- ☒ National wetlands inventory map(s). Cite name:ORM website, USFWS-NWI Overlay, retv'd 13 Oct 2010.
- ■ State/Local wetland inventory map(s): .
- ■ FEMA/FIRM maps: .
- ■ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☒ Photographs: ☒ Aerial (Name & Date):Aerial Satellite Image (ORM website, retv'd 13 Oct 2010).
  - or ☐ Other (Name & Date): .
- ■ Previous determination(s). File no. and date of response letter: .
- ■ Applicable/supporting case law: .
- ☒ Applicable/supporting scientific literature:DLNR-DAR Atlas of Hawaiian Watersheds, April 2008.
- ■ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: Puohokamoa is a perennial stream with end terminus in a TNW; poss Sectiion 404. Referenced data located in physical file POH-2011-00091.

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 31 Mar 2011

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:CEPOH-EC-R, Waikamoi Timber Flume Replacement; Haipuaena Stream Xing, POH-2011-00092

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui County City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.80326° [redacted], Long. -156.22132° [redacted].
Universal Transverse Mercator: UTM Zone 4 North NAD 83
Name of nearest waterbody: **Haipuaena Stream**

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Nuaailua Bay, Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
[redacted] Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
[redacted] Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
[redacted] Office (Desk) Determination. Date: 31 Mar 2011
[redacted] Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There [redacted] "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
[redacted] Waters subject to the ebb and flow of the tide.
[redacted] Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There [redacted] "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   [redacted] TNWs, including territorial seas
   [redacted] Wetlands adjacent to TNWs
   [redacted] Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   [redacted] Non-RPWs that flow directly or indirectly into TNWs
   [redacted] Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   [redacted] Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   [redacted] Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   [redacted] Impoundments of jurisdictional waters
   [redacted] Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: linear feet: width (ft) and/or acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction based on:** [redacted]
   Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   [redacted] Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain:

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain:
- ☐ Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):

Average width: feet
Average depth: feet
Average side slopes: [redacted]

Primary tributary substrate composition (check all that apply):

- ☐ Silts
- ☐ Cobbles
- ☐ Bedrock
- ☐ Other. Explain:
- ☐ Sands
- ☐ Gravel
- ☐ Vegetation. Type/% cover:
- ☐ Concrete
- ☐ Muck

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain:
Tributary geometry: [redacted]
Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: [redacted]
Estimate average number of flow events in review area/year: [redacted]
Describe flow regime:
Other information on duration and volume:

Surface flow is: [redacted]. Characteristics:

Subsurface flow: [redacted]. Explain findings:
- ☐ Dye (or other) test performed:

Tributary has (check all that apply):
- ☐ Bed and banks
- ☐ OHWM[6] (check all indicators that apply):
  - ☐ clear, natural line impressed on the bank
  - ☐ changes in the character of soil
  - ☐ shelving
  - ☐ vegetation matted down, bent, or absent
  - ☐ leaf litter disturbed or washed away
  - ☐ sediment deposition
  - ☐ water staining
  - ☐ other (list):
  - ☐ the presence of litter and debris
  - ☐ destruction of terrestrial vegetation
  - ☐ the presence of wrack line
  - ☐ sediment sorting
  - ☐ scour
  - ☐ multiple observed or predicted flow events
  - ☐ abrupt change in plant community
- ☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

- ■ High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- ■ Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain:
Identify specific pollutants, if known:

---

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☒ TNWs: linear feet width (ft), Or, acres.
   - ☒ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: Haipuaena is perennial, w/terminus in Nuaailua Bay(TNW) (DLNR-DAR Atlas of Hwn Watersheds).
   - ☒ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
  - Identify type(s) of waters: .
- Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:requested add'l info rcv'd 25 Mar 2011.
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- Data sheets prepared by the Corps: .
- Corps navigable waters' study: .
- U.S. Geological Survey Hydrologic Atlas: .
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☒ U.S. Geological Survey map(s). Cite scale & quad name:1:24000 (ORM website, retv'd 13 Oct 2010).
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation:NRCS Web Soil Survey conducted 31 Dec 2006.
- ☒ National wetlands inventory map(s). Cite name:ORM website, USFWS-NWI Overlay, retv'd 13 Oct 2010.
- State/Local wetland inventory map(s): .
- FEMA/FIRM maps: .
- 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☒ Photographs: ☒ Aerial (Name & Date):Aerial Satellite Image (ORM website, retv'd 13 Oct 2010).
  - or ☐ Other (Name & Date): .
- Previous determination(s). File no. and date of response letter: .
- Applicable/supporting case law: .
- ☒ Applicable/supporting scientific literature:DLNR-DAR Atlas of Hawaiian Watersheds, April 2008.
- Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: Haipuaena is a perennial stream with end terminus in a TNW; poss Secttion 404. Referenced data located in physical file POH-2011-00092.

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 13 Oct 2010

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:CEPOH-EC-R, Waikaoi Timber Flume Reconstruction, POH-2010-00283

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui County City: Wailuku
Center coordinates of site (lat/long in degree decimal format): Lat. 20.80910° [redacted], Long. -156.22404° [redacted].
Universal Transverse Mercator: UTM Zone 4 North NAD 83
Name of nearest waterbody: **Waikamoi Stream**
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
[redacted] Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
[redacted] Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
[redacted] Office (Desk) Determination. Date: 13 Oct 2010
[redacted] Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There [redacted] "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
[redacted] Waters subject to the ebb and flow of the tide.
[redacted] Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There [redacted] "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   [redacted] TNWs, including territorial seas
   [redacted] Wetlands adjacent to TNWs
   [redacted] Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   [redacted] Non-RPWs that flow directly or indirectly into TNWs
   [redacted] Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   [redacted] Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   [redacted] Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   [redacted] Impoundments of jurisdictional waters
   [redacted] Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 6864 linear feet: width (ft) and/or acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction based on:** [redacted].
   Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   [redacted] Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain:

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain:
- ☐ Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: [redacted].

Primary tributary substrate composition (check all that apply):
- ☐ Silts
- ☐ Sands
- ☐ Concrete
- ☐ Cobbles
- ☐ Gravel
- ☐ Muck
- ☐ Bedrock
- ☐ Vegetation. Type/% cover:
- ☐ Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain:
Tributary geometry: [redacted]
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: [redacted]
Estimate average number of flow events in review area/year: [redacted]
Describe flow regime:
Other information on duration and volume:

Surface flow is: [redacted]. Characteristics:

Subsurface flow: [redacted]. Explain findings:
- ☐ Dye (or other) test performed:

Tributary has (check all that apply):
- ☐ Bed and banks
- ☐ OHWM[6] (check all indicators that apply):
  - ☐ clear, natural line impressed on the bank
  - ☐ changes in the character of soil
  - ☐ shelving
  - ☐ vegetation matted down, bent, or absent
  - ☐ leaf litter disturbed or washed away
  - ☐ sediment deposition
  - ☐ water staining
  - ☐ other (list):
  - ☐ the presence of litter and debris
  - ☐ destruction of terrestrial vegetation
  - ☐ the presence of wrack line
  - ☐ sediment sorting
  - ☐ scour
  - ☐ multiple observed or predicted flow events
  - ☐ abrupt change in plant community
- ☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
- [redacted] High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- [redacted] Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain:
Identify specific pollutants, if known:

---

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: Stream is perennial per DLNR Division of Aquatic Resources' Atlas of Hawaiian Watersheds.
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
  - Identify type(s) of waters: .
- Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:early consultation request rcv'd 12 Oct 2010.
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- Data sheets prepared by the Corps: .
- Corps navigable waters' study: .
- U.S. Geological Survey Hydrologic Atlas: .
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name:1:24000 (ORM website, retv'd 13 Oct 2010).
- USDA Natural Resources Conservation Service Soil Survey. Citation:NRCS Web Soil Survey conducted 31 Dec 2006.
- National wetlands inventory map(s). Cite name:US Fish & Wildlife Service Online Wetland Mapper, ret'vd 13 Oct 2010.
- State/Local wetland inventory map(s): .
- FEMA/FIRM maps: .
- 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- Photographs: ☒ Aerial (Name & Date):Aerial Satellite Image (ORM website, retv'd 13 Oct 2010).
  - or ☐ Other (Name & Date): .
- Previous determination(s). File no. and date of response letter: .
- Applicable/supporting case law: .
- Applicable/supporting scientific literature:Atlas of Hawaiian Watersheds, DLNR-DAR.
- Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: Referenced data located in physical file POH-2010-283.

ALAN M. ARAKAWA
Mayor

DAVID TAYLOR, P.E.
Director

PAUL J. MEYER
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

September 15, 2011

George P. Young, P.E.
Chief, Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

RE: I.D.: File No. POH-2010-00283)
PHO-2010-00283 (Waikamoi Stream)
PHO-2011-00091 (Puohokamoa Stream)
PHO-2011-00092 (Haipuaena Stream)
TMK: (2) 2-4-016:004 (por.)
Project Name: Proposed Waikamoi Timber Flume Replacement Project at Makawao, Maui, Hawaii

Dear Mr. Young:

This letter pertains to the Department of Army's Approved Jurisdictional Determination letter dated March 31, 2011, that the Waikamoi, Puohokamoa and Haipuaena Streams have been determined to be waters of the U. S. and are subject to the U.S. Army Corps of Engineers (USACE) jurisdiction.

In the March 31, 2011 letter, your office noted the following items:

1. Sufficient site-specific information is needed to make a Jurisdictional Determination as to whether there are wetlands adjacent to navigable waters or impacted by the proposed project.

2. Sufficient information is needed for a determination as to whether the proposed timber flume replacement will involve the discharge of fill material waterward of the Ordinary High Water Mark (OHWM) of these waterbodies (Waikamoi, Puohokamoa, Haipuaena Streams) or the approved delineated boundary of wetlands; particularly with respect to the reconstruction of the existing flume support structures.

The purpose of this letter is to: (a) provide further information in response to the Department of Army's March 31, 2011 letter; (b) request a Jurisdictional Determination for the project corridor between the Waikamoi, Puohokamoa and Haipuaena Streams within the project boundaries; and (c) request confirmation regarding Department of Army (DA) permitting requirements for the entire project.

A. AQUATIC RESOURCE STUDY

Included with this letter is the "Waikamoi Timber Flume Replacement Project Aquatic Resources Study" (Aquatic Resource Study) completed by environmental consultant, Robert W. Hodby in May 2011. See **Exhibit "A"**. This study contains two (2) separate but related analyses. The first analysis assesses the forested lands between the aforementioned streams. Following established USACE guidelines, the ridge top and sloping lands along the flume corrider were analyzed for their potential of being USACE jurisdictional wetlands. The second analysis assessed the other gullies and streams that cross through the project corridor as discrete aquatic resources following separate USACE guidelines to determine if they are potential jurisdictional waters of the U.S.

Some highlights of Robert W. Hodby's analyses are as follows:

1. First Analysis (Wetland Assessment)

Ten (10) sampling points were established at intervals of the one (1) mile length along the flume corridor, and located along the uphill side of the flume to minimize effects of down slope disturbance. Once a sampling point was established, the vegetation was assessed within a 30 foot radius circle to determine hydrophytic character. A pit was also dug to assess the soil for hydric character and the water regime for wetland hydrology. Following USACE guidelines for a proposed determination of wetland status, these three parameters were analyzed. The analysis indicates that each of the ten (10) sampling points meets the three (3) minimum requirements of hydrophytic vegetation, hydric soil and wetland hydrology, and all lie within wetlands. Because of the uniformity of the resources and their extent across the mountain slope, no wetland boundaries were delineated around any of these points. The ridge tops along the flume appear to be wetlands, which merge with the stream corridor aquatic resources and are located adjacent to and directly abutting them.

2. Second Analysis (Stream Assessments)

The three (3) perennial streams, Waikamoi, Haipuaena and Puohokamoa Streams have 13 smaller tributary streams which were analyzed individually with a separate Jurisdictional Determination Form. USACE guidelines were followed leading to a proposed Jurisdictional Determination for each tributary stream. Nine (9) of the 13 tributaries assessed were judged to be perennial with year-round flow and determined to automatically be federally jurisdictional because they were Relatively Permanent Waters that flow into the Pacific Ocean, a Traditional Navigable Water (TNW) as defined by USACE. The remaining four (4) tributaries were assessed to have seasonal flow and, therefore, not automatically federally jurisdictional but required further detailed analysis for a determination. Because of the seasonal flow being substantially due to high rainfall in this watershed, these four (4) tributaries were also determined to be federally jurisdictional.

B. PROPOSED PROJECT

This section provides information about the scope of work of the proposed project. The Waikamoi Flume originally constructed in 1908 and reconstructed in the 1930's is located in the Koolau Forest Reserve on Maui, stretching about 1.1 miles from its intake at Haipuaena Stream in the east to the vicinity of Waikamoi Stream in the west. The flume is 2-feet wide by 13-inches deep and traverses rough terrain over various gulch and gulley crossings, within an approximately 10 foot wide corridor. The Waikamoi Flume is an integral part of the County of Maui, Department of Water Supply (DWS) Upper Kula system and is supplied by water from the Waikamoi Forest in East Maui watershed. Freshwater collected by the Waikamoi Flume from Haipuaena Stream and small tributaries is conveyed to the Waikamoi Reservoirs, then to Kahakapao Reservoirs for storage. After being treated at the Olinda Water Treatment Plant, this water is delivered to residents of Kula, Waiakoa, Keokea, Ulupalakua, and Kanaio in Upcountry Maui as the main source of water supply for this area. In 1974 and 1975 the flume box was replaced with new redwood planking, though the supporting truss that was constructed in the 1930's has remained in place.

Due to years of weathering, the flume box, timber bridges, and supporting truss are currently in poor condition. The flume box is full of holes causing the loss of approximately 40 percent of the water being carried by the existing flume. Also the timber bridges are in poor condition creating a dangerous situation for DWS maintenance personnel when they traverse the flume.

The purpose of this repair and maintenance project is to provide: (1) DWS with an improved flume that will carry approximately the same volume of water as the existing flume is designed to; and (2) DWS maintenance workers with a safe platform to access the flume along its entire length to perform routine maintenance, the frequency of which is expected to be greatly reduced following completion of the repair project.

This project involves the replacement of the wooden flume structure and supporting trestles along its entire length. The subject project will affect a corridor of land approximately 1.4 miles long by 30 feet wide. A copy of the project plans are presented in **Exhibit "B"**. The design for the proposed new flume structure consists of a 30-inch diameter pipe supported on an aluminum space frame truss. The truss will be supported on concrete foundations buried in the soil measuring approximately 8-feet wide by 4-feet long. The foundations will be placed at locations along the flume length that provide a level and stable support for the flume. Where the flume runs along level ground, the foundations will be spaced approximately 25 feet apart on center. Where the flume crosses over a gully or gulch, the foundations may be spaced as much as 100 feet apart. To avoid any sediment from entering into any stream, the foundations will be located at least 25 feet away from the edge of any stream that may exist along the length of the flume.

In the case of Haipuaena Stream, concrete encasing work will be undertaken to an existing pier below the OHWM of the stream channel. A copy of the project plan illustrating the portion of Haipuaena Stream affected by the proposed reconstruction of the existing flume support structure is presented in **Exhibit "C"**. This concrete pedestal and encasement of the existing red wood pier will provide a level and stable support for the new flume. There is no other work proposed to occur below the OHWM of Haipuaena Stream, Puohokamoa Stream, Waikamoi Stream or any of the tributaries that cross beneath the flume.

Upon completion of the flume replacement work, a continuous catwalk will be mounted to the flume support structure to provide access along the length of the flume for DWS maintenance personnel. The catwalk will be constructed of fiberglass grating and will have non-metallic handrails wherever the flume becomes elevated.

The replacement flume will occupy a smaller footprint than the existing flume structure. With the project in place, the area of disturbed ground occupied by the flume will be reduced from 1,650 square feet to approximately 1,260 square feet. As previously noted, the capacity of the new flume will be the same as the existing flume such that there will be no intensification of use. As mentioned previously, the replacement flume is being implemented to eliminate leakages that result in substantial losses of water from the system, thereby providing an improved and more efficient conveyance facility. The

proposed project is consistent with the recommendations of the Upcountry Water Use and Development Plan regarding continued leak detection and repair of DWS systems.

In summary, the proposed project is not expected to result in either temporary or permanent loss of navigable waters and/or associated functions. . Best Management Practices will be included in the design plans for the project to prevent sedimentation entering aquatic resources.

C. CONCLUSION

The enclosed "Waikamoi Timber Flume Replacement Project Aquatic Resources Study" by Robert W. Hodby and additional project information is provided in support of our request for a Jurisdictional Determination for the project corridor between Haipuaena Stream and Waikamoi Stream. Refer to **Exhibit "A"**. We look forward to receiving this Jurisdictional Determination from your office.

In addition, we acknowledge that applications will need to be submitted for any required Department of Army permits from the USACE. In that event, we are also writing to you to respectfully request confirmation from USACE as to which DA permits will need to be obtained by the County of Maui for the flume replacement project.

We look forward to receiving your response to this letter so that project planning can proceed on a timely basis.

Should you have any questions or require additional information, please feel free to contact our planning consultant, Mark Alexander Roy of Munekiyo and Hiraga, Inc. at (808) 244-2015.

Sincerely,

David Taylor, P.E.
Director

Enclosures
cc: Mike Hunnemann, KAI Hawaii, Inc. (w/enclosures)
Tom Ochwat, Department of Water Supply (w/enclosures)
Mark Alexander Roy and Cheryl K. Okuma, Munekiyo & Hiraga, Inc. (with enclosures)
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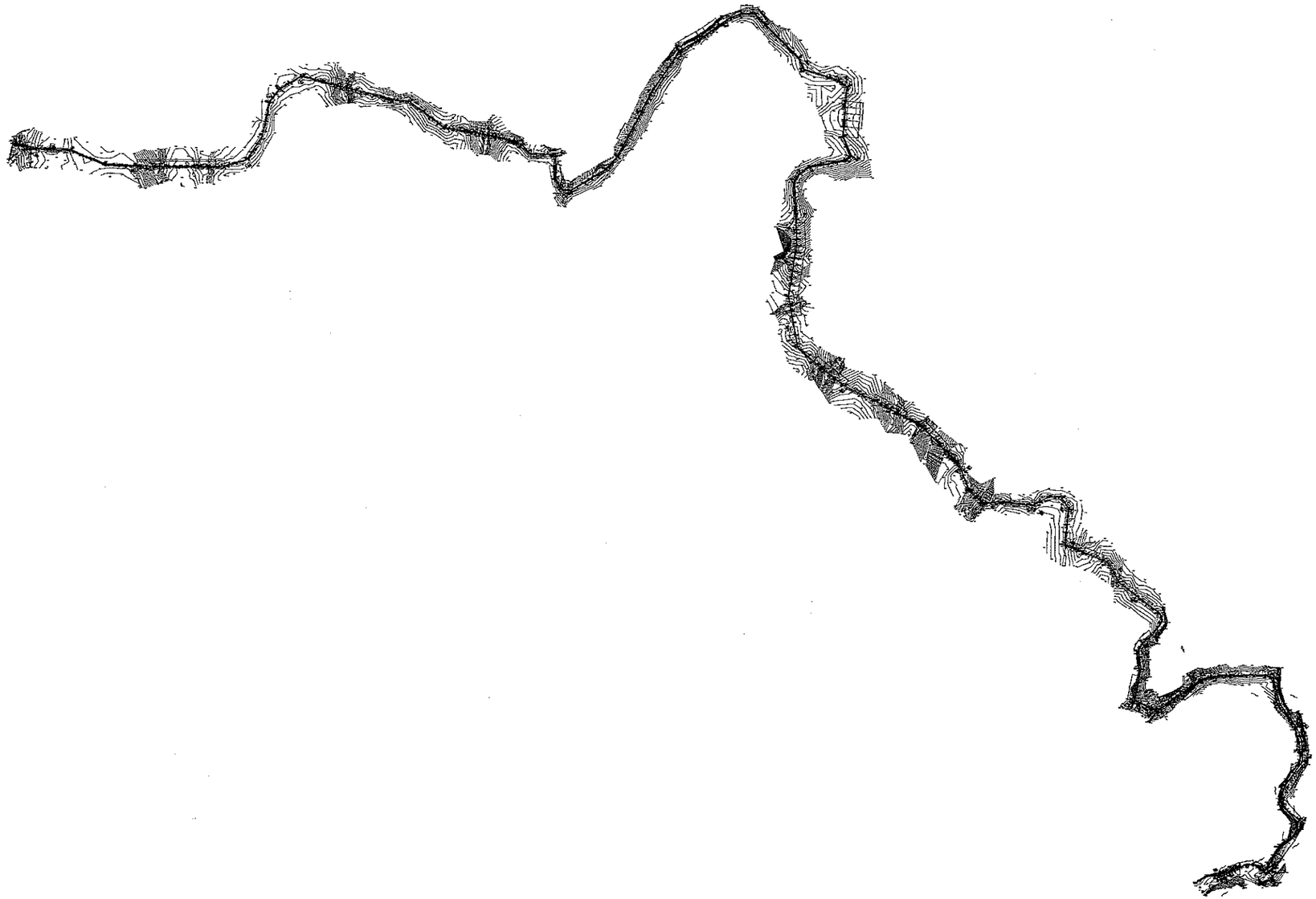
EXHIBIT A.

Aquatic Resources Study

(Refer to Appendix "G" of this EA Document)

EXHIBIT B.

Project Plans



APPROVED					
	NO.	DATE	DESCRIPTION		APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

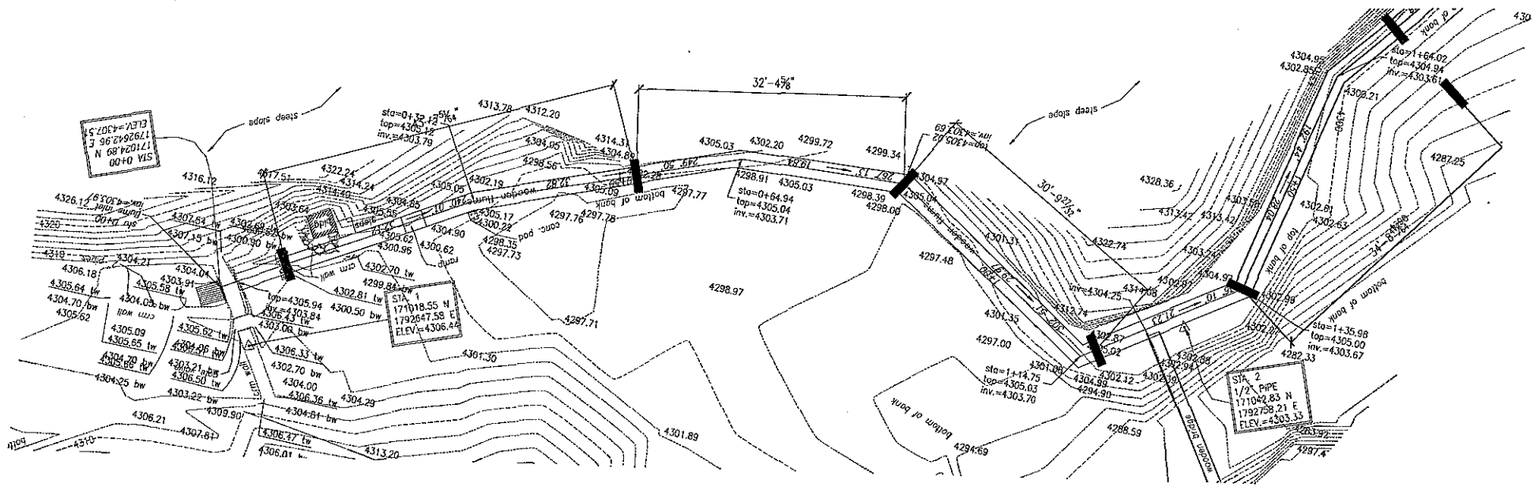
S-0

APPROVED

REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



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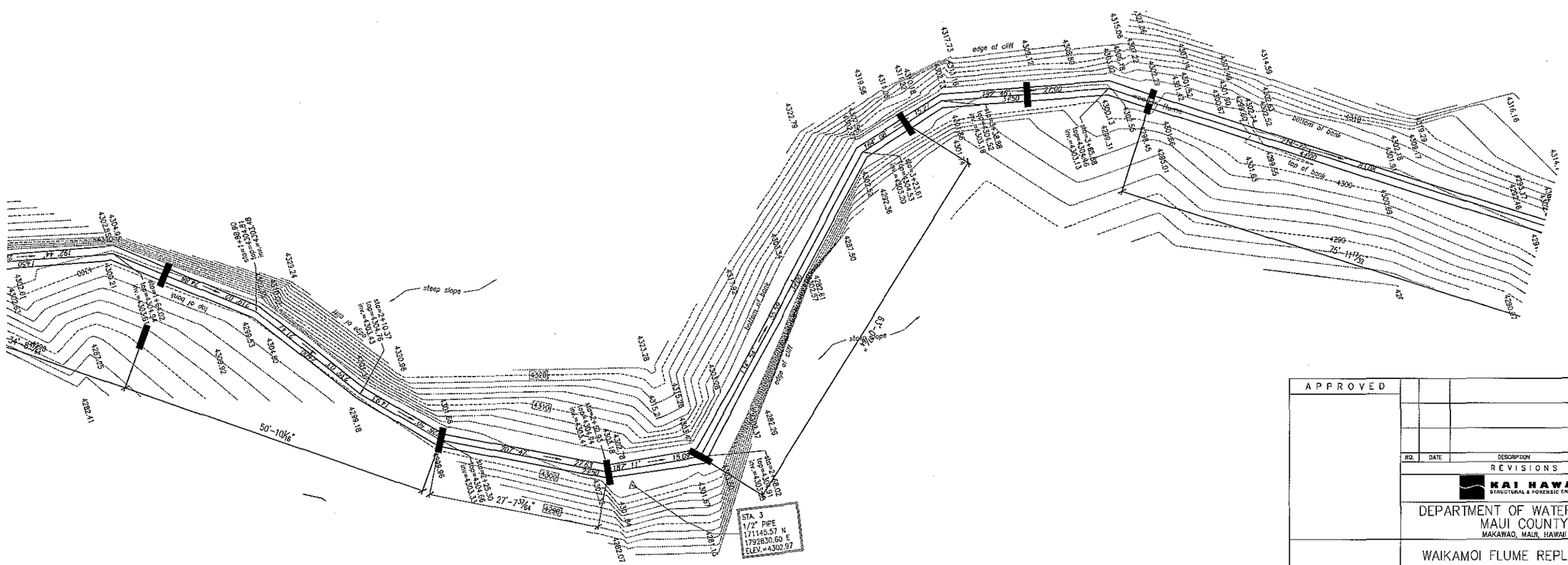

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APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

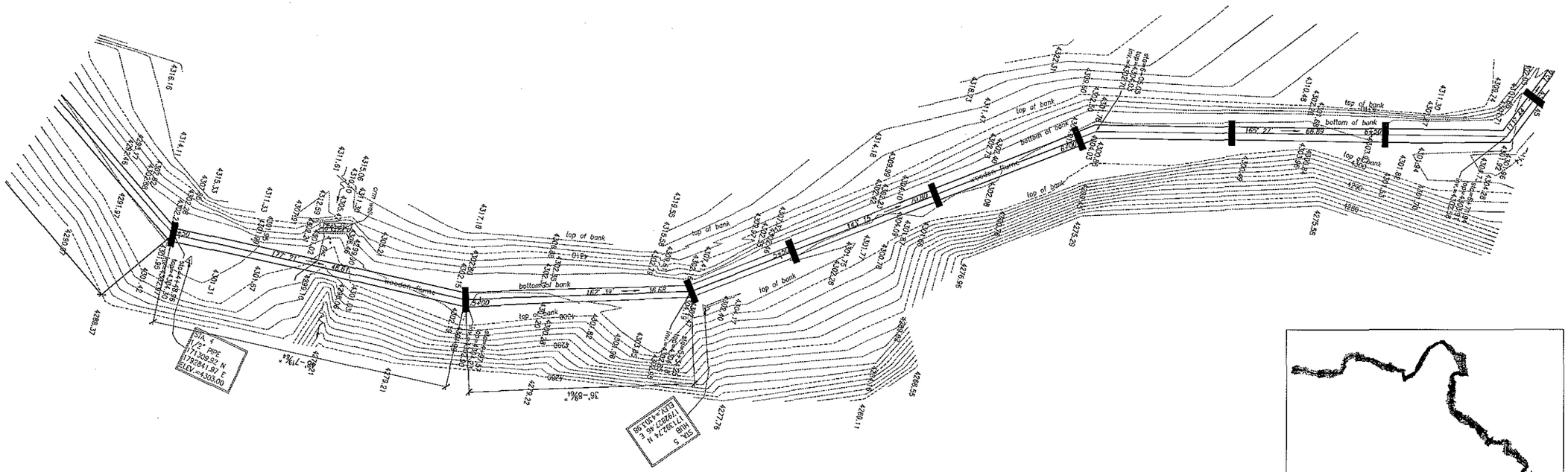
WAIKAMOI FLUME REPLACEMENT

S-1

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



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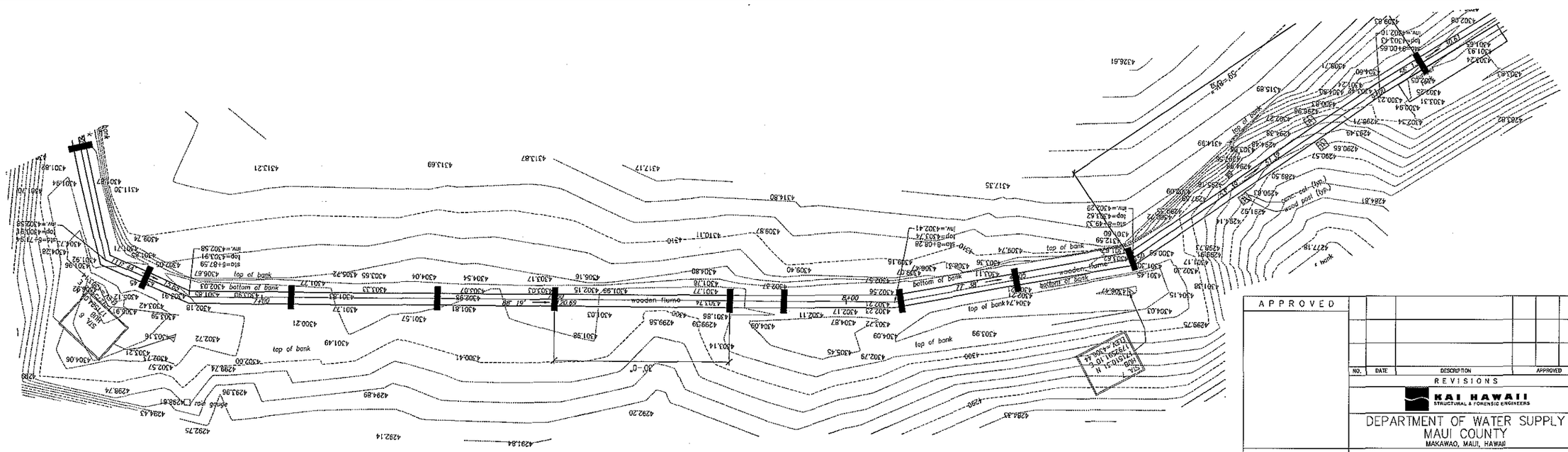

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APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

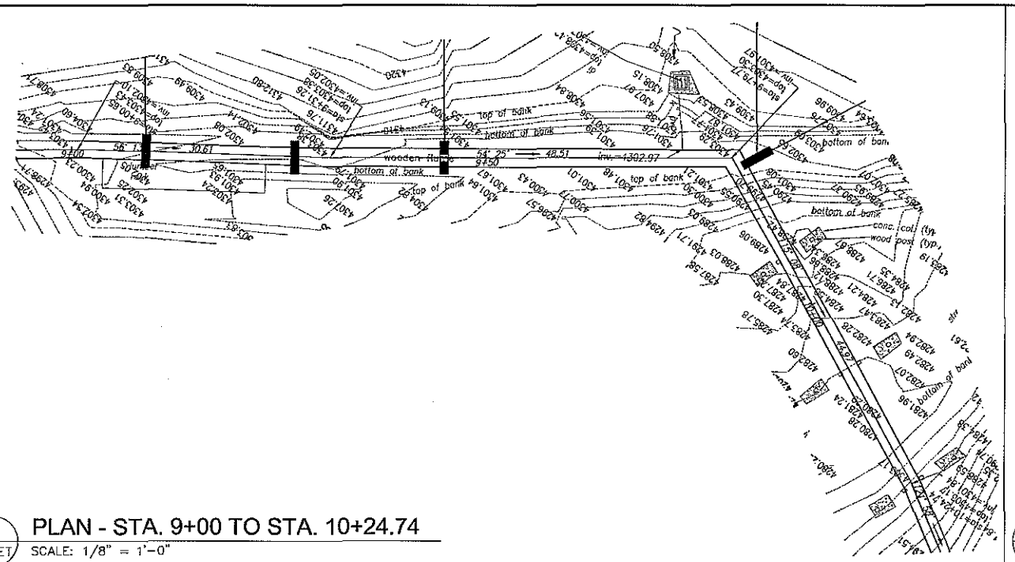
WAIKAMOI FLUME REPLACEMENT

S-2

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



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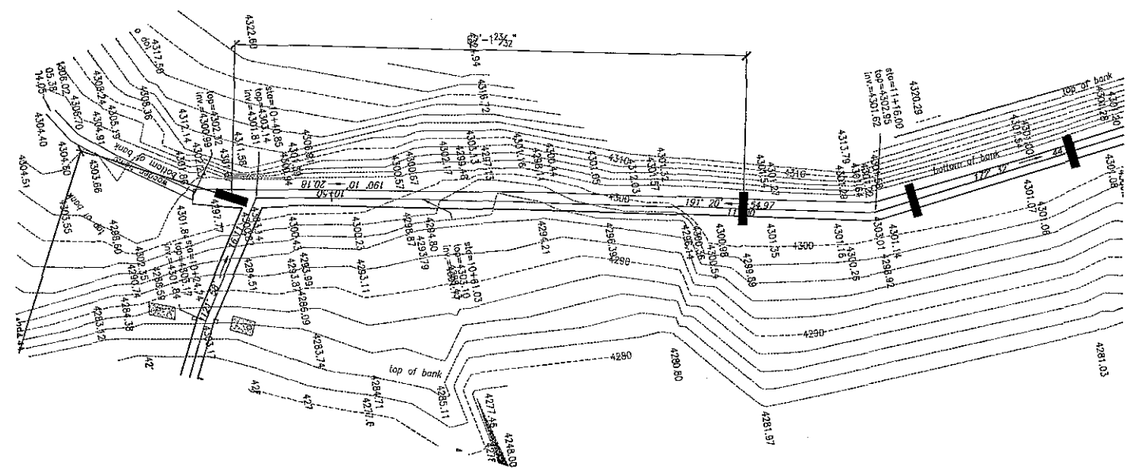

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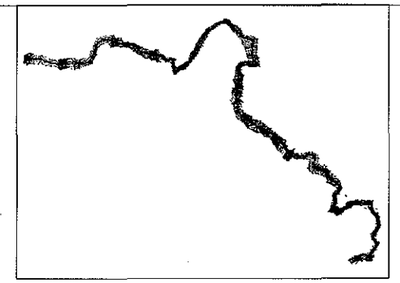
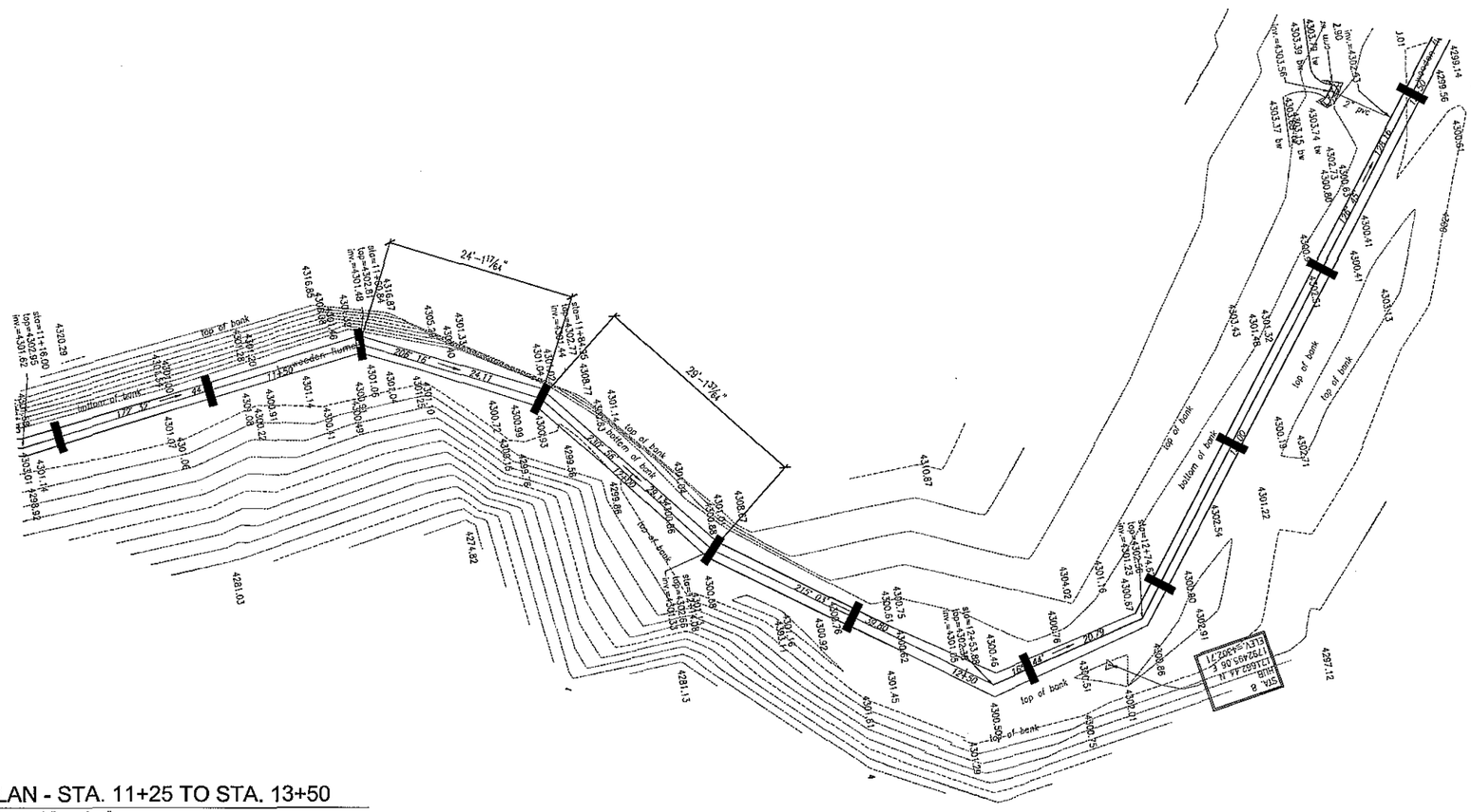




1 SHEET PLAN - STA. 11+25 TO STA. 13+50
SCALE: 1/8" = 1'-0"

APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

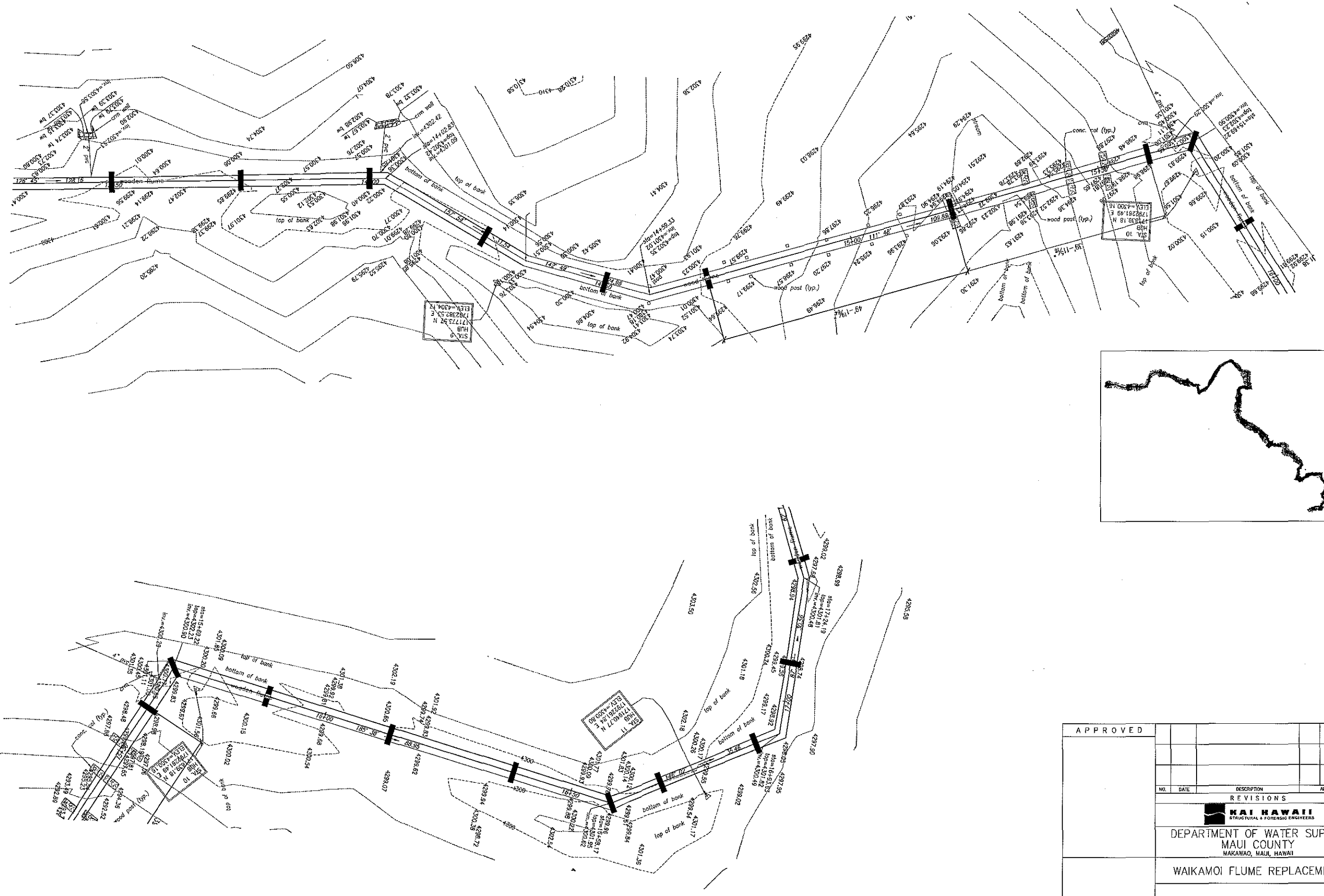
WAIKAMOI FLUME REPLACEMENT

S-3

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET __ OF 21 SHEETS



APPROVED					
	NO.	DATE	DESCRIPTION		APPROVED
	REVISIONS				

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

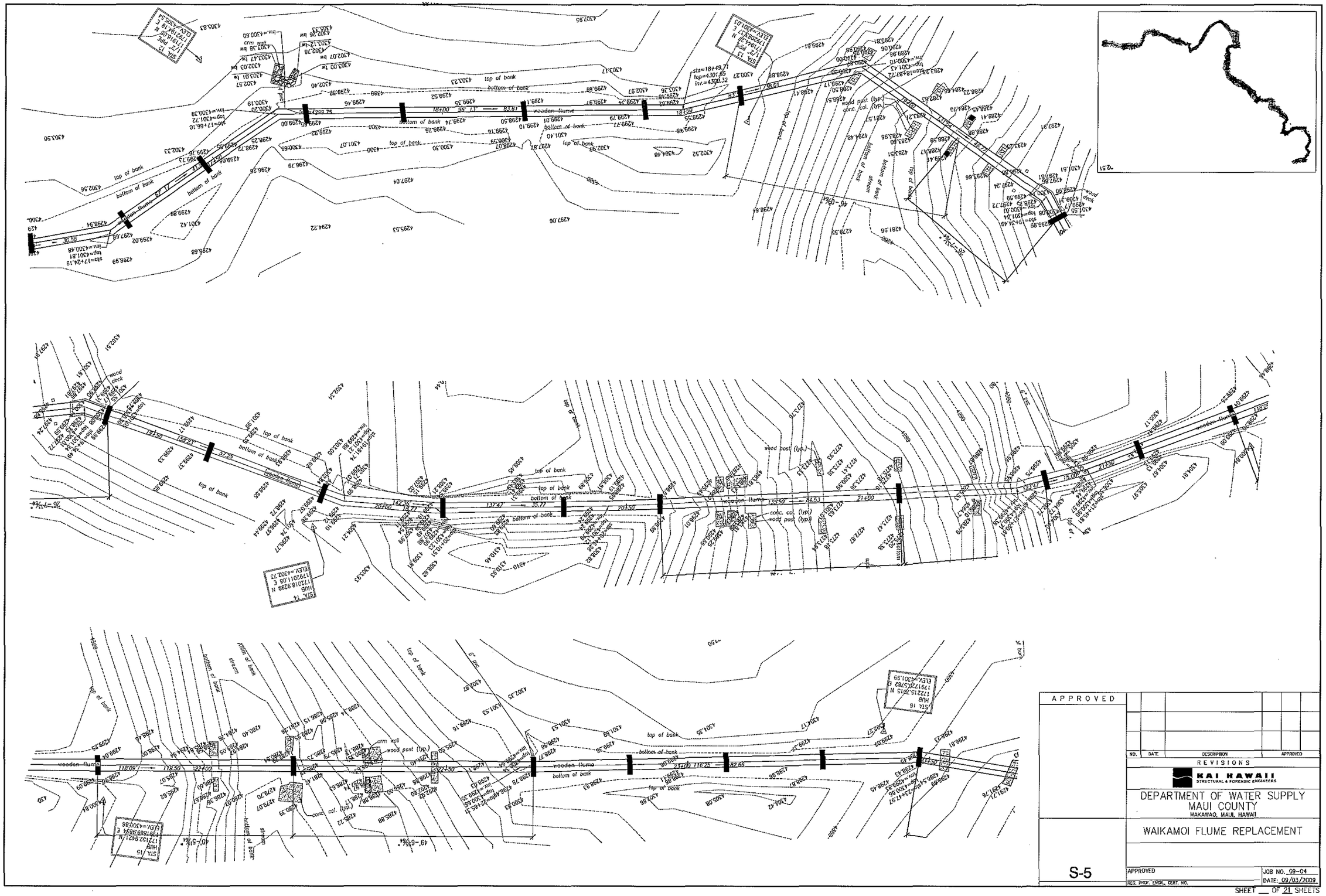
WAIKAMOI FLUME REPLACEMENT

S-4

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



APPROVED	NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

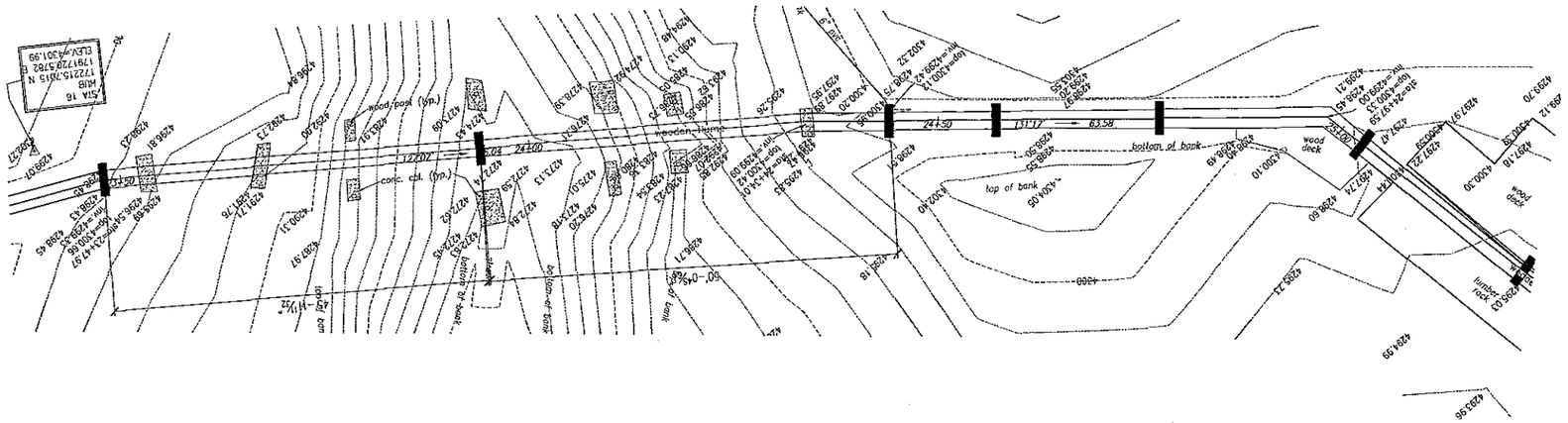
S-5

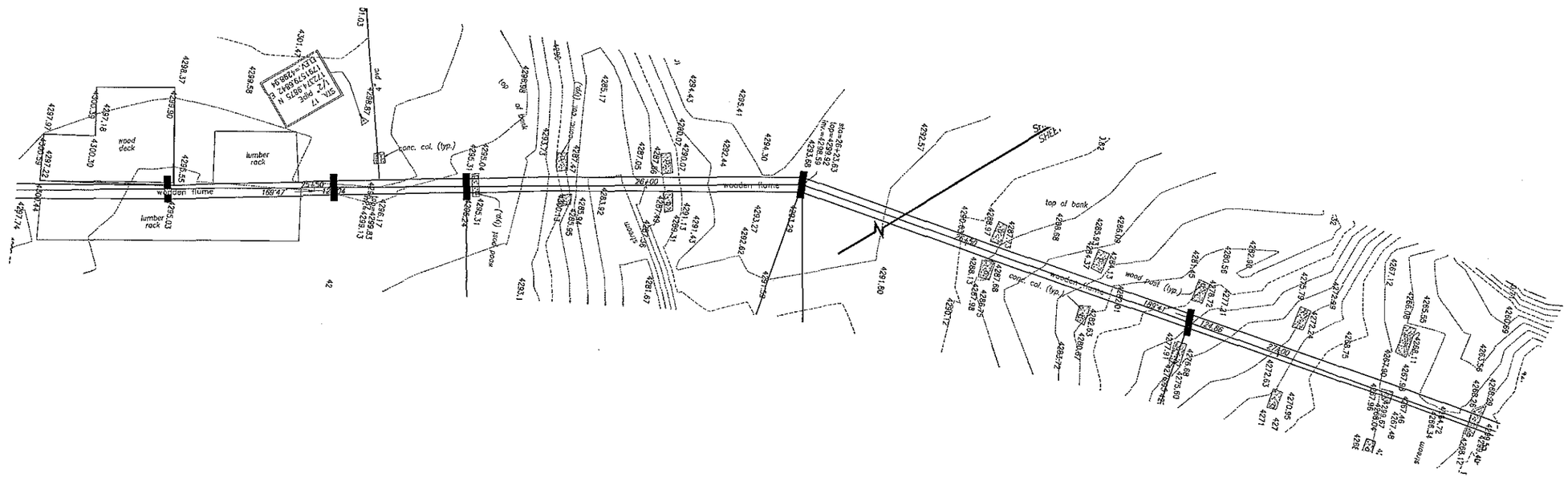
APPROVED

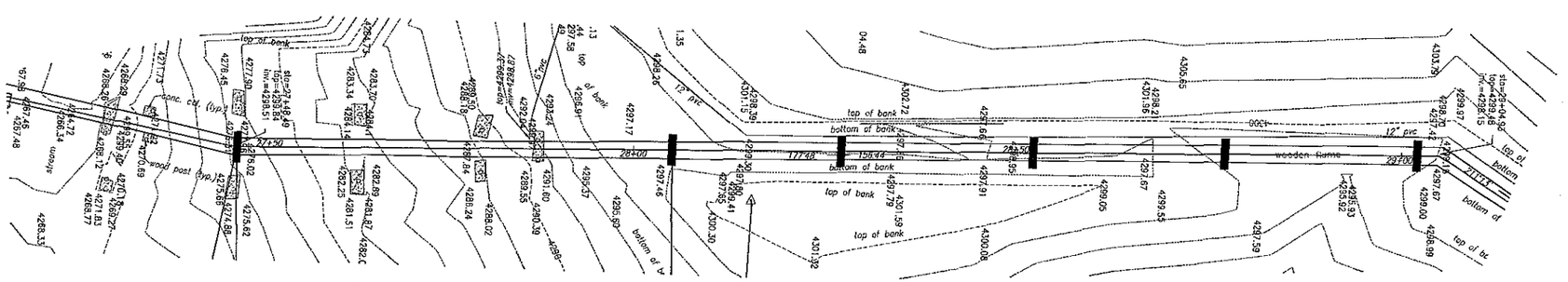
REG. PROF. ENGR., CERT. NO.

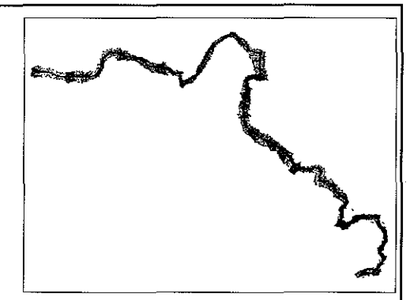
JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS









APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

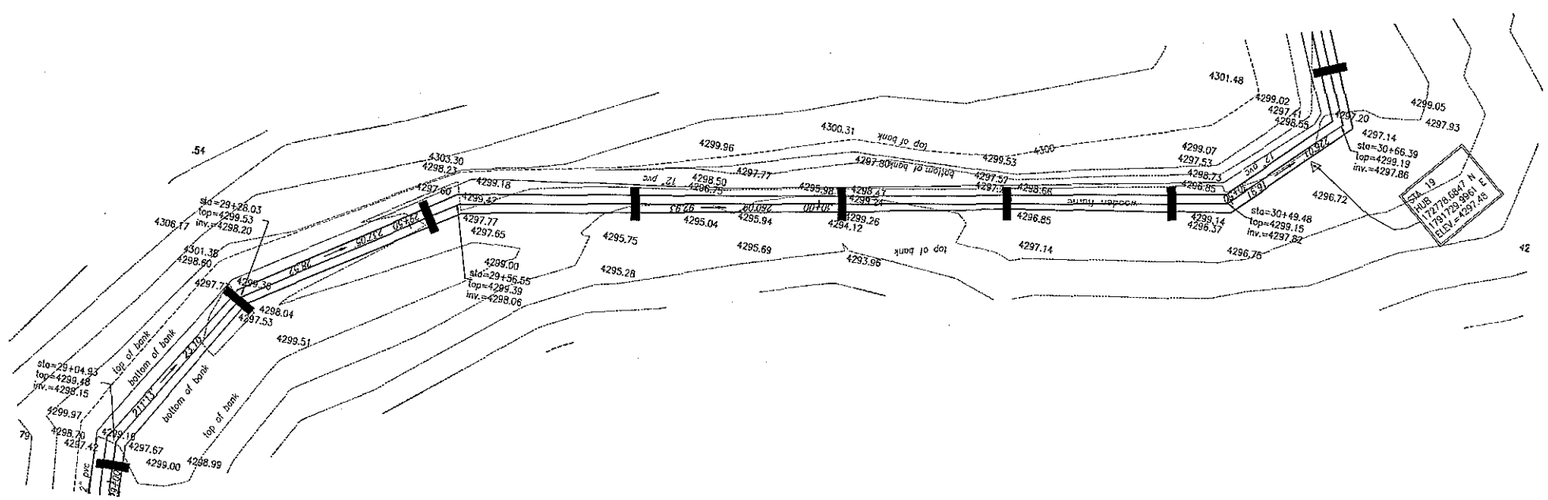
S-6

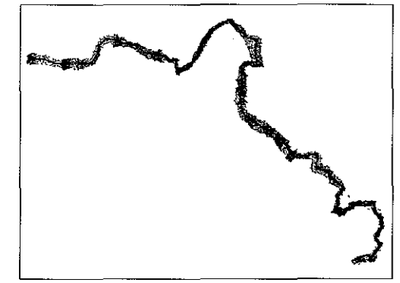
APPROVED

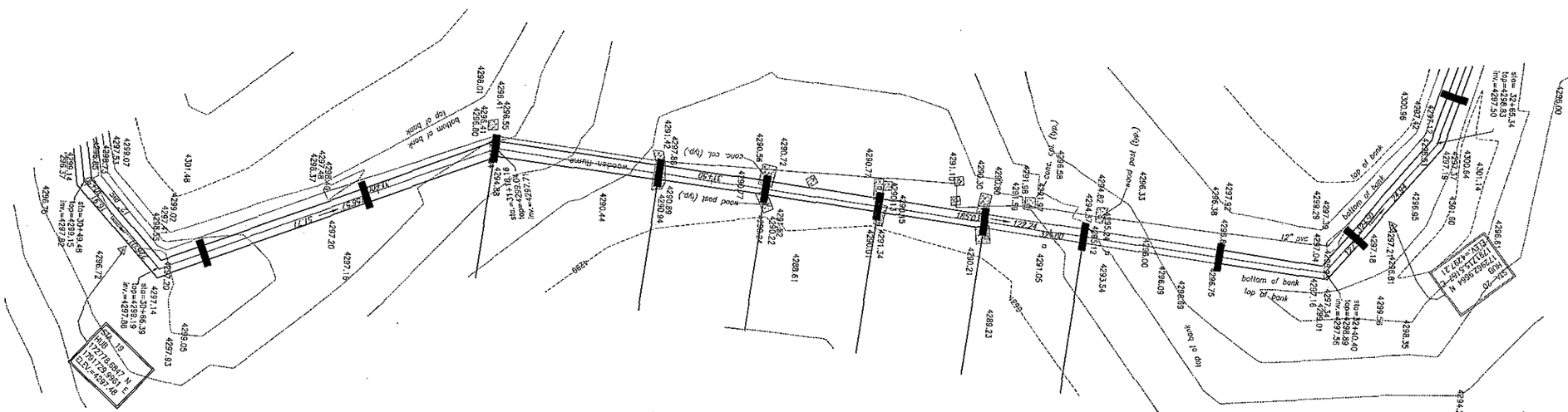
REG. PROF. ENGR., CERT. NO.

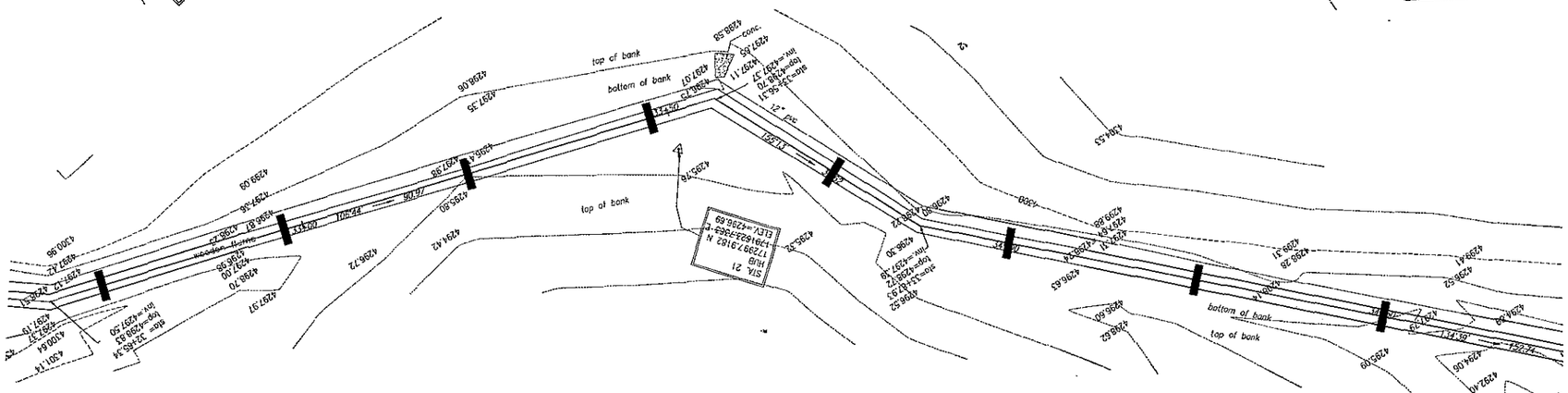
JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS









APPROVED	NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

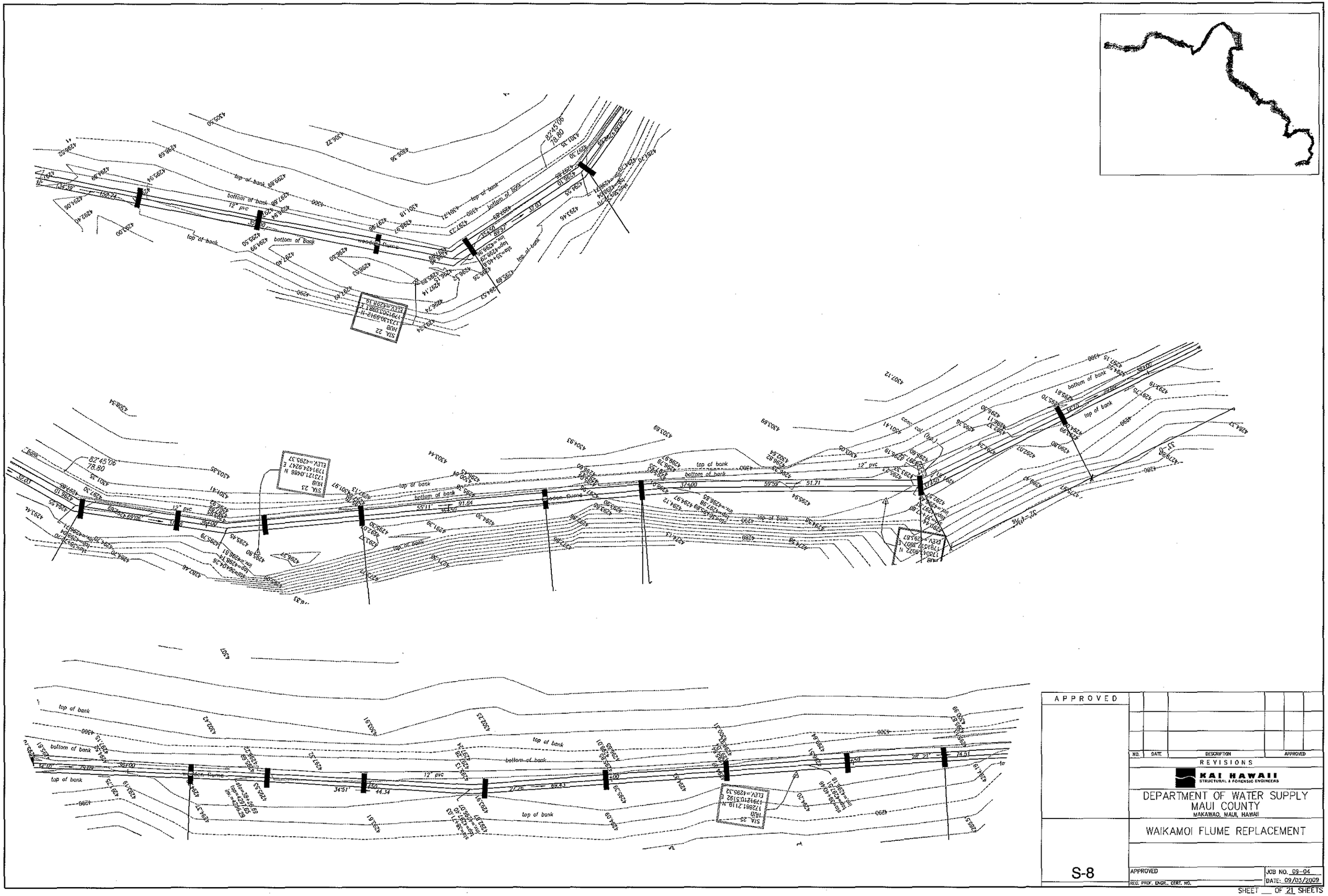
WAIKAMOI FLUME REPLACEMENT

S-7

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



APPROVED				
	NO.	DATE	DESCRIPTION	APPROVED
	REVISIONS			

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

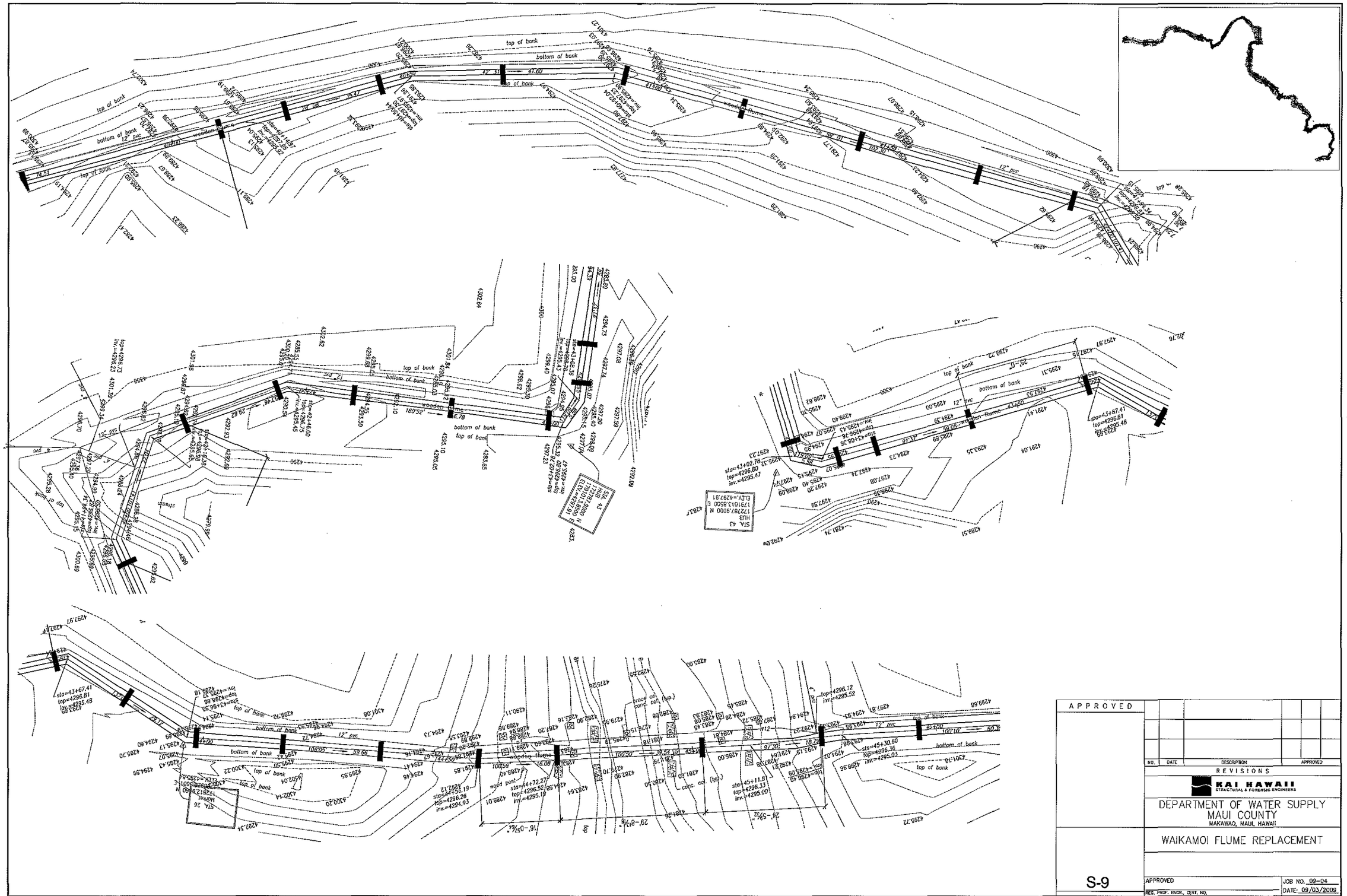
S-8

APPROVED

REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

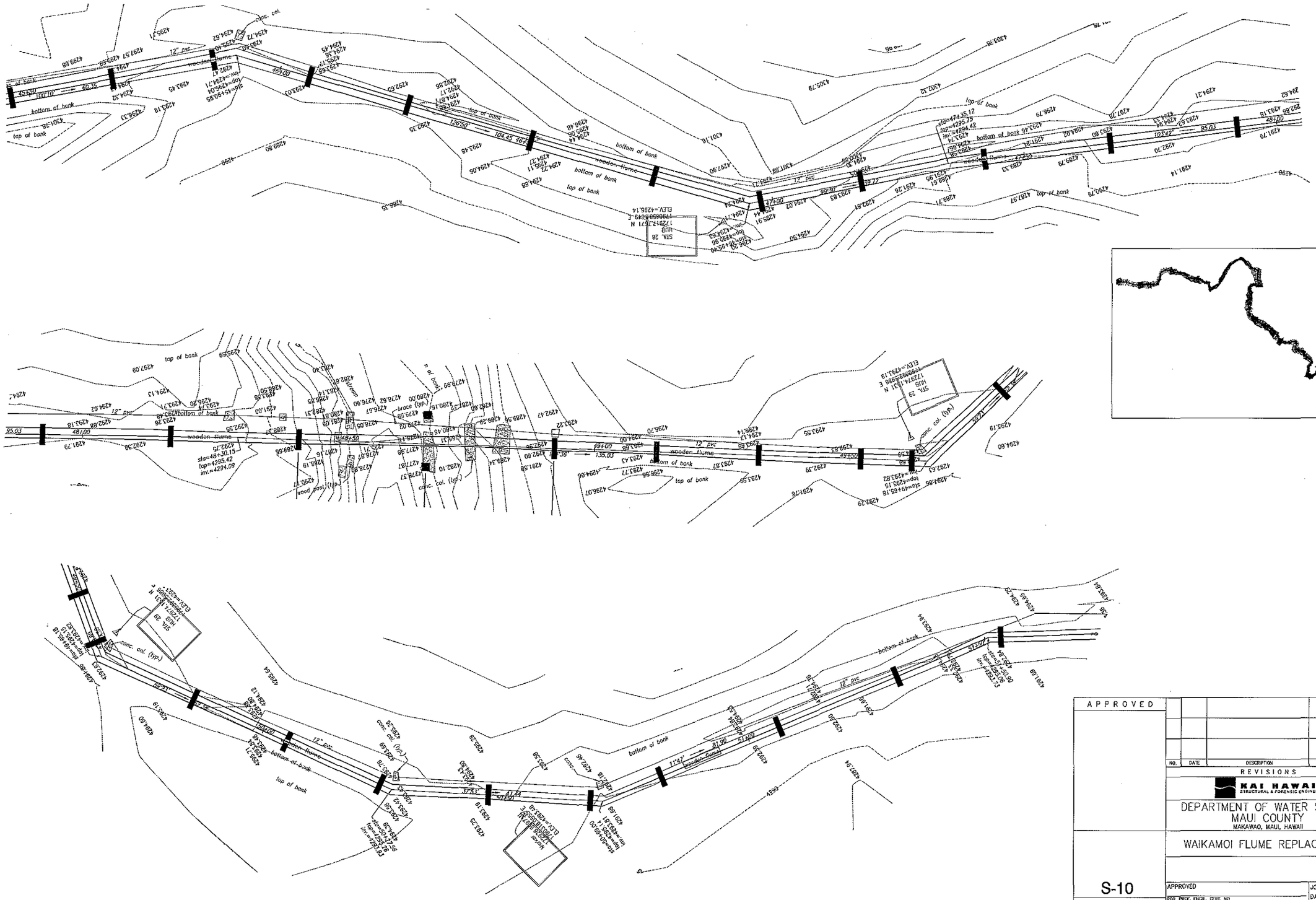
WAIKAMOI FLUME REPLACEMENT

S-9

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



APPROVED	NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

S-10

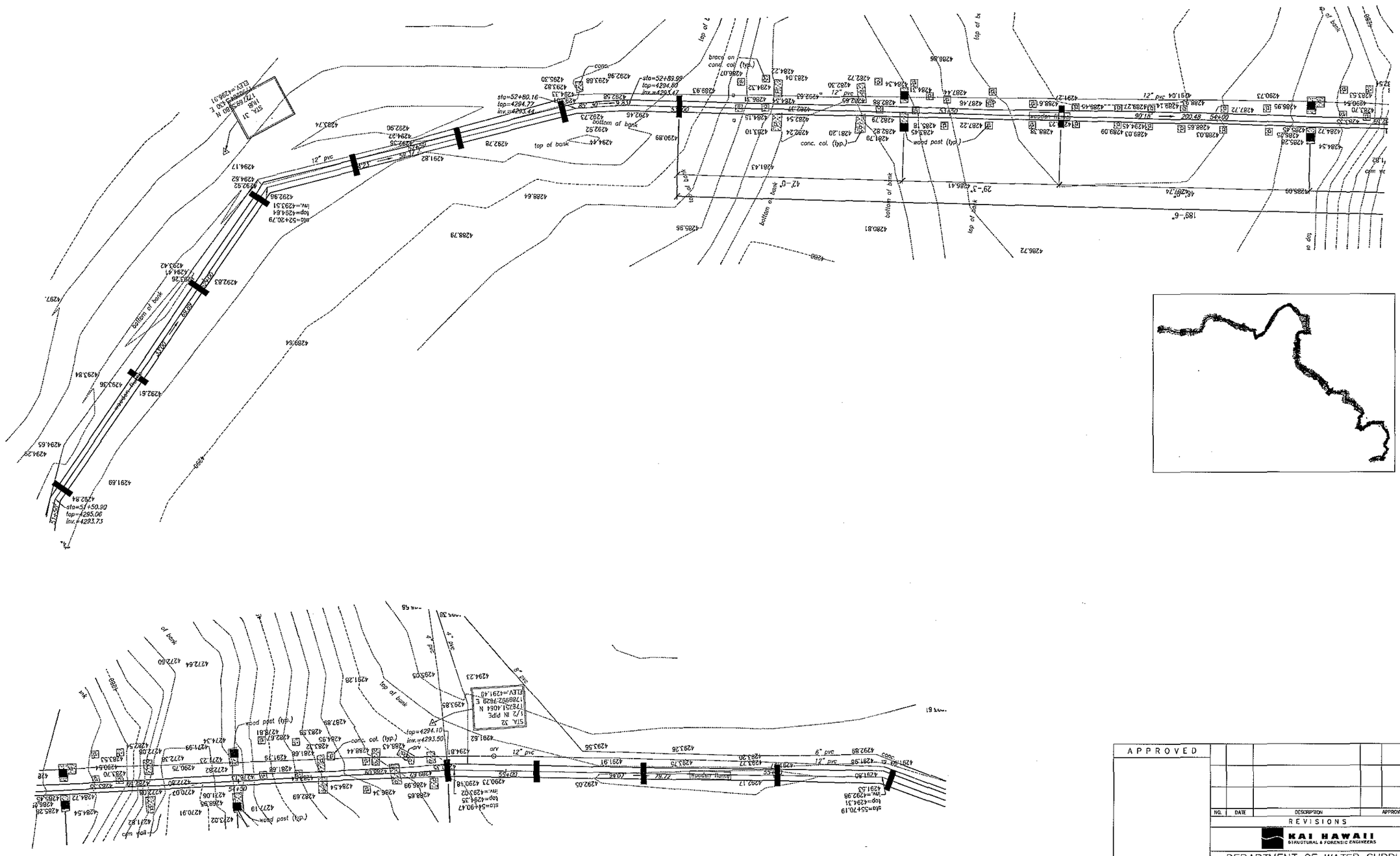
APPROVED

REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04

DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



APPROVED				
	NO.	DATE	DESCRIPTION	APPROVED
	REVISIONS			

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

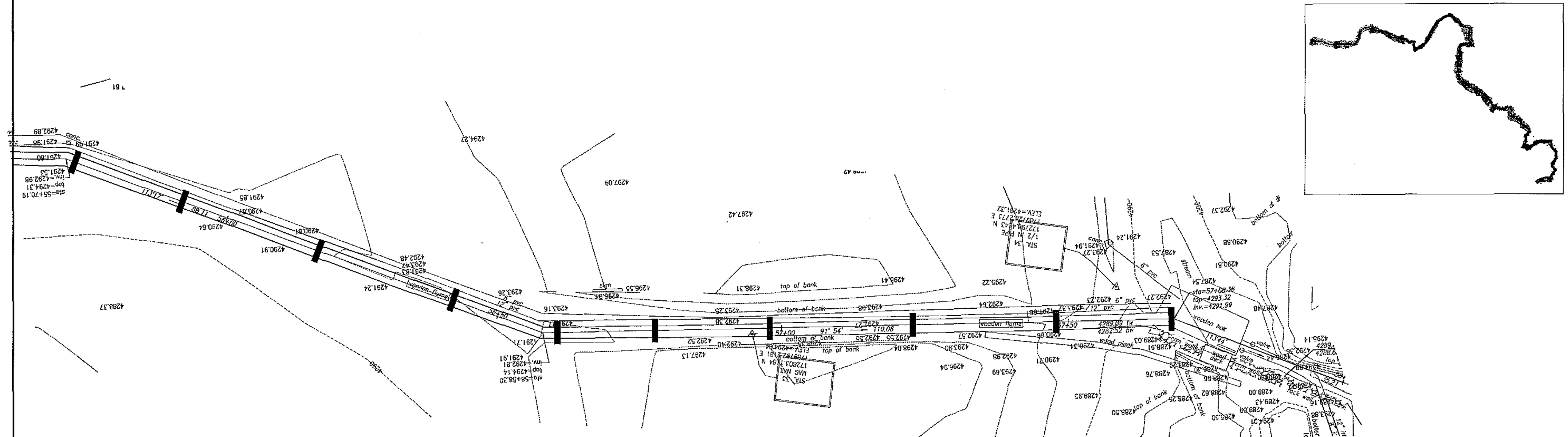
S-11

APPROVED

REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET __ OF 21 SHEETS



APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

S-12

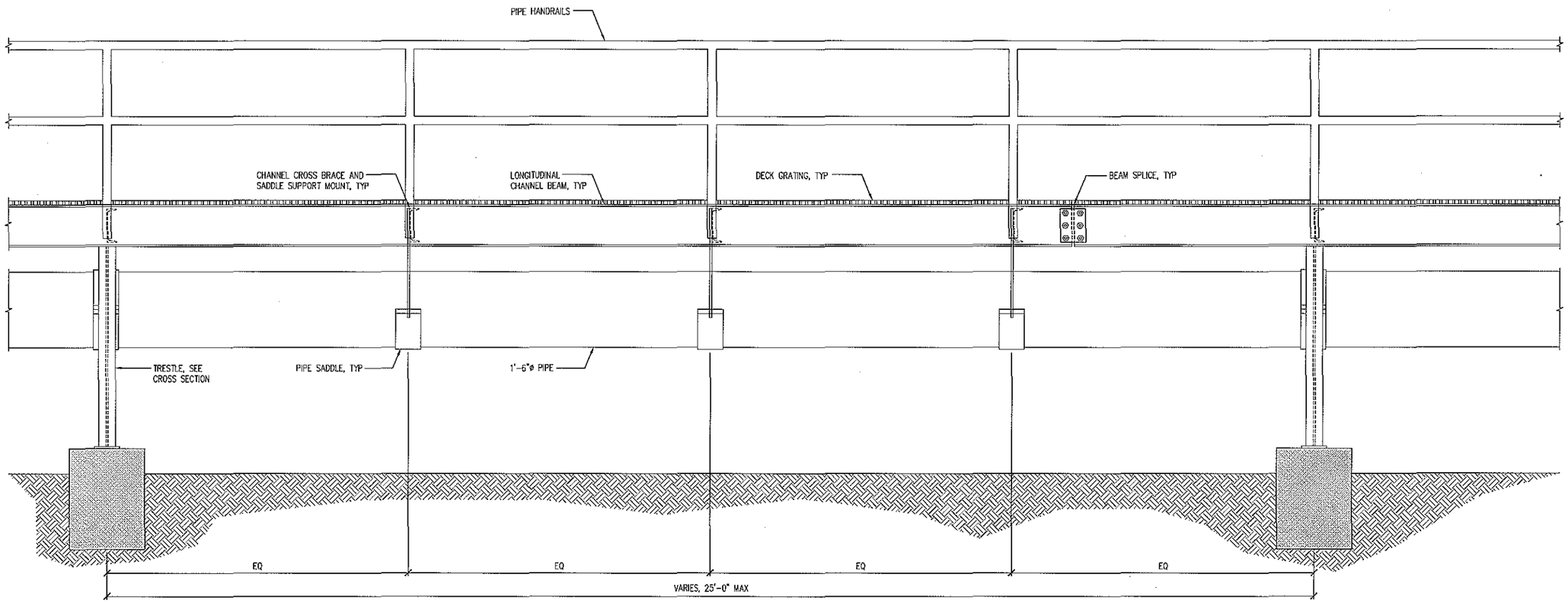
APPROVED

REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS

64



APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

TYPICAL SUPPORT
LONGITUDINAL ELEVATION

S-X

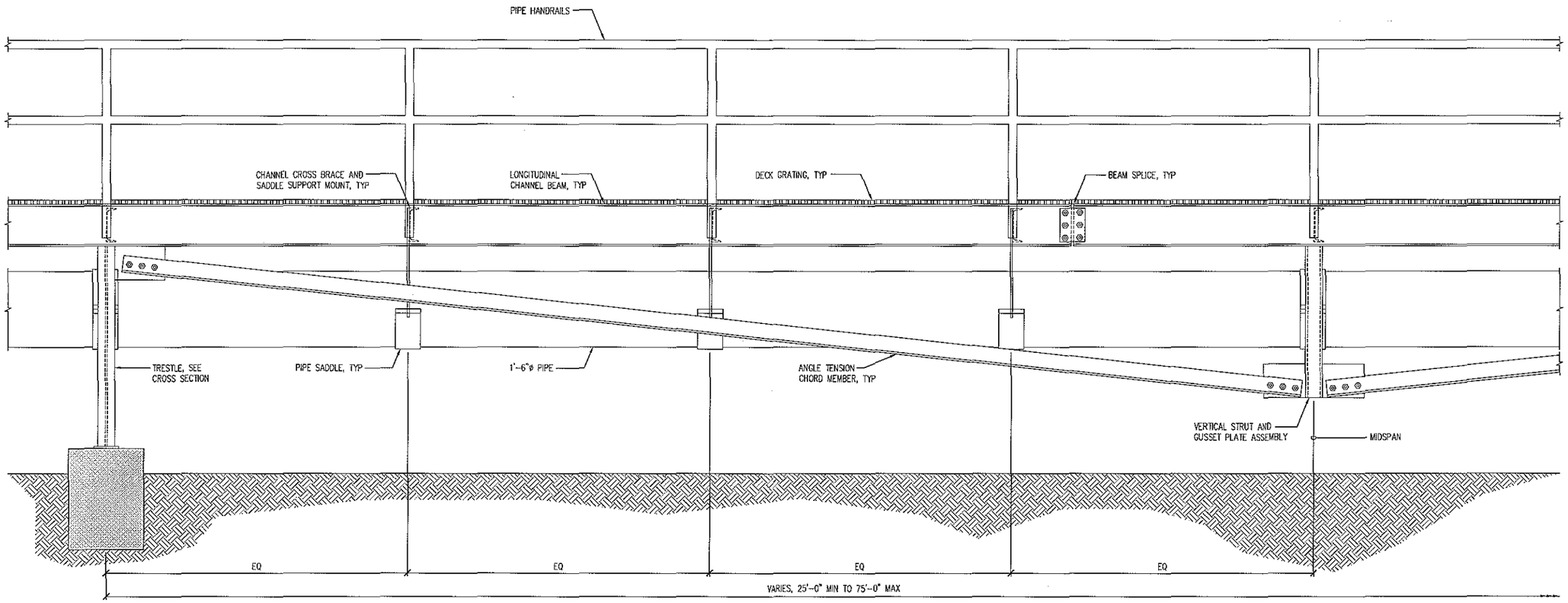
APPROVED

REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04

DATE: 09/03/2009

SHEET 5 OF 21 SHEETS



APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

BRIDGE TYPE SUPPORT
LONGITUDINAL ELEVATION

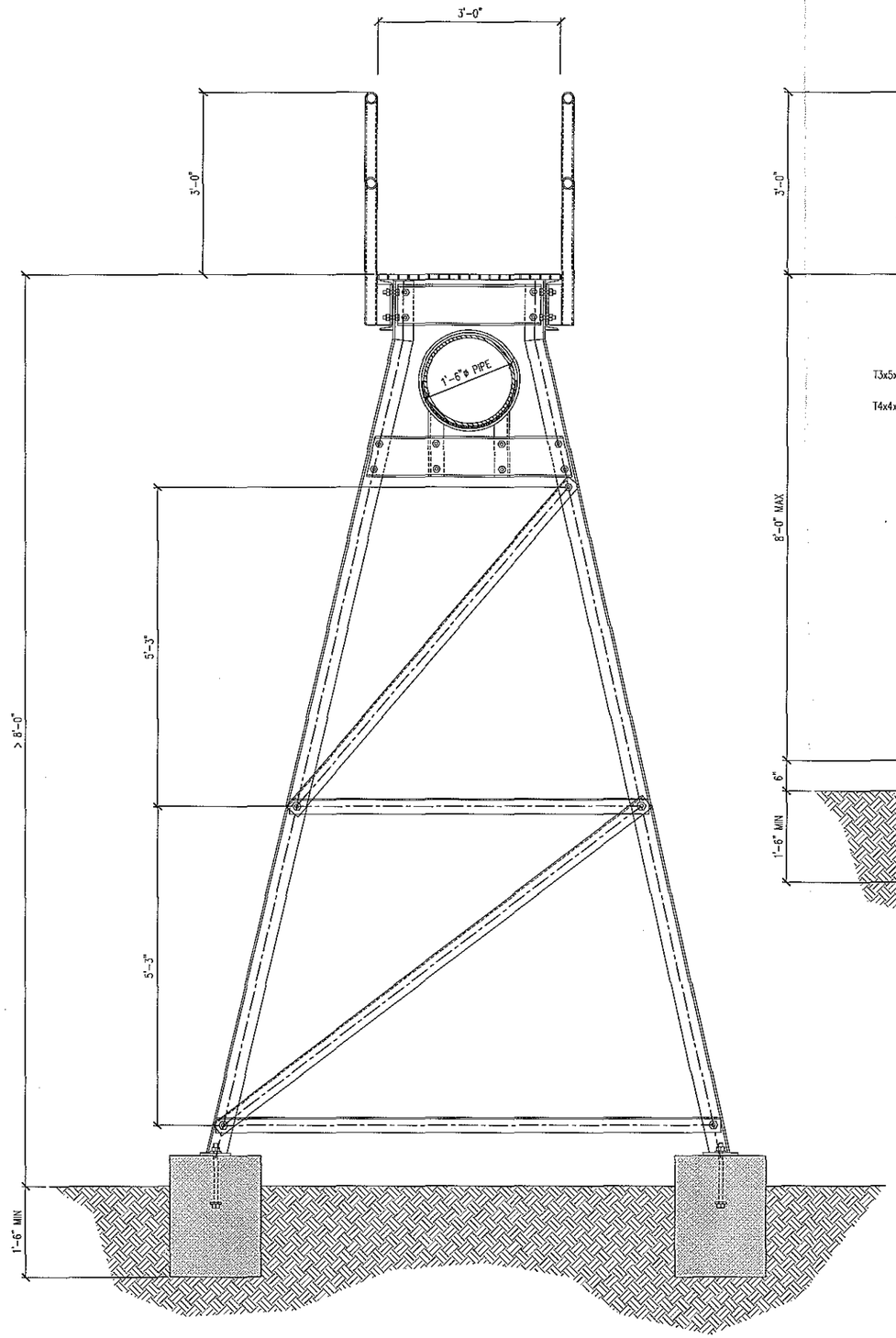
S-X

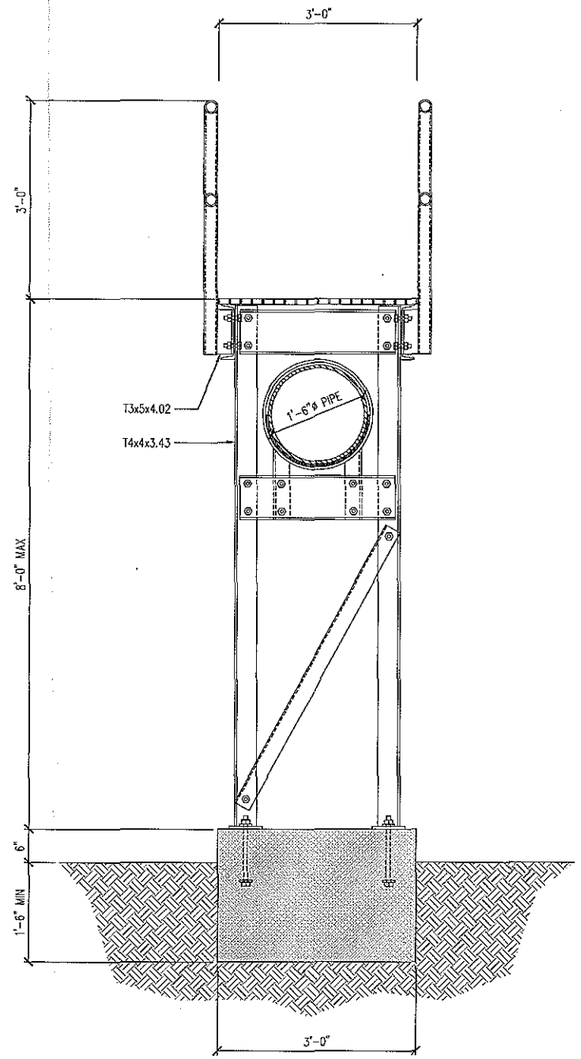
APPROVED
REG. PROF. ENGR., CERT. NO.

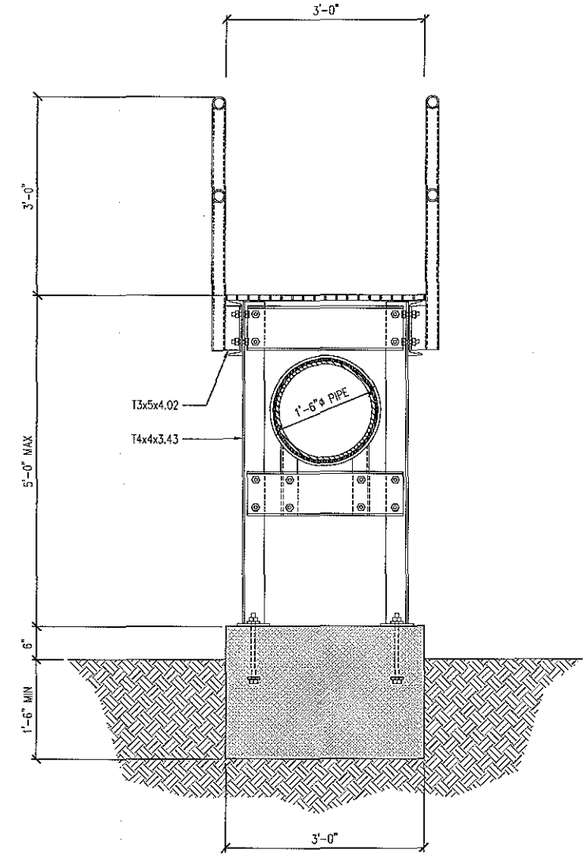
JOB NO. 09-04
DATE: 09/03/2009

SHEET 5 OF 21 SHEETS

66







APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

TYPICAL SUPPORT
CROSS SECTIONS

S-X

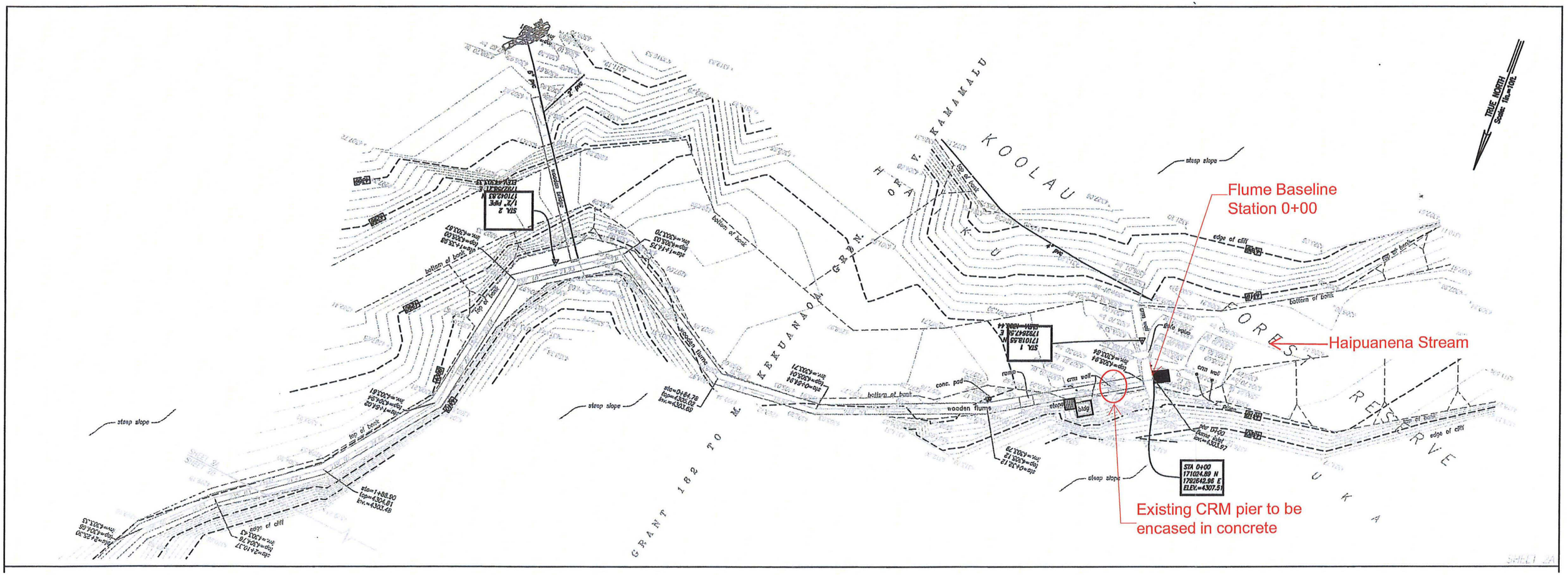
APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET 5 OF 21 SHEETS

EXHIBIT C.

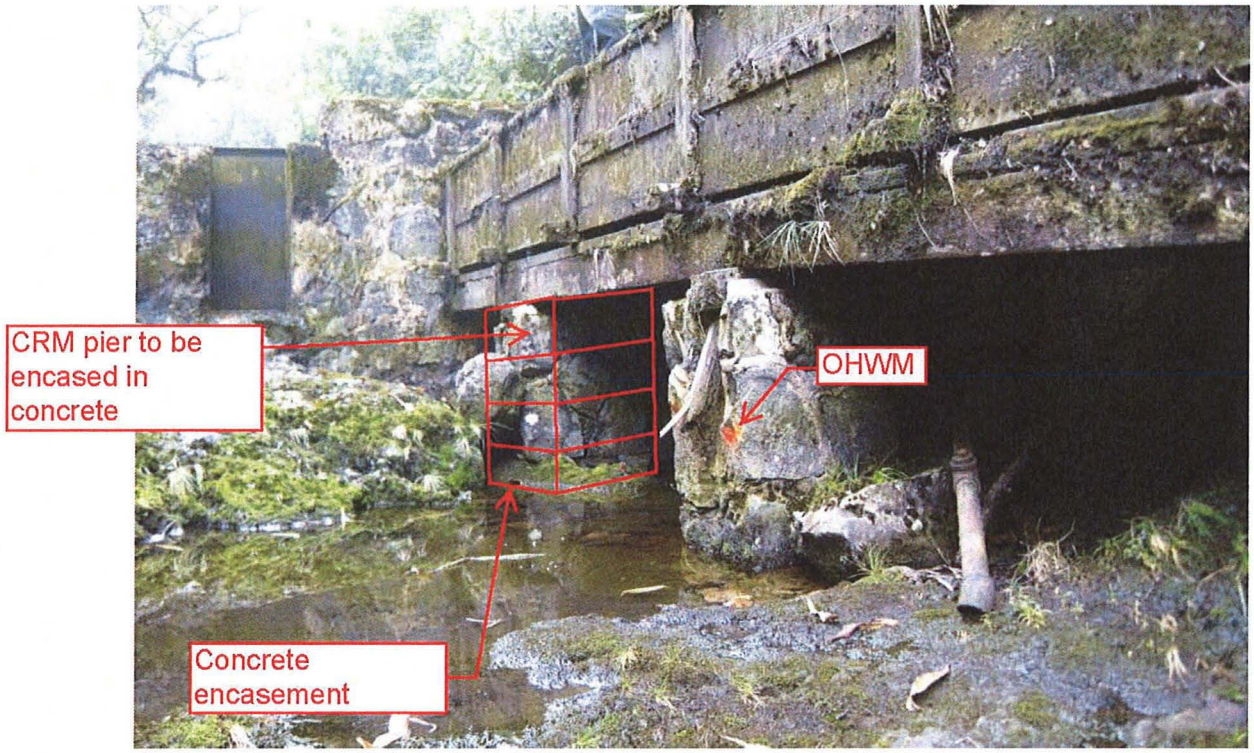
Project Plan
(Affected Portion of Haipuaena Stream)


Flume Baseline
Station 0+00
Haipuanena Stream
Existing CRM pier to be encased in concrete
STA 0+00
171024.89 N
1792642.96 E
ELEV.=4307.51
TRUE NORTH
Scale: 1in.=10ft.
KOOLAU
FORESTRESERVE
GRANT 182 TO M. KEKUANAOA
steep slope
edge of cliff
bottom of bank
top of bank
wooden flume
conc. pad
ramp
crm wall
steps
bldg
pier 13-00
bottom of bank

Photograph No. 1

Haipuaena Stream

Ordinary High Water Mark (red line)



Photograph No. 2: Proposed Encasement of Existing Pier

Haipuaena Stream

Ordinary High Watermark (red line)

ALAN M. ARAKAWA
Mayor

DAVID TAYLOR, P.E.
Director

PAUL J. MEYER
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

November 9, 2011

George P. Young, P. E., Chief
Attention: Jessie K. Paahana, Biologist
U.S. Army Corps of Engineers
Regulatory Branch
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

RE: I.D.: File No. POH-2010-00283
PHO-2010-00283 (Waikamoi Stream)
PHO-2011-00091 (Puohokamoa Stream)
PHO-2011-00092 (Haipuaena Stream)
TMK: (2) 2-4-016:004 (por.)

Project Name: Proposed Waikamoi Timber Flume Replacement Project at Makawao, Maui, Hawaii

Dear Ms. Paahana:

We thank you for your email correspondence of October 25, 2011, regarding our request for determination of the Department of the Army (DA) Section 404 permitting requirements for the proposed Waikamoi Timber Flume Replacement Project. See **Exhibit "A"**. Pursuant to your request, this letter is written to request verification that the subject project is exempt from Section 404 permitting requirements, based on the following provisions of the Clean Water Act (CWA) and Code of Federal Regulations (CFR):

Section 404 (f)(1)(c) of the CWA states that the discharge of dredged or fill material *"for the purpose of construction or maintenance of farm or stock ponds or irrigation ditches or the maintenance of drainage ditches"* is a non-prohibited activity. Meanwhile, 40 CFR 232.3 (c)(3) states that the following is exempt from Section 404 permitting requirements:

> *Construction or maintenance of farm or stock ponds or the maintenance (but not construction) of drainage ditches. Discharge associated with siphons, pumps, headgates, wingwalls, wiers, diversion structures, and such other facilities as are appurtenant and functionally related to irrigation ditches are included in this exemption.*

The Waikamoi Timber Flume is an integral component of the Upper Kula System of the County of Maui, Department of Water Supply. Surface water collected by the flume is conveyed to the Waikamoi and Kahakapao Reservoirs before being fed into the Olinda Water Treatment Plant (WTP). From the Olinda WTP, the Upper Kula System provides water service to users in Upper Kula, Kanaio, Waiakoa, and Ulupalakua. Inasmuch as this system services both residential and agricultural users, the water that is conveyed by the Waikamoi Timber Flume is utilized for both domestic and irrigation purposes.

In light of the foregoing and based on your review of our previous correspondence dated March 22, 2011 and September 15, 2011, your office has indicated that the proposed Waikamoi Timber Flume Replacement project may qualify for this particular exemption. We are, therefore, writing to you today to respectfully request a written Section 404 exemption determination from the U.S. Army Corps of Engineers for the project.

Should you have any questions or require additional information, please feel free to contact our Planning Consultant, Mark Alexander Roy of Munekiyo & Hiraga, Inc. at (808) 244-2015 or of course, Mr. Tom Ochwat or myself of this office at (808) 270-7835. Thank you for your kind attention to this request.

Sincerely,

David Taylor, P.E.
Director

Enclosure

cc: Mike Hunnemann, KAI Hawaii, Inc. (w/enclosure)
Tom Ochwat, Department of Water Supply (w/enclosure)
Mark Alexander Roy, Munekiyo & Hiraga, Inc. (with enclosure)

K:\DATA\KAIH\WaikamoiFlume\Army EC email res.doc

Mark Roy

From: Paahana, Jessie K POH [Jessie.K.Paahana@usace.army.mil]
Sent: Tuesday, October 25, 2011 10:49 AM
To: thomas.ochwat@co.maui.hi.us
Subject: POH-2010-00283, 2011-00091, 2011-00092 Waikamoi Timber Flume Replacement, Makawao, Maui, Hawaii (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Aloha, Tom:

Per our telephone conversation earlier this morning, you stated that the subject Waikamoi Timber Flume conveys both potable water and water for irrigation. For your information, under Subsection 404(f)(1)(c) of the CWA and 40 CFR 232.3(c)(3) discharges of dredged and/or fill material associated with construction or maintenance of irrigation ditches are exempt from the need to obtain a Section 404 permit from the DA. Section 404 permit exemption includes discharges of dredged and/or fill material resulting from construction of necessary appurtenances functional to the irrigation ditch i.e., concrete foundations/support structures, maintenance platforms/catwalks, etc. Reference http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=43f906ae67ec931937339f6d31e42205;rgn=div5;view=text;node=40%3A25.0.1.3.26;idno=40;cc=ecfr.

Based on my review of your submittal dated September 15, 2011, it appears the propsed flume replacement and appurtenant repairs will qualify for exemption under Subsection 404(f)(1)(c). Please submit to this office in writing (electronic copy is sufficient) a request for verification of the above permit exemption.

Should you have any questions, comments or concerns regarding this project, please contact me via email or the number below.

You are encouraged to provide comments on your experience with the Honolulu District Regulatory Branch by accessing our automated customer survey form at http://per2.nwp.usace.army.mil/survey.html

Thank you,
Jessie

Jessie K Paahana, Biologist
US Army Corps of Engineers, Regulatory
Ft. Shafter, Bldg. 214
ph: 808.438.0391

Classification: UNCLASSIFIED
Caveats: NONE

- -

County of Maui.

IT Security measures will reject attachments

larger than 11 MB, and will block or quarantine

high-risk file types in attachments.

EXHIBIT "A"

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

REPLY TO
ATTENTION OF:

December 5, 2011

Regulatory Branch

File Number POH-2010-00283
POH-2011-00091
POH-2011-00092

County of Maui
Department of Water Supply
Attention: David Taylor
200 South High Street
Wailuku, Hawaii 96793

RECEIVED
COUNTY OF MAUI
2011 DEC -6 PM 3: 5
DEPT. OF WATER SUPPLY

NO PERMIT REQUIRED

Dear Mr. Taylor:

We have received your letter dated November 9, 2011 requesting a Department of the Army (DA) determination of exemption under the Clean Water Act Subsection 404(f)(1)(C) for the proposed Waikamoi Timber Flume Replacement Project that crosses the Waikamoi, Puohokamoa and Haipuaena Streams in Makawao, Island of Maui, Hawaii.

We have completed our review of the submitted document pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404) and have determined the submitted documents accurately identifies waters of the U.S., subject to U.S. Army Corps of Engineers (Corps) jurisdiction.

For your information, Section 10 requires that a DA permit be obtained from the U.S. Army Corps of Engineers (Corps) prior to undertaking any construction, dredging, or other activity occurring in, over, or under or affecting navigable waters of the U.S. For tidal waters, the shoreward limit of the Corps' jurisdiction extends to the Mean High Water Mark (MHWM). The proposed flume replacement is not subject to regulation under Section10. Section 404 requires that a DA permit be obtained for the discharge (placement) of dredged and/or fill material into waters of the U.S., including wetlands. For non-tidal waters, the lateral limits of the Corps' jurisdiction extend to the Ordinary High Water Mark or the approved delineated boundary of any adjacent wetlands.

The perennial **Waikamoi, Puohokamoa and Haipuaena Streams, their tributaries and adjacent wetlands**, with end terminus in Uaoa Bay are as such **waters of the U.S., subject to Corps jurisdiction.** Based on the information you submitted, the proposed flume replacement would necessitate the discharge of fill material below the OHWM of the subject water bodies, their tributaries and adjacent wetlands resulting from construction of the irrigation ditch footing. Under Subsection 404(f)(1)(c) of the CWA and 40 CFR 232.3(c)(3) discharges of dredged and/or fill material associated with construction or maintenance of irrigation ditches are exempt from the need to obtain a Section 404 permit from the DA. Section 404 permit exemption includes discharges of dredged and./or fill material resulting from construction of necessary appurtenances and support structures functional to the irrigation ditch i.e., siphons, headgates, wingwalls, etc. Per your letter dated November 9, 2011, the Waikamoi flume normally conveys water for both domestic and irrigation purposes. Accordingly, we have determined that the **proposed discharges resulting from**

the flume construction would not be subject to regulation under Subsection 404(f)(1)(C), therefore, a **DA permit will not be required.**

We advise your client consult with this office prior to undertaking any future construction activities involving the discharge of dredged and/or fill material waterward of the OHWM of the subject water bodies, their tributaries and/or adjacent wetlands. This determination does not relieve you of the responsibility to obtain any other permits, licenses, or approvals that may be required under County, State, or Federal law for your proposed work.

Thank you for contacting us regarding this project and providing us with the opportunity to comment. Should you have any questions, please contact Ms. Jessie Pa'ahana at *808.438.0391* or via e-mail at *Jessie.K.Paahana@usace.army.mil*. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at *http://per2.nwp.usace.army.mil/survey.html*.

Sincerely,

George P. Young, P.E.
for Chief, Regulatory Branch

NOV 0 8 2010

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EMD / CWB

11019PJF.10

November 5, 2010

Ms. Kimberly Skog
Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

SUBJECT: Consultation Request for Proposed Waikamoi Timber Flume Reconstruction Makawao, Island of Maui, Hawaii TMK: (2) 2-4-016:004

The Department of Health, Clean Water Branch (CWB), has reviewed the subject document and offers these comments on your project.

Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://www.hawaii.gov/health/environmental/env-planning/landuse/CWB-standardcomment.pdf.

1. Any project and its potential impacts to State waters must meet the following criteria:

    a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

    b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

    c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55). For the following types of discharges into Class A or Class 2 State waters, you may apply for an NPDES general permit coverage by submitting a Notice of Intent (NOI) form:

   a. Storm water associated with construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NPDES permit is required before the start of the construction activities.

   b. Construction dewatering effluent.

   You must submit a separate NOI form for each type of discharge at least 30 calendar days prior to the start of the discharge activity, except when applying for coverage for discharges of storm water associated with construction activity. For this type of discharge, the NOI must be submitted 30 calendar days before to the start of construction activities. The NOI forms may be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html.

3. For types of wastewater not listed in Item No. 2 above or wastewater discharging into Class 1 or Class AA waters, you may need an NPDES individual permit. An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. The NPDES application forms may be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 Water Quality Certification are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

If you have any questions, please visit our website at:
http://www.hawaii.gov/health/environmental/water/cleanwater/index.html, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

JF:ml

c: DOH-EPO #I-3376 [via email only]

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

May 8, 2012

Alec Wong, PE, Chief
Clean Water Branch
State of Hawaii, Department of Health
Post Office Box 3378
Honolulu, Hawaii 96801-3378

SUBJECT: Early Consultation Request for the Proposed Waikamoi Timber Flume Replacement Project at Makawao, Maui, Hawaii (Ref 11019PJF.10)

Dear Mr. Wong:

Thank you for your letter, dated November 5, 2010, providing early consultation comments on the subject project. On behalf of the applicant, the County of Maui, Department of Water Supply (DWS), we offer the following information in response to your comments.

We have reviewed the standard comments that are compiled on your listed website. Below are the applicable comments and our responses thereto:

- **Comment:** The Army Corps of Engineers should be contacted at (808) 438-9258 to see if this project requires a Department of the Army (DA) permit. Permits may be required for work performed in, over, and under navigable waters of the United States. Projects requiring a DA permit also require a Section 401 Water Quality Certification (WQC) from our office.

  Response: Consultation with the DA has been undertaken as part of early consultation for the proposed project. By letter dated December 5, 2011, the U.S. Army Corps of Engineers confirmed that a DA Permit is not required for the project. See **Exhibit "A"**.

- **Comment:** You must also submit a copy of the NOI or NPDES permit application to the State DLNR, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the CWB that SHPD has or is in the process of evaluating your project. Please submit a copy of your request for review by

SHPD or SHPD's determination letter for the project along with your NOI or NPDES permit application, as applicable.

Response: As applicable, a copy of the Notice of Intent (NOI) or National Pollutant Discharge Elimination System (NPDES) permit application will be submitted to the State Department of Natural Resources, State Historic Preservation Division (SHPD). As applicable, a copy of the request for review by SHPD or SHPD's determination letter will also be submitted with the NOI or NPDES permit application.

- **Comment:** Effluent discharge and/or receiving water monitoring may be required as conditions of Section 401 Water Quality Certifications and NPDES General and Individual permits.

Response: We note that monitoring of effluent discharge and/or receiving water may be required as conditions of Section 401 Water Quality Certifications and NPDES General and Individual permits, as applicable.

The proposed project will comply with applicable criteria relating to Antidegradation Policy, Designated Uses, and Water Quality as set forth in Sections 11-54-1.1, 11-54-3, and 11-54-4 through 11-54-8, Hawaii Administrative Rules.

It is recognized that a NPDES permit may be required for the proposed project. Coordination with your Department will be carried out to determine the applicable NPDES Permit requirements.

It is acknowledged that all discharges related to project construction or operations must comply with the State's Water Quality Standards, regardless of whether NPDES permit coverage and/or Section 401 Water Quality Certification are required.

We appreciate the input provided by your office. A copy of your letter will be included in the Draft EA for the subject project.

Should you have any questions, please feel free to contact me at (808) 244-2015.

Very truly yours,

Kimberly Skog
Associate

KS:yp
cc: Mike Hunnemann, KAI Hawaii
Tom Ochwat, Department of Water Supply
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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF:

December 5, 2011

Regulatory Branch

File Number POH-2010-00283
POH-2011-00091
POH-2011-00092

County of Maui
Department of Water Supply
Attention: David Taylor
200 South High Street
Wailuku, Hawaii 96793

RECEIVED
COUNTY OF MAUI
2011 DEC -6 PM 3:59
DEPT. OF WATER SUPPLY

NO PERMIT REQUIRED

Dear Mr. Taylor:

We have received your letter dated November 9, 2011 requesting a Department of the Army (DA) determination of exemption under the Clean Water Act Subsection 404(f)(1)(C) for the proposed Waikamoi Timber Flume Replacement Project that crosses the Waikamoi, Puohokamoa and Haipuaena Streams in Makawao, Island of Maui, Hawaii.

We have completed our review of the submitted document pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404) and have determined the submitted documents accurately identifies waters of the U.S., subject to U.S. Army Corps of Engineers (Corps) jurisdiction.

For your information, Section 10 requires that a DA permit be obtained from the U.S. Army Corps of Engineers (Corps) prior to undertaking any construction, dredging, or other activity occurring in, over, or under or affecting navigable waters of the U.S. For tidal waters, the shoreward limit of the Corps' jurisdiction extends to the Mean High Water Mark (MHWM). The proposed flume replacement is not subject to regulation under Section10. Section 404 requires that a DA permit be obtained for the discharge (placement) of dredged and/or fill material into waters of the U.S., including wetlands. For non-tidal waters, the lateral limits of the Corps' jurisdiction extend to the Ordinary High Water Mark or the approved delineated boundary of any adjacent wetlands.

The perennial **Waikamoi, Puohokamoa and Haipuaena Streams, their tributaries and adjacent wetlands**, with end terminus in Uaoa Bay are as such **waters of the U.S., subject to Corps jurisdiction**. Based on the information you submitted, the proposed flume replacement would necessitate the discharge of fill material below the OHWM of the subject water bodies, their tributaries and adjacent wetlands resulting from construction of the irrigation ditch footing. Under Subsection 404(f)(1)(c) of the CWA and 40 CFR 232.3(c)(3) discharges of dredged and/or fill material associated with construction or maintenance of irrigation ditches are exempt from the need to obtain a Section 404 permit from the DA. Section 404 permit exemption includes discharges of dredged and./or fill material resulting from construction of necessary appurtenances and support structures functional to the irrigation ditch i.e., siphons, headgates, wingwalls, etc. Per your letter dated November 9, 2011, the Waikamoi flume normally conveys water for both domestic and irrigation purposes. Accordingly, we have determined that the **proposed discharges resulting from**

EXHIBIT "A"

the flume construction would not be subject to regulation under Subsection 404(f)(1)(C), therefore, a **DA permit will not be required.**

We advise your client consult with this office prior to undertaking any future construction activities involving the discharge of dredged and/or fill material waterward of the OHWM of the subject water bodies, their tributaries and/or adjacent wetlands. This determination does not relieve you of the responsibility to obtain any other permits, licenses, or approvals that may be required under County, State, or Federal law for your proposed work.

Thank you for contacting us regarding this project and providing us with the opportunity to comment. Should you have any questions, please contact Ms. Jessie Pa'ahana at *808.438.0391* or via e-mail at *Jessie.K.Paahana@usace.army.mil*. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at *http://per2.nwp.usace.army.mil/survey.html*.

Sincerely,

for George P. Young, P.E.
Chief, Regulatory Branch

NOV 05 2010

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 4, 2010

Munekiyo & Hiraga, Inc.
305 High Street Suite 104
Wailuku, Hawaii 96793

Attention: Ms. Kimberly Skog, Associate

Ladies and Gentlemen:

Subject: Early Consultation Request for Proposed Waikamoi Timber Flume Reconstruction

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comment.

Other than the comments from Division of Aquatic Resources, Division of Forestry & Wildlife, Commission on Water Resource Management, Engineering Division, the Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0414. Thank you.

Sincerely,

Charlene E. Unoki

for Russell Y. Tsuji
Administrator

85

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

PAUL J. CONRY
ACTING FIRST DEPUTY

LENORE N. OHYE
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

TO: Charlene Unoki

FROM: David Leonard, Wildlife Biologist, Division of Forestry and Wildlife

SUBJECT: Early consultation for proposed Waikamoi Timber Flume Reconstruction

DATE: October 24, 2010

Until additional details are provided the only relevant comment is that every effort should be made to minimize the transport of alien species to the site. Attached please find protocols that may be useful.

RECEIVED
LAND DIVISION
2010 OCT 25 P 3: 21
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

86

PREVENTING INTRODUCTION OF ALIEN SPECIES

Control of non-native plants and animals is a high priority for resource management groups in Hawaii. A large amount of personnel time and resources are expended every year to battle alien species. New plant and animals arrive in the islands on a continual basis, and natural resource managers must focus on preventing their spread into natural areas. Visitors, volunteers, researchers, and staff are potential vectors of alien species. The origin of these alien pests can be the mainland, another island in the Hawaiian archipelago, or even a weedy or urban area of the same island. Described below are likely routes of alien species introduction and procedures that can be followed to minimize or eliminate introduction and spread of alien plants and animals.

1 - Field Gear and Field Equipment

Inspect field gear and equipment before going into the field. Two categories of pests that merit attention are weeds and insects (especially ants and cockroaches). Clods of dirt or mud can hide these hitchhikers. It is necessary to inspect and clean: footwear (treads, laces, boot tongues); socks; pant legs; pockets; jackets; raingear; food-stuffs; tools; packs; tents; hammocks; tarps; helicopter sling nets; wood and building materials; fencing materials; bottoms of plastic buckets; tool bags; and other containers or equipment. Appropriate methods to clean gear include: water and hose, brush, clean rag, knife edge, or insecticide. Cleaning should be done in a designated area with a nearby receptacle for disposal. Laundering of washable items should be done after each trip. This is particularly important when working on different islands, in different areas on the same island, or on the mainland. Each area may have its own assemblage of pests that must be prevented from spreading to new locations where the pests do not currently exist. In some cases, it may be preferable to use a different set of field gear for each field site. If items can not be cleaned, they should be left at the baseyard or discarded.

2 - Field Vehicles

Keep field vehicles clean. The inside of field vehicles should be vacuumed, and pickup truck beds should be swept out after every trip to the field. Pay particular attention to seats, floors, dashboards, and door jambs. Tires (especially treads) and undercarriage of vehicles should be hosed off after each field visit to avoid transporting weed seeds. Maintaining clean field gear can be compromised by using a dirty truck.

3 - Helicopter Landing Zones and Camp Sites

Keep helicopter landing zones and camp sites free of significant weed species. Helicopter used to transport personnel into the field fly to and from other islands and land in other natural areas. Although it may be impractical to clean helicopter skids and interiors, a well-used landing zone can be managed. Weeds in these areas should be eradicated or cut back periodically. Similarly, weeds around camp sites should be controlled or eliminated.

4 - Travel Routes and Trails

Avoid carrying weed seeds from an infested part of the preserve to pristine areas. If travel routes go through areas infested with invasive weeds, be conscious of the potential for spread. When leaving a weedy area and entering a more pristine area, transport of weed seeds can be reduced by carrying a small brush to clean shoe soles, pant legs, and packs. Stick to established and well used trails or travel routes to avoid spreading weeds off trail.

5 - Trash and Garbage

Pack out your trash and unused foodstuffs. Do not bury trash in the field. Avoid taking in any fruits (in your food or digestive tract) that have seeds with the potential to naturalize (e.g. cherry tomatoes, chili peppers, berries, and guava). Organic trash (e.g. orange and banana skins, apple and pear cores, peach and avocado pits) should be treated as other garbage and packed out. Garbage that is discarded in the field has the potential to spread unseen insects, fungi, and other plant pathogens and may provide food for alien vertebrates.

6 - Education

Learn to recognize invasive species, the habitats they currently occupy, and those areas where they are likely to spread. Learn which weeds are particularly invasive in Hawaii and where they occur. Note which weeds or animal sign (e.g. tracks or scat) are encountered along preserve trails or roads and pay attention to any changes. If a highly invasive weed or animal sign is encountered, inform the preserve staff of the location. One source of information about alien species in Hawaii, including photos and distribution maps, can be found on the internet at the Hawaii Ecosystems at Risk Project web site (<http://www.hear.org>). Share this information and your knowledge with friends and colleagues when visiting other natural areas.

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON

WILLIAM D. BALFOUR, JR.
SUMNER ERDMAN
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
DONNA FAY K. KIYOSAKI, P.E.
LAWRENCE H. MIIKE, M.D., J.D.

LENORE N. OHYE
ACTING DEPUTY DIRECTOR

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

October 25, 2010

REF: RFD.2763.6

Ms. Kimberly Skog
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Skog:

SUBJECT: Early Consultation Request for Proposed Waikamoi Timber Flume Reconstruction at TMK (2) 2-4-016:004 (por), Makawao, Maui, Hawaii

TMK NO.: (2) 2-4-016:004 (por)

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at *http://www.hawaii.gov/dlnr/cwrm.*

Our comments related to water resources are checked off below.

☐ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.

☐ 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EPA as having high water efficiency can be found at http://www.epa.gov/watersense/pp/index.htm.

☐ 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://hawaii.gov/dbedt/czm/initiative/lid.php.

☐ 6. We recommend the use of alternative water sources, wherever practicable.

☐ 7. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM:
Additional information and forms are available at *www.hawaii.gov/dlnr/cwrm/forms.htm*.

☐ 8. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water.

☐ 9. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.

☐ 10. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☐ 11. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 12. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☒ 13. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.

☒ 14. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 15. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 16. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☒ OTHER:
Please continue to consult and inform the Commission on Water Resource Management throughout the progression of this project to ensure efficiency should permits be required, as this project relates to the Commission's recent actions on instream flow standards in east Maui.

If there are any questions, please contact Robert Chong at (808) 587-0266.

Sincerely,

Lenore N. Ohye

LENORE N. OHYE
Acting Deputy Director

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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2010 OCT 28 A 9:32
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

10 OCT 14 AM 10:50 ENGINEERING

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 13, 2010

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
__ Div. of Boating & Ocean Recreation
x Engineering Division
x Div. of Forestry & Wildlife
__ Div. of State Parks
x Commission on Water Resource Management
x Office of Conservation & Coastal Lands
__ Land Division –
x Historic Preservation

FROM: Charlene Unoki, Assistant Administrator Charlene
SUBJECT: Early Consultation for Proposed Waikamoi Timber Flume Reconstruction
LOCATION: Island of Maui
APPLICANT: Munekiyo & Hiraga, Inc. on behalf of the County of Maui, Department of Water

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by November 3, 2010.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(X) Comments are attached.

Signed: [signature]
Date: 10/29/10

91

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/CharleneUnoki
RE:EarlyConsultWaikamoiFlumeRestoration
Maui.524

COMMENTS

( ) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ___.

(X) **Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zones X. The Flood Insurance Program does not have any regulations for developments within Flood Zones X.**

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

( ) Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

( ) Mr. Robert Sumitomo at (808) 768-8097 or Mr. Mario Siu Li at (808) 768-8098 of the City and County of Honolulu, Department of Planning and Permitting.

( ) Mr. Carter Romero at (808) 961-8943 of the County of Hawaii, Department of Public Works.

( ) Mr. Francis Cerizo at (808) 270-7771 of the County of Maui, Department of Planning.

( ) Ms. Wynne Ushigome at (808) 241-4890 of the County of Kauai, Department of Public Works.

( ) The applicant should include water demands and infrastructure required to meet project needs. Please note that projects within State lands requiring water service from the Honolulu Board of Water Supply system will be required to pay a resource development charge, in addition to Water Facilities Charges for transmission and daily storage.

( ) The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.

( ) Additional Comments: _____

( ) Other: _____

Should you have any questions, please call Ms. Suzie S. Agraan of the Planning Branch at 587-0258.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 10/26/10

OCT 25 2010

FORESTRY & WILDLIFE - MAUI
54 S. High Street, Room 101
Wailuku, HI 96793
(808) 873-3502, fax 873-3505

Memo

To: Kimberly Skog, Munekiyo & Hiraga, Inc.

From: Dr. Fern p. Duvall II, Wildlife Biologist

CC: Dr. David Leonard, Wildlife Biologist, Administration,
Glenn Shishido, Forestry Manager, Maui Branch

Date: 10/25/2010

Re: Early Consultation Comments for Waikamoi Timber Flume Reconstruction at TMK (2) 2-4-016:004 (port.), Makawao, Maui, Hawaii

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Dear Kimberly:

Thank-you for the opportunity to comment early in the process. The Waikamoi Timber Flume passes through a very sensitive ecological area. The following bullets point to concerns that should be incorporated into project implementation.

- How much of the area to each side of the flume, and below the flume at the gulch crossings, will actually be impacted by the work? At least several very rare plant species, and possibly land snails, just adjacent to the flume or the trestle areas in the gulches, could well be impacted during the work process. A pre-work-start survey to locate and mark the rare plant species and snails should be included. Methods for prevention of damage needs to be included in the formulation of the project.

- Trestle replacement could have the biggest impact to the plant resources and snails; how will impacts be reduced or mitigated?

- All "trash" from the work needs to be removed from the site, no discard materials or any waste should remain in the field, or be placed so that it causes collateral negative impacts preceding its removal.

- All precautions against import or spread of any weed plant species must be implemented. If weeds are imported or spread, a mitigation and removal plan must be included in the work.

My contacts, if there are any questions or comments: (808) 873-3502, Fax (808) 873-3505.

Sincerely,

Dr. Fern P. Duvall II

Wildlife Biologist

93

LD

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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LAND DIVISION

2010 NOV -4 A 11:54

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

DEPT OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

October 13, 2010

MEMORANDUM

TO: ~~DLNR Agencies:~~
x Div. of Aquatic Resources
__ ~~Div. of Boating & Ocean Recreation~~
x Engineering Division
x Div. of Forestry & Wildlife
__ Div. of State Parks
x Commission on Water Resource Management
x Office of Conservation & Coastal Lands
__ Land Division –
x Historic Preservation

RECEIVED
OCT 14 2010
AQUATIC RESOURCES

FROM: Charlene Unoki, Assistant Administrator Charlene
SUBJECT: Early Consultation for Proposed Waikamoi Timber Flume Reconstruction
LOCATION: Island of Maui
APPLICANT: Munekiyo & Hiraga, Inc. on behalf of the County of Maui, Department of Water

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by November 3, 2010.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(X) Comments are attached.

Signed: [signature]
Date: 10/28/10

ROBERT T. NISHIMOTO, Ph.D.
Aquatic Resources Program Manager

RECEIVED OCT 27 2010 Maui

94

DIVISION OF AQUATIC RESOURCES - MAUI
DEPARTMENT OF LAND & NATURAL RESOURCES
130 Mahalani Street
Wailuku, Hawai'i 96793
October 28, 2010

To: Alton Miyasaka, Aquatic Biologist

From: Skippy Hau, Aquatic Biologist

Subject: Early Consultation for Proposed Waikamoi Timber Flume Reconstruction (DAR3426)
(Due November 3, 2010 Charlene Unoki, Land)

Has a full assessment of the water system been completed? Have areas with leaks been identified?

Although it was built as a timber flume, is it feasible to replace the system? Have other materials or the use of plastic pipes been considered for replacement of parts of the irrigation ditches and flume system? How has leakage from the system been reduced?

Will old flumes and discontinued sections be removed when parts of the system have been upgraded? There are decomposing flumes, pipes, and equipment that appear to have been used and abandoned in East Maui.

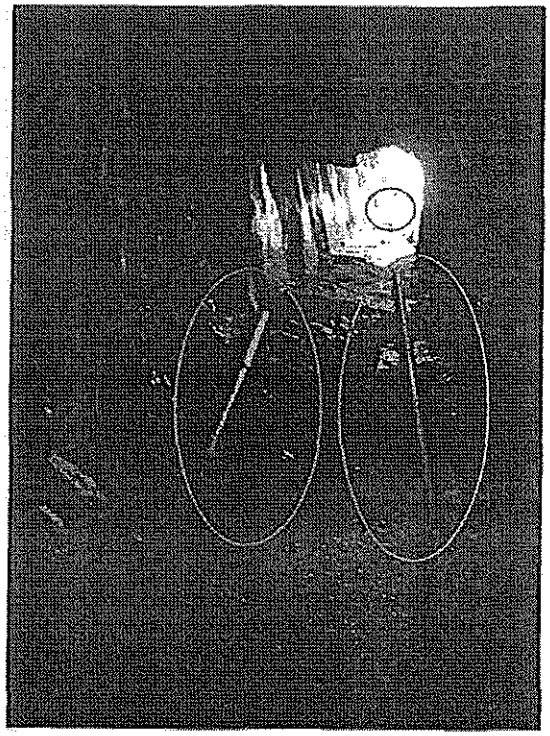
Parts of the old flume and equipment should be removed and not be abandoned.

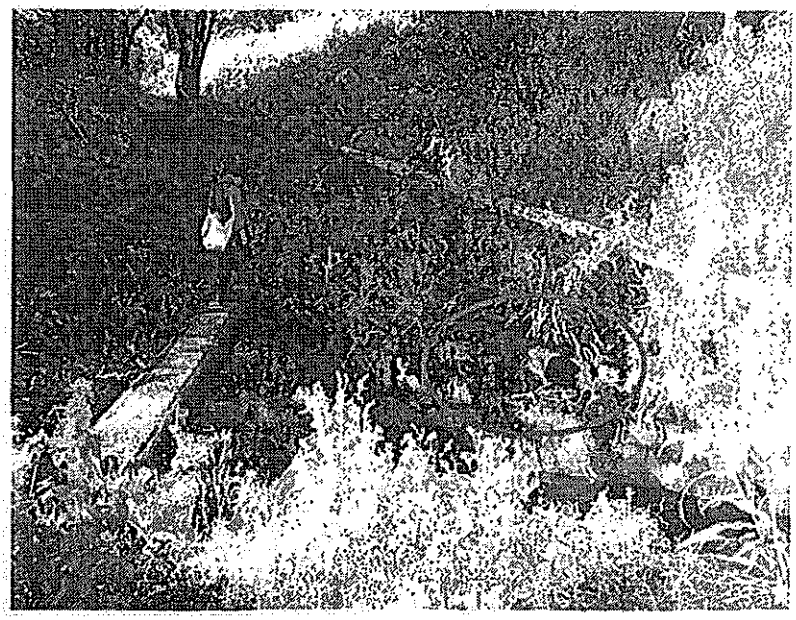
As has been discovered with the East Maui Irrigation system, water could have been allowed to remain in certain streams with sufficient water for current irrigation demand if leakage were reduced.

Once completed, who will maintain the irrigation system? Without maintenance, leaks will cause losses from the irrigation ditch system.

East Maui Stream Surveys

Kapa'ula Stream 11 February 2009
(Abandoned pipes circled in red)





MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

May 8, 2012

Russell Y. Tsuji, Administrator
Land Division
State of Hawaii, Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Early Consultation Request for the Proposed Waikamoi Timber Flume Replacement Project at Makawao, Maui, Hawaii

Dear Mr. Tsuji:

Thank you for your letter, dated November 4, 2010, providing early consultation comments on the subject project. On behalf of the applicant, the County of Maui, Department of Water Supply (DWS), we offer the following information in response to your comments.

DIVISION OF AQUATIC RESOURCES

The existing Waikamoi Timber Flume is approximately 1.1 miles long and consists of a redwood box section that measures two (2) feet wide by 13 inches deep. Timber bridges support the flume over gulches and areas where abrupt changes in ground elevation preclude the maintenance of a constant slope for the flume. DWS has estimated that approximately 40 percent of the water carried by the Waikamoi Timber Flume is lost through leaks and gaps that have been worn into the aged wooden planks that make up the flume. Aside from the leaks, the flume structure is in poor condition, and the timber bridges are hazardous for maintenance personnel to cross.

The proposed project involves the replacement of the entire Waikamoi Flume. The conceptual design of the replacement flume structure consists of an aluminium flume box similar in size to the existing timber flume box that will be supported by an aluminum space frame truss. The flume replacement will serve to eliminate leaks along the entire length of the flume. Additionally, the aluminum truss is anticipated to resist weathering better than the existing wooden truss.

All debris from the deconstruction of the existing flume and all debris associated with the construction of the new flume will be removed from the project area. The removal of

waste will be addressed in the contractor bid package and specified in the Best Management Practices (BMPs).

We note your comment regarding the benefits of reducing leakages from the water transmission system. In this respect, the goal of the proposed project is to eliminate the substantial losses in the system that currently result from leaks in the existing timber flume. This project is being undertaken in compliance with an implementation action issued on May 25, 2010 by the Commission on Water Resource Management that requires DWS to replace the flume to reduce waste and system loss. The proposed project will provide an improved and more efficient water system that will ensure continued supply of drinking water to Upcountry Maui residents.

As is the case with the existing flume, the replacement flume will be maintained by DWS.

DIVISION OF FORESTRY AND WILDLIFE

The following information is provided in response to the memorandum from David Leonard, dated October 24, 2010.

- It is recognized that the project site, being situated within the Koolau Forest Reserve, is located within a sensitive ecological area that is home to a high concentration of native species of flora and fauna. The applicant will make every practicable effort to minimize the transport of alien species to the project site. The protocols for preventing the introduction of alien species that were provided with your letter have been reviewed, and applicable protocols will be followed during project implementation.

The following information is provided in response to the letter from Dr. Fern Duvall II, dated October 26, 2010:

- All work involved in the proposed project will be confined to a corridor approximately 30 feet in width, spanning 15 feet to either side of the existing timber flume. It is recognized that construction activities may have an impact on any species that may be located within this corridor. A Flora and Fauna Survey has been prepared (by biological consultant Robert Hobdy) as part of the Draft Environmental Assessment (EA) to identify and record any rare species of flora or fauna that may be present within the affected corridor. The Flora and Fauna Survey and appropriate measures to prevent and minimize damage to any rare species that are found within the project corridor will be discussed in the Draft EA.

- Towards reducing the impact of trestle placement on flora and fauna resources, to the extent practicable, new trestles will be placed in existing trestle locations and the number of new trestles will be kept to a minimum. It is noted that the replacement flume as a whole will occupy a smaller footprint than the existing flume. In addition, construction activity will be confined to the existing disturbed corridor that surrounds the flume structure.

- In seeking to prevent collateral negative impacts to the project site and surrounding areas, all "trash" and other waste will be removed from the project site, and no materials will be discarded in or around the area. The handling of waste will be addressed in the contractor bid package and specified in the BMPs.

- It is recognized that the project site, being situated within the Koolau Forest Reserve, is located within a sensitive ecological area that is home to a high concentration of native species of flora and fauna. As recommended by the Flora and Fauna Survey report, the applicant will make every practicable effort to minimize and prevent the transport of alien species to the project site.

COMMISSION ON WATER RESOURCE MANAGEMENT

- Bridge piers that support the reconstructed flume will not be located within 25 feet of any streambed or stream channel, and related construction will not involve alteration to any streambed or stream channel. One (1) existing support footing that is below the Ordinary High Water Mark of Haipuaena Stream will be encased in concrete; however, no alteration to the streambed will take place. As such, the proposed project is not anticipated to require a Stream Channel Alteration Permit.

- The proposed project is limited to the reconstruction of an existing Waikamoi Timber Flume. As such, the scope of work does not involve diversion of any stream and is, therefore, not anticipated to require a Stream Diversion Works Permit.

ENGINEERING DIVISION

We note that the project site is located in Flood Zone X, as denoted by the Flood Insurance Rate Map (FIRM), and that the National Flood Insurance Program does not have any regulations for developments within Flood Zone X.

We appreciate the input provided by your office and will include a copy of your letter in the Draft EA for the subject project.

Should you have any questions, please feel free to contact me at (808) 244-2015.

Very truly yours,

Kimberly Skog
Associate

KS:yp
cc: Mike Hunnemann, KAI Hawaii
Tom Ochwat, Department of Water Supply
K:\DATA\KAIHi\WaikamoiFlume\EC Response Letter\DLNR LandDivecres.doc

NOV 1 5 2010

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

PAUL J. CONRY
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AQUATIC RESOURCES
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CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:AB

Correspondence: MA-11-78

NOV 1 2 2010

Kimberly Skog
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai'i 96793

SUBJECT: Early Consultation for the Proposed Waikamoi Timber Flume Reconstruction Project, Makawao, Maui, TMK: (2) 2-4-016:004 (portion)

Dear Ms. Skog:

The Department of Land and Natural Resources (DLNR) Office of Conservation and Coastal Lands (OCCL) has reviewed the information you provided regarding the pre-consultation for the proposed Waikamoi Timber Flume reconstruction project, located at Makawao, Maui, TMK: (2) 2-4-016:004 (portion).

According to your information, the proposed project involves construction of a new flume that will carry approximately the same volume of water as the existing flume, and a new pedestrian catwalk for accessing the flume along its entire length to perform routine maintenance.

The project site appears to be located in the State Conservation District, Protective subzone. The project is an identified land use in the Conservation District pursuant to HAR §13-5-22 *Identified Land Uses in the Protective Subzone*, P-9 STRUCTURES, EXISTING, (C-1) *Demolition, removal, or alteration of existing structures, facilities and equipment. Any historic property shall be evaluated by the department for historical significance.*

This action would require filing a Conservation District Use Application (CDUA) for a Departmental Permit, as well as an Environmental Assessment.

Should you have any questions regarding this letter, you may contact Audrey Barker of our office at (808) 587-0377.

Sincerely,

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

c: Chairperson
MDLO
Maui Planning Department
Maui Department of Water Supply

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

December 28, 2011

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Proposed Waikamoi Timber Flume Replacement Project at Makawao, Maui, Hawaii (Correspondence: MA-11-78)

Dear Mr. Lemmo:

Thank you for your letter, dated November 12, 2010, providing early consultation comments on the proposed Waikamoi Timber Flume Replacement project. On behalf of the applicant, the County of Maui, Department of Water Supply (DWS), we offer the following information in response to your comments:

A. *STATE CONSERVATION DISTRICT RULES*

We note the determination that the project site is located within the State Conservation District, Protective subzone. As stated in your letter, under the previous Conservation District rules set forth by §13-5-22, Hawaii Administrative Rules (HAR), Identified Land Uses in the Protective Subzone, the proposed project was classified under the following:

> *P-9 STRUCTURES EXISTING, (C-1) Demolition, removal, or alteration of existing structures, facilities and equipment. Any historic property shall be evaluated by the department for historical significance.*

As such, the determination was made that the proposed project would require filing of a Conservation District Use Application (CDUA) for a Departmental Permit.

We recognize, however, that the new Conservation District rules have gone into effect as of Monday, December 5, 2011. Under this set of rules, a similar land use category is provided:

> *P-8 STRUCTURES AND LAND USES, EXISTING, (B-1) Demolition, removal, or minor alteration of existing structures, facilities and equipment. Any historic property shall be evaluated by the department for historical significance.*

We hereby seek confirmation that under this classification, the proposed project would now require a Site Plan Approval (B-1) from the Office of Conservation and Coastal Lands (OCCL) in order to proceed.

B. ***PROJECT DESCRIPTION***

As previously described in our early consultation letter, the purpose of the flume replacement project is to eliminate leakages that result in substantial losses of water from the system, thereby providing an improved and more efficient conveyance facility for the County of Maui. The Waikamoi Flume, originally constructed in 1908 and reconstructed in the 1930's, is situated in the Koolau Forest Reserve on Maui. Located within the State Conservation District, the flume stretches about 1.1 miles from its intake at Haipuaena Stream in the east to the vicinity of Waikamoi Stream in the west. See **Figure 1** and **Figure 2**. In 1974 and 1975 the flume box was replaced with new redwood planking, though the supporting trusses that were constructed in the 1930's were retained in place. The existing flume is 2-feet wide by 13-inches deep and traverses rough terrain over various gulch and gulley crossings, within an approximately 10-foot-wide corridor.

Due to years of weathering, the flume box, timber bridges, and supporting trusses are currently in poor condition. The flume box is full of holes causing the loss of approximately 40 percent of the water being carried by the existing flume. Also, the timber bridges are in poor condition, creating a dangerous situation for DWS maintenance personnel when they traverse the flume. DWS is pursuing the Waikamoi Flume replacement project to reduce waste and system loss, in compliance with an implementation action issued by the Commission on Water Resource Management on May 25, 2010.

This project involves the replacement of the entire wooden flume structure and supporting trusses. The subject project will affect a corridor of land approximately 1.1 miles long by 30 feet wide. The design for the proposed new

flume structure consists of a stainless steel or aluminum flume box similar in size to the existing timber flume box that will be supported on a stainless steel prefabricated space frame truss. The truss will be supported on concrete foundations buried in the soil measuring approximately 8-feet wide by 4-feet long. Where the flume runs along level ground, the foundations will be spaced approximately 25 feet apart on center. Where the flume crosses over a gully or gulch, the foundations may be spaced as much as 70 feet apart. To avoid any sediment from entering into any streams, the new foundations will be located at or above the ordinary high water mark (OHWM) of every streambed that is crossed. However, it is noted that one (1) existing support footing below the OHWM of Haipuaena Stream will be retained in place but will be encased in concrete to serve as a support footing for the replacement flume.

The replacement flume will occupy a smaller footprint than the existing flume structure. With the project in place, the area of disturbed ground occupied by the flume will be reduced from 1,650 square feet (with the existing flume) to approximately 1,260 square feet (with the replacement flume). The existing flume intake structures will not be modified as part of the replacement project such that the capacity of the new flume will be approximately the same as the existing flume and there will be no intensification of use.

Ancillary construction-related improvements in the Conservation District include repairs to an existing access road, and small secondary equipment laydown areas along existing flume corridor. The existing access road is an unimproved dirt and gravel roadway that extends a distance of approximately 3.9 miles from the mauka terminus of Olinda Road, eastward to Waikamoi Stream. The road passes through both State Agricultural District and Conservation District lands. To facilitate access for construction vehicles and equipment, minor repair work, such as the placement of gravel in specific locations, will be undertaken along the access road. Minor grading may be necessary in specific areas of the access road, however, the existing roadway will not be lengthened or widened. It is noted that the primary temporary construction staging area will be located to the immediate north of the existing Kahakapao Reservoir in the State Agricultural District on a portion of Tax Map Key (TMK) (2) 2-4-016:001. See **Figure 3.**

Table 1, below, identifies the Tax Map Key (TMK) parcels in the Conservation District that are affected by the proposed project.

Table 1. Affected TMK Parcels in the Conservation District

TMK	State Land Use Designation	Existing Use(s)	Proposed Use(s)
(2) 2-4-016:002	Conservation	Access road	Minor repairs to access road
(2) 2-4-016:003	Conservation	Access road	Minor repairs to access road
(2) 2-4-016:004	Conservation	Access Road Waikamoi Reservoirs Waikamoi Dams Waikamoi Flume	Minor repairs to access road; Waikamoi Flume Replacement work

C. ***CONSERVATION DISTRICT USE APPLICATION REQUIREMENTS***

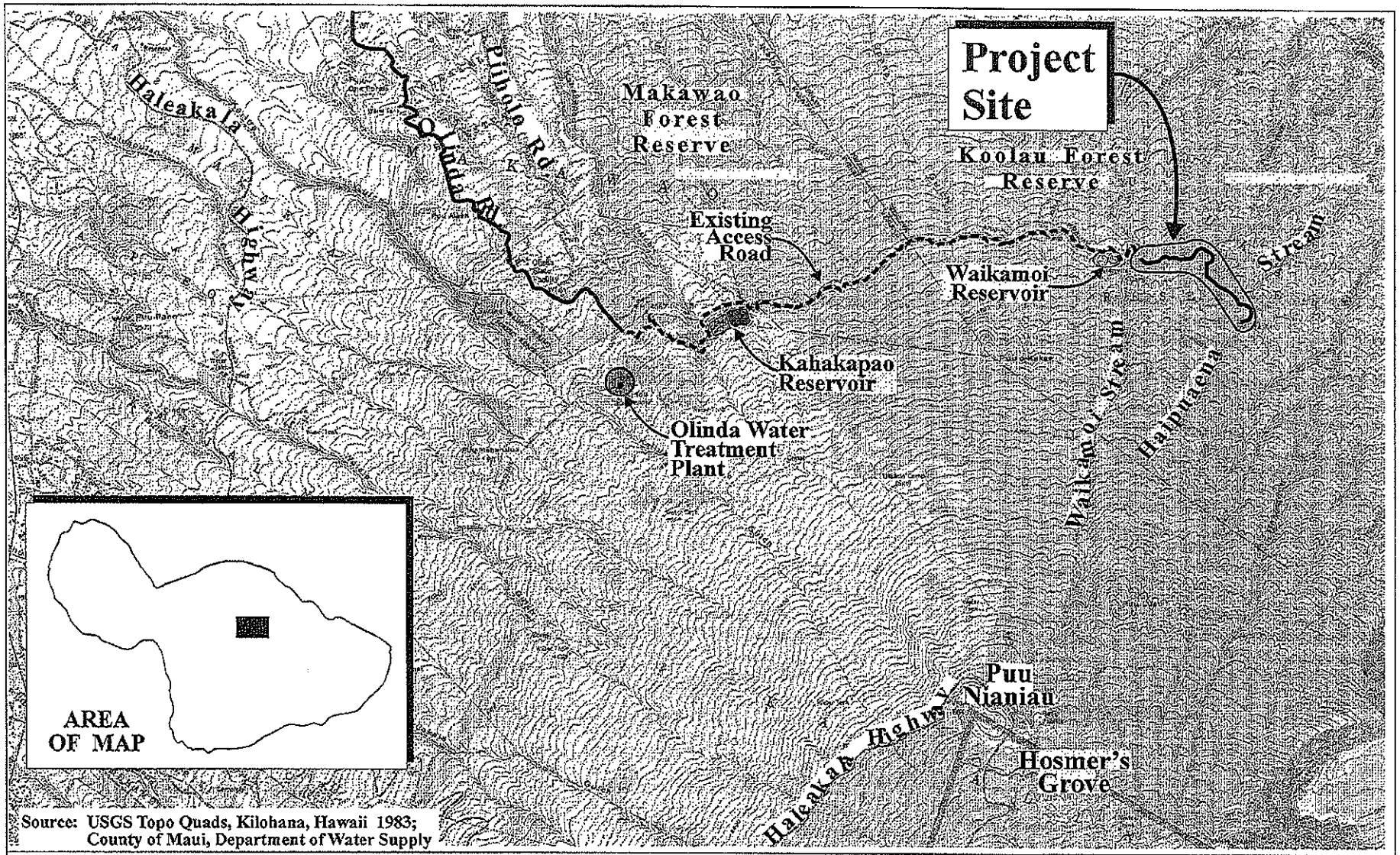
In light of the foregoing project description and the recent amendments to the Conservation District Rules, we are writing to you today to respectfully request confirmation from your office that (1) the proposed project would now fall under the *"P-8, Structures and Land Uses, Existing"* land use provision specified above; and (2) that the proposed project now requires a Site Plan Approval, rather than a Departmental Permit from OCCL.

Should you have any questions or require additional information, please feel free to contact me at (808) 244-2015. Thank you for your kind attention to this request.

Very truly yours,

Kimberly Skog
Associate

KS:yp
Enclosures
cc: Mike Hunnemann, KAI Hawaii, Inc. (w/enclosures)
Tom Ochwat, Department of Water Supply (w/enclosures)
K:\DATA\KAIHi\WaikamoiFlume\OCCL Confirmation.ltr.doc



Source: USGS Topo Quads, Kilohana, Hawaii 1983; County of Maui, Department of Water Supply

Figure 1 Proposed Waikamoi Flume Replacement Project

Regional Location Map

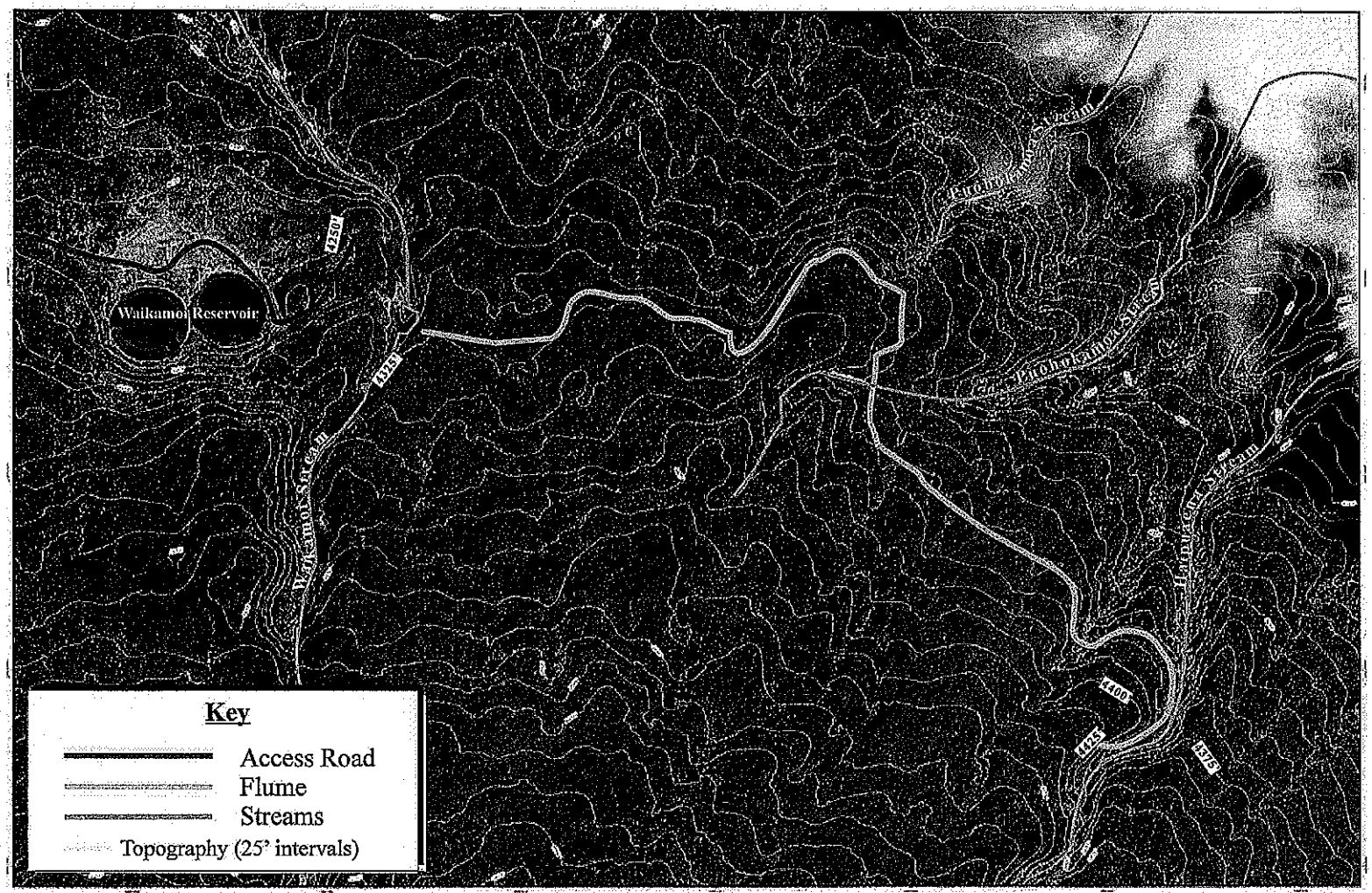
NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIHi\WaikamoiFlume\RegMap

106



Source: County of Maui, Department of Water Supply

Figure 2

Proposed Waikamoi Flume Replacement Project

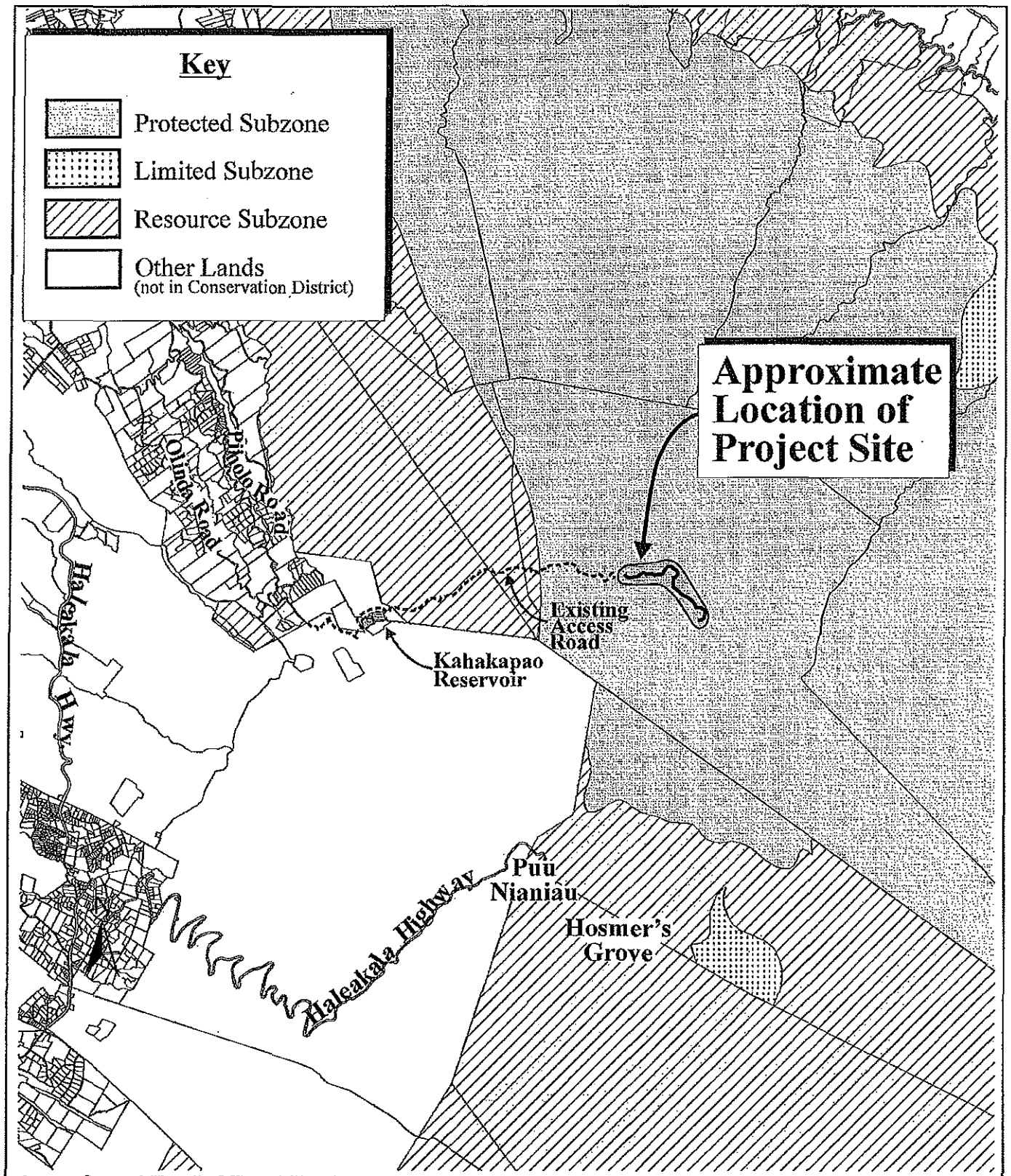
Aerial Photo of Waikamoi Flume

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAIII\WaikamoiFlumeaerialmap



Source: State of Hawaii, Office of Planning

Figure 3

Proposed Waikamoi Flume Replacement Project

State Conservation District Map

0 — 3,125 — 1,562.5 — 6,250 Feet

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

KAHfi\WaikamoiFlume\OCCL.Ltr.Fig3

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JAN 1 1 2012

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

GUY H. KAULUKUKUI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

Office of Conservation and Coastal Lands
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF: OCCL: AJR

COR: MA-12-162

JAN 1 0 2012

Kimberly Skog
c/o Munekiyo & Hiraga, Inc.
305 High St., Suite 104
Wailuku, Hawaii 96793

SUBJECT: *Proposed Waikamoi Timber Flume Replacement*
TMK: (2) 2-4-016: 002; 003; 004 (por.)
Makawao, Island of Maui, Hawaii

Dear Ms. Skog,

The Department of Land and Natural Resources, Office of Conservation and Coastal Lands (OCCL) is in receipt of your letter regarding a proposal to completely replace an existing timber flume and accessory structures with a stainless steel metal flume; to replace supporting trusses; to construct an unknown number of 8-foot long by 4-foot wide concrete foundations for the flume structure; to complete access road grading, to conduct access road improvements and to construct multiple equipment lay down areas along the project site located in the Conservation District Protective Subzone.

1. The replacement of the existing flume and associated structures is an identified land use in the Conservation District Protective Subzone pursuant to Hawaii Administrative Rules (HAR) §13-5-22 (P-8) **STRUCTURES AND LAND USES, EXISTING,** (C-1) *Moderate alteration of existing structures, facilities, uses and equipment*;

2. This action will require the filing of a Conservation District Use Application (**CDUA**) and all required documents for a **Departmental Permit**;

3. In conformance with §343, Hawaii Revised Statutes (HRS), as amended, and HAR, §11-200-8 *(2) Replacement or reconstruction of existing structures and facilities where the new structure will be located generally on the same site and will have substantially the same purpose, capacity, density, height and dimensions as the structure replaced.* Therefore this project <u>will not require</u> the filing of an Environmental Assessment (EA) report; and

4. Pursuant to HAR §13-5-40 *Hearings*, a public hearing <u>will not</u> be required.

Should you have any questions, please feel free to contact Alex J. Roy of the Office of Conservation and Coastal Lands at 808-587-0316.

Sincerely,

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

CC: *County of Maui, Planning Department*
MDLO

NOV 09 2010

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

PAUL J. CONRY
ACTING FIRST DEPUTY

LENORE N. OHYE
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AQUATIC RESOURCES
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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

November 5, 2010

Kimberly Skog, Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

LOG NO: 2010.3420
DOC NO: 1011MD10
Archaeology

Dear Ms. Skog:

SUBJECT: Chapter 6E-8 Historic Preservation Review –
Early Consultation Request for the Proposed Waikamoi Timber Flume Reconstruction
Ha'ikū Uka Ahupua'a, Makawao District, Island of Maui
TMK: (2) 2-4-016:004 (por.)

Thank you for the opportunity to review the aforementioned project, which we received on October 12, 2010. Early consultation is being sought for the preparation of an environmental assessment for this project.

The County of Maui Department of Water Supply is proposing to reconstruct the 1.3-mile long Waikamoi Timber Flume, located in the Koolau Forest Reserve. The flume was originally constructed in the 1930s, and reconstructed between 1974 and 1975.

A search of our records indicates we do not have an archaeological inventory survey for this parcel, nor do we have the flume on our State Inventory of Historic Properties. Given the reconstruction in the 1970s, it is unclear if the flume remains a significant historic property or not. We recommend that an archaeological inventory survey of the flume and flume corridor, including proposed access roadways be conducted and submitted to SHPD for review and approval pursuant to HAR §13-276. Findings and recommendations from the accepted survey should be reported in the environmental assessment.

If you have questions about this letter please contact Morgan Davis at (808) 243-5169 or via email to: morgan.e.davis@hawaii.gov.

Aloha,

Theresa K. Donham
Acting Archaeology Branch Chief
State Historic Preservation Division

cc:
Maui CRC, Department of Planning, 250 S. High Street, Wailuku, Hawaii 96793
County of Maui, DPW-DSA via fax to: (808) 270-7972

111

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

May 8, 2012

Theresa K. Donham, Acting Chief
Archaeology Branch
State Historic Preservation Division
State of Hawaii, Department of Land and Natural Resources
601 Kamokila Boulevard, Room 555
Kapolei, Hawaii 96707

SUBJECT: Early Consultation Request for the Proposed Waikamoi Timber Flume Replacement Project, Maui, Hawaii (Log No. 2010.3420) (Doc No. 1011MD10)

Dear Ms. Donham:

Thank you for your letter, dated November 5, 2010, providing early consultation comments on the proposed Waikamoi Timber Flume Reconstruction project. On behalf of the applicant, the County of Maui, Department of Water Supply (DWS), we offer the following information in response to your comments:

An archaeological inventory survey (AIS) of the flume, surrounding corridor, and existing dirt access road has been conducted by Xamanek Researches, LLC. In compliance with Section 13-276, Hawaii Administrative Rules, the AIS has been submitted to your office for review and approval. Furthermore, the AIS, including its findings and recommendations, will be incorporated into the Draft Environmental Assessment (EA) for the subject project.

We appreciate the input provided by your office and will include a copy of your letter in the Draft EA for the subject project.

Should you have any questions, please feel free to contact me at (808) 244-2015.

Very truly yours,

Kimberly Skog
Associate

KS:yp
cc: Mike Hunnemann, KAI Hawaii
Tom Ochwat, Department of Water Supply
Erik Fredericksen, Xamanek Researches, LLC
K:\DATA\KAIHi\WaikamoiFlume\EC Response Letter\DLNR SHPDecres.doc

OCT 18 2010

LINDA LINGLE
GOVERNOR OF HAWAI'I

KATHERINE PUANA KEALOHA
DIRECTOR

STATE OF HAWAI'I
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 S BERETANIA ST. SUITE 702
HONOLULU, HAWAI'I 96813
Tel. (808) 586-4185
Fax. (808) 586-4186
Email: oeqc@doh.hawaii.gov

October 14, 2010

Kimberly Skog
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Subject: Early Consultation Request for the Proposed Waikamoi Timber Flume reconstruction at TMK (2) 2-4-016:004 (POR.), Makawao, Maui, Hawai'i

Dear Mr. Schnell:

Thank you for your early consultation letter on October 8, 2010. Your letter states that you will be preparing a draft environmental assessment for the subject action on behalf of your client, the County of Maui, Department of Water Supply. Section 11-200-10, Hawaii Administrative Rules, requires that the environmental assessment shall contain, but not be limited to the following information:

A. Identification of applicant or proposing agency;
B. Identification of approving agency, if applicable;
C. Identification of agencies, citizen groups, and individuals consulted in making the assessment;
D. General description of the action's technical, economic, social, and environmental characteristics;
E. Summary description of the affected environment, including suitable and adequate regional, location and site maps such as Flood Insurance Rate Maps, Floodway Boundary Maps, or United States Geological Survey topographic maps;
F. Identification and summary of impacts and alternatives considered;
G. Proposed mitigation measures;
H. Agency determination or, for draft environmental assessments only, an anticipated determination;
I. Findings and reasons supporting the agency determination or anticipated determination;
J. Agencies to be consulted in the preparation of the EIS, if an EIS is to be prepared;

K. List of all permits and approvals (State, federal, county) required; and
L. Written comments and responses to the comments under the early consultation provisions of sections 11-200-9(a)(1), 11-200-9(b)(1), or 11-200-15, and statutorily prescribed public review periods.

Once your environmental study is complete, please coordinate with the County of Maui, Department of Water Supply for the review and determination of the proposed agency action pursuant to Chapter 343, Hawaii Revised Statutes and Section 11-200-12, Hawaii Administrative Rules, and the submittal requirements to the Office of Environmental Quality Control for publication on the Environmental Notice.

Please feel free to call Herman Tuiolosega of my staff at (808) 586-4185 if you have further questions.

Sincerely,

KATHERINE PUANA KEALOHA
Director

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

May 8, 2012

Gary Hooser, Director
Office of Environmental Quality Control
State of Hawaii, Department of Health
235 South Beretania Street
Honolulu, Hawaii 96813

SUBJECT: Early Consultation Request for the Proposed Waikamoi Timber Flume Replacement Project at Makawao, Maui, Hawaii

Dear Mr. Hooser:

Thank you for your office's letter, dated October 14, 2010, providing early consultation comments on the subject project. On behalf of the applicant, the County of Maui, Department of Water Supply (DWS), we offer the following information in response to the comments noted in the October 14th letter:

The Environmental Assessment (EA) for the proposed project, which is being prepared pursuant to Chapter 343, Hawaii Revised Statutes (HRS), will include the information required by Section 11-200-10, Hawaii Administrative Rules (HAR).

Review of the EA will be coordinated with DWS, in accordance with the provisions of Chapter 343, HRS and Section 11-200-12, HAR. Further, the Draft EA will be submitted to your office, as required, for publication in the Environmental Notice.

excellence in process management

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

We appreciate your comments on the proposed project and will include a copy of your letter in the Draft EA.

Should you have any questions, please feel free to contact me at (808) 244-2015.

Very truly yours,

Kimberly Skog
Associate

KS:yp
cc: Mike Hunnemann, KAI Hawaii
Tom Ochwat, Department of Water Supply
K:\DATA\KAIHi\WaikamoiFlume\EC Response Letter\OEQCecres.doc

OCT 27 2010

CHARMAINE TAVARES
Mayor

MILTON M. ARAKAWA, A.I.C.P.
Director

MICHAEL M. MIYAMOTO
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

RALPH NAGAMINÈ, L.S., P.E.
Development Services Administration

CARY YAMASHITA, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET, ROOM NO. 434
WAILUKU, MAUI, HAWAII 96793

October 21, 2010

Ms. Kimberly Skog, Associate
MUNEKIYO & HIRAGA, INC.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Ms. Skog:

SUBJECT: EARLY CONSULTATION REQUEST FOR PROPOSED WAIKAMOI TIMBER FLUME RECONSTRUCTION; TMK: (2) 2-4-016:004 (POR.)

We reviewed your early consultation request and offer the following comments:

1. Describe access to the site and any impacts to County roads.

2. Describe any impacts to drainage systems.

Please call Michael Miyamoto at 270-7845 if you have any questions regarding this letter.

Sincerely,

MILTON M. ARAKAWA, A.I.C.P.
Director of Public Works

MMA:MMM:ls
xc: Highways Division
Engineering Division
S:\LUCA\CZM\prop_waikamoi_timber_flume_reconstruc_ec_24016004_por_ls.wpd

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

May 8, 2012

David Goode, Director
County of Maui
Department of Public Works
200 South High Street, Room 434
Wailuku, Hawaii 96793

SUBJECT: Early Consultation Request for the Proposed Waikamoi Timber Flume Replacement Project at Makawao, Maui, Hawaii

Dear Mr. Goode:

Thank you for your department's letter, dated October 21, 2010, providing early consultation comments on the subject project. On behalf of the applicant, the County of Maui, Department of Water Supply (DWS), we offer the following information in response to your department's comments:

1. A private, unimproved dirt/gravel road provides access to the project site; access to this private roadway is provided by Olinda Road. To facilitate construction access, minor repairs to the existing unimproved access road are anticipated which would include spot-placement of gravel and minor grading within the existing corridor. Construction activity associated with the proposed project will be conducted to ensure that there is no impact on Olinda Road.

2. The scope of the proposed project is limited to the reconstruction of the existing Waikamoi Timber Flume, a DWS water conveyance system. The flume is completely contained within the Koolau Forest Reserve and is not located in proximity to any County drainage system. As such, the proposed project is not anticipated to pose an impact to County drainage systems nor result in an increase in storm water runoff.

We appreciate the input provided by your office and will include a copy of your letter in the Draft Environmental Assessment (EA) for the subject project.

Should you have any questions, please feel free to contact me at 244-2015.

Very truly yours,

Kimberly Skog
Associate

KS:yp
cc: Mike Hunnemann, KAI Hawaii
Tom Ochwat, Department of Water Supply
K:\DATA\KAIHi\WaikamoiFlume\EC Response Letter\DPWecres.doc

OCT 19 2010

CHARMAINE TAVARES
Mayor

CHERYL K. OKUMA, Esq.
Director

GREGG KRESGE
Deputy Director

TRACY TAKAMINE, P.E.
Solid Waste Division

DAVID TAYLOR, P.E.
Wastewater Reclamation
Division

COUNTY OF MAUI
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT
2200 MAIN STREET, SUITE 100
WAILUKU, MAUI, HAWAII 96793

October 15, 2010

Ms. Kimberly Skog
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Skog:

SUBJECT: **WAIKAMOI TIMBER FLUME RECONSTRUCTION**
EARLY CONSULTATION
TMK (2) 2-4-016:004, MAKAWAO

We reviewed the subject application and have the following comments:

1. Solid Waste Division comments:

   a. None.

2. Wastewater Reclamation Division (WWRD) comments:

   a. None.

If you have any questions regarding this memorandum, please contact Gregg Kresge at 270-8230.

Sincerely,

CHERYL K. OKUMA
Director of Environmental Management

IX. REFERENCES

IX. REFERENCES

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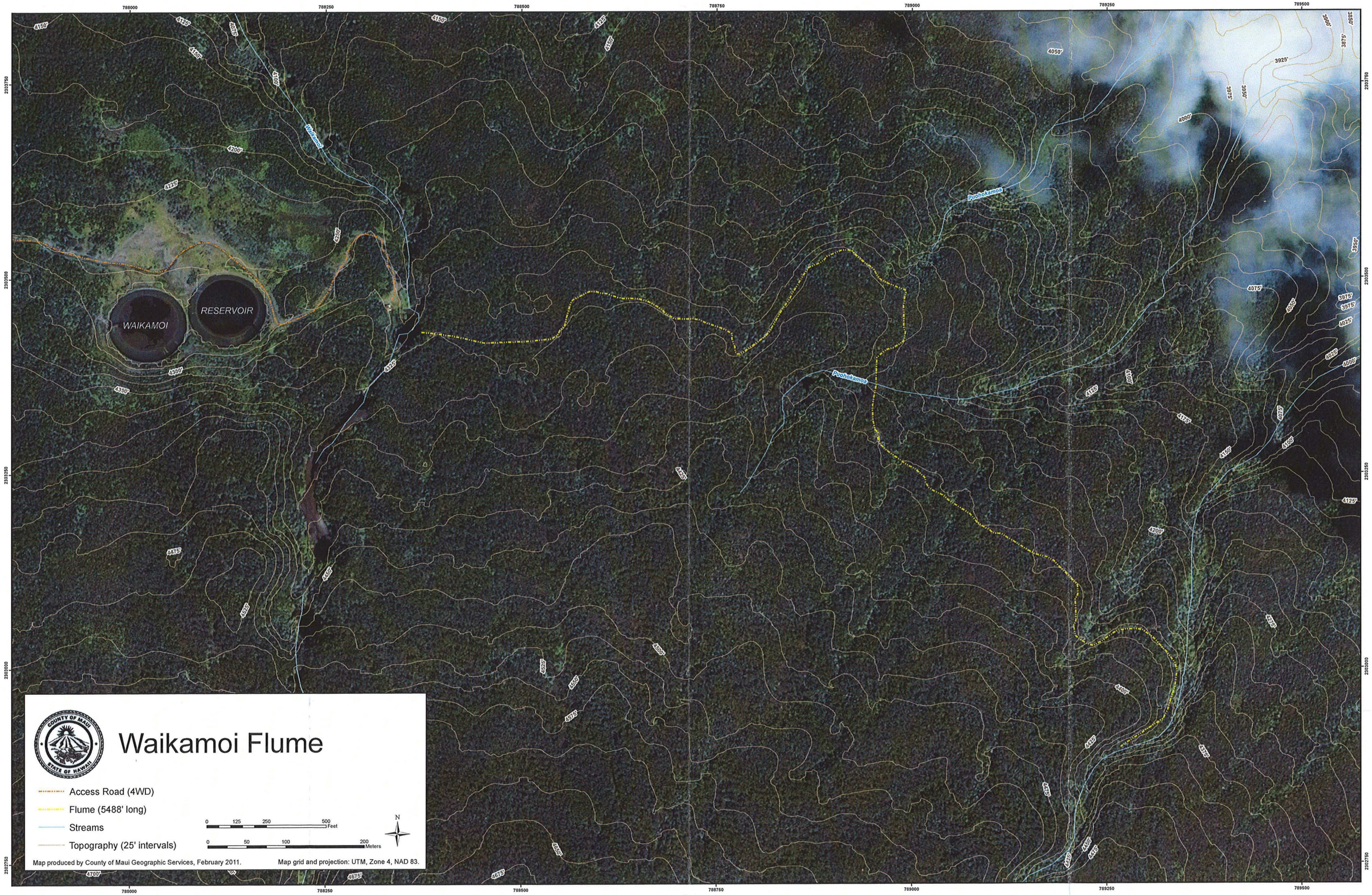
APPENDIX A.

Topographic Survey


Waikamoi Flume
Access Road (4WD)
Flume (5488' long)
Streams
Topography (25' intervals)
0 125 250 500 Feet
0 50 100 200 Meters
N
Map produced by County of Maui Geographic Services, February 2011.
Map grid and projection: UTM, Zone 4, NAD 83.
WAIKAMOI
RESERVOIR
Waikamoi
Puohokamoa
Puohokamoa
788000
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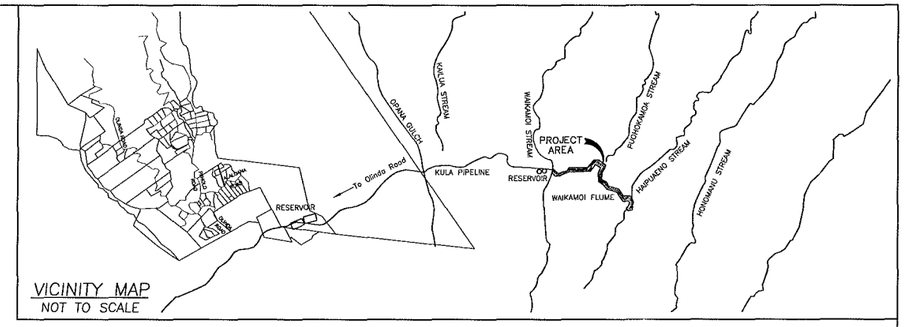

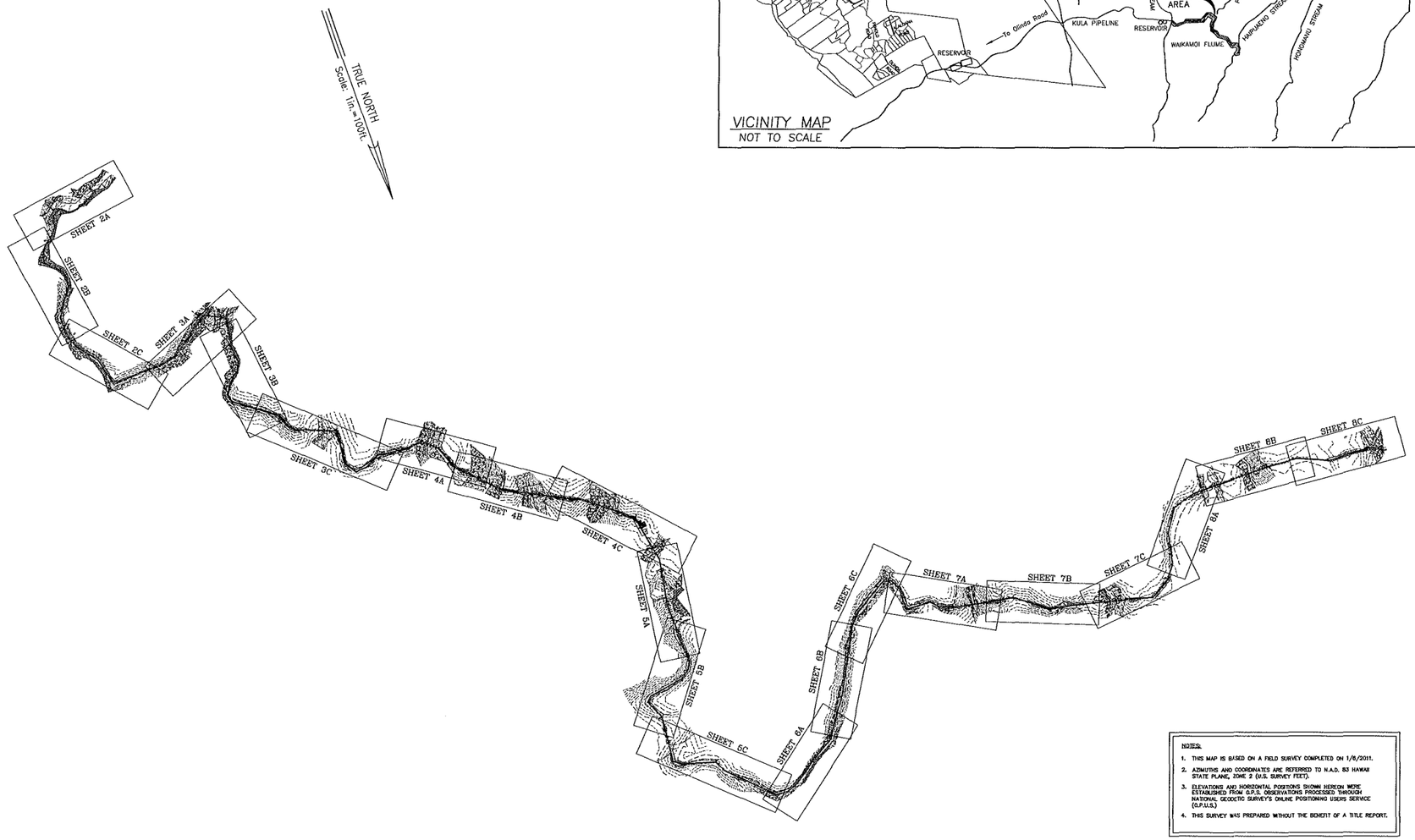

NOTES:

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2. AZIMUTHS AND COORDINATES ARE REFERRED TO N.A.D. 83 HAWAII STATE PLANE, ZONE 2 (U.S. SURVEY FEET).
3. ELEVATIONS AND HORIZONTAL POSITIONS SHOWN HEREON WERE ESTABLISHED FROM G.P.S. OBSERVATIONS PROCESSED THROUGH NATIONAL GEODETIC SURVEY'S ONLINE POSITIONING USERS SERVICE (O.P.U.S.)
4. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.

LEGEND

arv	air release valve
bw	bottom wall
bldg	building
col.	column
crm	concrete rock masonry
conc.	concrete
di	drain inlet
elev.	elevation
inv.	invert
pvc	polyvinyl chloride
sta.	station
tw	top wall
typ.	typical

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

TOPOGRAPHIC SURVEY
OF THE WAIKAMOI FLUME

BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA,
GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE
SITUATED AT HAIKU–UKA, MAKAWAO, MAUI, HAWAII

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 12964

PREPARED FOR:
MICHAEL HUNNEMANN
KAI NANAI, INC.
33 N. PAUAHI ST., 2ND FLOOR
HONOLULU HI, 96817

SHEET 1 OF 8

FEBRUARY 8, 2011

JOB NO.: 10-527

TMK: (2) 2-4-016: POR. 004
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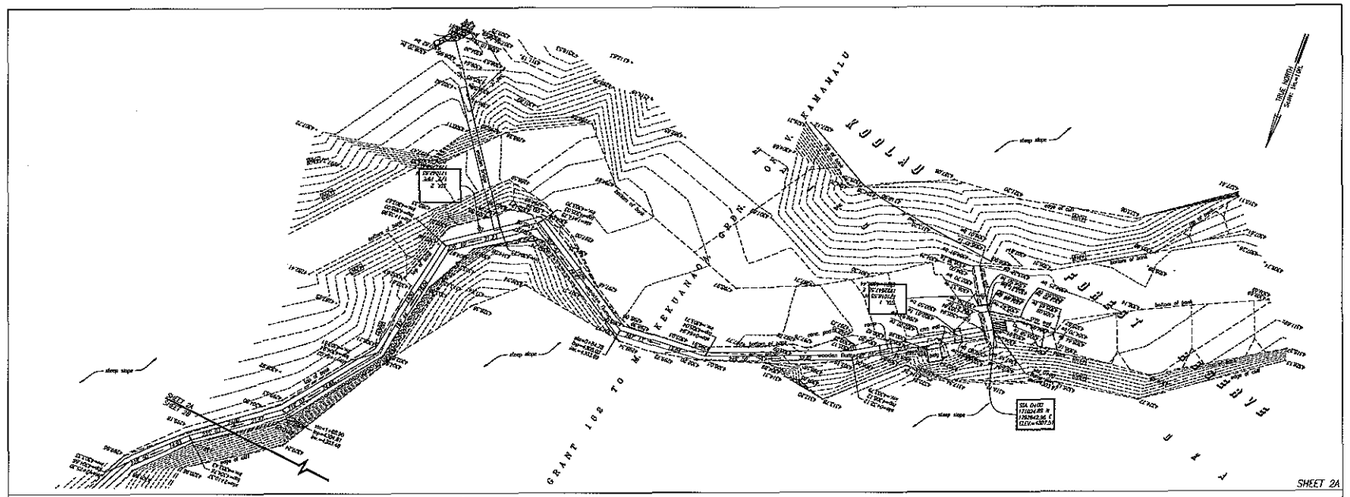
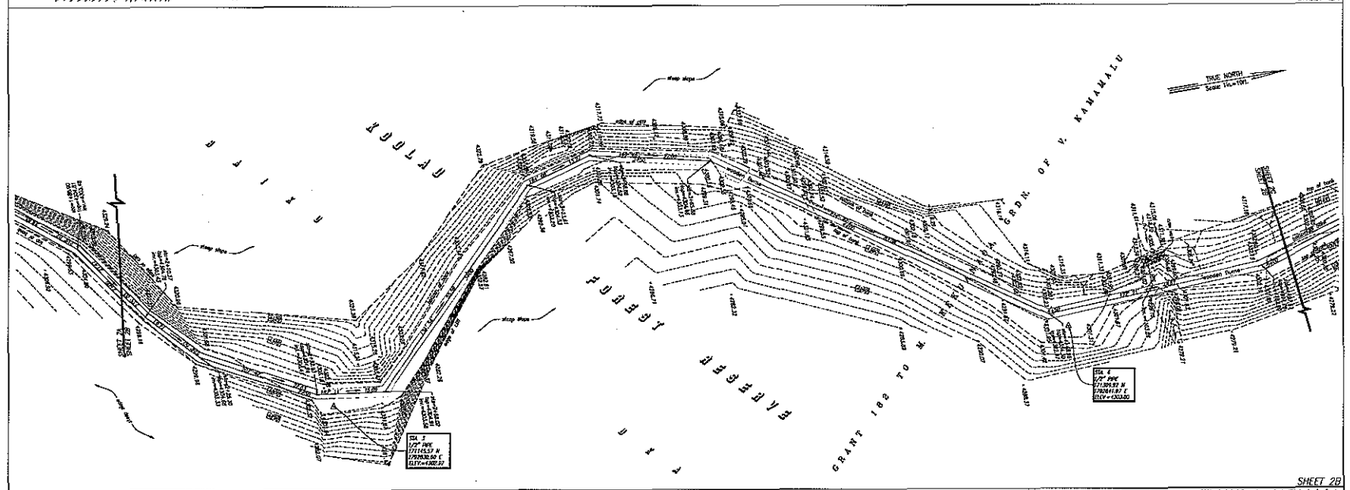
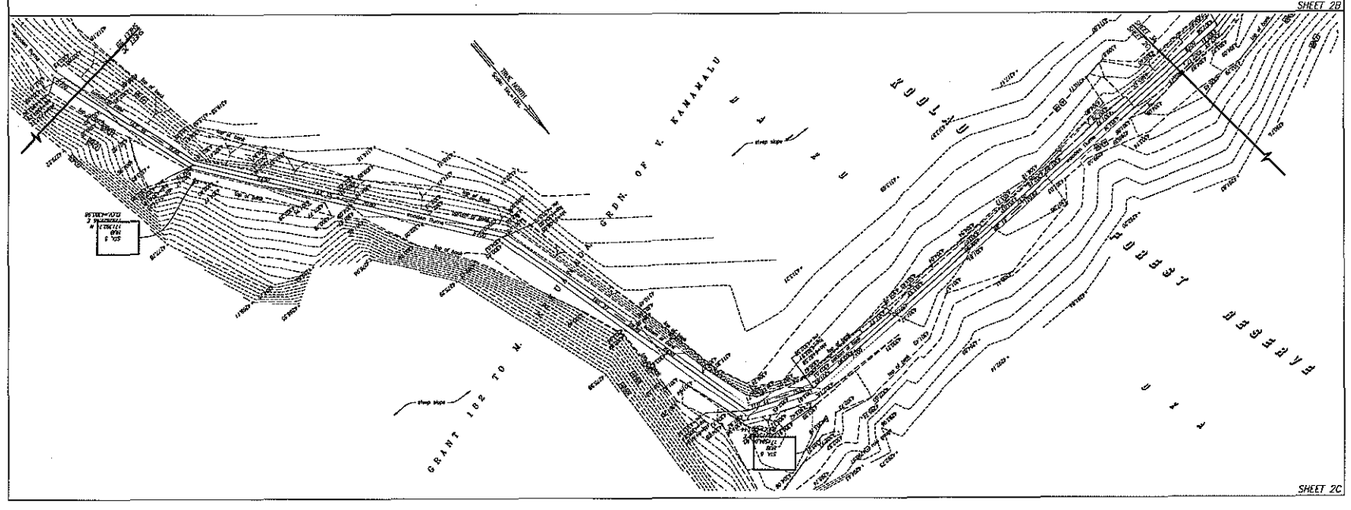
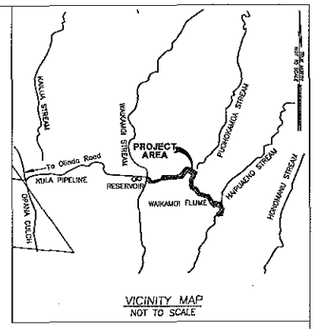
1871 WILI PA LOOP SUITE A • WAILUKU, MAUI, HAWAII 96793









VICINITY MAP
NOT TO SCALE

TOPOGRAPHIC SURVEY
OF THE WAIKAMOI FLUME

BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA,
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SITUATED AT HAIKU-UKA, MAKAWAO, MAUI, HAWAII

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4. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.

LEGEND

crv	air release valve
bw	bottom wall
bldg	building
col.	column
cmr	concrete rock masonry
conc.	concrete
di	drain inlet
elev.	elevation
inv.	invert
pvc	polyvinyl chloride
sta	station
tw	top wall
typ.	typical

GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.

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LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 12964

PREPARED FOR:
MICHAEL HURNEMANN
KAI HANNAL INC.
33 N. PAUAHI ST., 2ND FLOOR
HONOLULU HI, 96817

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SHEET 2 OF 8

FEBRUARY 8, 2011
JOB NO.: 10-527

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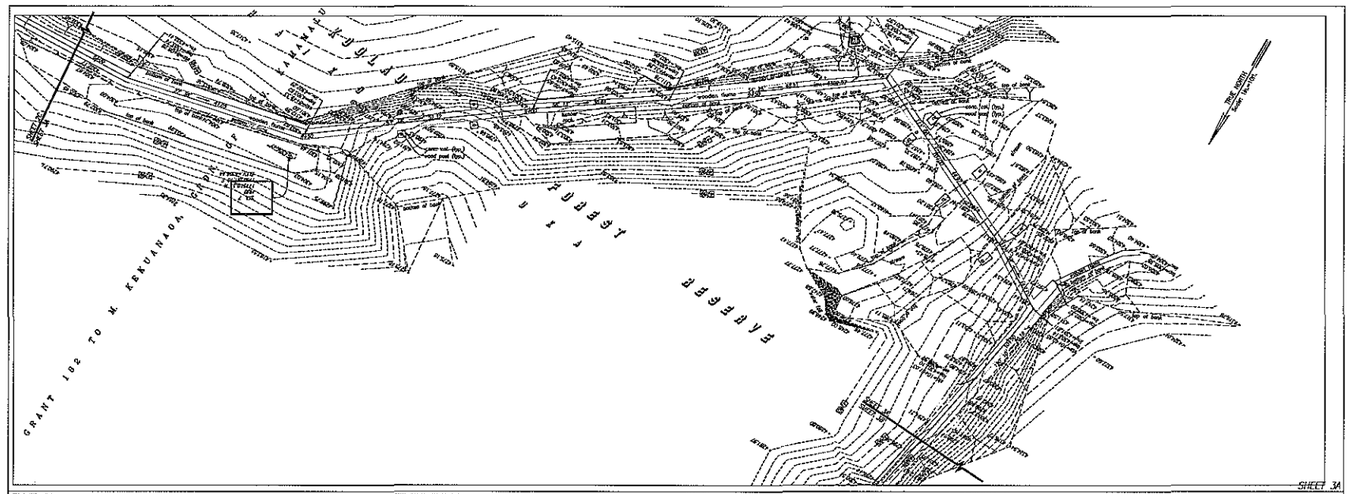

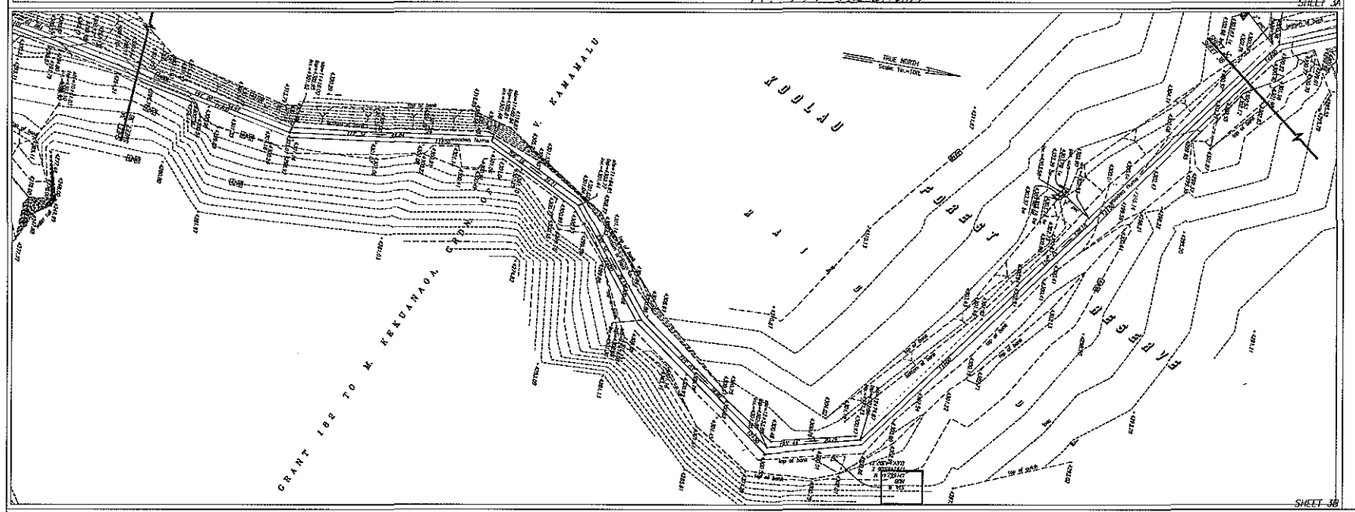

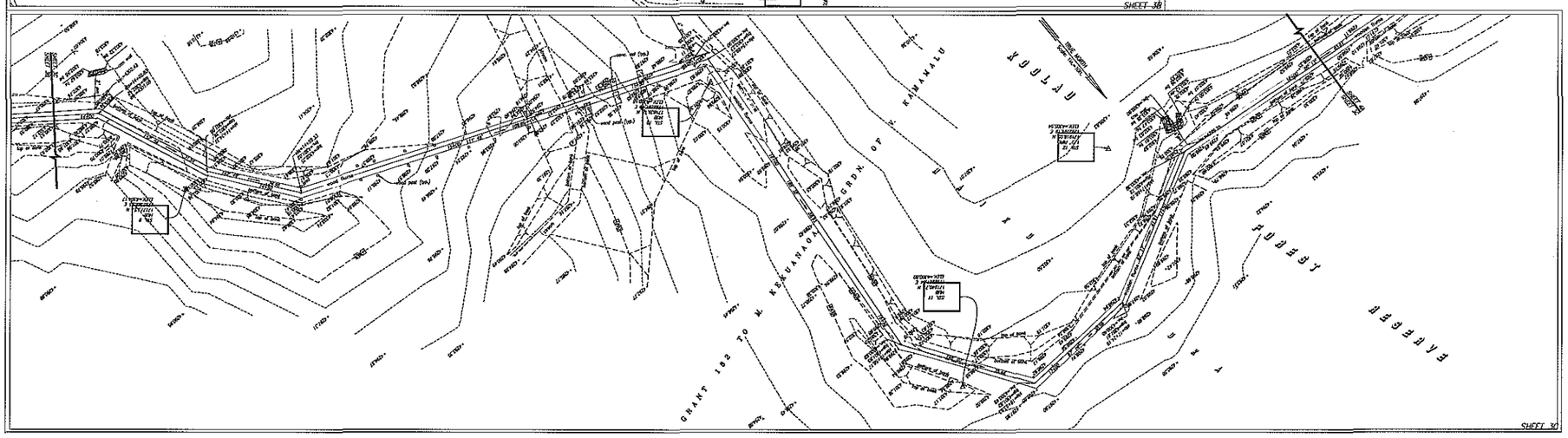

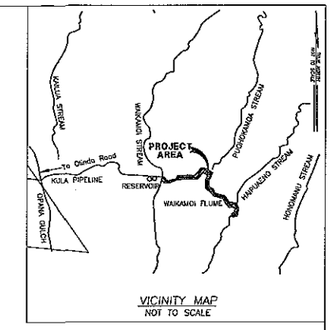

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LEGEND

air	air release valve
bw	bottom wall
bldg	building
col.	column
crm	concrete rock masonry
corr.	corrugate
df	drain inlet
elev.	elevation
inv.	invert
pvc	polyvinyl chloride
sta.	station
tw	top wall
typ.	typical

GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.

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LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 12954

PREPARED FOR:
MICHAEL HUNNEMANN
KAI HAWAII, INC.
33 N. PAUAHI ST., 2ND FLOOR
HONOLULU HI, 96817

TMK: (2) 2-4-016: POR. 004
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SHEET 3 OF 8

FEBRUARY 8, 2011

JOB NO: 10-527

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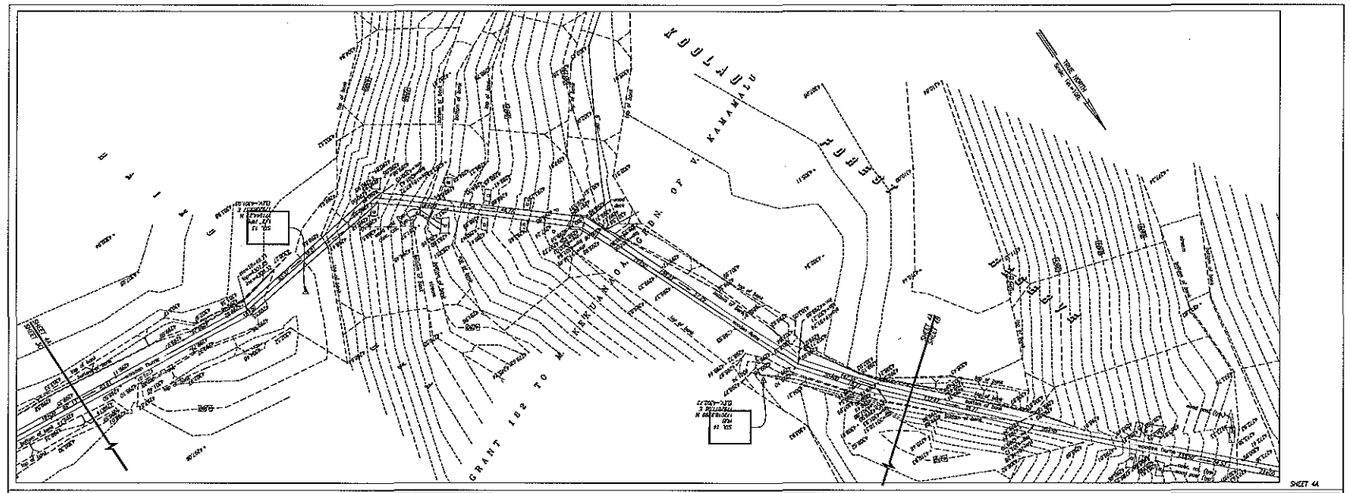

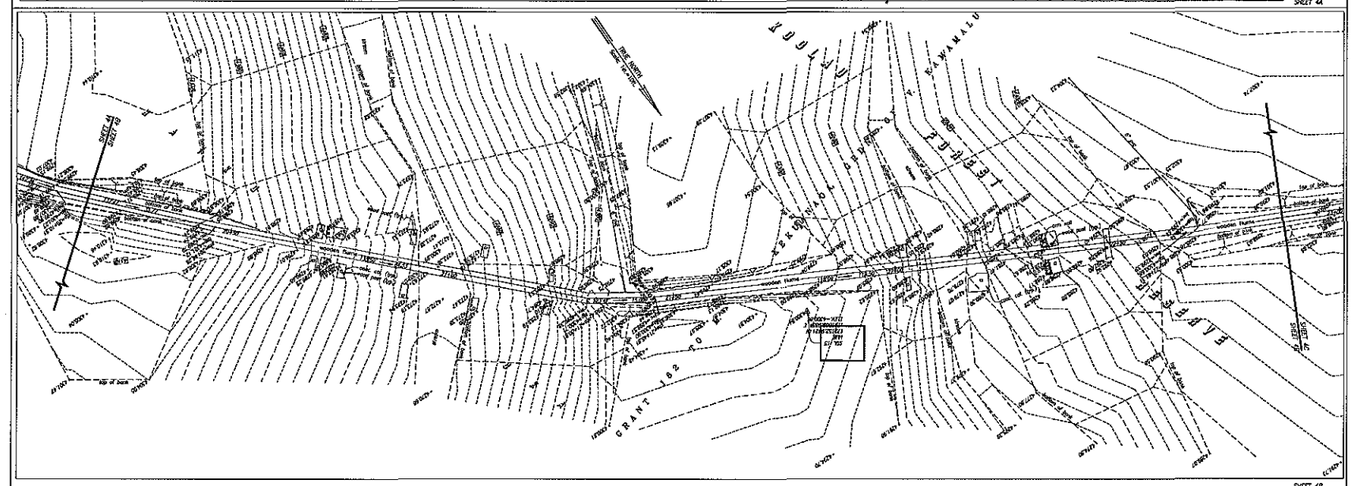

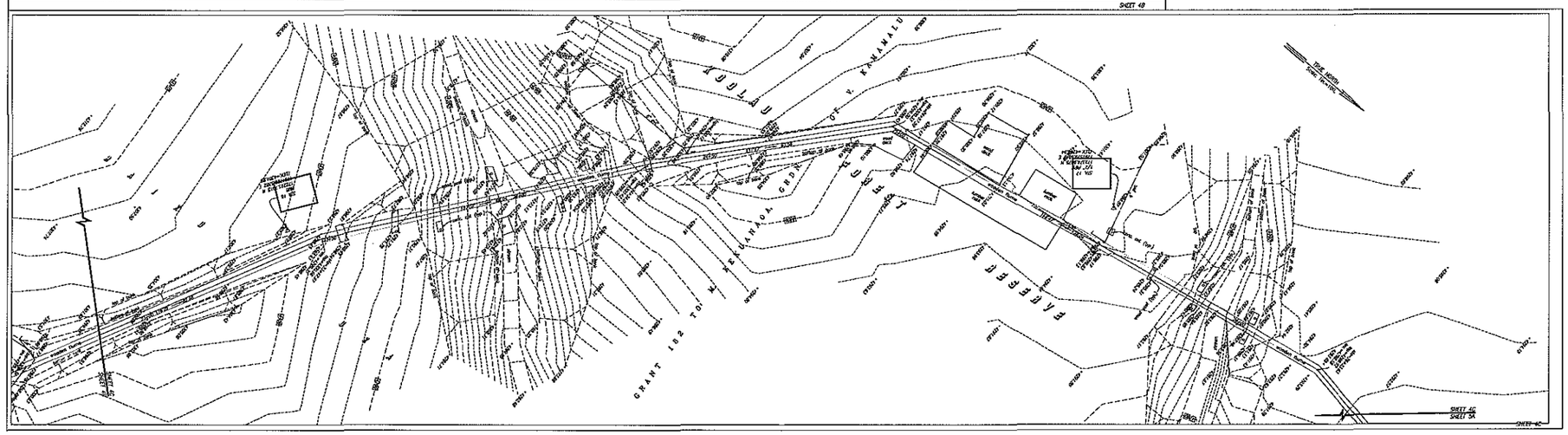

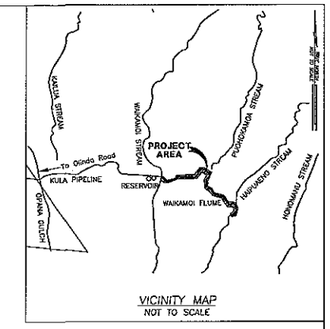

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OF THE WAIKAMOI FLUME

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LEGEND

a/v	air release valve
bw	bottom wall
bldg	building
col.	column
crm	concrete rock masonry
conc.	concrete
d	drain inlet
elev.	elevation
inv.	invert
pvc	polyvinyl chloride
rcp	reinforced
tw	top wall
typ.	typical

GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 12564

PREPARED FOR:
MICHAEL HUNNEMANN
KAI HAWAII, INC.
33 N. MAUIAE ST., 2ND FLOOR
HONOLULU HI, 96817

BM: (2) 2-4-016: POR. 004
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AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
1871 WILI PA LOOP SUITE A • WAILUKU, MAUI, HAWAII 96793

SHEET 1 OF 8

FEBRUARY 8, 2011

JOB NO.: 10-527

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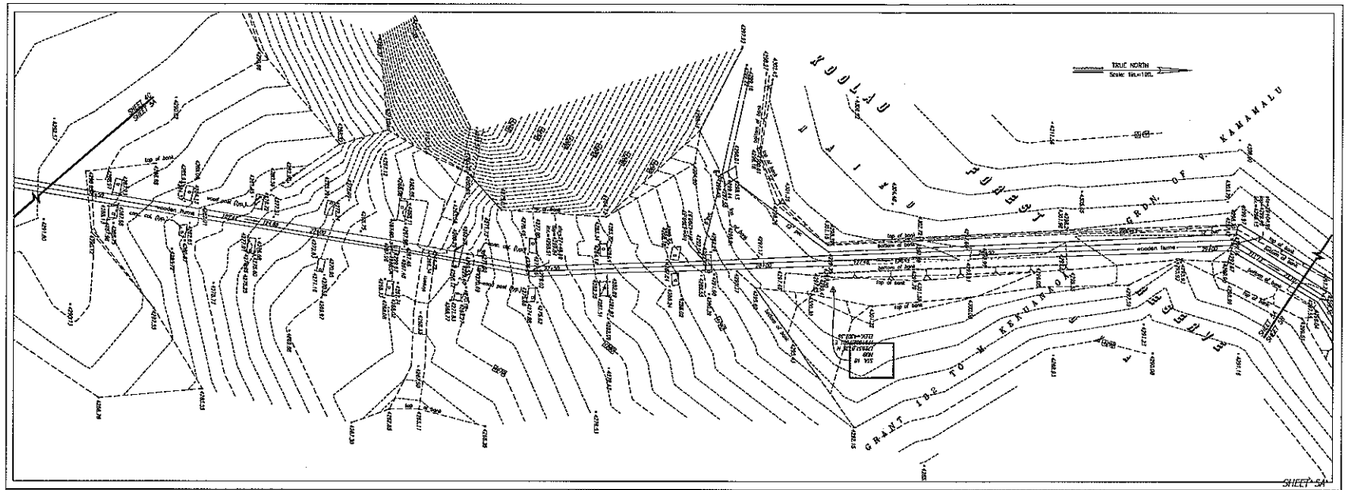

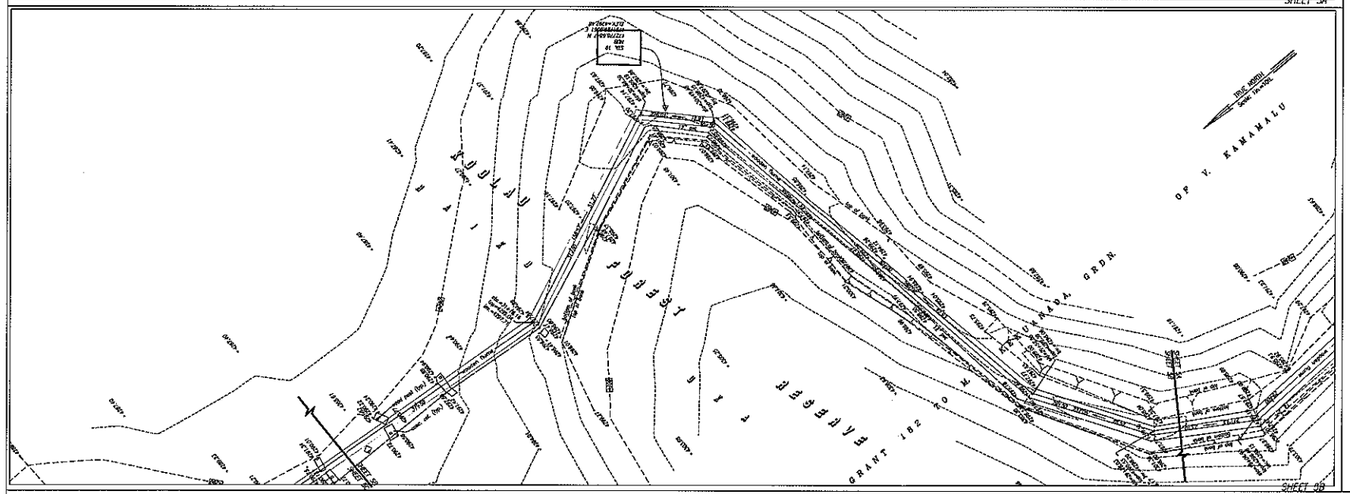

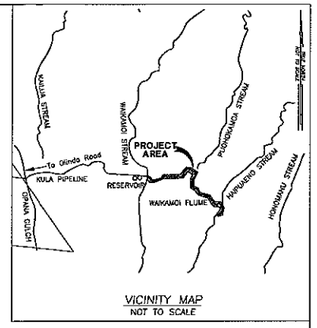

VICINITY MAP
NOT TO SCALE

TOPOGRAPHIC SURVEY
OF THE WAIKAMOI FLUME

BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA,
GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE
SITUATED AT HAIKU-UKA, MAKAWAO, MAUI, HAWAII

NOTES:

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4. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.

LEGEND

arv	air release valve
bw	bulkhead wall
bldg	building
col.	column
cmm	concrete rock masonry
conc.	concrete
cl	drain inlet
exc.	excavation
fw	fence
pvc	polyvinyl chloride
sc	stairs
tw	top wall
typ.	typical

GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.

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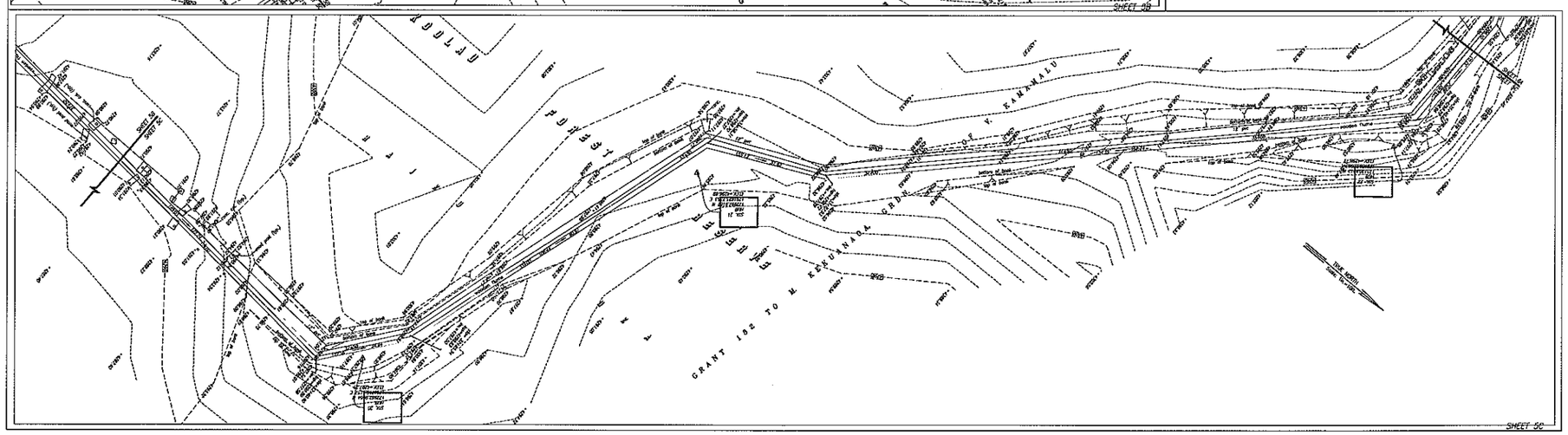
CERTIFICATE No. 12964



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MICHAEL HUNNEMANN
KAI HANNAL, INC.
33 N. PAUNOU ST., 2ND FLOOR
HONOLULU HI, 96817

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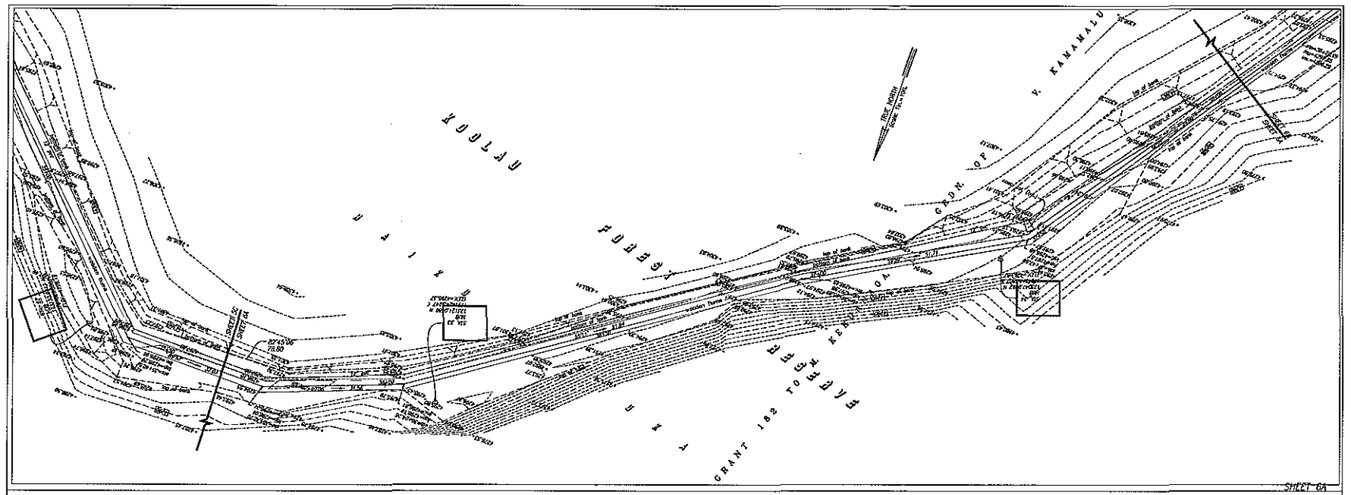
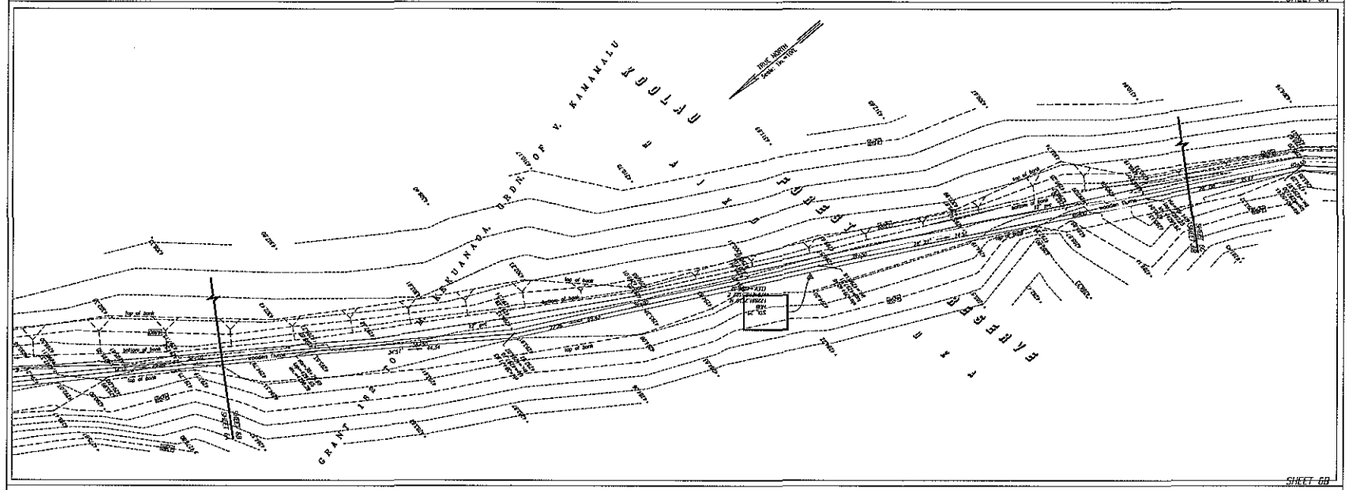
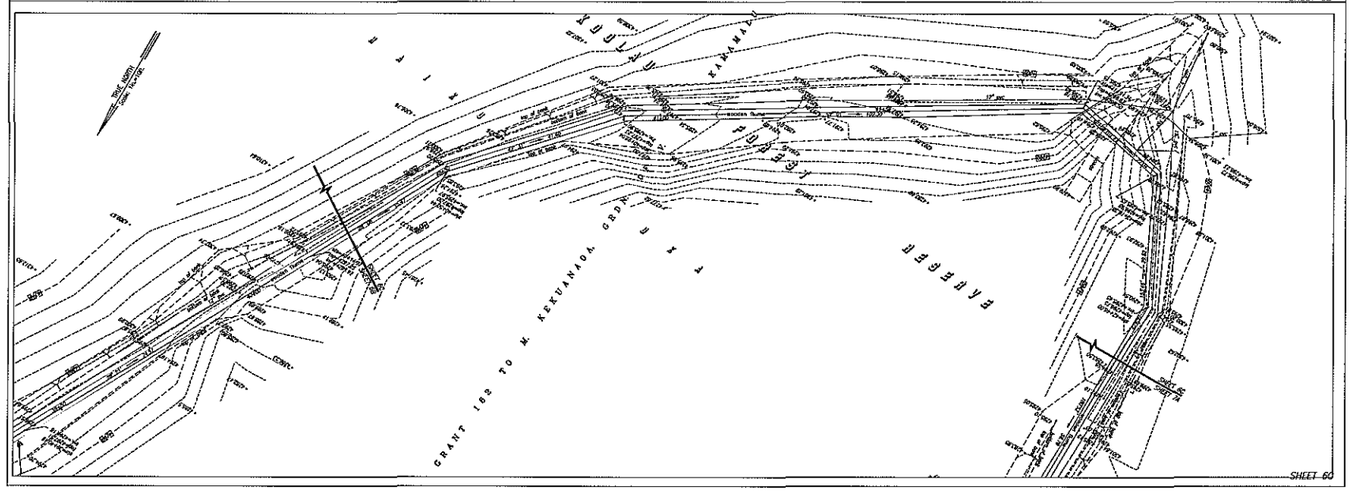
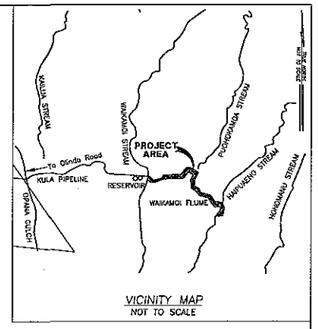
JOB NO.: 10-527









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LEGEND

arv	air release valve
bw	bottom wall
bldg	building
col.	column
crm	concrete rock masonry
conc.	concrete
di	drain inlet
elev.	elevation
inv.	invert
pvc	polyvinyl chloride
sto	storage
tw	top wall
typ.	typical

GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.

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SHEET 6 OF 8

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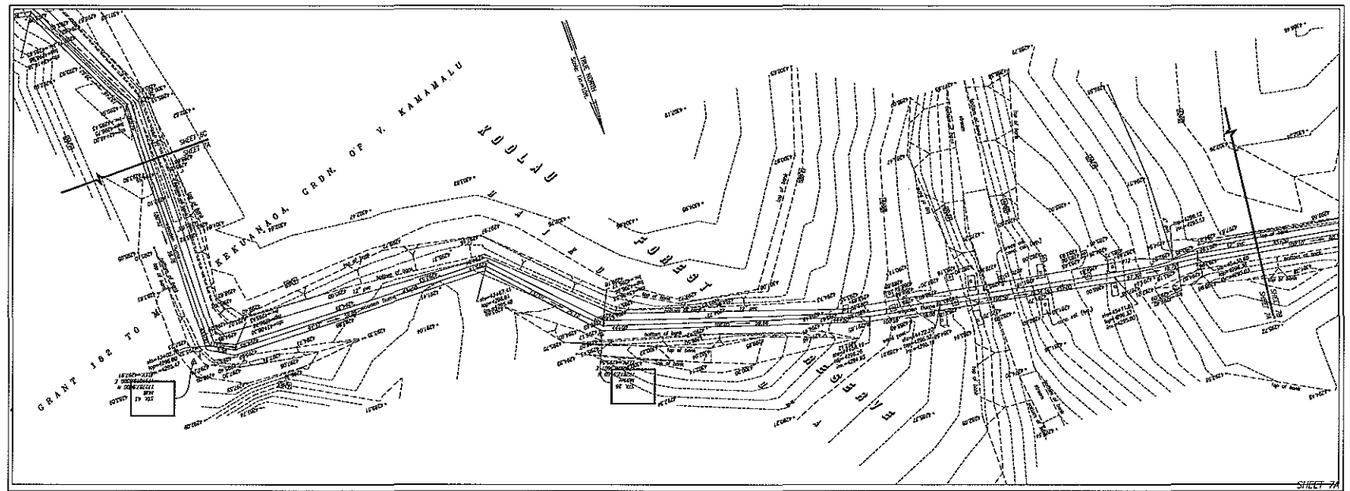

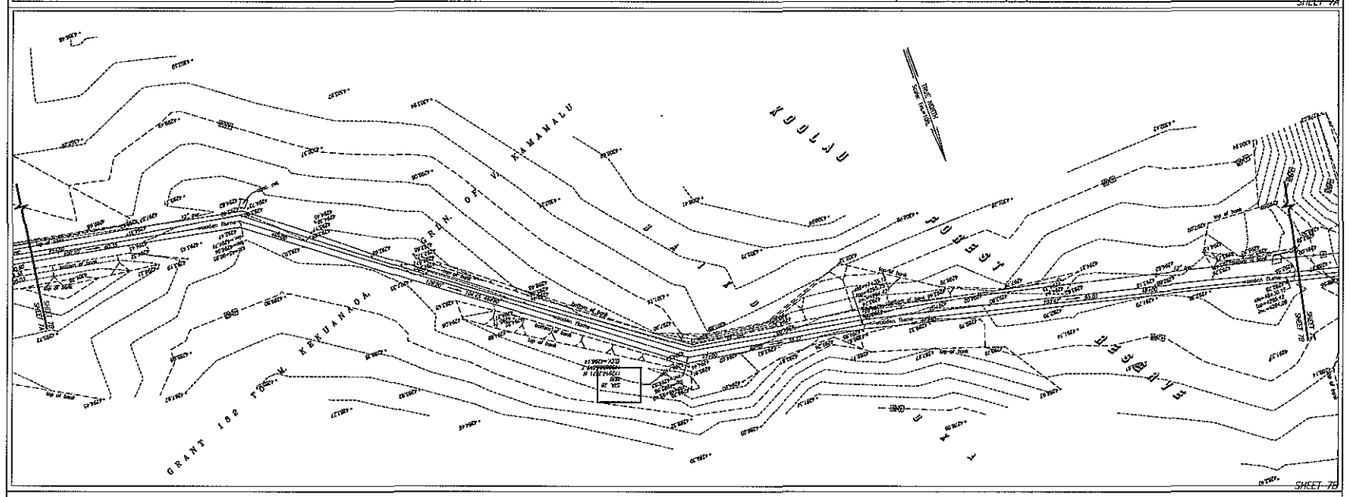

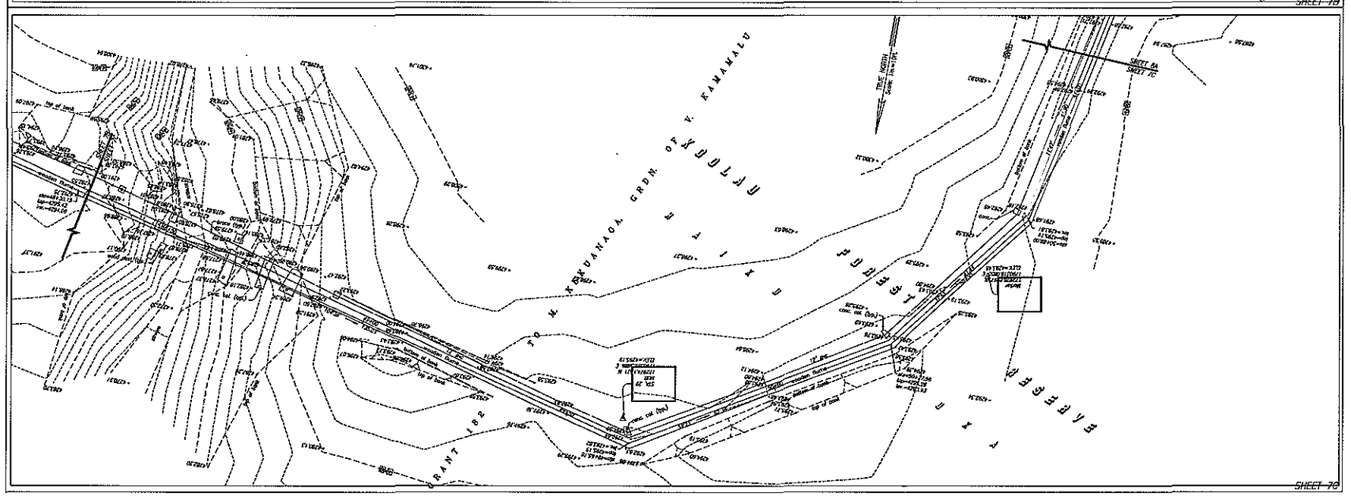

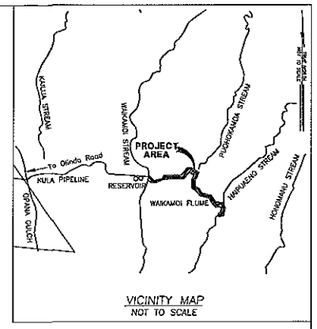

VICINITY MAP
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LEGEND

arv	air release valve
bw	bottom wall
bldg	building
col.	column
cm	concrete rock masonry
conc.	concrete
di	drain inlet
elev.	elevation
fnr.	forest
pvc	polyvinyl chloride
sta.	station
tw	top wall
typ.	typical

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 20 ft.

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SHEET 7 OF 8

FEBRUARY 8, 2011

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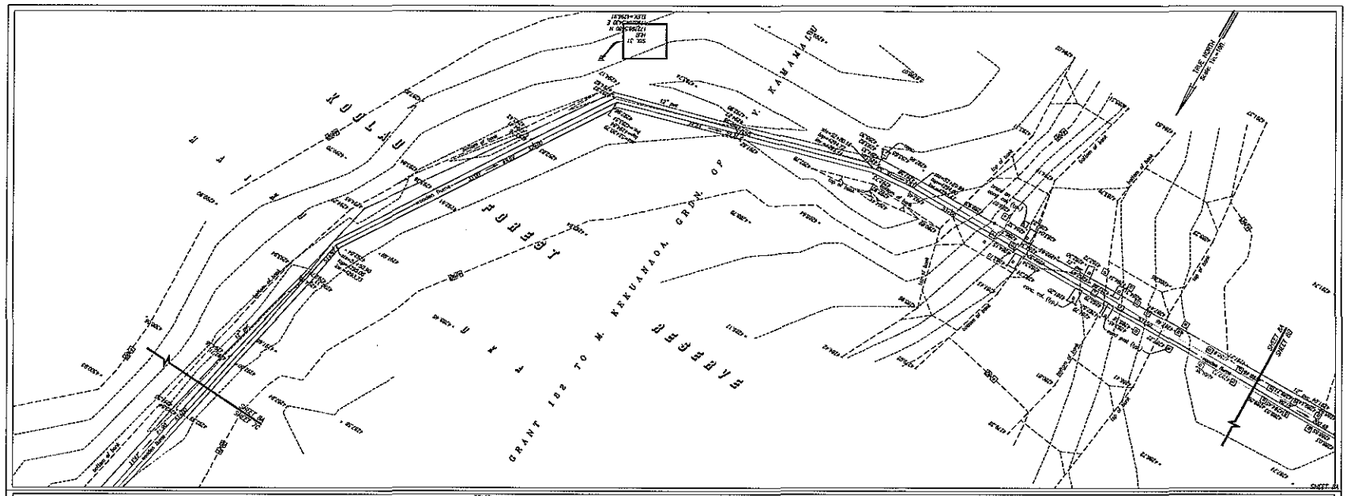

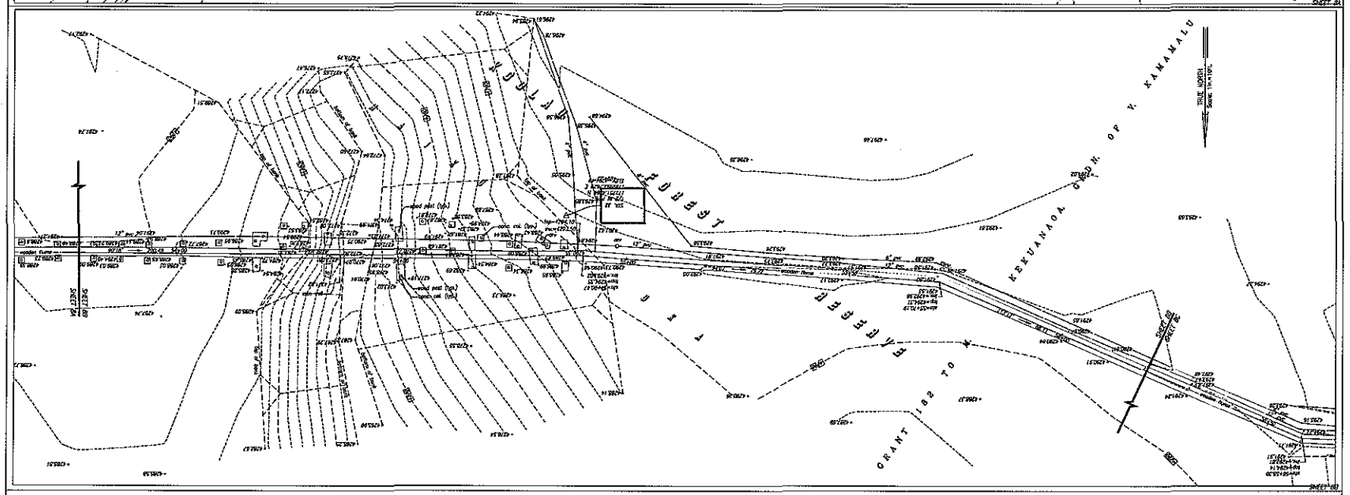

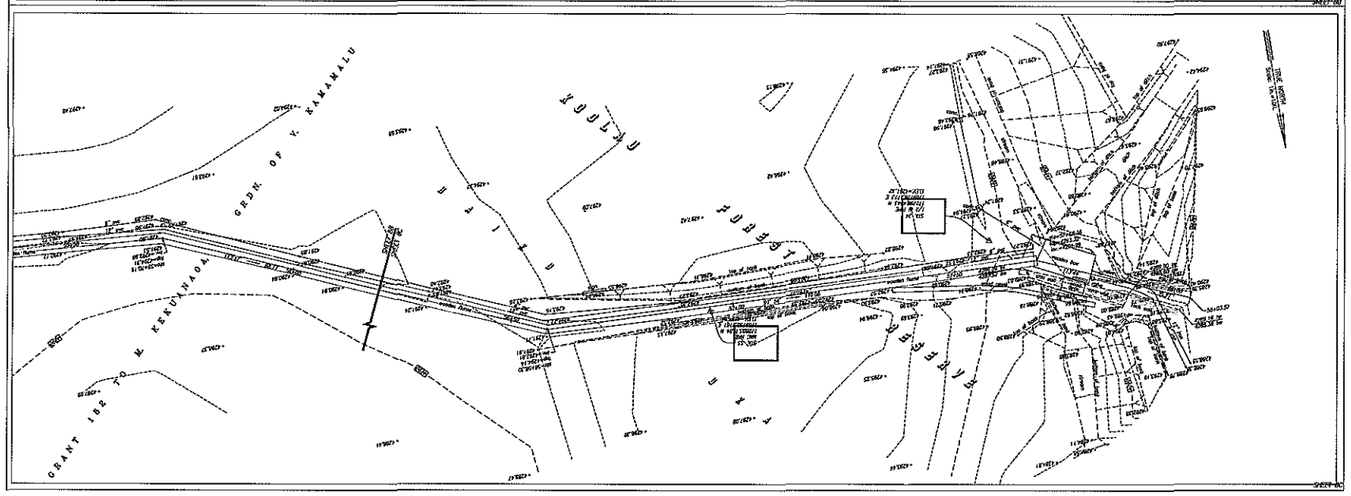

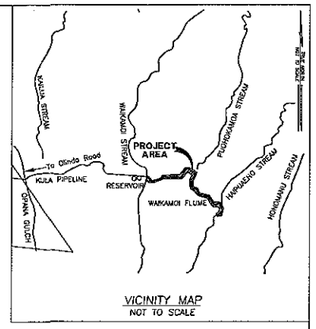

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GRAPHIC SCALE

10 0 5 10 20 40

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SHEET 8 OF 8

FEBRUARY 8, 2011

JOB NO.: 10-327

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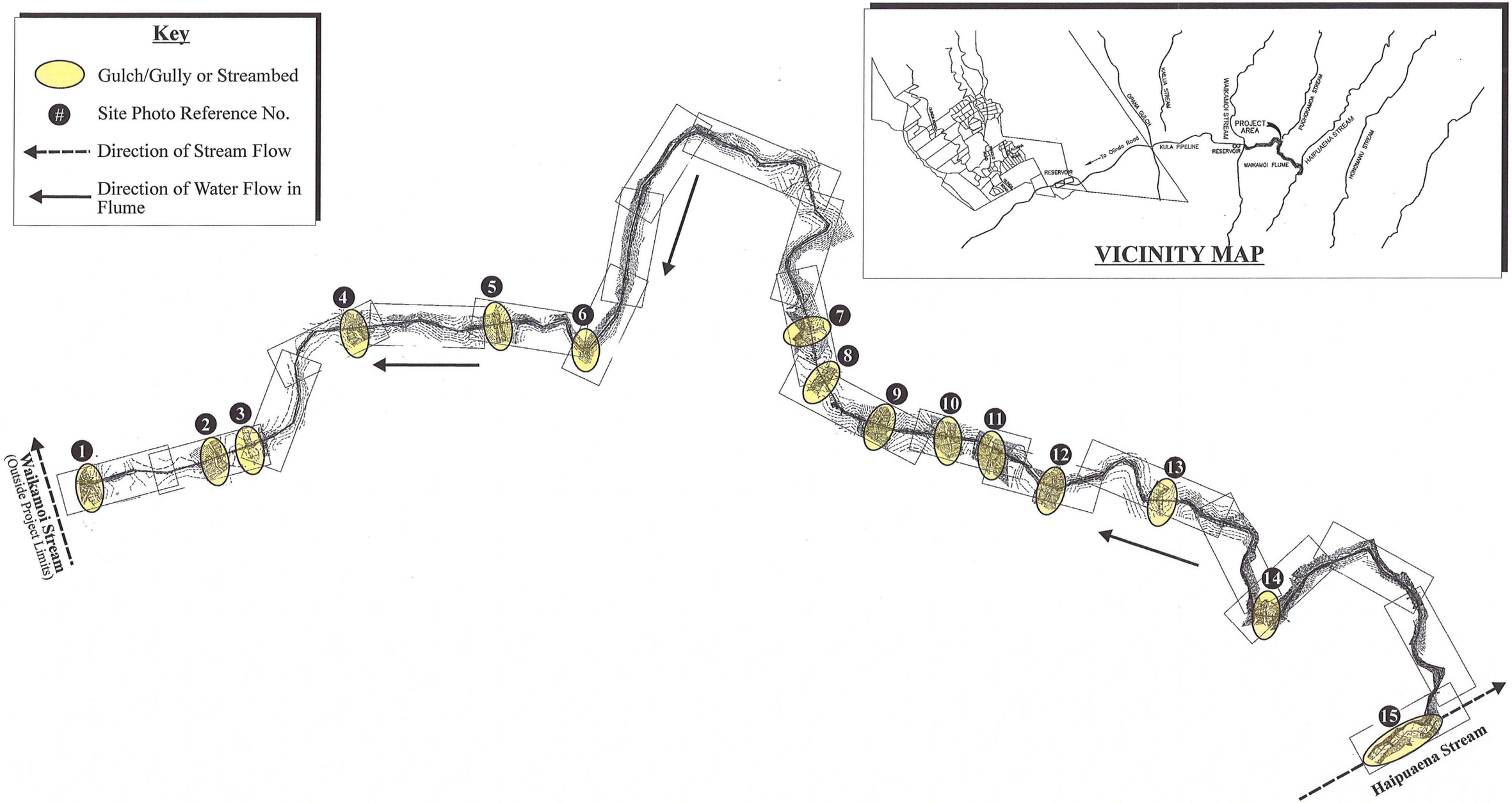
Appendix B.

Site Photographs



Source: Austin, Tsutsumi & Associates, Inc.

Proposed Waikamoi Flume Replacement Project

Site Photographic Reference Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

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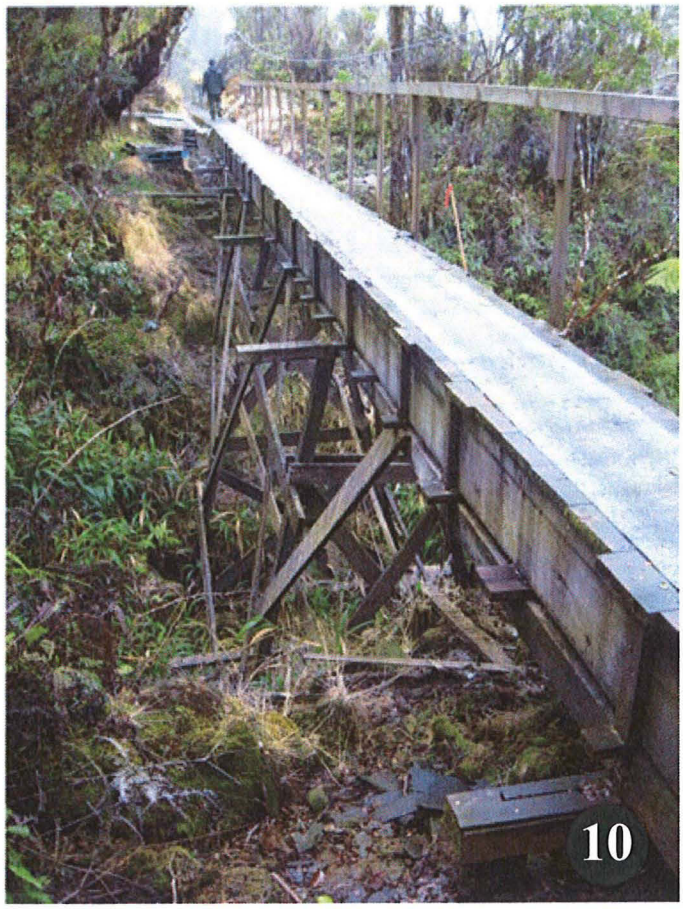

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APPENDIX C.

Staff Submittal for the May 25, 2010 Meeting of the Commission on Water Resource Management

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON

WILLIAM D. BALFOUR, JR.
SUMNER ERDMAN
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
DONNA FAY K. KIYOSAKI, P.E.
LAWRENCE H. MIIKE, M.D., J.D.

KEN C. KAWAHARA, P.E.
DEPUTY DIRECTOR

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

STAFF SUBMITTAL

For the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

May 25, 2010
Paia, Maui

Petitions to Amend the Interim Instream Flow Standards
For the Surface Water Hydrologic Units of
Waikamoi (6047), Puohokamoa (6048), Haipuaena (6049), Punalau (6050),
Honomanu (6051), Nuaailua (6052), Ohia (6054), West Wailuaiki (6057),
East Wailuaiki (6058), Kopiliula (6059), Waiohue (6060), Paakea (6061),
Waiaaka (6062), Kapaula (6063), Hanawi (6064), and Makapipi (6065), Maui

PETITIONER:

Na Moku Aupuni O Koolau Hui
c/o Native Hawaiian Legal Corp.
1164 Bishop Street
Honolulu, HI 96813

LOCATION MAP: See Figure 1

SUMMARY OF REQUEST:

Staff is requesting that the Commission consider the recommendations for 19 Petitions to Amend the Interim Instream Flow Standards (Interim IFS) for streams contained within the following 16 surface water hydrologic units in the region of east Maui (See Figure 1).

WAIKAMOI (6047): Waikamoi Stream, Alo Stream, and Wahinepee Stream
PUOHOKAMOA (6048): Puohokamoa Stream
HAIPUAENA (6049): Haipuaena Stream
PUNALAU (6050): Punalau/Kolea Stream
HONOMANU (6051): Honomanu Stream
NUAAILUA (6052): Nuaailua Stream
OHIA (6054): Ohia (Waianu) Stream
WEST WAILUAIKI (6057): West Wailuaiki Stream

EAST WAILUAIKI (6058): East Wailuaiki Stream
KOPILIULA (6059): Kopiliula Stream and Puakaa Stream
WAIOHUE (6060): Waiohue Stream
PAAKEA (6061): Paakea Stream
WAIAAKA (6062): Waiaaka Stream
KAPAULA (6063): Kapaula Stream
HANAWI (6064): Hanawi Stream
MAKAPIPI (6065): Makapipi Stream

BACKGROUND:

On May 24, 2001, Native Hawaiian Legal Corporation (NHLC), on behalf of Na Moku Aupuni O Koolau Hui (Na Moku), Beatrice Kepani Kekahuna, Marjorie Wallett, and Elizabeth Lehua Lapenia[1], filed 27 Petitions to Amend the Interim Instream Flow Standards for 27 East Maui streams.

On July 23, 2001, NHLC met with Commission staff to discuss the handling of the 27 petitions. Agreement was reached that efforts would focus on Honopou, Hanehoi, Waiokamilo, Kualani, Piinaau, Palauhulu, and Wailuanui Streams. Subsequent efforts by the Commission to adopt surface water hydrologic units for the purpose of improving surface water resource management resulted in the grouping of the eight petitioned streams into five hydrologic units. The State Water Code (Code), Chapter 174C, Hawaii Revised Statutes (HRS), provides that the Commission may adopt interim IFS on a stream-by-stream basis or a general IFS applicable to all streams within a specified area. This submittal seeks to address the remaining 19 petitions, grouped into 16 hydrologic units, as petitioned by NHLC.

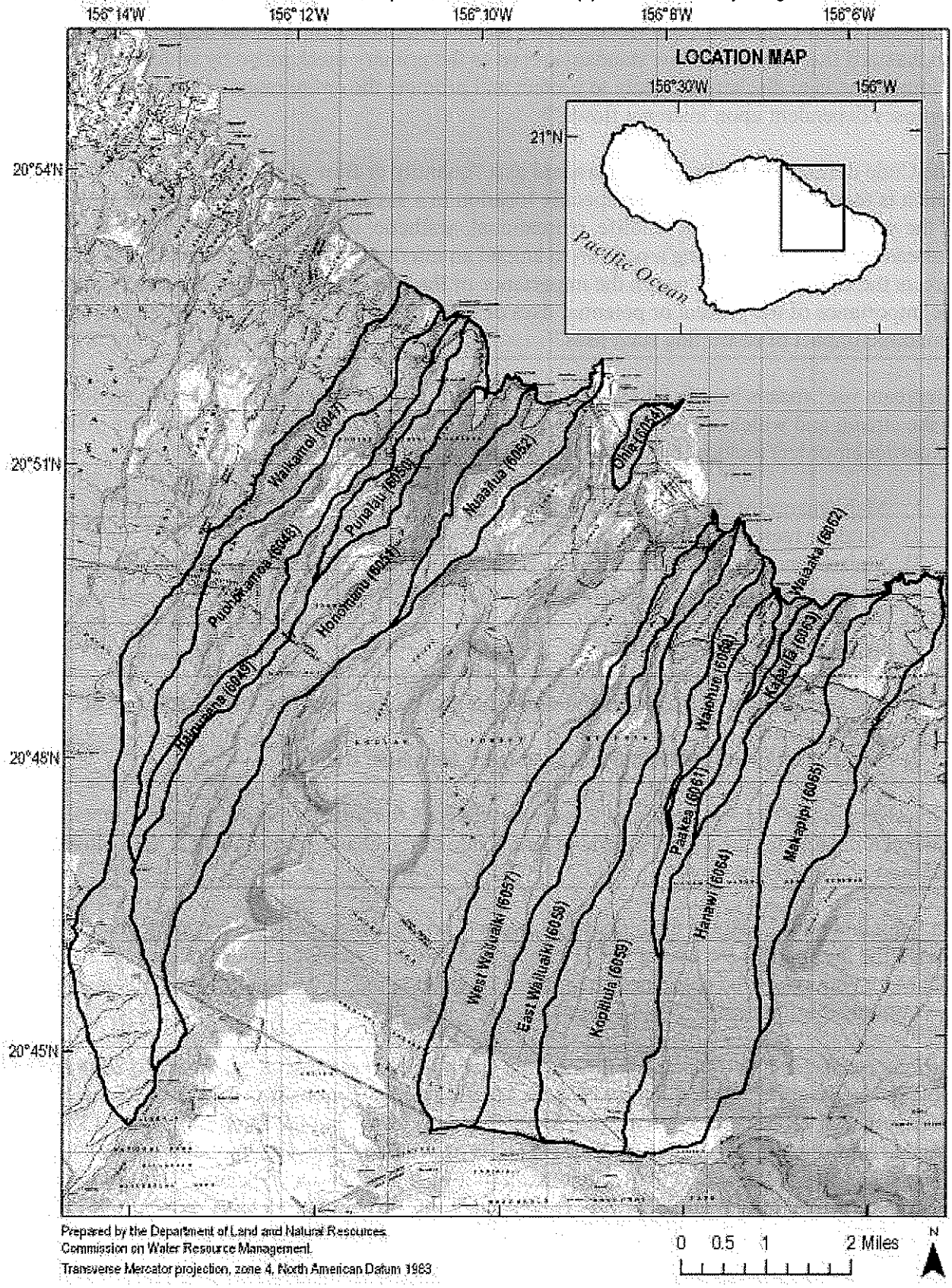
The current interim instream flow standard (interim IFS) for the streams being considered were established by way of Hawaii Administrative Rules (HAR) §13-169-44, which, in pertinent part, reads as follows:

> Interim instream flow standard for East Maui. The Interim Instream Flow Standard for all streams on East Maui, as adopted by the commission on water resource management on June 15, 1988, shall be that amount of water flowing in each stream on the effective date of this standard, and as that flow may naturally vary throughout the year and from year to year without further amounts of water being diverted offstream through new or expanded diversions, and under the stream conditions existing on the effective date of the standard.

The current interim IFS became effective on October 8, 1988. Thus, the status quo interim IFS, in effect, grandfathered all existing diversions that were registered with the Commission in subsequent years. Following the initial registration of stream diversions works, any new or modified stream diversion works structure requires a permit for construction.

[1] The Commission was notified by letter on May 10, 2007, that NHLC "no longer represent Ms. Lapenia and are, therefore, no longer authorized to advance the claim with respect to the parcel identified as TMK: 2-9-008:31 or LCAw-S-1 Claimant: Naoo on her behalf."

Figure 1: Location map of Waikamoi, Puohokamoa, Haipuaena, Punalau, Honomanu, Nuaailua, Ohia, West Wailuaiki, East Wailuaiki, Kopiliula, Waiohue, Paakea, Waiaaka, Kapaula, Hanawi, and Makapipi Surface Water Hydrologic Units, Maui.



Under the Code, the Commission has the responsibility of establishing IFS on a stream-by-stream basis whenever necessary to protect the public interest in the waters of the State. In the Waiahole Ditch Contested Case Decision and Order (Waiahole), the Hawaii Supreme Court emphasized that "instream flow standards serve as the primary mechanism by which the Commission is to discharge its duty to protect and promote the entire range of public trust purposes dependent upon instream flows."

The Code defines an instream flow standard as a "quantity or flow of water or depth of water which is required to be present at a specific location in a stream system at certain specified times of the year to protect fishery, wildlife, recreational, aesthetic, scenic, and other beneficial instream uses. In considering a petition to amend an interim instream flow standard, the Code directs the Commission to "weigh the importance of the present or potential instream values with the importance of the present or potential uses of water for noninstream purposes, including the economic impact of restricting such uses."

"Instream use" means beneficial uses of stream water for significant purposes which are located in the stream and which are achieved by leaving the water in the stream. Instream uses (listed in no particular order) include, but are not limited to:

1) Maintenance of fish and wildlife habitats;
2) Outdoor recreational activities;
3) Maintenance of ecosystems such as estuaries, wetlands, and stream vegetation;
4) Aesthetic values such as waterfalls and scenic waterways;
5) Navigation;
6) Instream hydropower generation;
7) Maintenance of water quality;
8) The conveyance of irrigation and domestic water supplies to downstream points of diversion; and
9) The protection of traditional and customary Hawaiian rights.

"Noninstream use" means the use of stream water that is diverted or removed from its stream channel and includes the use of stream water outside of the channel for domestic, agricultural, and industrial purposes.

On September 25, 2008, the Commission approved, with amendments, the recommendations to amend the interim IFS for five of the 21 total surface water hydrologic units covered by the 27 east Maui petitions. The combined streamflow restoration the Commission approved amounted to a combined estimate of 7 cfs (4.5 mgd).

Various events leading up to and following the Commission action on September 25, 2008 are provided in Exhibit 2, Staff Submittal for the Meeting of the Commission on Water Resource Management, December 16, 2010, Paia, Maui, Petitions to Amend the Interim Instream Flow Standards for the Surface Water Hydrologic Units of Waikamoi (6047), Puohokamoa (6048), Haipuaena (6049), Punalau (6050), Honomanu (6051), Nuaailua (6052), Ohia (6054), West Wailuaiki (6057), East Wailuaiki (6058), Kopiliula (6059), Waiohue (6060), Paakea (6061), Waiaaka (6062), Kapaula (6063), Hanawi (6064), and Makapipi (6065), Maui.

On December 16-17, 2009, Commission staff presented its submittal to address the interim instream standards for the remaining 16 surface water hydrologic units. Following considerable testimony and discussions with various stakeholders, the Commission deferred action on the submittal and directed staff to collect additional information from key stakeholders in the categories of short term, mid term, and long term issues.

The additional data submitted, as requested by the Commission, is provided in Exhibit 3 as the Compilation of Data Submissions, Part II, PR-2010-01. This staff submittal specifically addresses the key points that the Commission sought clarification on and provides two streamflow restoration approaches (seasonal and annual) to address the needs of native stream organisms and cultural gathering practices.

ISSUES/ANALYSIS:

This section of the submittal begins with general considerations of issues that broadly apply to the development of interim IFS for the 16 surface water hydrologic units (Figure 1). The analysis presented is based on additional information that was collected following the December 16-17, 2009 Commission meeting, and should be considered together with the analysis presented in the December 2009 submittal (Exhibit 2). Data summary sheets for each specific hydrologic unit and stream are provided in Exhibit 1.

System Loss Considerations. The 75-mile long East Maui Irrigation Co. (EMI) System consists of approximately 50 miles of tunnel and 25 miles of open ditch, which collect and transport surface water from Nahiku to Maliko Gulch at which point it enters the Hawaiian Commercial and Sugar (HC&S) plantation. Roughly 50 miles of the system is lined to reduce seepage and evaporative losses in the tunnels are essentially eliminated due to the non-exposure to sunlight or wind. While an exact system loss figure cannot be determined, HC&S cites an American Water Works Association survey that indicates municipal water systems (closed pipe systems) typically experience between 10- to 15-percent of unaccounted water loss. In their data submission, HC&S offers two options for determining system loss which range from an inexpensive system classification approach to a very costly (~$15 million) and accurate gaging approach. Regardless, EMI does conduct regular inspection and repair/maintenance of the entire system to minimize losses. These efforts are aided by 12 telemetry stations which enable remote monitoring of the entire ditch system.

Once at the HC&S plantation, east Maui water is used in conjunction with 36 reservoirs that serve the plantation and range in size from 1 million to 80 million gallons. Of these 36 reservoirs, 31 are unlined. HC&S was unable to provide current studies documenting system loss from the reservoirs. However, they did provide data from seepage runs conducted in the 1960s which estimated loss at 23 to 31 mgd. Those studies were conducted when HC&S utilized furrow irrigation and all reservoirs were storing water for longer periods. Current operations geared towards drip-irrigation use the reservoirs mainly as collection points where water is only stored for short periods and conveyed to the plant as soon as possible, thereby limiting water loss to less than the average amount of 23 to 31 mgd. HC&S believes that most of the current water loss (due to increased infiltration) occurs during high rainfall periods when water levels in the reservoirs are higher and water is stored for a greater length of time.

HC&S notes that the reservoirs are a carry-over from furrow irrigation practices when they were constructed to fill and store water overnight for watering adjacent fields the next morning. The amount of water lost can vary with reservoir size, underlying geology, and operational practices. The maximum storage capacity, normal operating capacity, lining, and range of estimated water loss for each reservoir are provided in Exhibit 3, Section 2.0. HC&S estimates the cost to line all 31 unlined reservoirs with polypropylene at $43.5 million.

Maui County Department of Water Supply (Maui DWS) estimates their system loss for the Upcountry Maui systems to be approximately 14-percent. An on-going leak detection program surveyed 14.1 miles of pipe (of a total 270 miles) in the Upcountry system during Fiscal Year (FY) 2009. The survey rate is expected to increase considerably by FY 2011.

Of particular concern are the system losses from the wooden Waikamoi Flume, which Maui DWS indicates cannot be accurately determined at this time. EMI personnel assist with inspection of the flume system and stream intakes on a regular basis, and in turn report leaks to Maui DWS to perform repairs. Periodic inspections are also performed by Maui DWS crews. Rehabilitation of the wooden Waikamoi Flume that serves the Maui DWS' Olinda Water Treatment Facility could undoubtedly increase available surface water supplies.

Maui DWS asserts that they do intend to consult with Commission staff to establish a monitoring program of system losses, and $500,000 has also been committed to the Waikamoi Flume Rehabilitation Design project in the current fiscal year. As of March 8, 2010, a design consultant was selected and has conducted a site inspection to prepare a proposal for the county. The Commission staff believes that rehabilitation of the Waikamoi Flume is of utmost importance in providing a more reliable source of water from existing surface water diversions and may help to maintain water levels in the existing Waikamoi and Kahakapao Reservoirs.

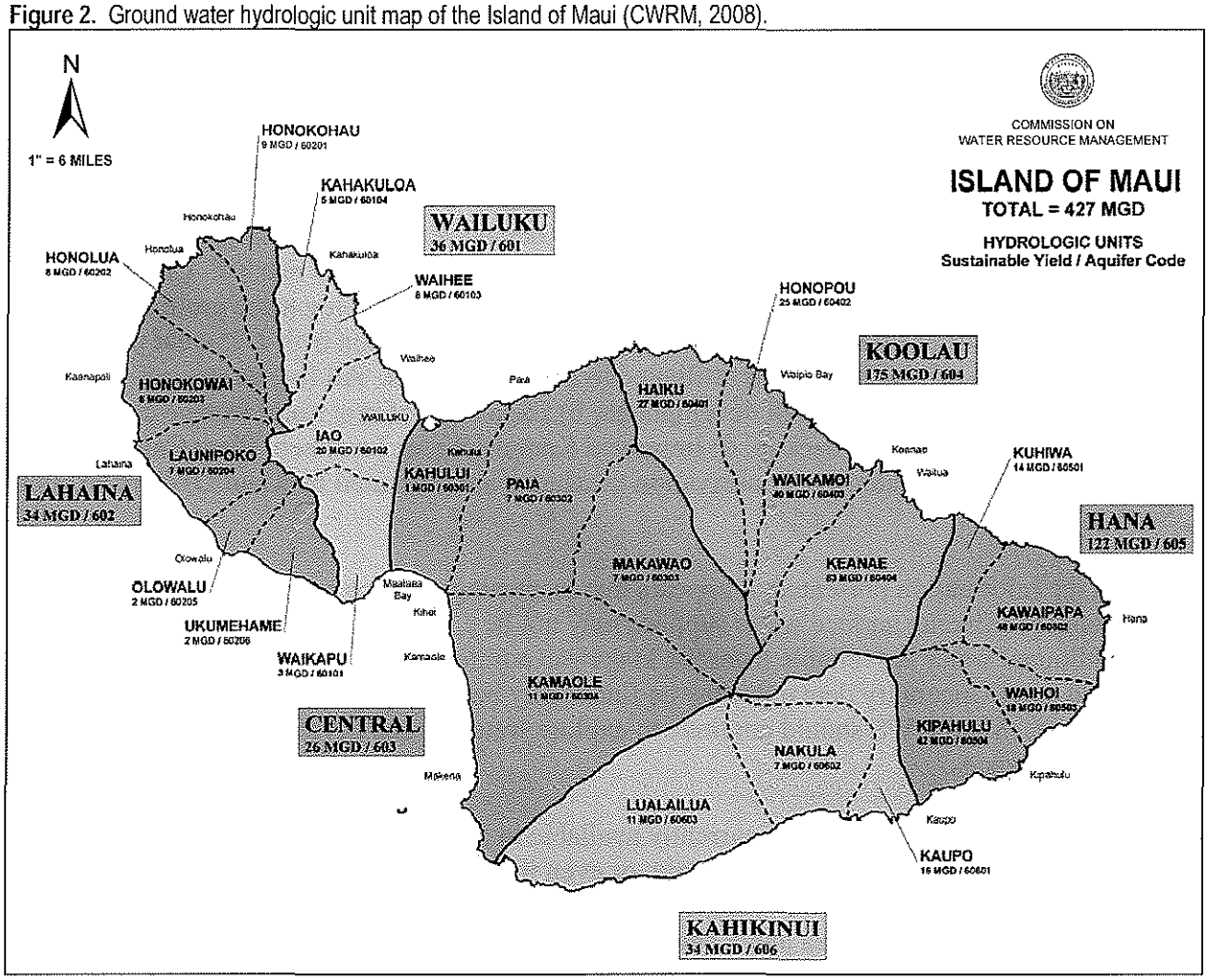
Ground Water Considerations. Based on water use data, the Commission is aware that ground water pumpage regularly exceeds the estimated ranges of sustainable yields in the Paia and Kahului Aquifer System Areas. Table 1 provides the 12-month moving average (12-MAV) of reported ground water pumpage as of December 2008 in comparison to the sustainable yields of each aquifer system in the Central sector (See Figure 2 for map of Maui ground water hydrologic units).

Table 1. Sustainable yields and reported 12-MAV pumpage rates for the Central Aquifer Sector as of December 2008. [mgd = million gallons per day]

Aquifer Code	Aquifer System	Sustainable Yield Range (mgd)	12-MAV Pumpage (mgd)
60301	Kahului	1 - 11	26.22
60302	Paia	7 - 25	33.55
60303	Makawao	7 - 18	0.78
60304	Kamaole	11 - 14	1.33

The Commission has officially adopted the minimums of the ranges as the sustainable yields due to lack of deep monitoring wells in those areas and the potential effects of drought without agricultural return irrigation (i.e. no importation of East Maui surface water).

Figure 2. Ground water hydrologic unit map of the Island of Maui (CWRM, 2008).



The current contribution of return irrigation recharge to the aquifer system areas from large-scale plantations and leakage from reservoirs and ditches[2] are represented in the upper range of the sustainable yields. This is supported by US Geological Survey's (USGS) study on the *Effects of Agricultural Land-Use and Rainfall on Ground-Water Recharge, Central and West Maui 1926-2004*[3]. Spillover from the Makawao Aquifer System Area to down-gradient aquifer system areas, as in the case of Paia, may help to explain why pumpage exceeds the range of sustainable yields without the drastic salinity problems one would expect. The Commission is currently working with USGS to further explore this issue specifically for the Paia and Kahului Aquifer System Areas.

In response to the Commission's request for additional information, HC&S provided summaries of their 16 brackish water wells used to irrigate the plantation. Based on data from 1986-2009, total pumpage from the 16 wells averaged 72 million gallons per day (mgd) and ranged from a

[2] State of Hawaii, Commission on Water Resource Management. (2008). Hawaii Water Plan: Water Resource Protection Plan. Department of Land and Natural Resources, Commission on Water Resource Management, 556 p.
[3] Engott, J.A., and Vana, T.T. (2007). Effects of Agricultural Land-Use Changes and Rainfall on Ground-Water Recharge in Central and West Maui, Hawai'i, 1926–2004: U.S. Geological Survey Scientific Investigations Report 2007–5103, 56 p.

January average of 27 mgd to an October average of 112 mgd. The pump capacity and estimated costs per million gallons pumped for each well is provided in Exhibit 3, Section 2.0.

In the case of Maui DWS, the Commission had specifically asked the County to consider a plan for shifting Upcountry Maui reliance on surface water from 85-percent to a more even balance between surface water and ground water. The Draft County Water Use and Development Plan outlines five strategies to meet anticipated Upcountry demands. The first strategy, referred to as the "Reference Strategy" calls for incremental basal well development as needed. Using the "Reference Strategy" as a baseline, Maui DWS explained that developing more ground water sources to reduce surface water demands would cost over $117 million over a 25-year planning period, $85 million of which could be attributed to electricity costs. All five strategies, including: a) Incremental basal well development; b) Expansion of raw water storage capacity; c) Drought proof full basal well backup; d) Improved Kamole Water Treatment Plant Capacity; and e) Limited growth with extensive conservation measures; are presented by Maui DWS in Exhibit 3, Section 3.0.

Based on the information presented, it appears that increasing reliance on ground water while simultaneously reducing surface water supplies may not be a feasible alternative. For Maui DWS, additional water is available from the Makawao aquifer system; however, the high cost of pumping to meet Upcountry demands may be financially burdensome on Maui's limited customer base. Maui DWS should continue to explore water source development alternatives as technology advances.

Conversely, ground water resources currently available to HC&S are already being overpumped and it would be difficult for HC&S to sustain, or even increase, their use of brackish ground water resources should surface water for irrigation be considerably reduced. The current reported pumpages from the Paia and Kahului Aquifer Systems far exceed the sustainable yields, and is largely attributable to irrigation recharge by east Maui surface water.

Alternative Water Source Considerations. Both Maui DWS and HC&S provided the Commission with summaries of potential alternative water sources. Maui DWS identified four alternatives including the exchange of Hamakuapoko Well water for Wailoa Ditch water for municipal use, use of recycled water from wastewater treatment plants on the Upcountry system (does not currently exist), use of reclaimed stormwater (currently being studied by the U.S. Department of Agriculture's Natural Resources Conservation Service), and various strategies outlined in the County Water Use and Development Plan to meet increasing Upcountry demands.

HC&S identified six alternatives consisting of wastewater reclamation, catchment, stormwater reclamation, desalination, development of new wells, and weather modification. Each alternative was determined to be of limited value either due to lack of infrastructure, high development costs, ineffectiveness, or a combination thereof. Exhibit 3 includes details for each of the alternatives presented by both HC&S (Section 2.0) and Maui DWS (Section 3.0).

Interim IFS Approach Considerations. As directed by the Commission, staff considered two different approaches to establish and implement interim IFS in the subject east Maui streams. The annual approach seeks to maintain a measurable flow standard in the stream year round, while the seasonal approach considers seasonal rainfall patterns in central Maui resulting in

lower offstream needs for surface water during the wet season. The Code definition for IFS as a "quantity or flow of water or depth of water which is required to be present at a specific location in a stream system at certain specified times of the year...", supports both annual and seasonal approaches. A comparison of the annual interim IFS approach and the seasonal interim IFS approach is provided below.

Annual approach

Similar to the interim IFS staff recommendations adopted in the September 2008 Commission decision, the annual approach is to establish and implement a single measurable flow standard that remains in the stream year-round, unless the natural flow is less in which case the interim IFS is the natural flow of the stream.

Increased streamflow is commonly believed to occur in the winter season when rainfall is high. However, rainfall in east Maui follows a different pattern. Rain gage stations in Puohokamoa, Keanae, Paakea, and Kailua[4] show that high rainfall occurs throughout the year and does not follow the typical wet winter - dry summer trend (Figure 3). Streamflow records for the east Maui streams also show a similar monthly pattern. Figure 4 illustrates the monthly streamflow trends for Puohokamoa (USGS station 16545000), West Wailuaiki (USGS station 16518000), Paakea (USGS station 16514000), and Hanawi Streams (USGS 16508000). All four streamflow trends show lack of a seasonal flow pattern and that high streamflow generally occurs in the months of March, April, May, July August, and December.

Under the annual approach, an amount of flow set by the interim IFS would be released downstream in the high streamflow periods that are observed on average 6 months out of the year (Figure 4). During the dry periods when streamflow is low, available flow in the stream would flow downstream. From a streams perspective, the annual approach would restore streamflow to its natural streamflow pattern for the full year that is characteristic of east Maui streams. This pattern is not of a well-defined seasonal trend, but one that varies throughout the year.

The annual interim IFS approach would also help to restore the natural life cycle of the native stream biota in east Maui. Native amphidromous species respond to the natural flow regime in which increased streamflow triggers spawning, recruitment, upstream and downstream migration. In the drier periods, these animals can only exist in shallow pools without major growth and reproduction. According to the Division of Aquatic Resources (DAR), management actions that mimic natural flow patterns with both high and low flows are likely to sustain suitable instream habitats and amphidromous animal populations (see PR-2009-19 Revised, Section 20.0). DAR has calculated the minimum flow to maintain minimum viable habitat for stream animals (H_{min}) in the wet season and minimum flows to maintain minimum connectivity for animals to survive in suitable habitats (C_{min}). Under the annual approach, an annual interim IFS may adapt the H_{min} flow rates for the full year, which could support long-term growth and reproduction of native stream animals year-round.

[4] Western Regional Climate Center. (2009). Western U.S. Historical Climate Summaries. Retrieved May 2010, from the Western Regional Climate Center Web site: http://www.wrcc.dri.edu/.

Figure 3. Monthly mean rainfall trends for selected rain gages in east Maui, Hawaii.

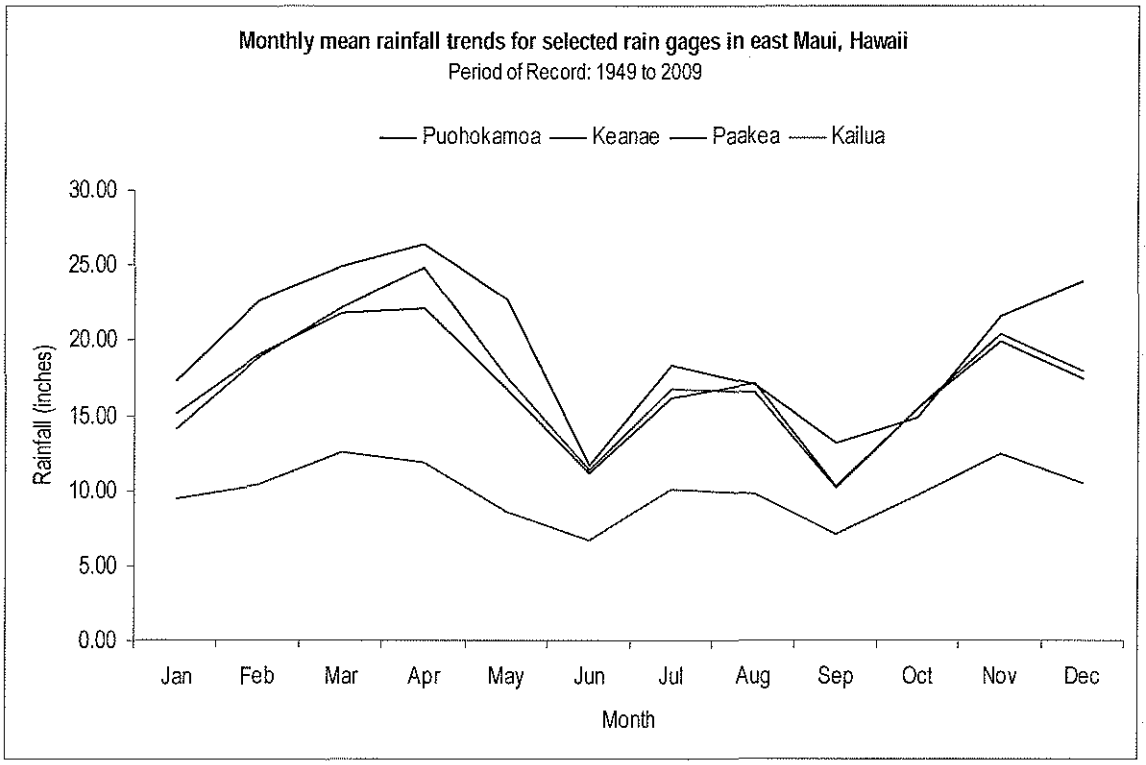
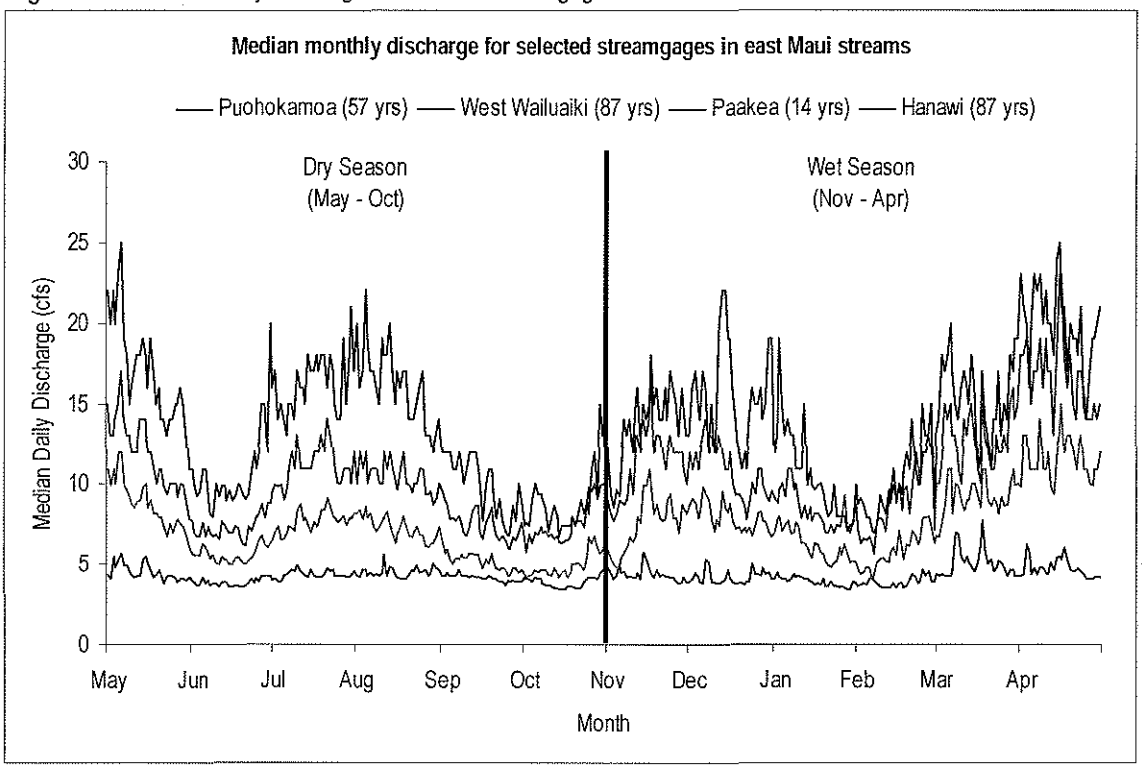


Figure 4. Median monthly discharge for selected streamgages in east Maui Streams.



Seasonal approach

The seasonal interim IFS approach was first discussed at the December 2009 Commission meeting. This approach recognizes the seasonal rainfall patterns in central Maui which translate to lower demands for surface water in the wet season. Accordingly, in the rainy season (November to April), offstream users could be mandated to restore some streamflow, while being permitted to divert some streamflow during the dry season (May to October). Obviously, the Commission needs to consider and weigh all instream values and offstream uses to determine if diversions from a stream should be authorized in establishing any interim IFS, seasonal or annual.

The first question in considering a seasonal IFS is whether that approach protects instream values. DAR has calculated minimum flows to maintain minimum viable habitat for native stream animals (H_{min}) and the minimum flows to maintain minimum connectivity for animals to survive in suitable habitats (C_{min}). Accordingly, a seasonal IFS may adapt H_{min} flow rates during the wet season and C_{min} flow rates during the dry season, which could support most ecological functions required by the stream animals. DAR cautions that the C_{min} flow rates are too low to expect suitable long-term growth and reproduction of native stream animals. Staff also notes that the seasonal approach may not be effective in streams where adjacent landowners are seeking to grow taro, as those uses require water on a regular basis. However, with the exception of Makapipi Stream, the streams at issue in this matter do not include applicants for taro cultivation at this time, but instead focuses on cultural gathering.

Agricultural crops generally need more water in the summer months to compensate for higher evapotranspiration rates and decreased rainfall contribution to irrigation. Contrary to the rainfall pattern in east Maui, rainfall in central Maui where a majority of the end water use is located, exhibit a strong seasonal pattern of wet winters and dry summers. Figure 5 plots the monthly mean rainfall for selected rain gages in central Maui[5]. All four trends show significantly lower rainfall amounts in the months of June to September. This seasonal rainfall pattern, with clearly defined winter and summer seasons, is characteristic of the Leeward coastal areas and areas with lower rainfall[6].

As expected from the streamflow trends, EMI ditch flows recorded at Honopou did not exhibit seasonal variations for a period of 65 years selected between 1922 and 2007. This is clearly illustrated in Figure 6, which shows the flow duration curves for wet season, dry season, and total annual ditch flows. A flow duration curve plots the relationship between flow and the percentage of time that the flow is exceeded. The median or Q_{50} flow has an exceedence probability of 50 percent, that is, the ditch flow is higher than the median flow half the time over the course of 65 years. The EMI ditch flow duration curves for wet and dry seasons are similar, meaning ditch flows behaved similarly in the wet and dry seasons. Figure 7 shows the 65-year median ditch flow for each day of the year. The higher daily median flows were not seasonally dependent as they occurred throughout the year. Similar to that of the east Maui streamflow, ditch flow trends show lack of a seasonal flow pattern. Cumulative ditch flow in the wet season contributes to over half of the annual total ditch flow for 42 out of 63 years (Figure 8). The

[5] Western Regional Climate Center. (2009).

[6] Giambelluca, T.W., Nullet, M.A., and Schroeder, T.A. (1986). Rainfall atlas of Hawaii: State of Hawaii, Department of Land and Natural Resources, Report R76, 59 p.

average wet season contribution to annual total ditch flow is 51 percent and for dry season 49 percent, which is another indication that ditch flows did not vary seasonally.

Figure 5. Monthly mean rainfall trends for selected rain gages in central Maui, Hawaii.

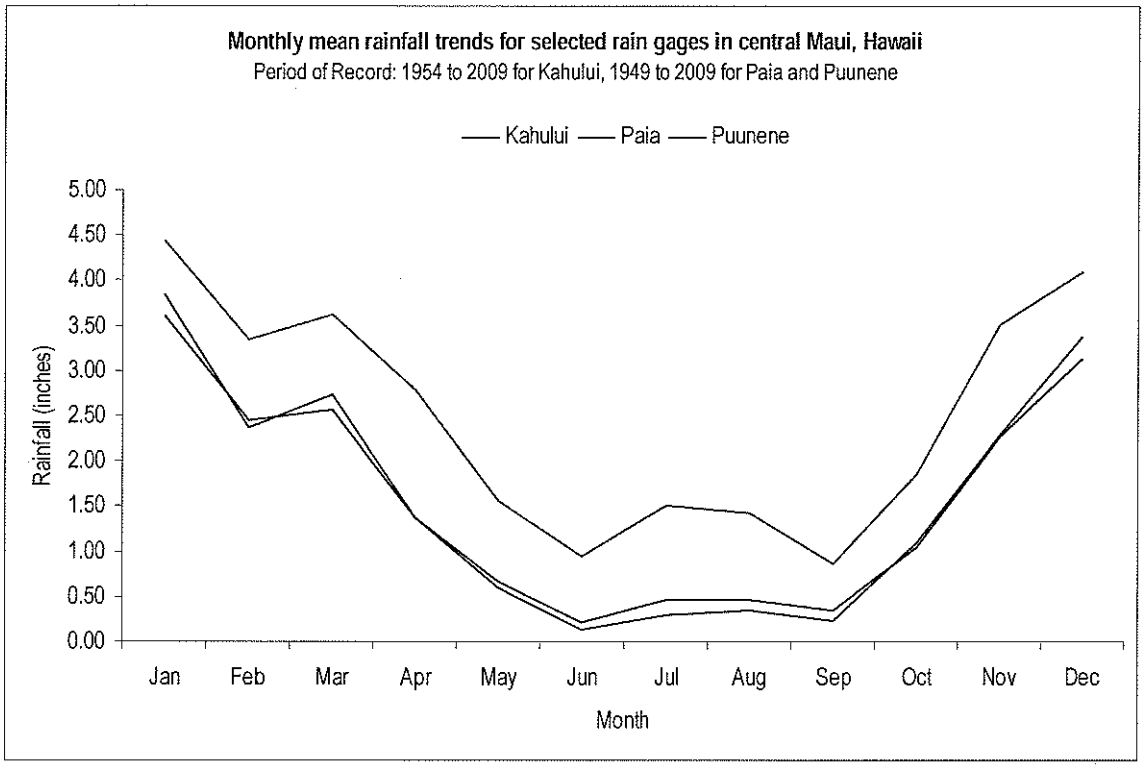


Figure 6. Flow duration for annual total and seasonal ditch flow at Honopou for over 65 years.

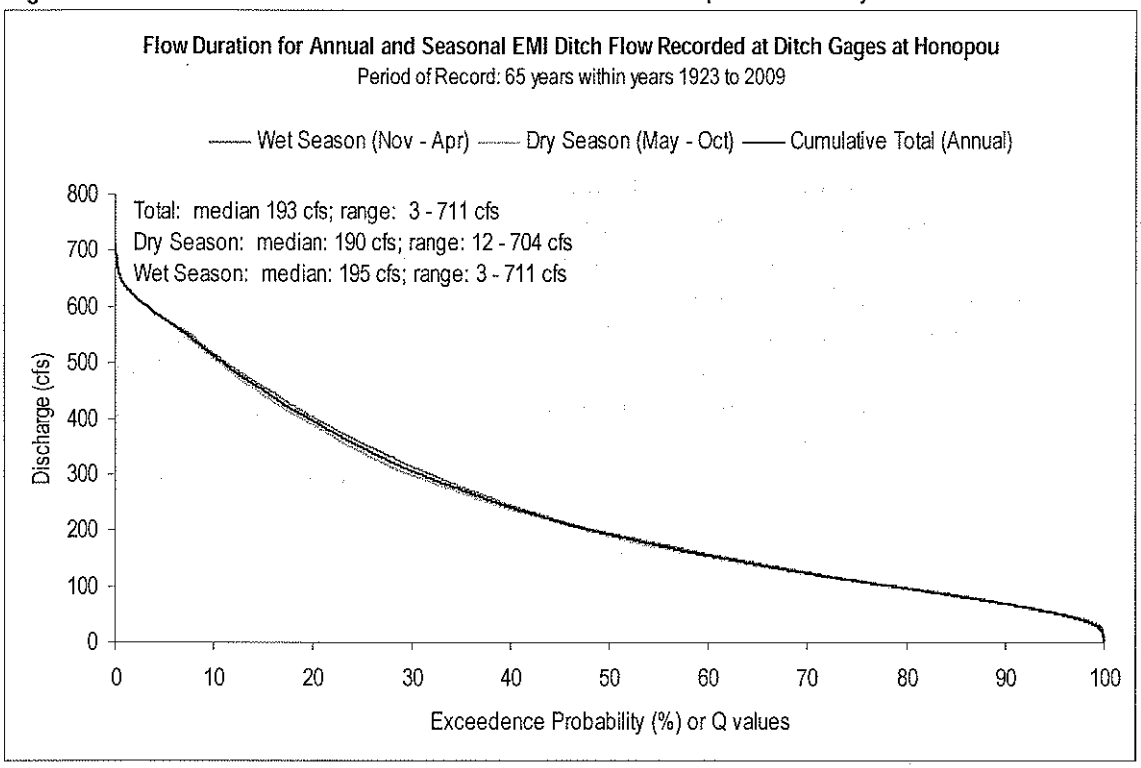


Figure 7. 65-year median daily EMI ditch flow at Honopou.

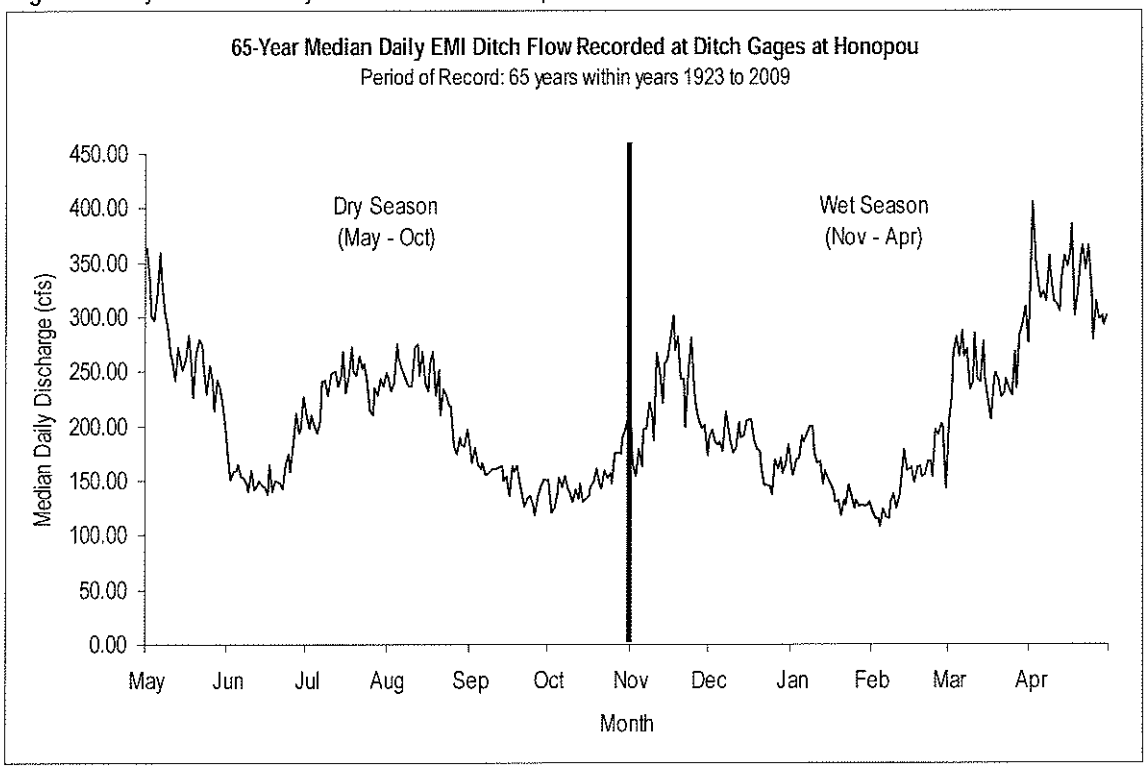
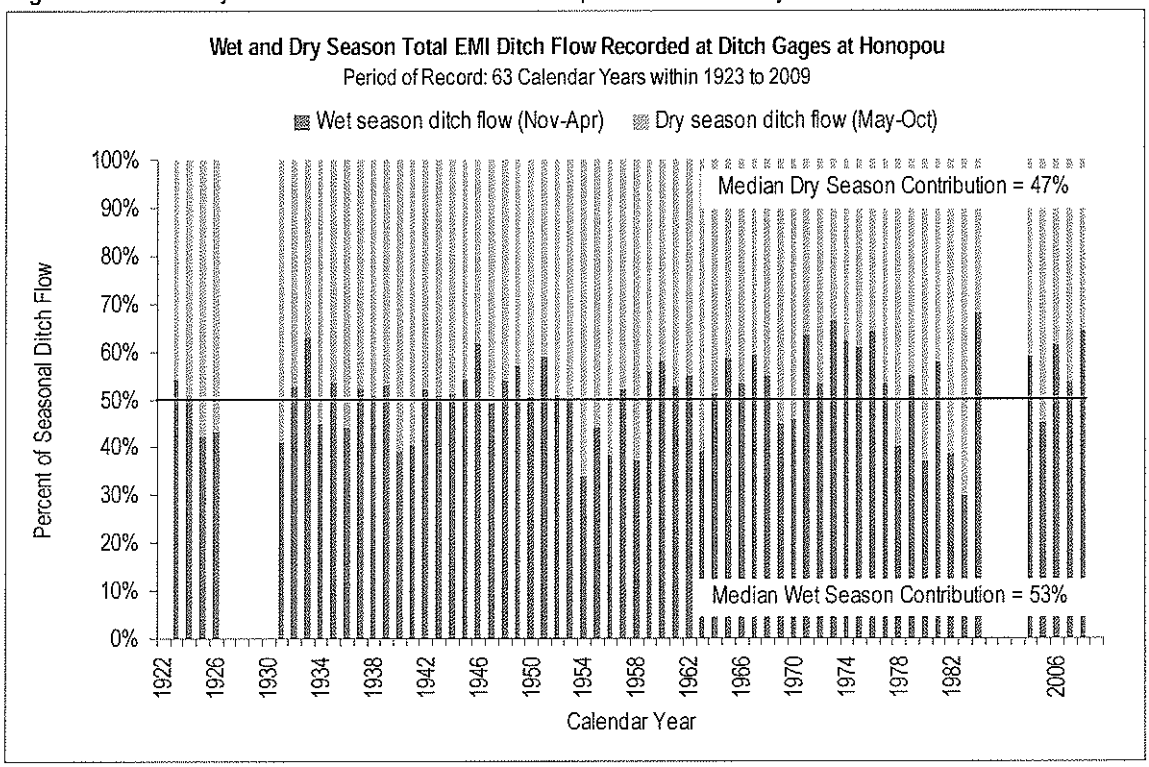


Figure 8. Wet and dry season total EMI ditch flow at Honopou for 63 calendar years.



Comparison between the two approaches

To summarize the information presented above, table 2 compares the annual and seasonal approaches from the instream and noninstream use perspectives.

Table 2. Comparison between the annual and seasonal interim IFS approaches.

	Annual Interim IFS Approach	Seasonal Interim IFS Approach
Instream Use Considerations	▪ Helps restore the east Maui streams to their natural flow pattern for the full year, one that is not seasonally varied, which using H_{min} flow rates could support long-term growth and reproduction of native stream animals year-round ▪ Results in greater biological benefit than the seasonal IFS as the higher levels support annual growth and reproduction of native stream animals	▪ Helps restore the east Maui streams to their natural flow pattern for a portion of the year, which using the H_{min}/C_{min} flow rates, supports most ecological functions required by the stream animals ▪ Results in semi-annual growth and reproduction of native stream animals with recruitment and survival during the alternate six months
Noninstream Use Considerations	▪ Less surface water is available for noninstream agricultural and domestic needs in the summer when demands are high ▪ One-time diversion modification needed for stable IFS	▪ Streamflows would provide water for agricultural and domestic needs in the summer season when surface water demands are higher than in the winter season ▪ More complex diversion modifications needed for flexible IFS and oversight of semi-annual modifications required

Diversion Modification Considerations. Physical modifications, if any, to existing diversion structures are somewhat independent of both proposed interim IFS approaches. The main purpose of a diversion modification in this context is to ensure sufficient streamflow for instream uses downstream of the diversion structure. To maximize the potential flow restoration, the diversion should be modified in such a way that best satisfies downstream uses. In this case, the major issues are: 1) releasing sufficient flow to support a healthy stream animal population downstream of the diversion structure; 2) increasing upstream migration and reducing downstream entrainment of native stream animals across the diversion structure; and 3) ensuring opportunities for traditional gathering. Therefore, any diversion modification should be designed to increase downstream flow in addition to providing connectivity for native stream animals. Designs for each recommended diversion modification should be developed on a stream-by-stream basis and in collaboration with biologists and engineers to ensure that the structural integrity of the diversions is not compromised.

The burden to modify the diversion to suit these objectives in a timely manner is upon the diverter. In addition, diverters should be obligated to install gages alongside such modifications in order to provide the Commission with accurate and timely data of the diversions and streamflows.

Water needs of HC&S. The question has been raised whether HC&S has been diverting more water than what the plantation needs. Based on HC&S' data submission, HC&S has been operating on 85 percent of its water need for the past 24 years (1986 to 2009). At an average need of 270 mgd, the plantation water demands are not met 10 months out of the year. Only

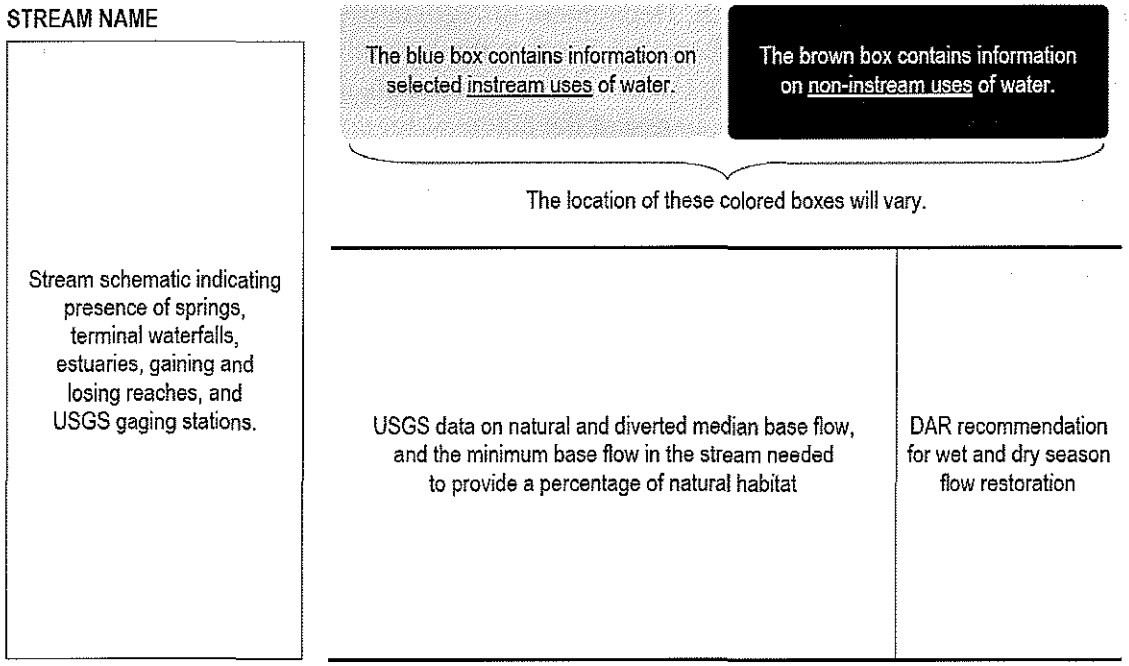
during the winter months of November and December are the water needs of the plantation satisfied with the available water (Exhibit 3, Section 2.0). On average, streamflow provides 167 mgd of water to the plantation with an additional 72 mgd from ground water sources. Evidently, the plantation's water needs greatly exceed available surface water sources otherwise HC&S would not expend the cost to pump water from its brackish water wells to supplement surface water sources. Pumping costs can range from $32 to $290 per million gallons (see Exhibit 3, Section 2.0). With decreasing trends in streamflow[7], east Maui streams will continue to be an insufficient supply of surface water needs for the plantation regardless of interim IFS adoption.

Additionally, on April 7, 2010, the U.S. Department of Agriculture (USDA) announced a partnership between its Agricultural Research Service, the Natural Resources Conservation Service, the Department of the Navy's Office of Naval Research, and the University of Hawaii, in working collaboration with HC&S, to assess the potential for commercial production of advanced biofuels and other renewable energy systems from sugarcane and other biomass crops grown in Hawaii. The energy produced is intended for use by the Department of the Navy which is providing $2 million per year through 2015 to support USDA's research efforts.[8] With few details available at this time, this information is provided for reference only.

[7] Oki, D. (2004). Trends in Streamflow Characteristics at Long-Term Gaging Stations, Hawaii. U.S. Geological Survey, Scientific Investigations Report 2004-5080, 120 p.
[8] U.S. Department of Agriculture. (2010). USDA Announces Partnership in Hawaii to Help Navy Achieve its Biofuel and Other Renewable Energy Goals. Retrieved May 2010, from http://www.usda.gov/wps/portal/usda/

Data Summaries. Exhibit 1 contains data summaries for each of the 19 east Maui streams. These are created to consolidate the available hydrologic, biologic, instream and noninstream use data specific for the streams. Each hydrologic unit has a data summary that is organized into two pages, with the exception of the Waikamoi hydrologic unit which has a 4-page data summary. The first page has the general format illustrated in Figure 9 with slight variations in the order of the colored boxes. The second page contains information on and photos of the major diversion structures present in the hydrologic unit.

Figure 9. First page of a data summary.



Interim IFS Rationale. Surface water is a precious resource, especially on Maui, which has become the most surface water dependent island in the state. The difficulty in establishing interim IFS for the subject east Maui streams lies in the complexity of the EMI ditch system and that HC&S, the largest diverter of east Maui streams, also supplies water for domestic needs. While the major diverters could quantify the economic impacts of flow restoration, the impact to native stream animals since the stream diversion were first constructed cannot be overlooked. Keeping water in the stream for the purposes such as ecosystem maintenance and aesthetics are intrinsic values that, unfortunately, are difficult to measure. Lastly, the traditional practices of taro cultivation and gathering have obviously been negatively impacted by diminishing streamflow, largely caused by upstream diversions.

The following is the rationale for staff's recommendation that is organized into four sections: 1) Interim IFS approach (annual versus seasonal); 2) Streams recommended for flow restoration; 3) Streams not recommended for flow restoration; and 4) Method of calculating the amount of flow restored. Stream names are in *italics* for ease of locating the rationale for specific streams.

<u>Interim IFS approach (annual versus seasonal)</u>
Compared to the existing diverted conditions, both annual and seasonal approaches provide for biological benefit. The annual interim IFS approach would result in greater stream habitat

restoration for building a healthy stream animal population, improving overall stream health, and increasing opportunities for traditional gathering. The seasonal interim IFS approach would provide biological benefit, mandate noninstream users to restore streamflow and increase system efficiency during the wet season, and provide for noninstream uses during the dry seasons.

Staff recommends adopting an annual interim IFS, subject to conditional release, for Makapipi Stream due to the potential for taro cultivation and other instream uses expressed in this community. The Commission should weigh the various values and uses to determine whether to adopt a seasonal or annual interim IFS for the remaining 18 streams.

Method of calculating amount of flow restored

DAR recommends 64-percent of median base flow (BFQ_{50}) in the stream to provide the minimum amount of viable habitat (H_{min}) during the wet season and 20-percent of BFQ_{50} in the dry season to provide minimum viable connectivity (C_{min}). DAR has also provided the minimum amount of median baseflow that is needed to maintain 50-percent (H_{50}) and 70-percent (H_{70}) of the habitat, but does not believe that these flow rates are viable flow rates for the protection of native aquatic biota. DAR cautions that the habitat availability study by USGS[9] did not consider all life history requirements of the stream animals; therefore, DAR does not believe there is linear relationship between the amount of viable habitat and the number of animals in the stream. According to DAR, the flow rate at H_{70} does not produce 20-percent fewer animals than the flow rate at H_{90}. DAR did not provide data on the difference between the volume of animals produced with 20-percent less viable habitat.

In any event, staff recommends that the Commission selects the level of natural habitat to remain in the stream that would apply to both annual and seasonal interim IFS approaches. In the event the Commission adopts the annual interim IFS approach, staff recommends the baseflow needed to maintain the selected natural habitat level to remain in the stream for the full year. In the event the Commission adopts the seasonal interim IFS approach, staff recommends the baseflow needed to maintain the selected natural habitat level to remain in the stream for the wet season and to maintain 20-percent of the natural median baseflow (C_{min} flow rate) during the dry season. Tables 3 and 4 includes the various flow rates needed to provide H_{min} and C_{min} discussed here.

The flow rates to provide H_{min} calculated by Commission staff are similar but not the same as DAR's recommended flows in the wet season. DAR calculated the flow values from natural median baseflow in the middle and lower reaches, whereas the interim IFS are based on natural median baseflow near the potential monitoring locations. Streamflow in the middle reaches include ground water gains from below the ditch. According to USGS data[10], ground water gains can be as high as 1 cfs in the selected streams. The monitoring sites are mostly established near Hana Highway and relatively close to the diversions such that ground water gains reflected at the monitoring locations are minimal. A majority of the ground water gains are observed below the monitoring sites. Therefore, the interim IFS are calculated from the natural median baseflow in the upper reaches upstream from the diversions.

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[9] Gingerich, S.B., and Wolff, R.H. (2005). Effects of Surface-Water Diversions on Habitat Availability for Native Macrofauna, Northeast Maui, Hawaii. U.S. Geological Survey, Scientific Investigations Report 2005-5213, 93 p.

[10] Gingerich, S.B. (2005). Median and Low-Flow Characteristics for Streams under Natural and Diverted Conditions, Northeast Maui, Hawaii. U.S. Geological Survey, Scientific Investigations Report 2004-5262, 72 p.

Table 3. Minimum flows provided by DAR for nine streams under the seasonal approach for restoring the minimum amount of water that is needed in the stream to provide minimum viable habitat in the wet season and minimum viable connectivity in the dry season.

[cfs is cubic feet per second; values in italics are not recommended by DAR but provided for comparison purposes; the first value for Kopiliula Stream corresponds to the flow needed in the middle reach and the second value corresponds to the flow needed in the lower reach.]

Stream	Rank	Wet Season			Dry Season
		Minimum flow in cfs [17% natural median base flow] needed in stream to provide 50 percent of natural habitat	Minimum flow in cfs [36% natural median base flow] needed in stream to provide 70 percent of natural habitat	Minimum flow in cfs [64% natural median base flow] needed in stream to provide 90 percent of natural habitat	Minimum flow in cfs to provide minimum connectivity
East Wailuaiki	1	1.2	2.6	4.5	1.4
West Wailuaiki	2	1.2	2.6	3.5	1.4
Puohokamoa	3	1.8	3.9	7.4	2.3
Waikamoi	4	1.2	2.5	4.2	1.3
Kopiliula	5	1.4	3.0	4.2 / 5.8	1.3 / 2.9
Puakaa				No change	1.2
Haipuaena	6	0.9	1.9	3.3	0.9
Waiohue	7	1.1	2.5	4.4	1.3
Hanawi	8	No change	No change	No change	0.1
Total flow returned		1.4	10.06	22.7*	1.4
Percent of total flow returned to average EMI delivery		0.5%	3.9%	8.8%	0.5%

* The total amount of flow restored in the wet season under the DAR recommendation is 22.7 cfs, which is slightly lower than the original data submission due to minor transcription errors recognized by DAR.

Table 4. Minimum flows needed to provide H_{50}, H_{70}, and H_{90} in the wet season, and the minimum flows needed to provide C_{min} for six streams using staff's method of calculating the interim IFS based upon the upper reach flow estimates.

[cfs is cubic feet per second; EMI delivery is 258 cfs or 167 mgd based on HC&S' data submission.]

Stream	Wet Season			Dry Season
	Minimum flow in cfs [17% natural median base flow] needed in stream to provide 50 percent of natural habitat	Minimum flow in cfs [36% natural median base flow] needed in stream to provide 70 percent of natural habitat	Minimum flow in cfs [64% natural median base flow] needed in stream to provide 90 percent of natural habitat	Minimum flow in cfs to provide minimum connectivity
East Wailuaiki	0.99	2.10	3.70	1.2
West Wailuaiki	1.00	2.20	3.80	1.2
Waikamoi	1.10	2.40	4.30	1.3
Waiohue	0.85	1.80	3.20	1
Hanawi	0.10 (to create a wetted pathway)			
Makapipi	0.93 (conditional flow release)			
Total flow returned	4.77	9.33	15.83	4.7
Percent of total flow returned to average EMI delivery	1.8%	3.6%	6.1%	1.8%

Streams recommended for flow restoration

Commission staff assessed available hydrologic, biologic, instream and noninstream use data for the 19 subject east Maui Streams. From these streams, DAR has recommended nine streams that they believed would produce the most biological return from flow restoration. Table 3 shows DAR's recommendation for nine streams under the seasonal flow restoration. Commission staff is recommending flow restoration for five of the nine streams from the DAR recommendation, and one stream that is not recommended by DAR. Staff recommends flow restoration in the following streams for reasons stated hereafter: Waikamoi, West Wailuaiki, East Wailuaiki, Waiohue, Hanawi, and Makapipi Streams.

Waikamoi Stream is recommended for flow restoration because staff supports DAR's position of a geographic approach to flow restoration. A geographic approach means restoring flow to streams both east and west of Keanae valley. Benefits of this approach include biological diversity in the east Maui area, and regional diversity in traditional gathering opportunities. Staff recommends flow restoration in Waikamoi Stream because it is the only stream out of the three DAR recommended streams located west of Keanae Valley that is not used for conveyance on its main reach. Many area residents also expressed interests in gathering native animals from this stream (See Exhibit 3, Section 5.0).

Staff recommends flow restoration for *West Wailuaiki Stream* and *East Wailuaiki Stream* because these streams would result in the most biological return from additional flow. The presence of an estuary in both streams further enhances the biological diversity of the stream. In addition, flow restoration provides increased opportunities for traditional gathering that area residents currently want to practice (See Exhibit 3, Section 5.0).

Waiohue Stream is also proposed for flow restoration for similar reasons that East and West Wailuaiki Streams were selected. The presence of an estuary further enhances the biological diversity of the stream. Based on NHLC's data, 25 residents testified to gathering vegetation and stream animals in Waiohue Stream (Exhibit 3, Section 5.0).

Staff proposed flow restoration for *Hanawi Stream* because minimal flow is needed to achieve the desired biological diversity and impacts to HC&S would be negligible. Modification of the diversion would serve mainly to create a wetted pathway for stream animal connectivity from the diversion to the ocean. The interim IFS for Hanawi Stream is an exception to the staff's approach of calculating the interim IFS because the stream has adequate flow to sustain a viable biota population. As recommended by DAR, the biological health of the stream could be further improved simply by providing connectivity in the dry reach immediately below the diversion. For this reason, staff established the monitoring site directly below the ditch at an interim IFS of 0.1 cfs to ensure a wetted pathway.

Apart from DAR's priority streams, staff recommends flow restoration for *Makapipi Stream* because the Nahiku community relies heavily on the stream for cultural practices, recreation, and other instream uses. With the uncertainty of gaining and losing reaches along most of the stream's course to the ocean, it is not known whether restored flow would result in continuous streamflow from the headwaters to the stream mouth. A coordinated study of a short-term release of water past the one major EMI diversion should be sufficient to determine the sustainability of the proposed standard. The interim IFS for Makapipi Stream is an exception to

the staff's approach of calculating the interim IFS because flow restoration is proposed mainly for the purpose of taro cultivation. The interim IFS for Makapipi Stream is the estimated TFQ_{70} flow at USGS station 16507000 located just upstream of Hana Highway.

Table 4 shows the minimum flows needed to provide H_{50}, H_{70}, and H_{90} in the wet season, and the minimum flows needed to provide C_{min} for six streams using staff's method of calculating the interim IFS based upon the upper reach flow estimates.

Streams not recommended for flow restoration

Among the DAR priority streams, staff is not recommending flow restoration for Puohokamoa Stream, Haipuaena Stream, Kopiliula Stream, and Puakaa Stream. *Puohokamoa, Haipuaena, and Kopiliula Streams* are not proposed for flow restoration because these streams are used for conveyance. At this time, flow restoration is not recommended for streams that are used to convey water from one ditch to another, as more water may exist in the portion of stream used for conveyance than would naturally occur. Commingled water exists for a considerable distance upstream of the diversion structures on both streams. Staff believes that any interim IFS should be based solely on the surface water available within the given hydrologic unit. Any modification to the existing diversion infrastructure on these streams could result in more water being released than naturally occurs.

While a minimal flow restoration to provide connectivity is proposed for Hanawi Stream, staff does not recommend the same for *Puakaa Stream*. According to DAR (see Exhibit B, Section 1.0), the amount of habitat unit gain in Puakaa Stream is only 300 meters compared to over 1,200 meters in Hanawi Stream. Staff feels that the cost and effort to modify the diversion to allow for connectivity is better spent in Hanawi Stream than Puakaa Stream.

For the remaining nine streams – *Alo, Wahinepee, Punalau, Honomanu, Nuaailua, Ohia, Paakea, Waiaaka, and Kapaula Streams*, flow restoration is not recommended because these streams would not result in significant biological return from additional flow. Instead, staff recommends establishing measurable status quo flows at specific locations along each stream.

RECOMMENDATION:
Recommendations are presented in order of the hydrologic units codes, from west to east.

WAIKAMOI (6047) RECOMMENDATIONS:
Waikamoi and Alo Streams: In the matter of the Petition to Amend the Interim Instream Flow Standard for Waikamoi and Alo Streams, staff recommends that one measurable instream IFS be established for Waikamoi Stream below the confluence with Alo Stream. The proposed interim IFS for Waikamoi Stream below all EMI diversions and just above Hana Highway, near an altitude of 550 feet, shall be established at an estimated flow of 4.3 cubic feet per second (2.8 million gallons per day).

Wahinepee Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Wahinepee Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 575 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 0.5 cubic feet per second (0.32 million gallons per day) cfs based on USGS estimates of total flow at Q_{95} (TFQ_{95}).

PUOHOKAMOA (6048) RECOMMENDATIONS:
Puohokamoa Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Puohokamoa Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 565 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 0.4 cubic feet per second (0.26 million gallons per day) based on USGS estimates of total flow at Q_{95} (TFQ_{95}).

HAIPUAENA (6049) RECOMMENDATIONS:
Haipuaena Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Haipuaena Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 510 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 0.1 cubic feet per second (0.07 million gallons per day) based on USGS estimates of total flow at Q_{95} (TFQ_{95}).

PUNALAU (6050) RECOMMENDATIONS:
Punalau/Kolea Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Punalau/Kolea Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 40 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 0.2 cubic feet per second (1.36 million gallons per day) based on USGS estimates of total flow at Q_{95} (TFQ_{95}).

HONOMANU (6051) RECOMMENDATIONS:
Honomanu Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Honomanu Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 20 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 0 based on USGS estimates of total flow at Q_{95} (TFQ_{95}).

NUAAILUA (6052) RECOMMENDATIONS:
Nuaailua Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Nuaailua Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 110 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 3.1 cubic feet per second (2 million gallons per day) based on USGS estimates of total flow at Q_{95} (TFQ_{95}).

OHIA (6054) RECOMMENDATIONS:
Ohia Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Ohia (Waianu) Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 195 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 4.6 cubic feet per second (2.00 million gallons per day) based on USGS estimates of total flow at Q_{95} (TFQ_{95}).

WEST WAILUAIKI (6057) RECOMMENDATIONS:
West Wailuaiki Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for West Wailuaiki Stream, staff recommends that one measurable instream IFS be established for this stream. The proposed interim IFS for West Wailuaiki Stream below all EMI diversions and just above Hana Highway, near an altitude of 1,235 feet, shall be established at an estimated flow of 3.8 cubic feet per second (2.5 million gallons per day).

EAST WAILUAIKI (6058) RECOMMENDATIONS:
East Wailuaiki Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for East Wailuaiki Stream, staff recommends that one measurable instream IFS be established for this stream. The proposed interim IFS for East Wailuaiki Stream below all EMI diversions and just above Hana Highway, near an altitude of 1,235 feet, shall be established at an estimated flow of 3.7 cubic feet per second (2.4 million gallons per day).

KOPILIULA (6059) RECOMMENDATIONS:
Kopiliula Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Kopiliula Stream, staff recommends that one measurable instream IFS be established for this stream. The proposed interim IFS for Kopiliula Stream below all EMI diversions and just above Hana Highway, near an altitude of 1,270 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 0.5 cubic feet per second (0.32 million gallons per day) based on USGS estimates of total flow at Q_{95} (TFQ_{95}).

Puakaa Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Puakaa Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 1,235 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 0.6 cubic feet per second (0.39 million gallons per day) based on USGS estimates of total flow at Q_{95} (TFQ_{95}).

WAIOHUE (6060) RECOMMENDATIONS:
Waiohue Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Waiohue Stream, staff recommends that one measurable instream IFS be established for this stream. The proposed interim IFS for Waiohue Stream below all EMI diversions and just above Hana Highway, near an altitude of 1,195 feet, shall be established at an estimated flow of 3.2 cubic feet per second (2.1 million gallons per day).

PAAKEA (6061) RECOMMENDATIONS:
Paakea Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Paakea Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 1,265 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 1.5 cubic feet per second (1 million gallons per day).

WAIAAKA (6062) RECOMMENDATIONS:
Waiaaka Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Waiaaka Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and at Hana Highway, near an altitude of 1,235 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 0.

KAPAULA (6063) RECOMMENDATIONS:
Kapaula Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Kapaula Stream, staff recommends that one measurable interim IFS be established for this stream. The interim IFS below all EMI diversions and just above Hana Highway, near an altitude of 1,194 feet, shall remain as designated on October 8, 1988. This is equivalent to an estimated flow of 0.2 cubic feet per second (0.1 million gallons per day).

HANAWI (6064) RECOMMENDATIONS:
Hanawi Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Hanawi Stream, staff recommends that one measurable instream IFS be established for this stream. The proposed interim IFS for Hanawi Stream immediately below the EMI diversion, near an altitude of 1,300 feet, shall be established at an estimated flow of 0.1 cubic feet per second (0.06 million gallons per day). This proposed interim IFS aims to create a wetted pathway directly below the EMI diversion to provide connectivity for stream biota.

MAKAPIPI (6065) RECOMMENDATIONS:
The balance of instream and noninstream uses for Makapipi Stream considers both the importance of diverted streamflow for the EMI System and the Nahiku community which relies on the stream for cultural practices, recreation, and other instream uses. With the uncertainty of gaining and losing reaches along most of the stream's course to the ocean, it is not known whether restored flow would result in continuous streamflow from the headwaters to the stream mouth. A coordinated study of a short-term release of water past the one major EMI diversion should be sufficient to determine the sustainability of the proposed standard.

Makapipi Stream: In the matter of the Petition to Amend the Interim Instream Flow Standard for Makapipi Stream, staff recommends that one measurable interim IFS be established for this stream. The proposed interim IFS below all EMI diversions and just above Hana Highway, near

an altitude of 935 feet, shall be established at an estimated flow of 0.93 cubic feet per second (0.6 million gallons per day) based on USGS estimates of total flow at Q_{70} (TFQ_{70}). Due to the uncertainty of existing hydrogeologic conditions of Makapipi Stream, this interim IFS will be subject to a conditional release of water by EMI and monitoring by Commission staff. Should an estimated flow of 0.93 cubic feet per second be unattainable, the interim IFS may be revised by a future Commission action.

GENERAL RECOMMENDATIONS:
Staff recommends approval of the following adaptive management strategies for all sixteen of the hydrologic units being considered:

IMPLEMENTATION

GENERAL ACTIONS

- Staff shall seek to enforce the provisions of the State Water Code should any unauthorized, non-registered or non-permitted diversions be discovered in the course of its fieldwork. Staff recommends that all owners of unauthorized diversion works structures contact staff to file the necessary applications to seek compliance with all permitting requirements set forth by the Code.
- Staff shall coordinate with EMI to identify and determine appropriate actions with regard to attaining the proposed interim IFS values downstream of existing diversion structures.
- Staff shall continue to assess existing conditions and the status of all EMI diversions, in coordination with EMI and the DAR, to develop the necessary modifications to improve habitat conditions for stream biota.
- Any party diverting water from a stream shall be responsible to maintain system efficiencies, minimize offstream water losses, and minimize impacts to the natural stream resource.

Staff is recommending flow restoration for six streams, and that the implementation of the interim IFS to follow a tiered approach. The tiered approach consists of implementation actions that can be achieved in the short-term, mid-term, and long-term. Each of the six streams is placed in the appropriate tier based on the potential difficulty of implementing the interim IFS. This approach allows the staff and stakeholders to evaluate the effectiveness of a particular implementation action, and whether that action can be repeated for the streams in the next tier.

SHORT-TERM ACTIONS:
The short-term recommendations represent interim IFS that shall be implemented in a period of one (1) year from the date of adoption.

- East Wailuaiki Stream: The proposed interim IFS for East Wailuaiki Stream below all EMI diversions and just above Hana Highway, near an altitude of 1,235 feet, shall be established at an estimated flow of 3.7 cubic feet per second (2.4 million gallons per day).
- West Wailuaiki Stream: The proposed interim IFS for West Wailuaiki Stream below all EMI diversions and just above Hana Highway, near an altitude of 1,235 feet, shall be established at an estimated flow of 3.8 cubic feet per second (2.5 million gallons per day).

- Hanawi Stream: The proposed interim IFS for Hanawi Stream immediately below the EMI diversion, near an altitude of 1,300 feet, shall be established at an estimated flow of 0.1 cubic feet per second (0.06 million gallons per day). This proposed interim IFS aims to create a wetted pathway directly below the EMI diversion to provide connectivity for stream biota.
- Makapipi Stream: The proposed interim IFS for Makapipi Stream below all EMI diversions and just above Hana Highway, near an altitude of 935 feet, shall be established at an estimated flow of 0.93 cubic feet per second (0.6 million gallons per day). Due to the uncertainty of existing hydrogeologic conditions of Makapipi Stream, this interim IFS will be subject to a conditional release of water by EMI and monitoring by Commission staff. Should an estimated flow of 0.93 cubic feet per second be unattainable, the interim IFS may be revised by a future Commission action. Adjustments to ground water development tunnels will not be required.

MID-TERM ACTIONS:

The mid-term recommendations represent interim IFS that shall be implemented in a period of one (1) year after the implementation of the short-term recommendations.

- Waikamoi Stream: The proposed interim IFS for Waikamoi Stream below all EMI diversions and just above Hana Highway, near an altitude of 550 feet, shall be established at an estimated flow of 4.3 cubic feet per second (2.8 million gallons per day).
- Waiohue Stream: The proposed interim IFS for Waiohue Stream below all EMI diversions and just above Hana Highway, near an altitude of 1,195 feet, shall be established at an estimated flow of 3.2 cubic feet per second (2.1 million gallons per day).

LONG-TERM ACTIONS

The long-term recommendations represent implementation actions that shall be achieved within a three (3) year time frame from the date of adoption.

- Maui DWS initiate rehabilitation and construction on the Waikamoi Flume within three (3) years. The reconstruction of the extremely leaky Waikamoi Flume is the least expensive alternative water source for Maui DWS Upcountry customers. Maui County is required to reduce waste and system loss. If action is not taken to initiate construction in this time period, then the Commission shall be obligated by law to reduce Maui DWS' diversions due to waste.

MONITORING

- HC&S currently reports monthly water use for four stations in its telemetry system. Upon approval of these recommendations, HC&S shall begin reporting water use for the other four stations in its system that are also continuously recorded (Wailoa Ditch at Opana, Kauhikoa Ditch at Maliko, Lowrie Ditch at Maliko, Haiku Ditch at Maliko). If EMI is unable to provide monthly water use reports, sufficient justification should be provided to Commission staff.
- There are currently four gaging stations in the EMI telemetry system that do not continuously record data. EMI, in coordination with Commission staff, shall identify and install continuous recorders at these four gaging stations within one year. If EMI is

unable to install a recorder, sufficient justification should be provided to Commission staff.

- EMI, in coordination with the Commission and USGS, shall seek to cooperatively fund and undertake a system efficiency study to accurately determine EMI system losses and/or gains. Should such an effort not be possible, Commission staff shall report back to the Commission.
- HC&S, in coordination with the Commission and USGS, shall undertake a system efficiency study to accurately determine HC&S reservoir system losses.
- Maui DWS, in consultation with Commission staff, shall regularly report monthly water use or related monitoring data (e.g., ditch flow, reservoir levels, pumpage amounts, etc.) on forms provided by the Commission.
- Staff shall monitor streamflow by taking periodic flow measurements, subject to available funding, at the proposed interim IFS locations, as weather permits. These will be point-in-time measurements; however, the installation of stream gaging stations remains an option for long-term management.
- Periodic biological surveys shall be conducted, subject to available funding, to monitor the response of stream biota to post-interim IFS implementation.
- Any party claiming to be negatively impacted as a result of the adopted interim IFS shall monitor and document, in cooperation with staff, the impact upon instream or noninstream uses, including economic impacts. Data shall be provided to staff to substantiate any claims.
- Likewise, any party claiming that negative impacts are a direct result of actions (i.e., diverting too much water, violating the interim IFS) caused by another party, shall monitor and document the impact upon instream or noninstream uses, including economic impacts. Data shall be provided to staff to substantiate any claims.
- All claimants shall cooperate with staff in conducting appropriate investigations and studies, particularly with regard to granting access to stream channels and private property related to such investigations, subject to the provisions of the State Water Code, Chapter 174C, HRS.

EVALUATION

- Within one year from the date of adoption of an interim IFS, staff shall report to the Commission on the progress of implementing the interim IFS and the application of the adaptive management strategies outlined above, and the impacts of the interim IFS upon instream and noninstream uses.
- Within one year, HC&S/EMI shall report to the Commission on the status and implementation of the proposed interim IFS.
- Within one year, Maui DWS shall report to the Commission on the status of efforts to rehabilitate the Waikamoi Flume and other steps being taken to improve system inefficiencies.
- Staff shall assess the implementation of these strategies on an as-needed basis, as may be necessary upon consultation with the affected parties.
- Staff shall continue to provide quarterly updates to the Commission during the course of the year.
- Should there be changes to the operational status of HC&S, changes to the current water uses declared by HC&S, and/or any substantial changes in water needs as determined by

the Commission or Commission staff, staff shall reassess the interim IFS for streams affected by the EMI System.

REPORTING

- Maui DWS shall submit annual reports to the Commission at a regular Commission meeting detailing the progress of the Waikamoi Flume design and construction until that rehabilitation construction is completed.
- HC&S shall submit annual reports to the Commission detailing the end use of water originating from east Maui streams. HC&S shall obtain agreements and/or provide existing agreements with any entity that receives water from the HC&S/EMI water delivery system to provide data on the ultimate end use of such water in these annual reports. HC&S shall work with Commission staff and present a draft report format to the Commission for review no later than September 2010.

Respectfully submitted,

KEN C. KAWAHARA, P.E.
Deputy Director

Note: Exhibit 3 is provided electronically on an accompanying CD and all exhibits are available from the Commission website at http://hawaii.gov/dlnr/cwrm/currentissues_Petition27EastMaui.htm.

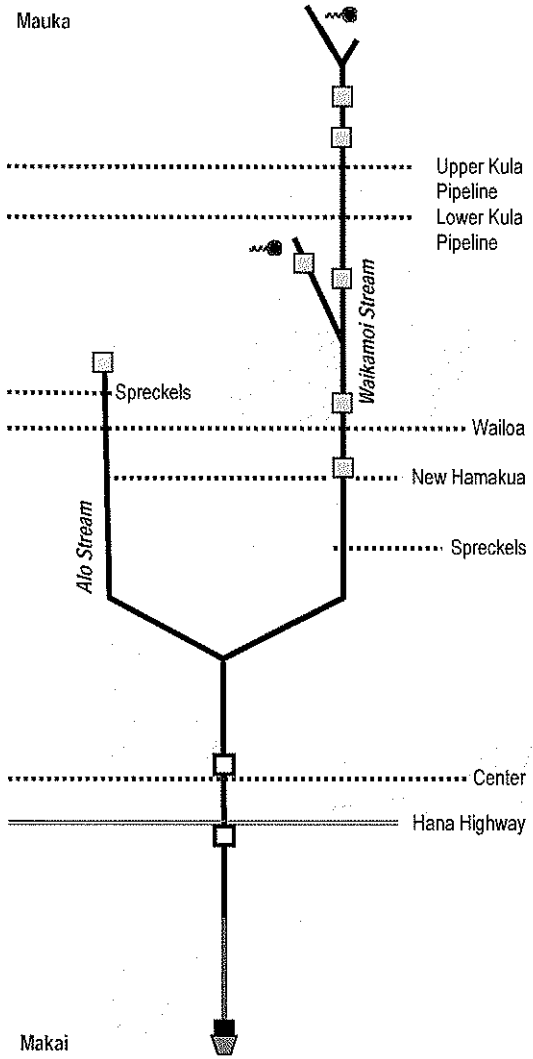
Exhibit 1	Data Summaries
Exhibit 2	Staff Submittal for the Meeting of the Commission on Water Resource Management, December 16, 2010, Paia, Maui, Petitions to Amend the Interim Instream Flow Standards for the Surface Water Hydrologic Units of Waikamoi (6047), Puohokamoa (6048), Haipuaena (6049), Punalau (6050), Honomanu (6051), Nuaailua (6052), Ohia (6054), West Wailuaiki (6057), East Wailuaiki (6058), Kopiliula (6059), Waiohue (6060), Paakea (6061), Waiaaka (6062), Kapaula (6063), Hanawi (6064), and Makapipi (6065), Maui.
Exhibit 3	Compilation of Data Submissions, Part II, PR-2010-01

APPROVED FOR SUBMITTAL:

LAURA H. THIELEN
Chairperson

EXHIBIT 1
DATA SUMMARIES

WAIKAMOI & ALO STREAM



Spring
USGS gaging station
Active
Inactive
Low Flow
Ungaged Site
Terminal Waterfall
Stream Section
Gaining
Losing
Dry
Uncertain

DIAGRAM NOT TO SCALE

[Data in black correspond to Waikamoi Stream, data in blue corresponds specifically to tributary Alo Stream]

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation [RANK 4]		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	3.5 1.5	Above diversion	0.60 0.26	0.88 0.38	1.30 0.54	1.70 0.72	2.20 0.96	No change	No change	526
Diversion	Diverting all flow		**Wailoa Ditch intake (W-1)** ☑ dam / weir ☑ control gate ☑ onstream sluice ☑ conveyance (S-8, Haipuaena)		**Wailoa Ditch intake (W-2)** ☑ dam / weir ☑ control gate ☑ ~~onstream~~ sluice ☐ conveyance			DAR recommends restoration at the Wailoa Ditch intake (W-2)		
Diversion	Diverting all flow		**New Hamakua Ditch intake (NH-1)** ☑ dam / weir ☑ control gate ☑ onstream sluice ☑ conveyance (overflow)					DAR does not recommend any restoration action for Alo Stream		
Diversion	Diverting all flow		**Spreckels Ditch intake (S-10, Skimming Dam)** ☑ dam / weir ☑ control gate ☐ sluice gate ☐ conveyance					DAR recommends restoration at the Spreckels Ditch intake (S-10)		
Middle-Upper	6.6	1.6	1.10	1.70	2.40	3.20	4.20	3.6 (+2.0)	1.7 (+0.1)	556
Diversion	Diverting all flow		**Center Ditch intake (C-1)** ☑ dam / weir ☐ control gate ☑ onstream sluice ☐ conveyance					DAR recommends restoration at the Center Ditch intake (C-1)		
Middle-Lower	6.7	0.2	1.10	1.70	2.40	3.20	4.30	4.2 (+0.6)	1.3 (-0.4)	1,005
Lower	7	0.2	1.20	1.80	2.50	3.40	4.50			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

Total HU: 7,080 m Restored: 2,087 m
*Action would restore 30% of total HU, or 30% of HU lost to diversions.

INSTREAM USES

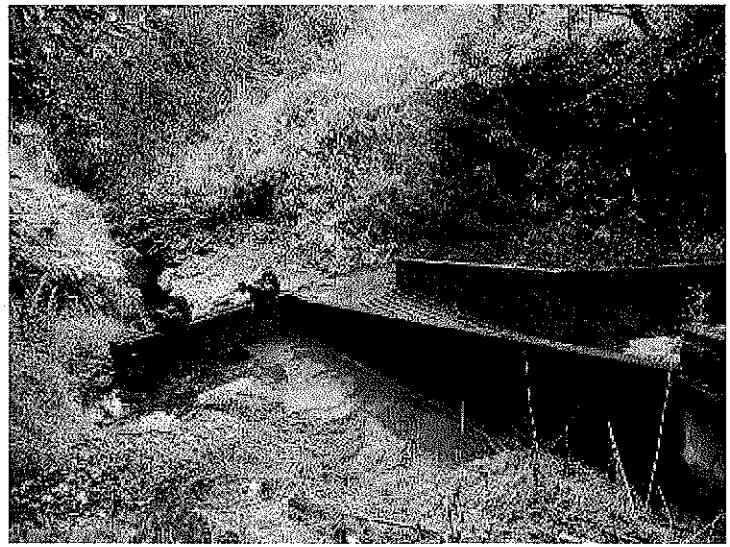
Traditional: 13 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Substantial (HSA rating)
Water Quality: Impaired
Hydropower Potential: No

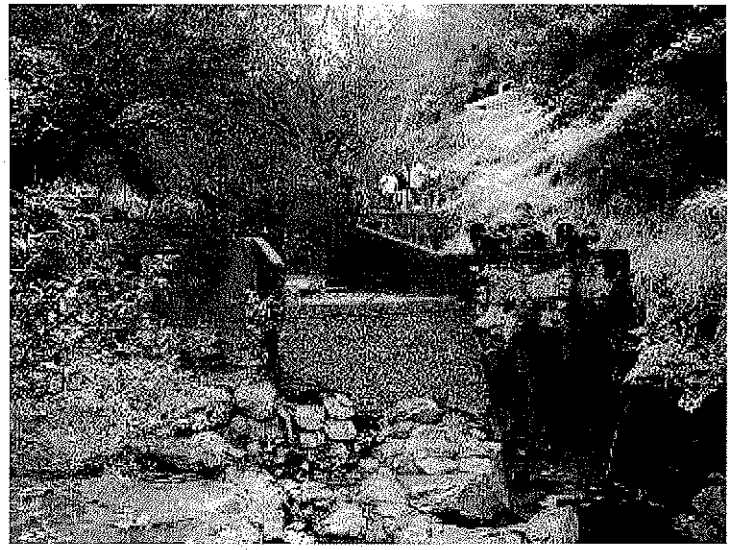
NONINSTREAM USES

Traditional: No taro cultivation
Diversions: EMI - 5 major, 5 minor; MDWS - 4 major, 8 minor
- EMI diverts 6.6 cfs (dry times) to 13.3 cfs (normal times) of water, 6-13% of Huelo Lic and 2-5% of East Maui Lic water yield

Wailoa Ditch intake (W-1) on Alo Stream

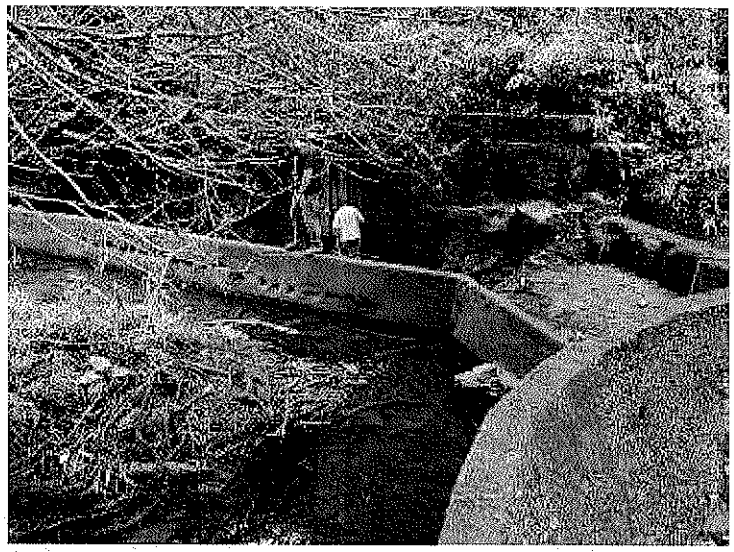
Diversion structure consists of a 36 feet (L) x 8 feet (H) dam. The intake grate (8 x 10 feet) spans across the stream channel and is about 6.5 feet above the stream. The control gate, gravel basin, and two sluice gates (3 x 3 feet, W x H) are situated on the left stream bank. This section of Alo Stream is used to convey water from Spreckels Ditch to the Wailoa Ditch.





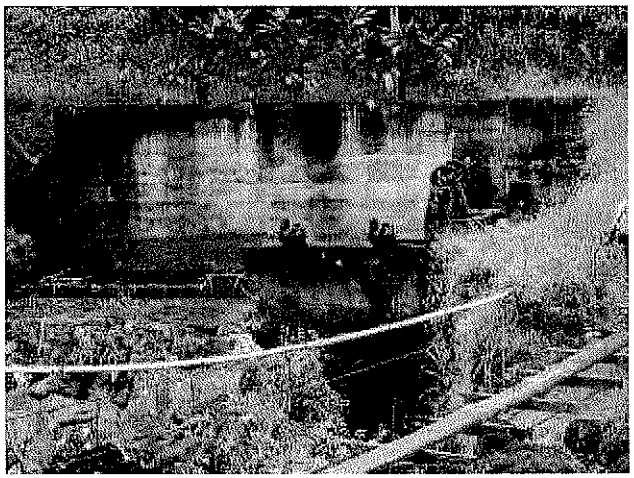
New Hamakua Ditch intake (NH-1) on Alo Stream

Diversion structure consists of a 10 feet tall curved dam, about 26 feet from the intake to the sluice gate. The dividing wall (43 feet in length) and the intake (5 x 2.2 feet, W x H) are situated on the left bank. The sluice gate (3 x 4.4 feet, W x H) is on the right bank. During normal flows, much of the water from Alo Stream is diverted in the Wailoa Ditch. During high flows when the Wailoa Ditch is full, excess water is diverted into New Hamakua Ditch via this intake. Alo Stream continues as a waterfall if flow was present.



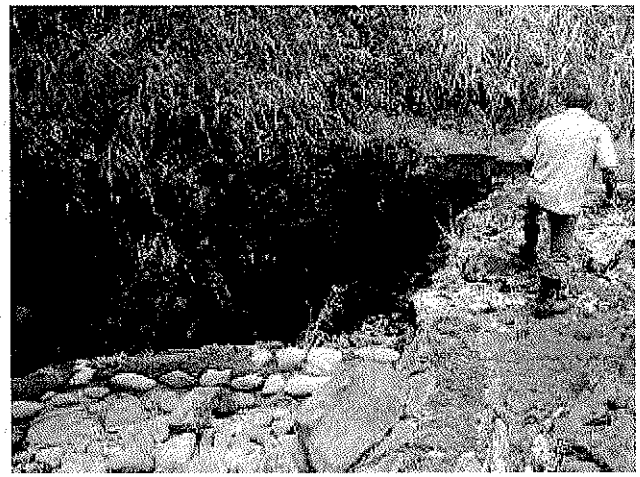
Wailoa Ditch intake (W-2) on Waikamoi Stream

Diversion structure consists of a 50 feet (L) x 4 feet (H) dam. The dividing wall, about 41 feet in length and 2.1 feet in height, is on the left stream bank. Water flows into two inlets and is transported to the Wailoa Ditch further downstream (by the swinging bridge). A minor diversion is located on the right stream bank. At the Wailoa Ditch by the swinging bridge, the radio gate (with float chamber) controls the water entering the New Hamakua Ditch (via a cross-tunnel) when Wailoa Ditch is full. The two sluice gates are 4 x 4 feet (W x H).



Spreckels Ditch intake (S-10) on Waikamoi Stream

Diversion structure consists of a 31 feet (L) x 4.7 feet (H) dam. The dividing wall is 41 feet (L) x 1.8 feet (H) and has one opening that is 3 inches wide. The intake (6.8 x 4 feet, W x H) is located on the left stream bank, with no sluice gate. This diversion diverts excess water from Waikamoi to Kolea Stream.



Center Ditch intake (C-1) on Waikamoi Stream

Diversion structure consists of a 80 feet (L) x 6 feet (H) dam. Intake and sluice gate (3.8 x 4.7 feet, W x H) situate on the left stream bank. The dividing wall is 50 feet (L) x 3 feet (H), and has three openings with diameter of 0.6 feet. This section of the Waikamoi Stream is used for conveying water from the Manuel Luis Ditch to the Center Ditch. Downstream from the diversion, Waikamoi Stream continue as a waterfall when there is flow.

WAHINEPEE STREAM

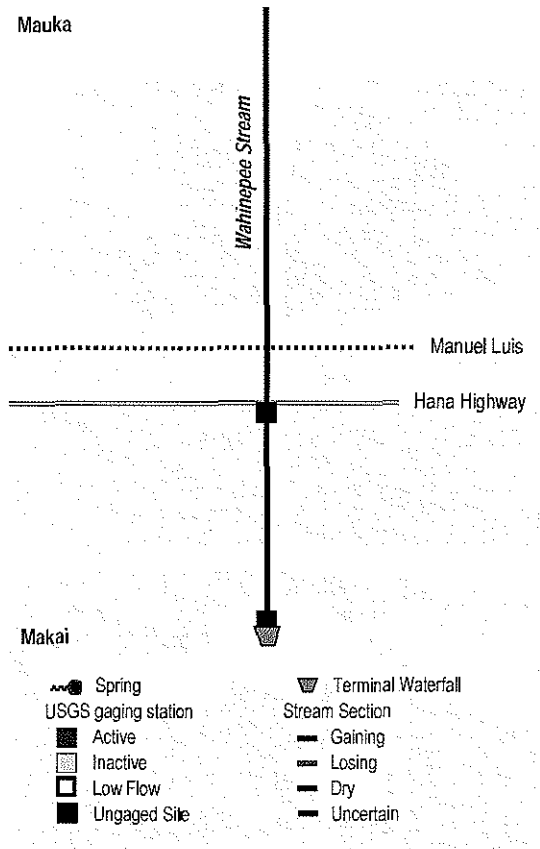


DIAGRAM NOT TO SCALE

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	--	--	--	--	--	--	--			
Diversion	Diverting all flow		Manuel Luis Ditch intake (ML-5) ☑ dam / weir ☐ control gate ☐ sluice gate ☐ conveyance					DAR does not recommend any restoration action for Wahinepee Stream		
Middle	0.9	0.9	0.15	0.23	0.32	0.43	0.58			
Lower	0.9	1.8	0.31	0.45	0.65	0.86	1.20			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

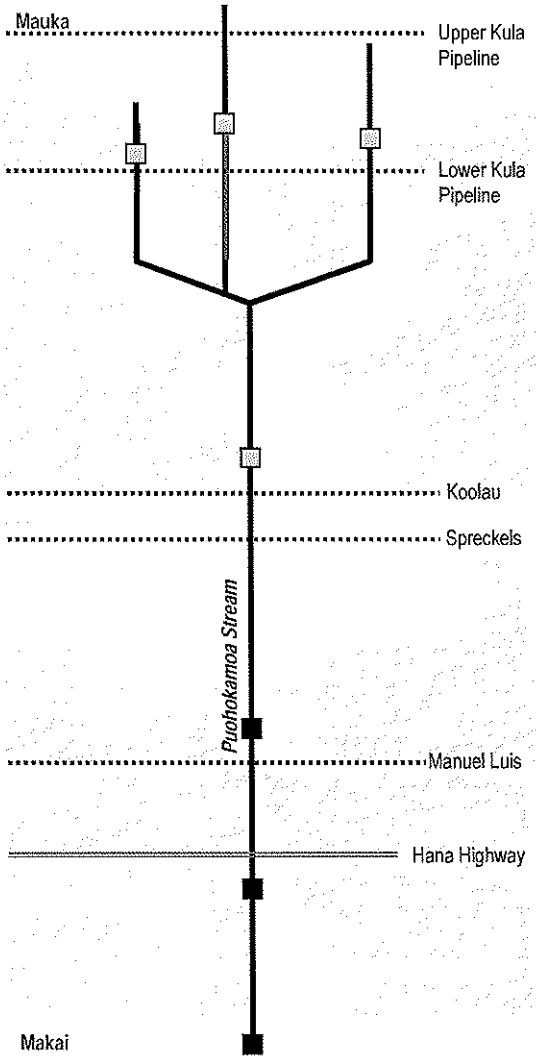
INSTREAM USES

Traditional: 0 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Substantial (HSA rating)
Water Quality: No information
Hydropower Potential: No

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: EMI - 1 major, 9 minor; 1 for Puohokamoa Farm
- EMI diverts minimal amounts of water from Wahinepee Stream

PUOHOKAMOA STREAM



Spring
USGS gaging station
Active
Inactive
Low Flow
Ungaged Site
Terminal Waterfall
Stream Section
Gaining
Losing
Dry
Uncertain

DIAGRAM NOT TO SCALE

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation [RANK 3]		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	6.4	Above diversion	1.10	1.60	2.30	3.10	4.10	No change	No change	668
Diversion	Diverting all flow		Koolau Ditch intake (K-33) ☑ dam / weir ☑ control gate ☐ sluice gate ☐ conveyance					DAR recommends restoration at the Koolau Ditch intake (K-33)		
Diversion	Diverting all flow		Spreckels Ditch intake (S-9) ☑ dam / weir ☑ control gate ☑ sluice gate ☑ conveyance (overflow)					DAR recommends restoration at the Spreckels Ditch intake (S-9)		
Middle-Upper	8.4	2	1.40	2.10	3.00	4.00	5.40	5.4 (+3.4)	2.1 (+0.1)	635
Diversion	Diverting all flow		Manual Luis Ditch intake (ML-3) ☑ dam / weir ☐ control gate ☐ sluice gate ☑ conveyance (??)					DAR recommends restoration at the Manuel Luis Ditch intake (ML-3)		
Middle-Lower	10	1.1	1.70	2.50	3.60	4.80	6.40	7.4 (+2.0)	2.3 (+0.2)	1,498
Lower	11	2.1	1.90	2.80	4.00	5.30	7.00			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

Total HU: 11,955 m Restored: 2,801 m
*Action would restore 33% of total HU, or 29% of HU lost to diversions.

INSTREAM USES

Traditional: 0 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Substantial (HSA rating)
Water Quality: Impaired
Hydropower Potential: No

NONINSTREAM USES

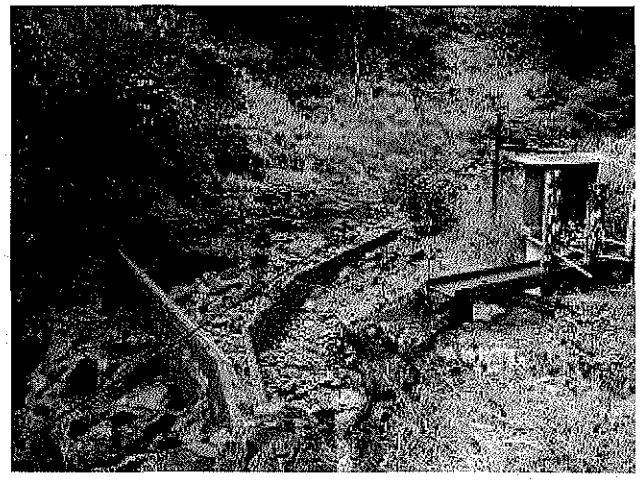
Traditional: No taro cultivation
Diversions: EMI - 4 major, 3 minor; MDWS - 4 major, 9 minor
- EMI diverts 8.4 cfs (dry times) to 16 cfs (normal times) of water, 8-15% of Huelo Lic and 3-6% of East Maui Lic water yield

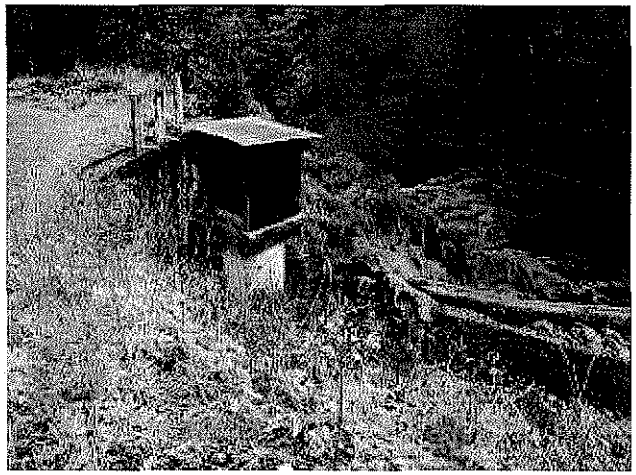
Koolau Ditch intake (K-33) on Puohokamoa Stream

Diversion structure consists of a 41 feet (L) x 3.2 feet (H) dam. Intake (10 x 5 feet, W x H) is on the left stream bank, with no sluice gate. The control (radio) gate is connected to a float in the Koolau Ditch. When the ditch is full, the float rises and the control gate shuts to allow water flow downstream to the next ditch level, i.e., Spreckels Ditch. The Koolau and Spreckels Ditch are situated at different elevations. The intakes on Puohokamoa Stream into these two ditches are about 200 feet apart, with the Koolau Ditch intake upstream from the Spreckels Ditch intake.

Spreckels Ditch intake (S-9) on Puohokamoa Stream

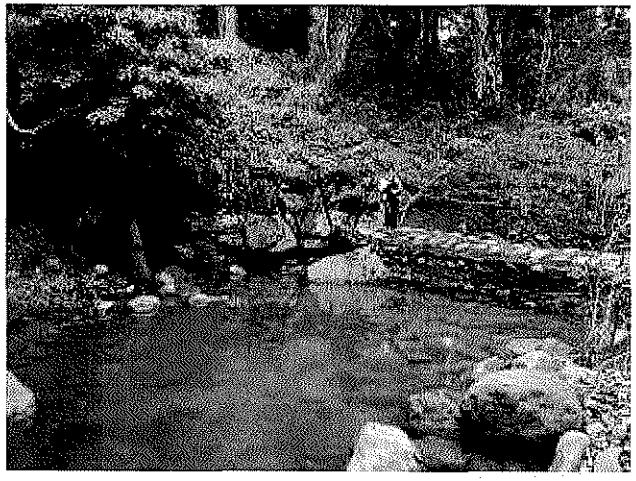
Diversion structure consists of 37 feet (L) x 3.5 feet (H) dam. The intake (4 x 2 feet, W x H) is on the left stream bank. Water from Puohokamoa Stream flows past the gravel basin, into the Spreckels Ditch, and eventually ends up in Alo Stream (tributary of Waikamoi Stream). The Koolau Ditch by Puohokamoa Stream has a lower capacity. Therefore, the excess water captured by the Spreckels Ditch will continue to Alo Stream, where the Koolau Ditch has a higher capacity.





Manuel Luis Ditch intake (ML-3) on Puohokamoa Stream

Puohokamoa Stream drops directly into Manuel Luis Ditch. The diversion structure does not have a sluice gate or gravel basin. The diversion dam is 30 feet in length and 6 feet high.



HAIPUAENA STREAM

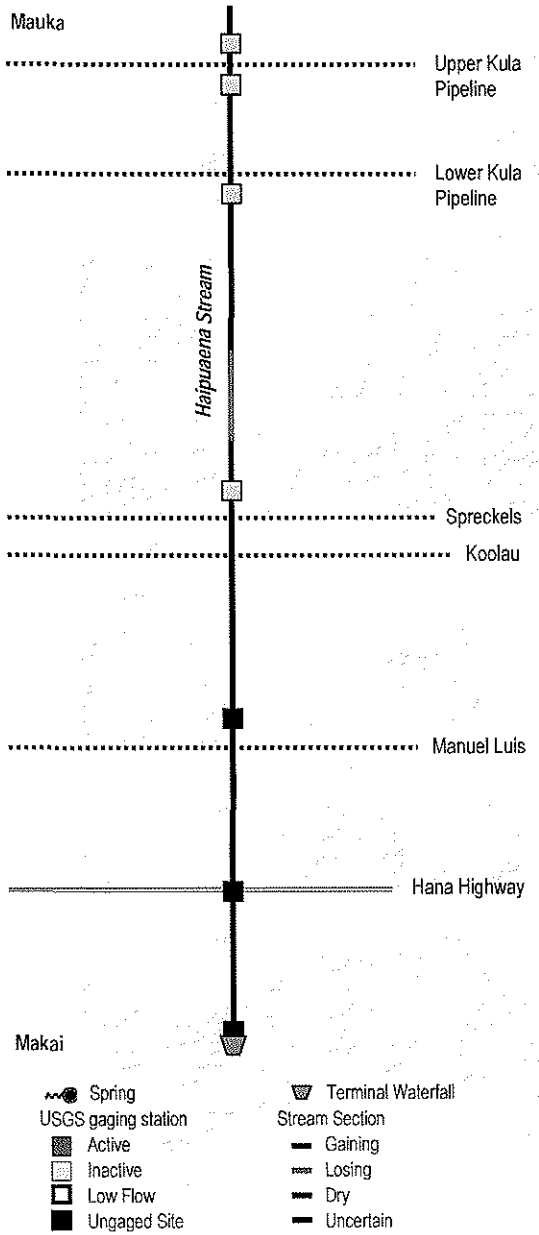


DIAGRAM NOT TO SCALE

INSTREAM USES

Traditional: 12 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Moderate (HSA rating)
Water Quality: Impaired
Hydropower Potential: No

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: EMI - 2 major, 7 minor; MDWS - 2 major, 9 minor; 1 State Parks

- EMI diverts 4.4 cfs (dry times) to 6.5 cfs (normal times) of water, 10-18% of Honomanu Lic and 2-3% of East Maui Lic water yield

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation [RANK 6]		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	3.6	Above diversion	0.61	0.90	1.30	1.70	2.30	No change	No change	0
Diversion	Diverting all flow		Spreckels Ditch intake (S-8) ☑ dam / weir ☑ control gate ☐ sluice gate ☑ conveyance (S-7, Punalau)					DAR recommends restoration at the Spreckels Ditch intake (S-8)		
Middle-upper	4.3	0.8	0.73	1.10	1.50	2.10	2.80	2.8 (+2)	0.8 (+0)	548
Diversion	Diverting all flow		Manuel Luis Ditch intake (ML-2) ☑ dam / weir ☐ control gate ☐ sluice gate ☐ conveyance					DAR recommends restoration at the Manuel Luis Ditch intake (ML-2)		
Middle-lower	4.9	0.5	0.83	1.20	1.80	2.40	3.10	3.3 (+0.5)	0.9 (+0.12)	951
Lower	5.5	1.1	0.94	1.40	2.00	2.60	3.50			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

Total HU: 5,968 m Restored: 1,499 m
*Action would restore 25% of total HU, or 29% of HU lost to diversions.

Spreckels Ditch intake (S-8) on Haipuaena Stream

Haipuaena Stream drops directly into Spreckels Ditch. The diversion dam is 63 feet in length, and the control gate at the intake 5 feet wide.

Manuel Luis Ditch intake (ML-2) on Haipuaena Stream .

Haipuaena Stream drops directly into Manuel Luis Ditch. The diversion dam is located on the opposite side of the EMI access road, and it is 36 feet in length and 6 feet high.

PUNALAU / KOLEA STREAM

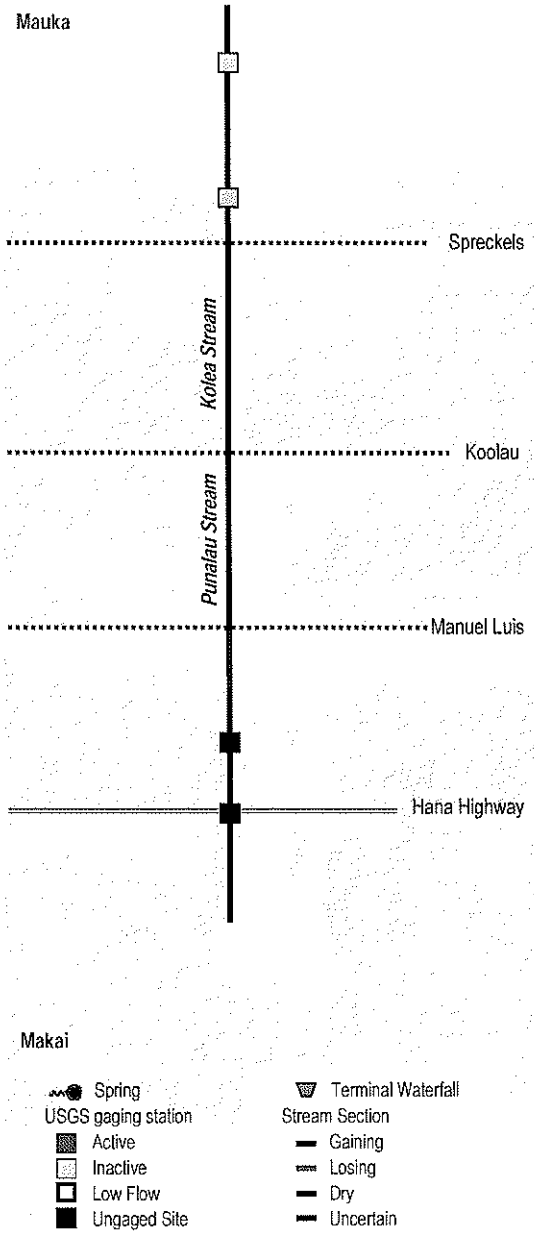


DIAGRAM NOT TO SCALE

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	3.9	Above diversion	0.66	1.00	1.40	1.90	2.50			
Diversion	Diverting all flow		Spreckels Ditch intake (S-7) ☑ dam / weir ☑ control gate ☑ onstream sluice ☑ conveyance (S-6, Honomanu)							
Middle-Upper										
Diversion	Diverting all flow		Koolau Ditch intake (K-32) ☑ dam / weir ☑ control gate ☑ ~~onstream~~ sluice ☐ conveyance					DAR does not recommend any restoration action for Punalau / Kolea Stream		
Middle-Lower										
Diversion	Diverting all flow		Manual Luis Ditch intake (ML-1) ☑ dam / weir ☑ control gate ☑ onstream sluice ☐ conveyance							
Lower	4.5	0.6	0.77	1.10	1.60	2.20	2.90			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

INSTREAM USES

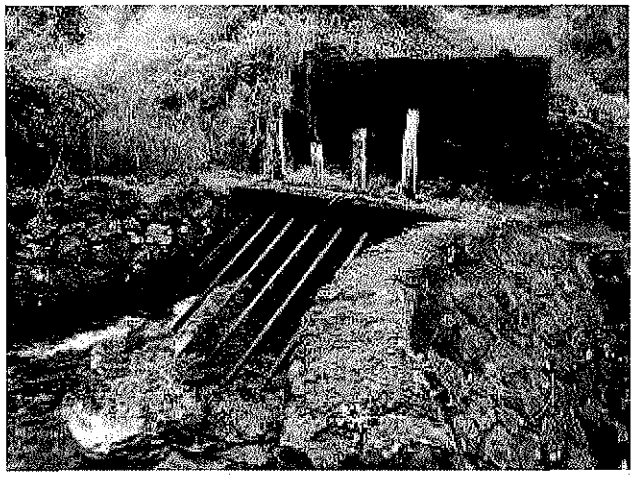
Traditional: 12 testified potential gatherers of vegetation and fish
Ecosystem: Alien and native same
Recreation: No HSA rating
Water Quality: Impaired
Hydropower Potential: No

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: EMI - 3 major, 8 minor
- EMI diverts 4.4 cfs (dry times) to 6.5 cfs (normal times) of water, 9-13% of Honomanu Lic and 2% of East Maui Lic water yield

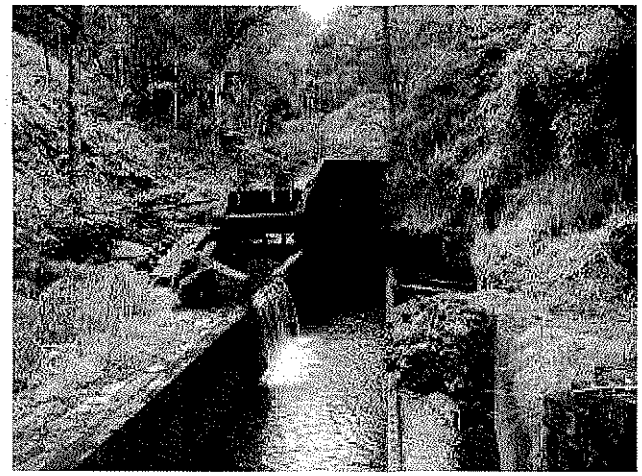
Spreckels Ditch intake (S-7) on Kolea Stream

Diversion structure consists of a 35 x 6 feet (W x H) dam with a valve (0.4 feet ID) that returns water to the stream. The intake (8 feet wide) is on the left stream bank.



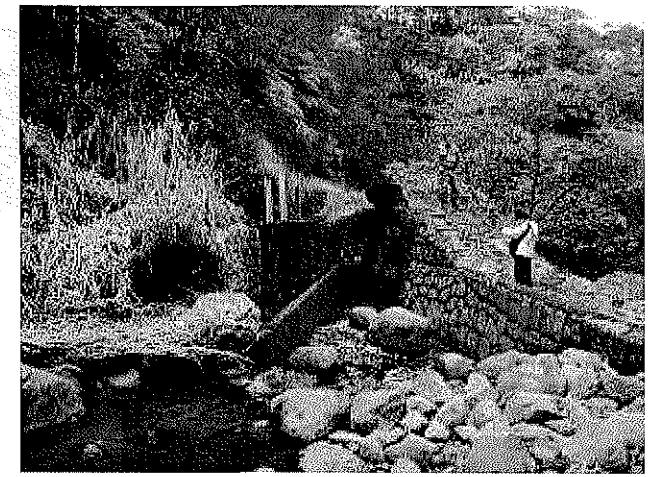
Koolau Ditch intake (K-32) on Kolea Stream

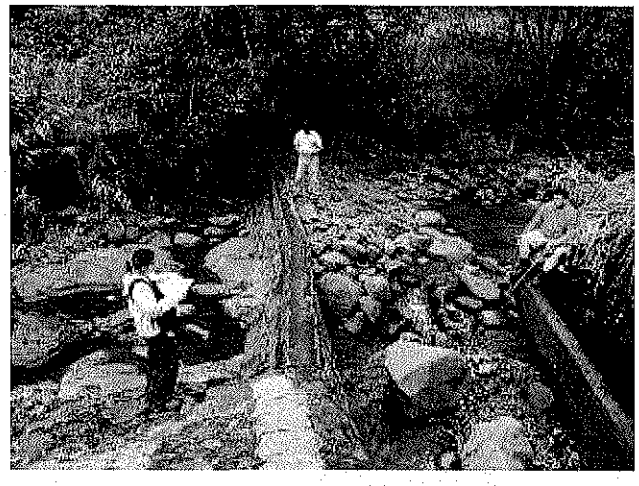
Diversion structure consists of a 50 feet (L) x 13 feet (H) dam with the intake grate (17 x 28 feet), control gate (9.5 x 1.3 feet, W x H), dividing wall, and gravel basin on the left stream bank. There are two sluice gates on the left stream bank, each 3.6 feet wide x 5 feet high. The power house is no longer in operation.



Manuel Luis Ditch intake (ML-1) on Punalau Stream

Diversion structure consists of a 39 feet (L) x 4.6 feet (H) dam, with the intake (4 x 1.8 feet, W x H) and sluice gate (3.8 x 4 feet, W x H) on the left stream bank. The dividing wall is 27 feet in length and 3.3 feet high with one opening for water to flow from the gravel basin to the intake.





HONOMANU STREAM

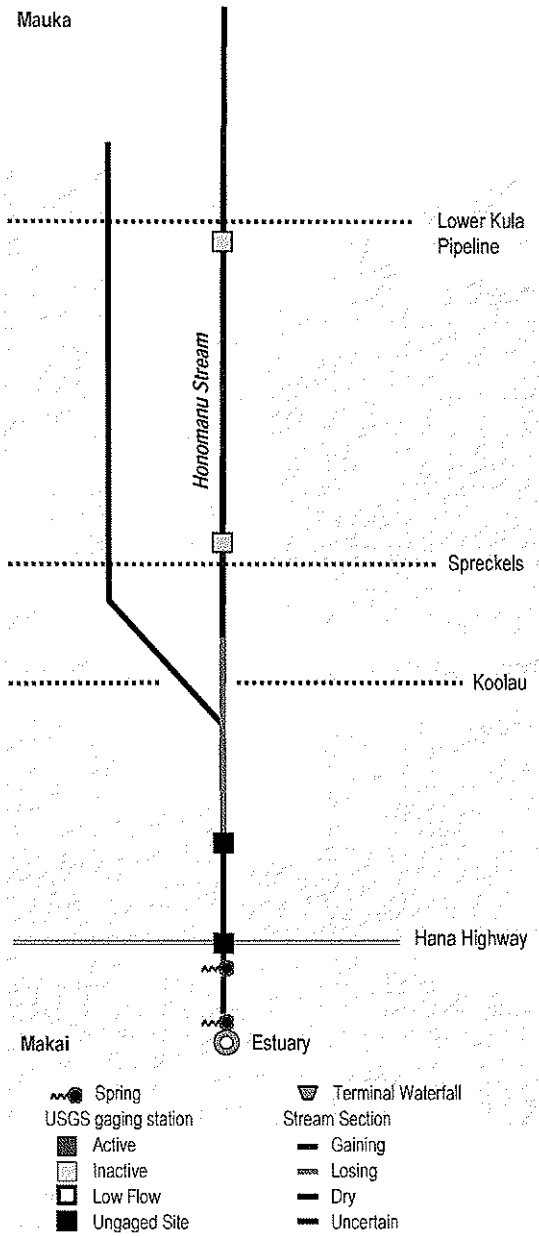


DIAGRAM NOT TO SCALE

INSTREAM USES

Traditional: 26 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Outstanding (HSA rating)
Water Quality: Impaired
Hydropower Potential: No

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: EMI - 5 major, 5 minor; MDWS - 1 major; 2 Haleakala Ranch

- EMI diverts 3 cfs (dry times) to 6 cfs (normal times) of water, 6-14% of Honomanu Lic and 1-2% of East Maui Lic water yield

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	2.8	Above diversion	0.48	0.70	1.00	1.30	1.80			
Diversion	Diverting all flow		**Spreckels Ditch intake (S-2, S-4)** ☑ dam / weir ☐ control gate ☑ onstream sluice ☐ conveyance **Spreckels Ditch intake (S-6)** ☑ dam / weir ☐ control gate ☑ ~~onstream~~ sluice ☐ conveyance					DAR does not recommend any restoration action for Honomanu Stream		
Middle	6.7	3.8	1.10	1.70	2.40	3.20	4.30			
Lower	9	0	1.50	2.30	3.20	4.30	5.80			

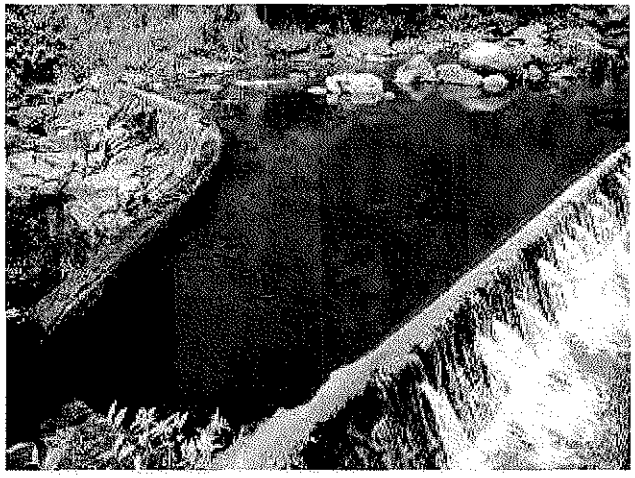
H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

Spreckels Ditch intake (S-2) on Honomanu Stream

Diversion structure consists of a 16 feet (L) x 2.7 feet (H) dam. Intake (2.3 x 3.3 feet, W x H) and sluice gate (2.5 x 2.7 feet, W x H) situate on the left bank. The dividing wall has a height of 3.2 feet. Honomanu Stream continues as a waterfall downstream from the diversion.

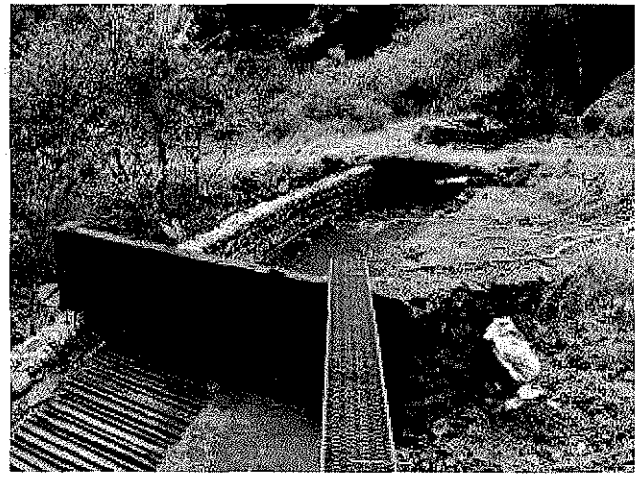
Spreckels Ditch intake (S-4) on Honomanu Stream

Diversion structure consists of a curved dam about 66 feet in length. Intake (4 x 3 feet, W x H) and sluice gate (4 x 3 feet, W x H) situate on the left bank. The dividing wall is 37 feet in length. Honomanu Stream continues as a waterfall downstream from the diversion.



Spreckels Ditch intake (S-6) on Honomanu Stream

Diversion structure consists of an intake grate (11 x 4 feet) that spans the entire stream channel. Gravel basin and the sluice gate (2 x 4 feet, W x H) situate on the left stream bank. The dividing wall is about 5.5 feet in height.



NUAAILUA STREAM

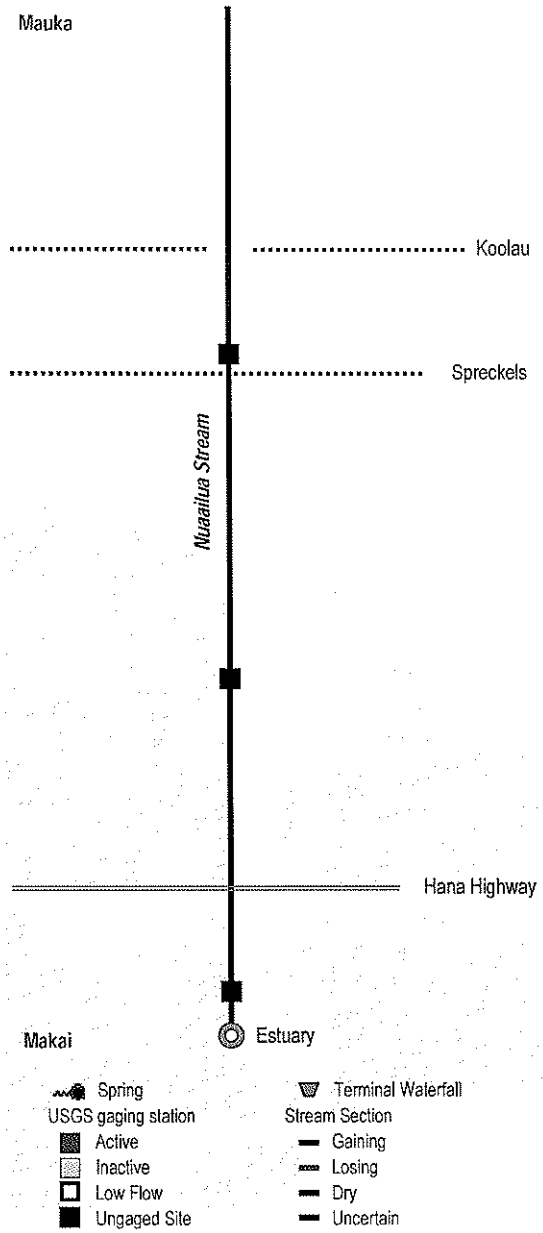


DIAGRAM NOT TO SCALE

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	0.28	Above diversion	0.05	0.07	0.10	0.13	0.18			
Diversion	Diverting all flow		Spreckels Ditch intake (S-1) ☑ dam / weir ☑ control gate ☐ sluice gate ☐ conveyance					DAR does not recommend any restoration action for Nuaailua Stream		
Middle	2.5	2.2	0.43	0.63	0.90	1.20	1.60			
Lower	7.4	7.1	1.30	1.90	2.70	3.60	4.70			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

INSTREAM USES

Traditional: 25 testified potential gatherers of vegetation and fish
Ecosystem: Alien and native same
Recreation: No HSA rating
Water Quality: Not impaired
Hydropower Potential: No

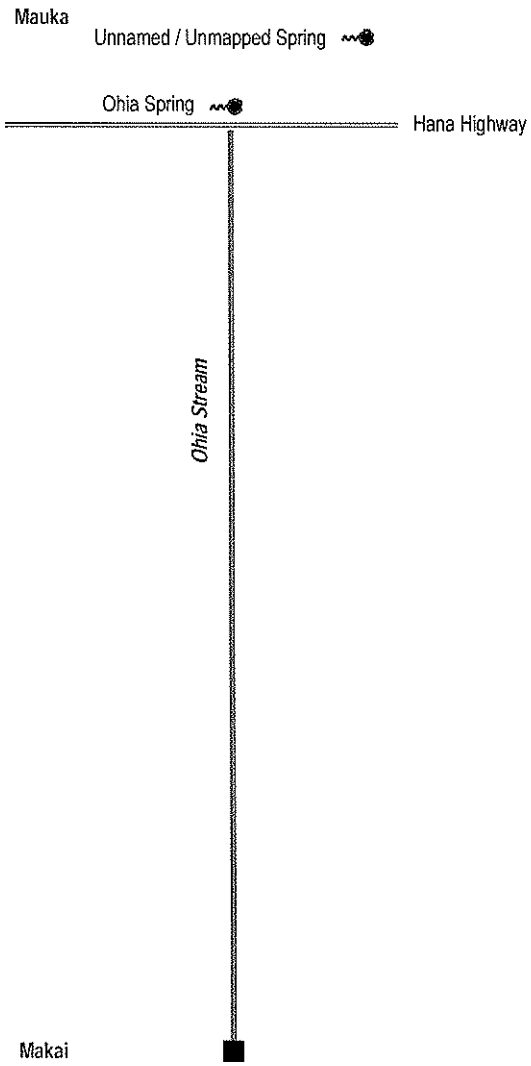
NONINSTREAM USES

Traditional: No taro cultivation
Diversions: EMI - 1 major, 3 minor
- EMI diverts <1 cfs of water, 1% of Honomanu Lic and 0.2% of East Maui Lic water yield

Spreckels Ditch intake (S-1) on Nuaailua Stream

Diversion structure consists of a 25 feet (L) x 3.3 feet (H) dam. Intake (1.7 x 2.32 feet, W x H) situate on the left bank without a sluice gate. Two minor diversion pipes sit adjacent to the diversion dam, with diameters 0.62 feet and 0.5 feet. Nuaailua Stream marks the start of the Spreckels Ditch.

OHIA STREAM



Spring
USGS gaging station
Active
Inactive
Low Flow
Ungaged Site
Terminal Waterfall
Stream Section
Gaining
Losing
Dry
Uncertain

DIAGRAM NOT TO SCALE

INSTREAM USES

Traditional: 28 testified potential gatherers of vegetation and fish
Ecosystem: Alien species dominant
Recreation: Substantial (HSA rating)
Water Quality: Impaired
Hydropower Potential: No

NONINSTREAM USES

Traditional: One active taro cultivation
- Diversions: EMI does not divert from Ohia stream.

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper										
Middle								DAR does not recommend any restoration action for Ohia Stream		
Lower	4.7	4.7	0.80	1.20	1.70	2.30	3.00			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

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WEST WAILUAIKI STREAM

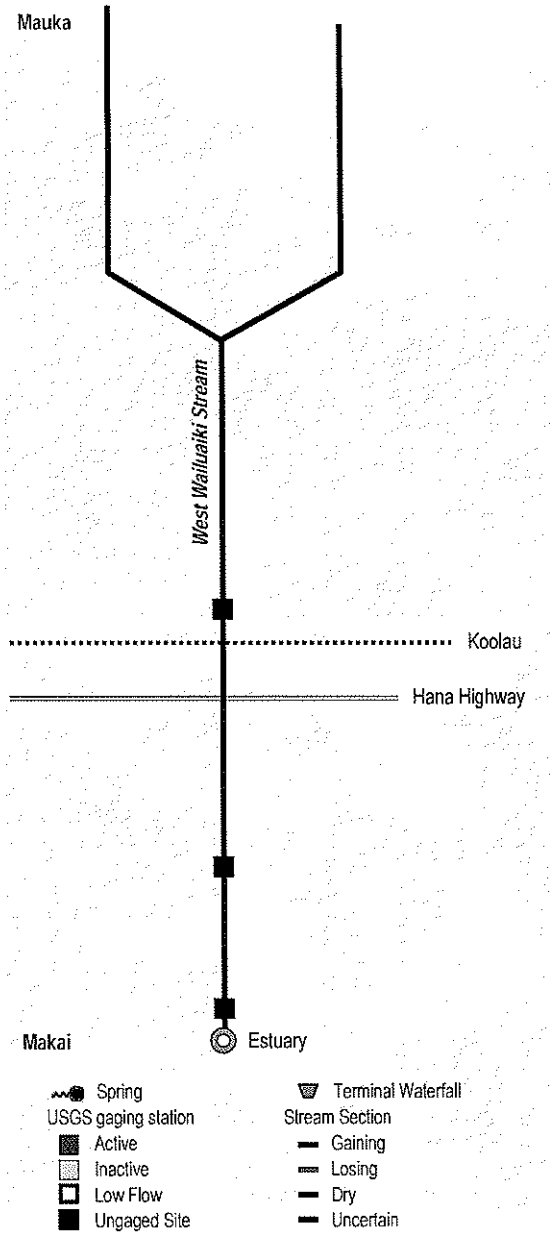


DIAGRAM NOT TO SCALE

INSTREAM USES

Traditional: 25 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Outstanding (HSA rating)
Water Quality: Impaired
Hydropower Potential: Yes

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: 1 EMI major, 5 EMI minor
- EMI diverts 6 cfs (dry times) to 10 cfs (normal times) of water, 9-15% of Keanae Lic and 2-4% of East Maui Lic water yield

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation [RANK 2]		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	6	Above diversion	1.00	1.50	2.20	2.90	3.80	No change	No change	886
Diversion	Diverting all flow		Koolau Ditch intake (K-17) ☑ dam / weir ☑ control gate ☑ onstream sluice ☐ conveyance					DAR recommends restoration at the Koolau Ditch intake (K-17)		
Middle	6.8	0.8	1.20	1.70	2.40	3.30	4.40	4.5 (+3.5)	1.4 (+0.4)	1,331
Lower	7.2	1.2	1.20	1.80	2.60	3.50	4.60			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

Total HU: 5,703 m Restored: 2,218 m
*Action would restore 39% of total HU, or 55% of HU lost to diversions.

Koolau Ditch intake (K-17) on West Wailuaiki Stream

Diversion structure consists of a 30 feet (L) x 2 feet (H) dam. Intake (4.5 x 3 feet, W x H) and sluice gate (5.5 x 3 feet, W x H) situate on the right bank. The dividing wall between the gravel basin and the ditch is 33.5 feet in length. Water flows down a waterfall into a tunnel that runs further downstream into the intake and sluice structures. Past the diversion, water flows down a waterfall.

EAST WAILUAIKI STREAM

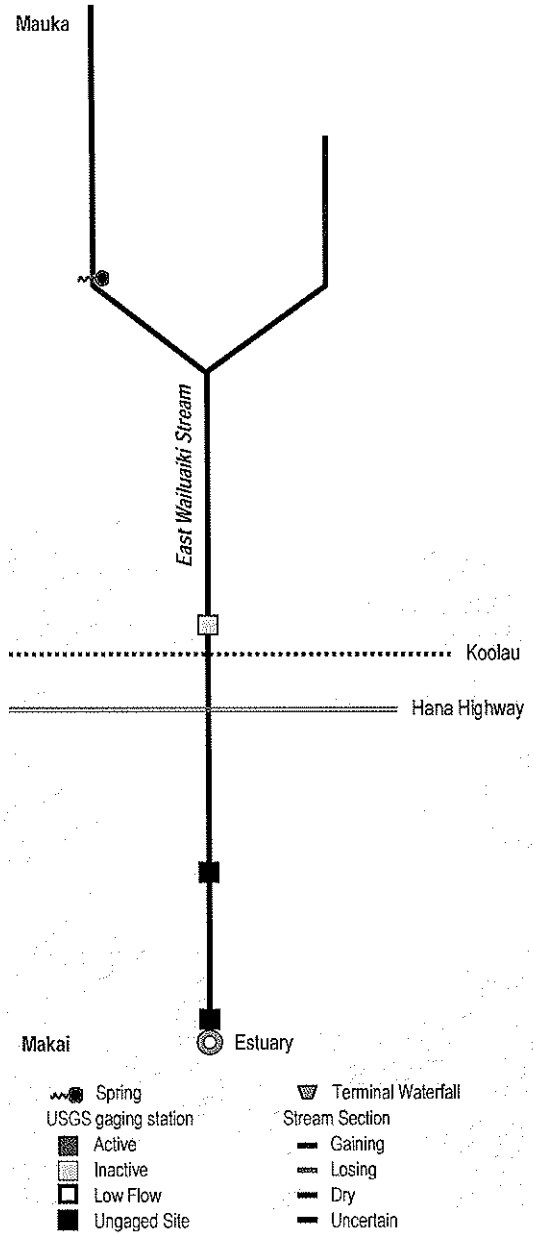


DIAGRAM NOT TO SCALE

INSTREAM USES

Traditional: 25 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Outstanding (HSA rating)
Water Quality: Impaired
Hydropower Potential: Yes

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: 1 EMI major, 3 EMI minor
- EMI diverts 5.8 cfs (dry times) to 10 cfs (normal times) of water, 9-15% of Keanae Lic and 2-4% of East Maui Lic water yield

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation [RANK 1]		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units (HU) restored (m)
Upper	5.8	Above diversion	0.99	1.50	2.10	2.80	3.70	No change	No change	951
Diversion	Diverting all flow		Koolau Ditch intake (K-16) ☑ dam / weir ☑ control gate ☑ onstream sluice ☐ conveyance					DAR recommends restoration at the Koolau Ditch intake (K-16)		
Middle	6.8	1	1.20	1.70	2.40	3.30	4.40	4.5 (+3.2)	1.4 (+0.2)	1,452
Lower	7.2	1.5	1.20	1.80	2.60	3.50	4.60			

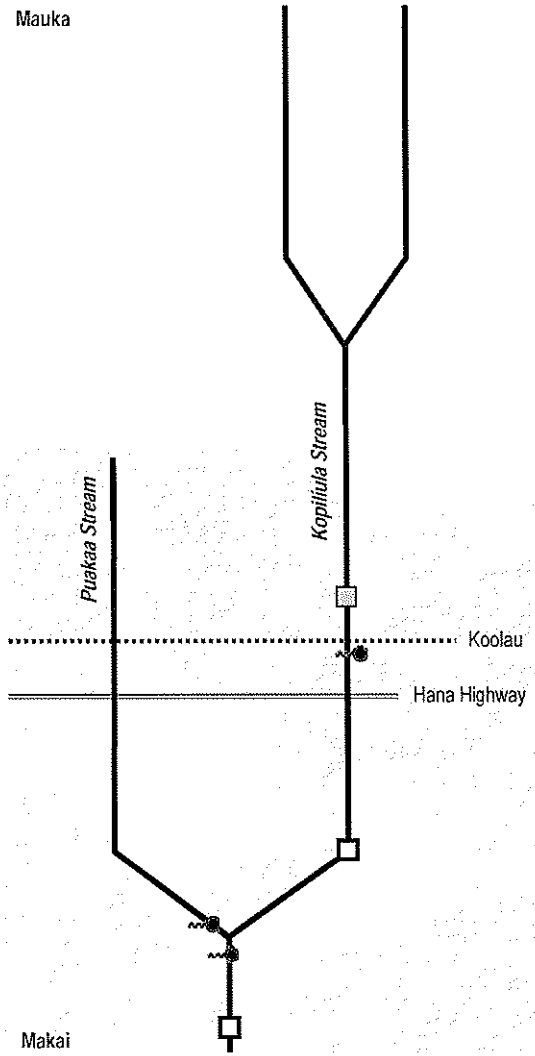
H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

Total HU: 6,528 m Restored: 2,402 m
*Action would restore 37% of total HU, or 55% of HU lost to diversions.

Koolau Ditch intake (K-16) on East Wailuaiki Stream

Diversion dam consists of two walls, one man-made dam (34 feet – L, 4.4 feet – H), and a natural dam (61 feet – L, 5.5 feet – H). Intake (5 x 4 feet, W x H) and sluice gate (3 x 2 feet, W x H) situate on the left bank. The dividing wall between the gravel basin and the ditch is 42 feet (L) x 5 feet (H) and has two openings.

KOPILIULA & PUAKAA STREAMS



Spring
USGS gaging station
Active
Inactive
Low Flow
Ungaged Site
Terminal Waterfall
Stream Section
Gaining
Losing
Dry
Uncertain

DIAGRAM NOT TO SCALE

INSTREAM USES

Traditional: 0 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Substantial (HSA rating)
Water Quality: Impaired
Hydropower Potential: No

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: 1 EMI major per stream, 8 EMI minor (7 on Kopiliula)
- EMI diverts 6 cfs (dry times) to 11 cfs (normal times) of water, 15-26% of Nahiku Lic and 2-4% of East Maui Lic water yield

[Data in black correspond to Kopiliula Stream, data in blue corresponds specially to Puakaa Stream]

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation [RANK 5]		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	5	Above diversion	0.85	1.30	1.80	2.40	3.20	No change	No change	901
	1.1		0.19	0.28	0.40	0.53	0.7			300
Diversion	Diverting all flow		Koolau Ditch intake (K-14) ☑ dam / weir ☑ control gate ☑ ~~onstream~~ sluice ☐ conveyance			Koolau Ditch intake (K-15) ☑ dam / weir ☑ control gate ☑ onstream sluice ☑ conveyance (ditch)		DAR recommends restoration at both Koolau Ditch intakes (K-14 and K-15)		
Middle	6.5	1.2	1.10	1.60	2.30	3.10	4.20	4.2 (+3)	1.3 (+0.2)	
	2.2	1.1	0.37	0.55	0.79	1.10	1.40	no change	+0.1	805
Lower	9.5	2.8	1.60	2.40	3.40	4.60	6.10	5.8 (+0)	2.9 (+0)	0

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

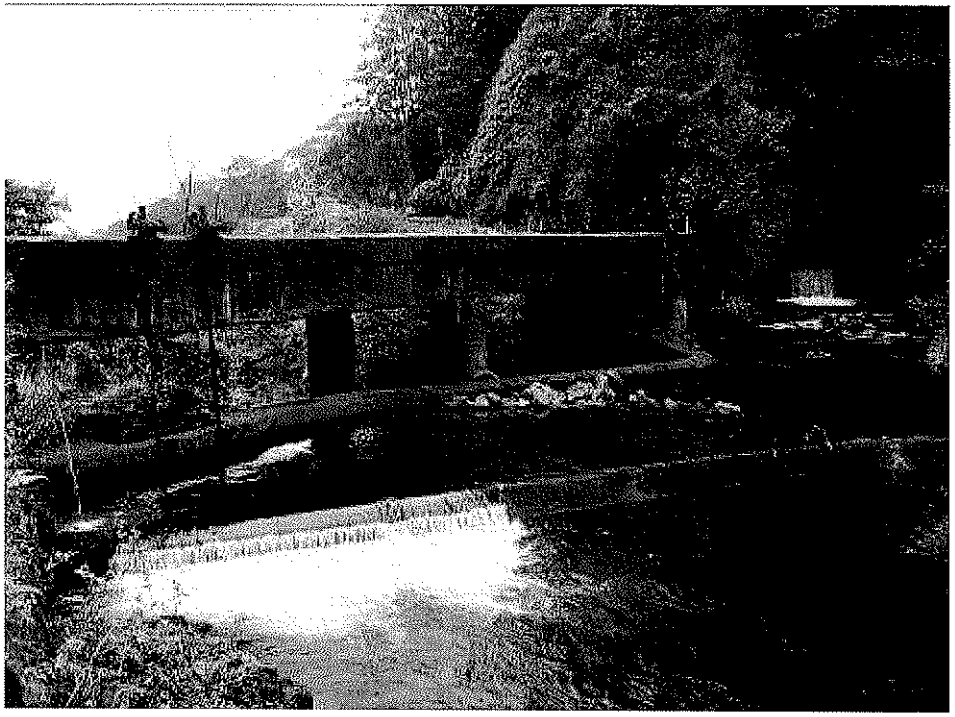
Total HU: 9,257 m Restored: 2,007 m
*Action would restore 22% of total HU, or 39% of HU lost to diversions.

Koolau Ditch intake (K-14) on Puakaa Stream

Diversion structure consists of a 46 feet (L) x 2.3 feet (H) dam. Intake (5.7 x 5.2 feet, W x H) and sluice gate (2 x 4 feet, W x H) situate on the left bank, with the sluice gate further downstream from the intake. The dividing wall between the gravel basin and the ditch has an opening with diameter of 1.6 feet.

Koolau Ditch intake (K-15) on Kopiliula Stream

Diversion structure is located by Hana Highway and consists of a 25.5 feet (L) x 2 feet (H) dam. Intake and sluice gate situate on the left bank. Water from Kopiliula flows downstream and co-mingles with the ditch water (diverted from Makapipi, Hanawi, Kapaula, Waiaaka, Paakea, Waiohue, and Puakaa Streams) in the gravel basin and then flows back into the Koolau Ditch (tunnel) on the left bank.



WAIOHUE STREAM

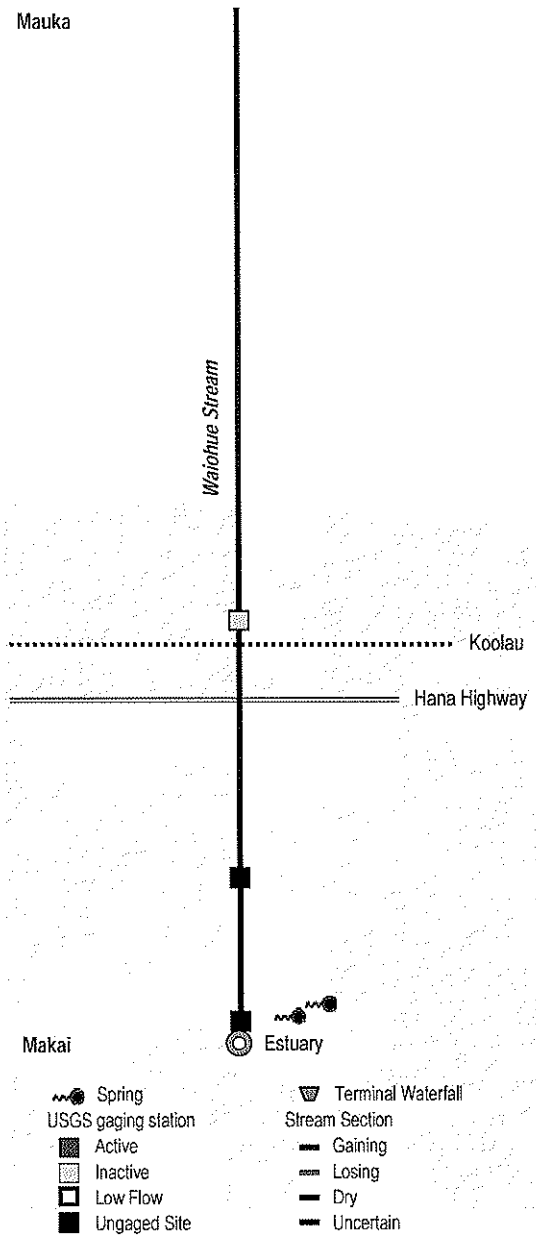


DIAGRAM NOT TO SCALE

INSTREAM USES

Traditional: 25 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Outstanding (HSA rating)
Water Quality: Not impaired
Hydropower Potential: No

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: 2 EMI major, 5 EMI minor
- EMI diverts 5 cfs (dry times) to 6.5 cfs (normal times) of water, 14-19% of Nahiku Lic and 2-3% of East Maui Lic water yield

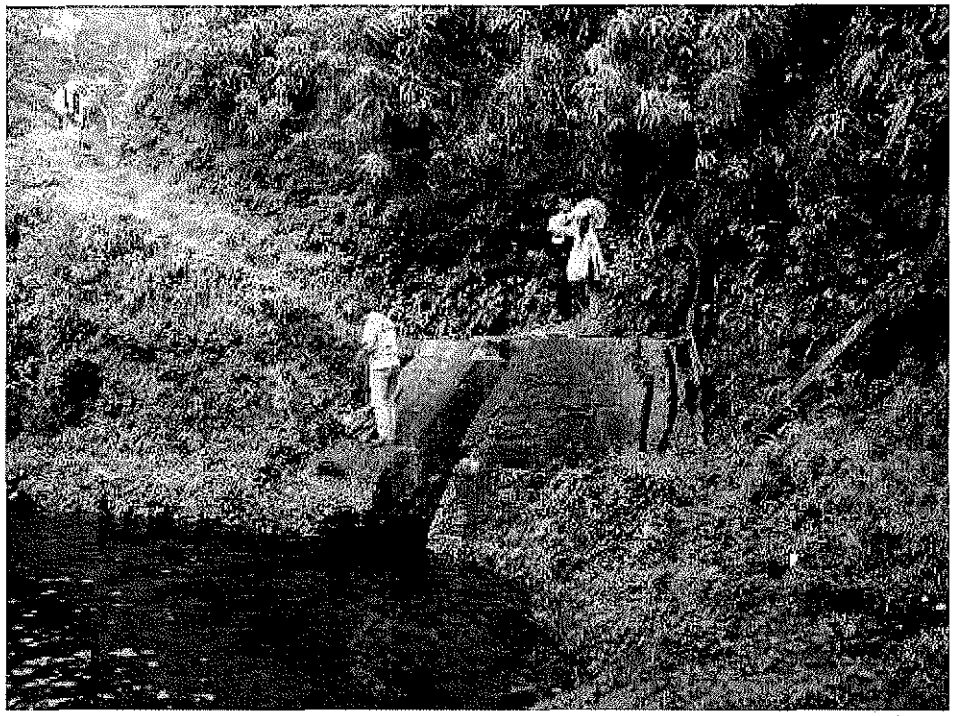
Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation [RANK 7]		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	5	Above diversion	0.85	1.30	1.80	2.40	3.20	No change	No change	562
Diversion	Diverting all flow		Koolau Ditch intake (K-13) ☐ dam / weir ☑ control gate ☑ ~~enstream~~ sluice ☐ conveyance					DAR recommends restoration at the Koolau Ditch intake (K-13)		
Middle	6	1	1.00	1.50	2.20	2.90	3.80	4.4 (+2.7)	1.3 (+0.1)	932
Lower	7.5	2.1	1.30	1.90	2.70	3.60	4.80			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

Total HU: 4,428 m Restored: 1,494 m
*Action would restore 34% of total HU, or 55% of HU lost to diversions.

Koolau Ditch intake (K-13) on Waiohue Stream

The intake (2.4 x 2.1 feet, W x H) is further upstream from the sluice gate (1.4 x 5.9 feet, W x H). Water flows from a waterfall into the plunge pool, where it is diverted into the intake grate and then through a short tunnel into the gravel basin downstream from the intake. The dividing wall of the diversion structure has two openings with diameters 1.3 feet and 0.8 feet diameter.



PAAKEA STREAM

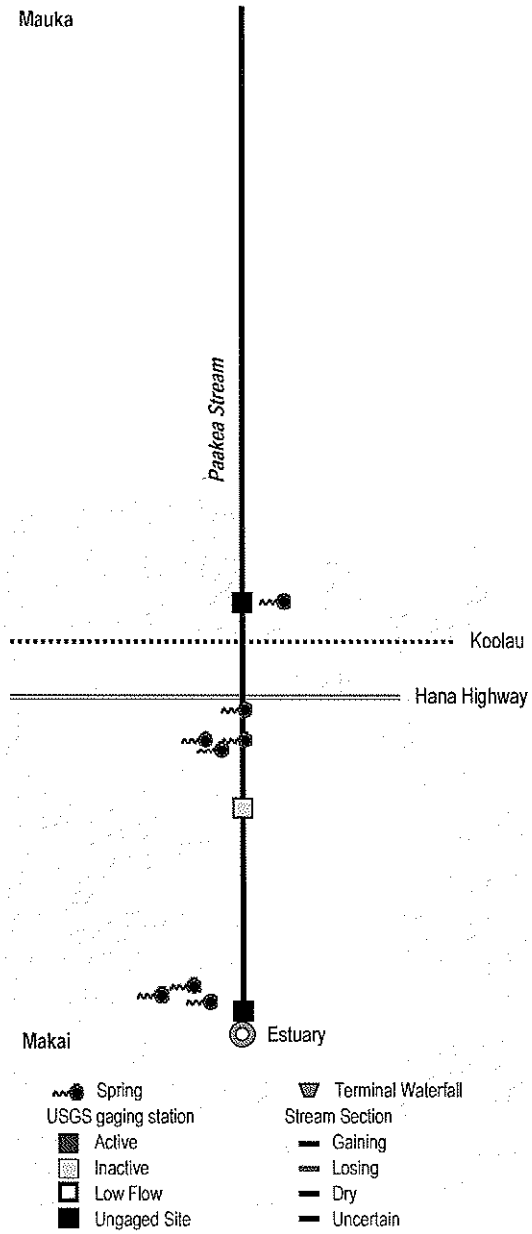


DIAGRAM NOT TO SCALE

INSTREAM USES

Traditional: 25 testified potential gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Substantial (HSA rating)
Water Quality: Not impaired
Hydropower Potential: No

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: 2 EMI major, 3 EMI minor
- EMI diverts 1 cfs (dry times) to 1.5 cfs (normal times) of water, 2.6-4% of Nahiku Lic and 0.3-0.6% of East Maui Lic water yield

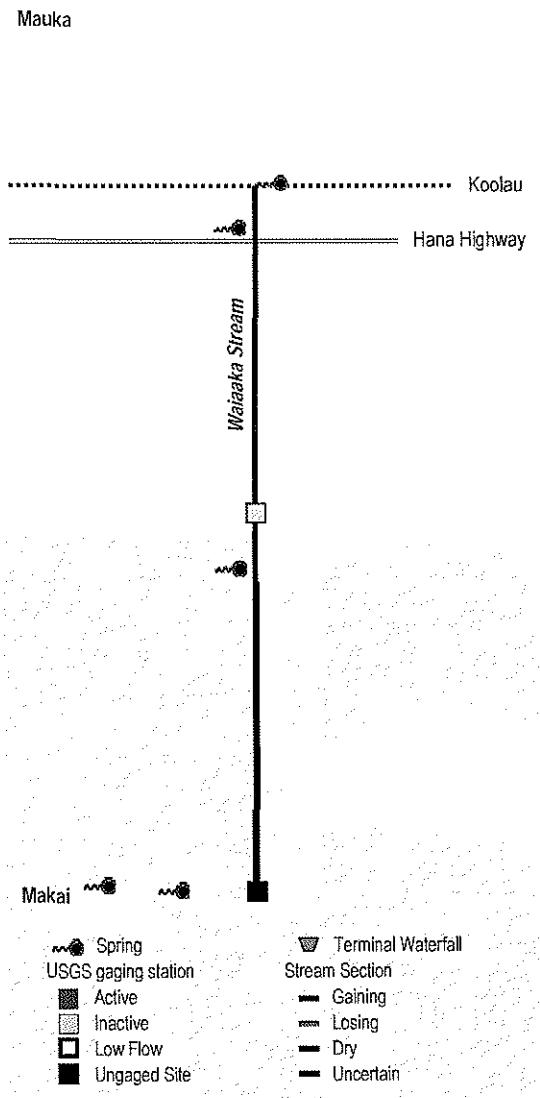
Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	0.9	Above diversion	0.15	0.23	0.32	0.43	0.58			
Diversion	Diverting all flow		Koolau Ditch intake (K-10) ☑ dam / weir ☑ control gate ☑ ~~onstream~~ sluice ☐ conveyance					DAR does not recommend any restoration action for Paakea Stream		
Middle	4.7	3.8	0.80	1.20	1.70	2.30	3.00			
Lower	5.5	4.6	0.94	1.40	2.00	2.60	3.50			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

Koolau Ditch intake (K-10) on Paakea Stream

Diversion structure consists of a 24 feet (L) x 3.6 feet (H) dam. Intake (2.7 x 1.05 feet, W x H) and sluice gate (3.1 x 2.5 feet, W x H) situate on the left bank. The dividing wall between the gravel basin and the ditch has an opening with diameter of 0.7 feet.

WAIAAKA STREAM



Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Diversion	Diverting all flow		Koolau Ditch intake (K-9) ☐ dam / weir ☐ control gate ☑ onstream sluice ☑ conveyance					DAR does not recommend any restoration action for Waiaaka Stream		
Middle	0.77	0.77	0.13	0.19	0.28	0.37	0.49			
Lower	1.1	1.1	0.19	0.28	0.40	0.53	0.70			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

INSTREAM USES

Traditional: 0 testified potential gatherers of vegetation and fish
Ecosystem: Alien species dominance
Recreation: Substantial (HSA rating)
Water Quality: Not impaired
Hydropower Potential: No

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: 1 EMI major

- EMI diverts minimal amounts of water from Waiaaka Stream.
- The stream is used to convey water from a development tunnel to the ditch.

Koolau Ditch intake (K-9) on Waiaaka Stream

Waiaaka Stream is used to convey water from a development tunnel into the Koolau Ditch. The stream was dry downstream from the diversion. No physical measurements were recorded.

KAPAULA STREAM

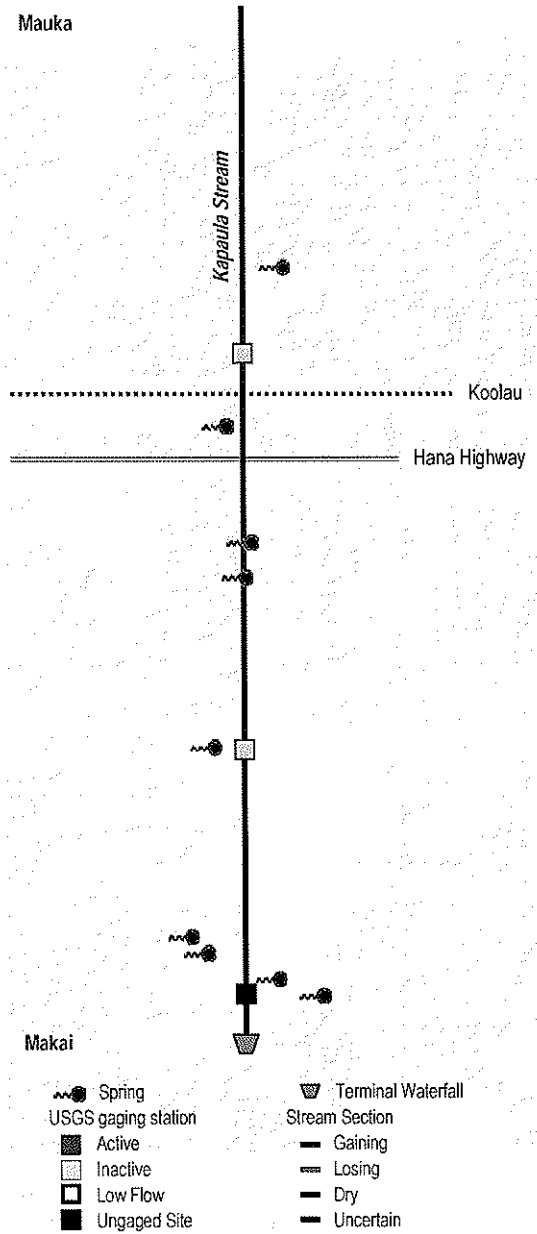


DIAGRAM NOT TO SCALE

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	2.8	Above diversion	0.48	0.70	1.00	1.30	1.80			
Diversion	Diverting all flow		Koolau Ditch intake (K-7) ☑ dam / weir ☐ control gate ☐ sluice gate ☐ conveyance					DAR does not recommend any restoration action for Kapaula Stream		
Middle	5.1	2.1	0.87	1.30	1.80	2.40	3.30			
Lower	5.7	2.6	0.97	1.40	2.10	2.70	3.60			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

INSTREAM USES

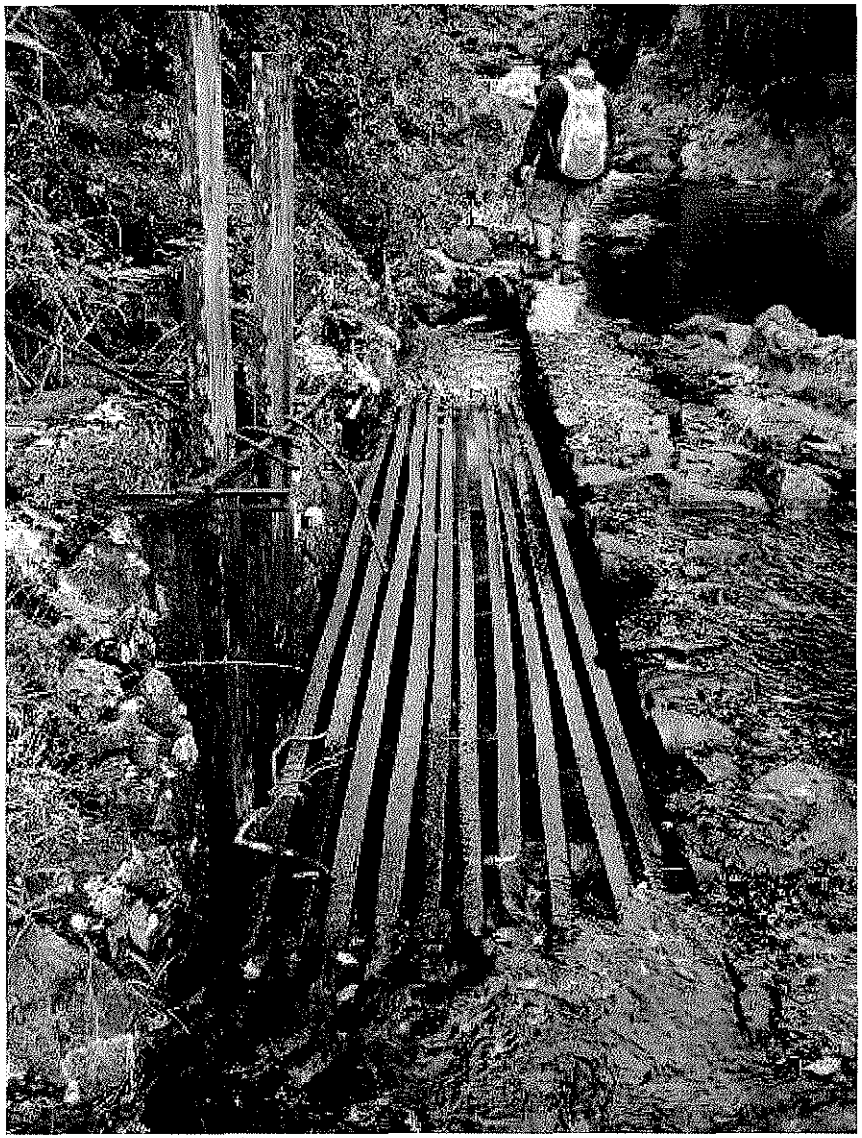
Traditional: 26 testified potential gatherers of vegetation and fish
Ecosystem: Alien and native species same dominance
Recreation: Substantial (HSA rating)
Water Quality: Not impaired
Hydropower Potential: No

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: 2 EMI major, 5 EMI minor
- EMI diverts 3 cfs (dry times) to 5.2 cfs (normal times) of water, 8-15% of Nahiku Lic and 1-2% of East Maui Lic water yield

Koolau Ditch intake (K-7) on Kapaula Stream

Diversion structure consists of a 19.5 feet (L) x 2.7 feet (H) dam. Intake grate (3 x 19 feet, W x L) situates on the right bank with no sluice gate. Water flows down a small cascading waterfall before reaching the diversion. Downstream of the diversion appears to have an existing diversion dam. According to Garret Hew, the stream is losing upstream of the old dam. Therefore, the diversion dam was moved further upstream from the losing section.



HANAWI STREAM

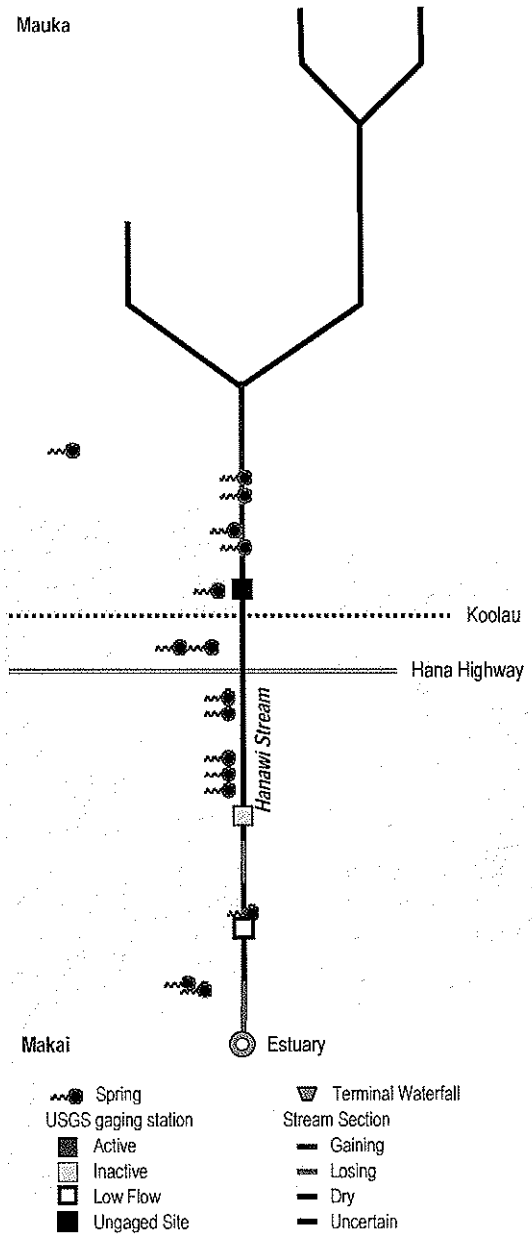


DIAGRAM NOT TO SCALE

INSTREAM USES

Traditional: 30 testified gatherers of vegetation and fish
Ecosystem: Native species dominance
Recreation: Outstanding (HSA rating)
Water Quality: Impaired
Hydropower Potential: Yes

NONINSTREAM USES

Traditional: No taro cultivation
Diversions: 5 EMI major, 11 EMI minor, 1 MLP – Nahiku Pump
- EMI diverts 4.6 cfs (dry times) to 7 cfs (normal times) of water, 13-20% of Nahiku Lic and 2-3% of East Maui Lic water yield

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation [RANK 8]		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	4.6	Above diversion	0.78	1.20	1.70	2.20	2.90	No change	No change	1,296
Diversion	Diverting all flow		Koolau Ditch intake (K-4) ☑ dam / weir ☐ control gate ☑ onstream sluice ☐ conveyance					DAR recommends restoration at the Koolau Ditch intake (K-4)		
Middle	24	19	4.10	6.00	8.60	12.00	15.00	No change	(+0.1) Wetted pathway	0
Lower	26	21	4.40	6.50	9.40	12.00	17.00			

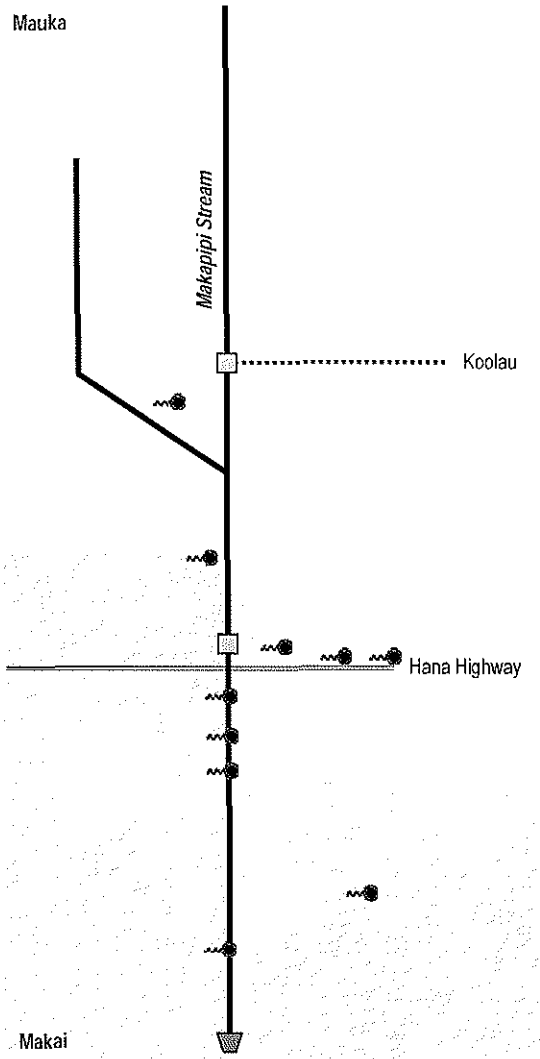
H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

Total HU: 7,585 m Restored: 1,296 m
*Action would restore 17% of total HU, or 38% of HU lost to diversions.

Koolau Ditch intake (K-4) on Hanawi Stream

Diversion structure consists of a 38 feet (L) dam. Intake and sluice gate (2.97 x 4 feet, W x H) situate on the right bank, with the intake grate about 30 feet upstream of the sluice gate. Minor diversion on the right bank consists of 2 white pipes that transmit seepage flow into the gravel basin. Water flows down a waterfall before reaching the diversion.

MAKAPIPI STREAM



Spring
USGS gaging station
Active
Inactive
Low Flow
Ungaged Site
Terminal Waterfall
Stream Section
Gaining
Losing
Dry
Uncertain

DIAGRAM NOT TO SCALE

Reach	Median base flow, BFQ_{50} (cfs)		Minimum flow, a percentage of natural BFQ_{50}, needed in the stream to provide a percentage of natural habitat (cfs)					DAR Recommendation		
	Natural condition	Diverted condition	17% of BFQ_{50} for H_{50}	25% of BFQ_{50} for H_{60}	36% of BFQ_{50} for H_{70}	48% of BFQ_{50} for H_{80}	64% of BFQ_{50} for H_{90}	Wet season H_{min} (cfs)	Dry season C_{min} (cfs)	Habitat units restored (m)
Upper	1.3	Above diversion	0.22	0.33	0.47	0.62	0.83			
Diversion	Diverting all flow		Koolau Ditch intake (K-1) ☑ dam / weir ☐ control gate ☑ onstream sluice ☐ conveyance					DAR does not recommend any restoration action for Makapipi Stream		
Middle	--	--	--	--	--	--	--			
Lower	--	--	--	--	--	--	--			

H_{min} = minimum flow, defined as 64% of BFQ_{50}, to provide 90% of natural instream habitat.
C_{min} = minimum flow, defined as 20% of BFQ_{50}, to provide connectivity between ocean and stream habitats.
Habitat units restored = total amount of habitat restored at H_{90} for the native species of oopu, hihiwai, and opae at 64% of BFQ_{50}.

INSTREAM USES

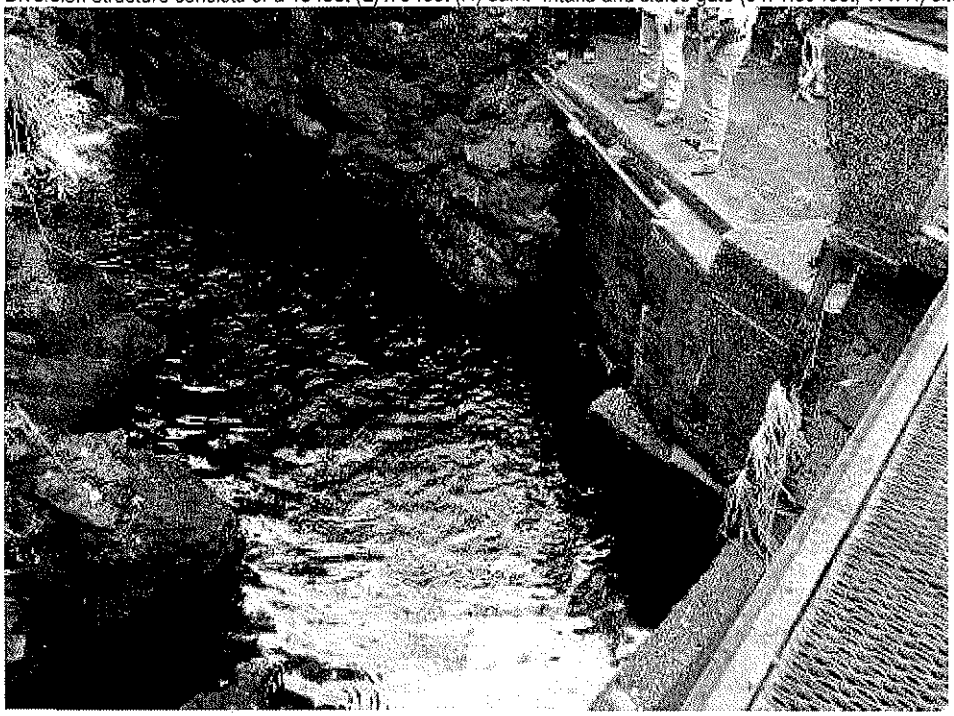
Traditional: 31 testified potential gatherers of vegetation and fish
Ecosystem: Alien and native species same dominance
Recreation: Substantial (HSA rating)
Water Quality: Not impaired
Hydropower Potential: No

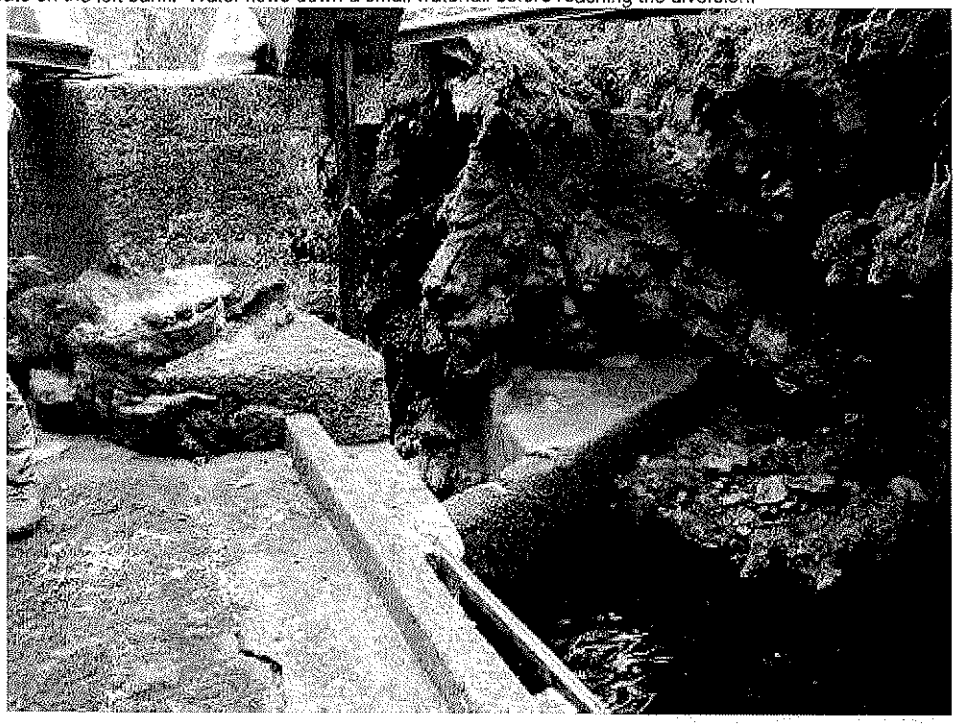
NONINSTREAM USES

Traditional: Existing taro cultivation
Diversions: 1 EMI major, 2 EMI minor; 2 for domestic
- EMI diverts 1.3 cfs (dry times) to 4.4 cfs (normal times) of water, 4-13% of Nahiku Lic and 1-2% of East Maui Lic water yield

Koolau Ditch intake (K-1) on Makapipi Stream

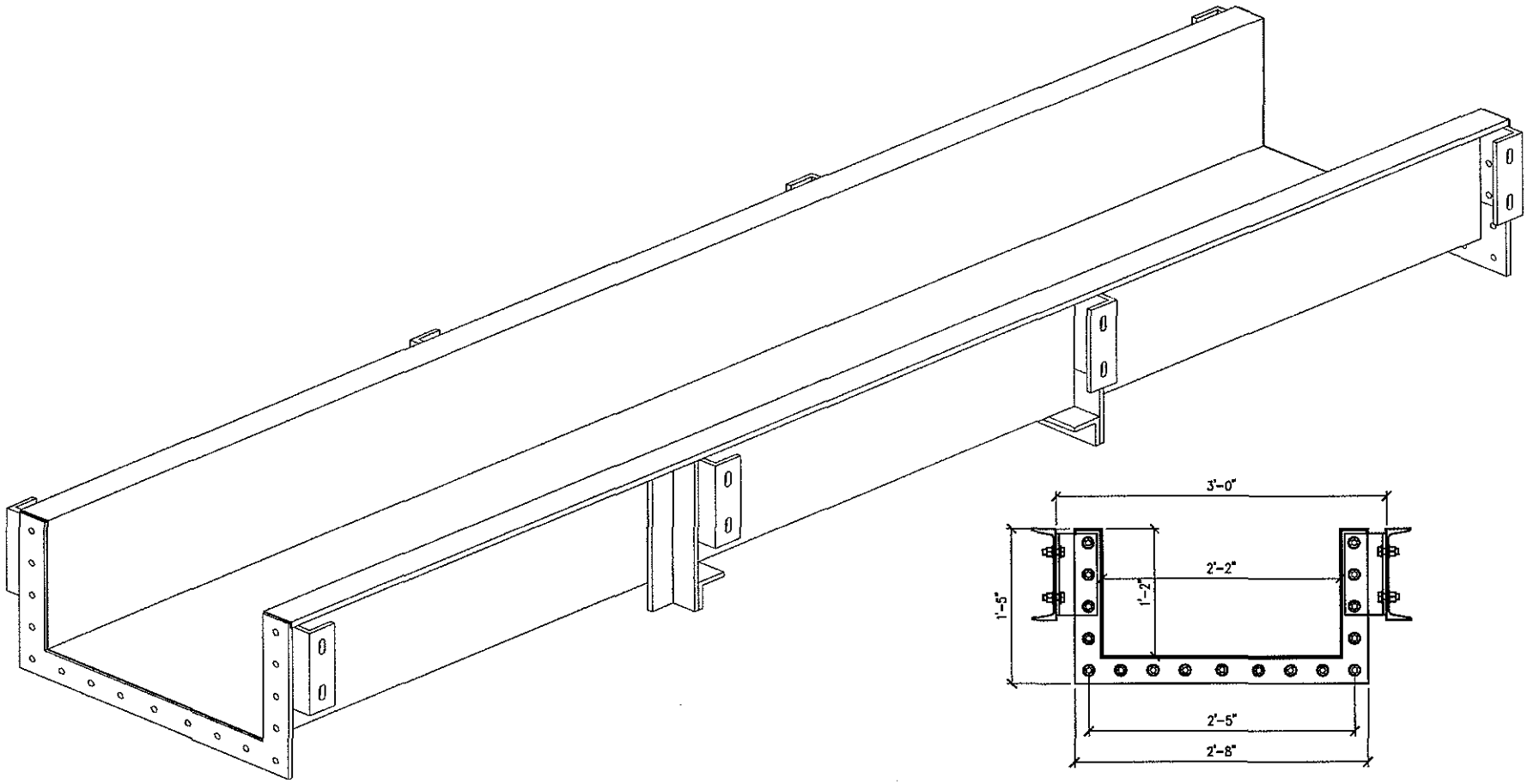
Diversion structure consists of a 15 feet (L) x 5 feet (H) dam. Intake and sluice gate (3 x 1.83 feet, W x H) situate on the left bank. Water flows down a small waterfall before reaching the diversion.



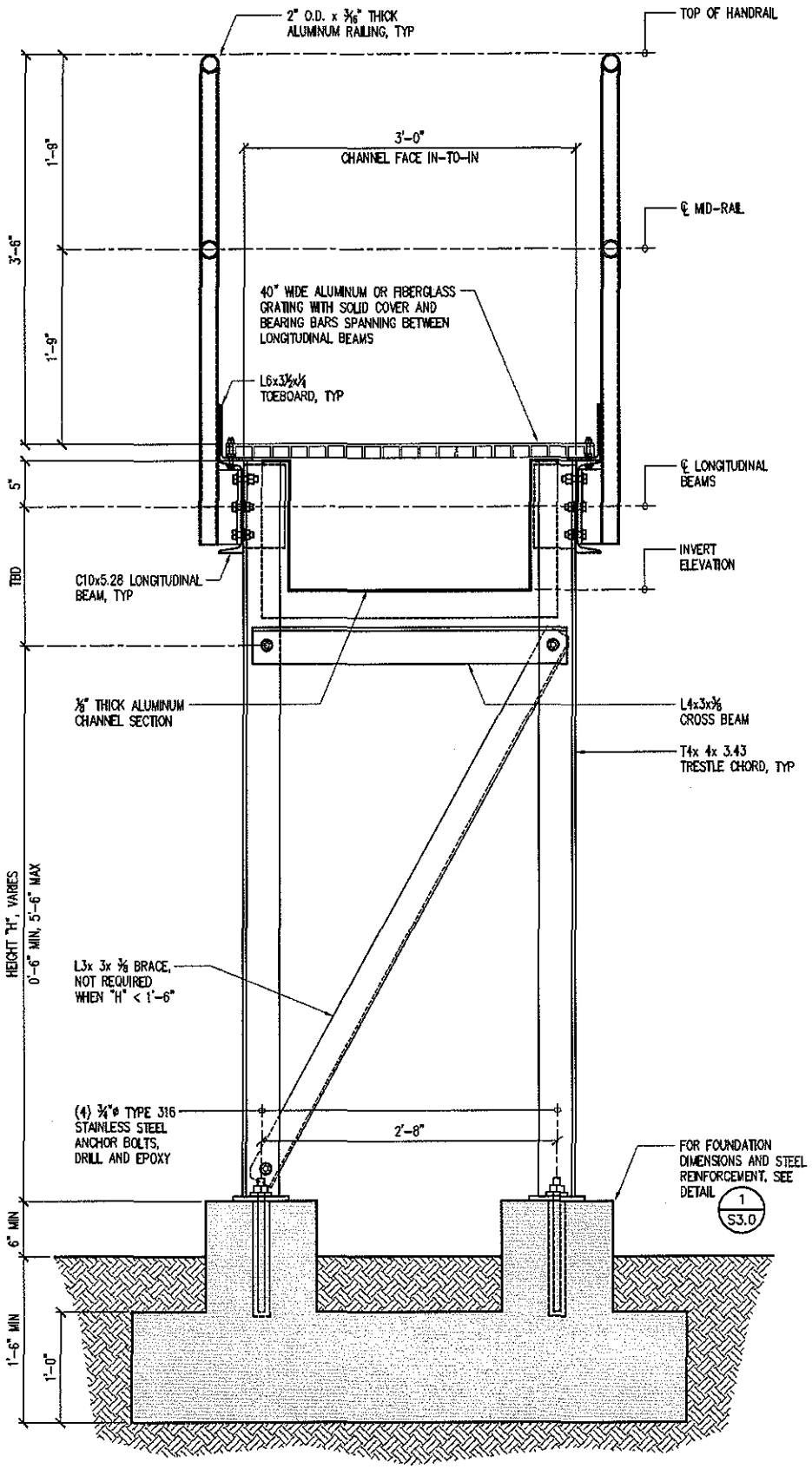


APPENDIX D.

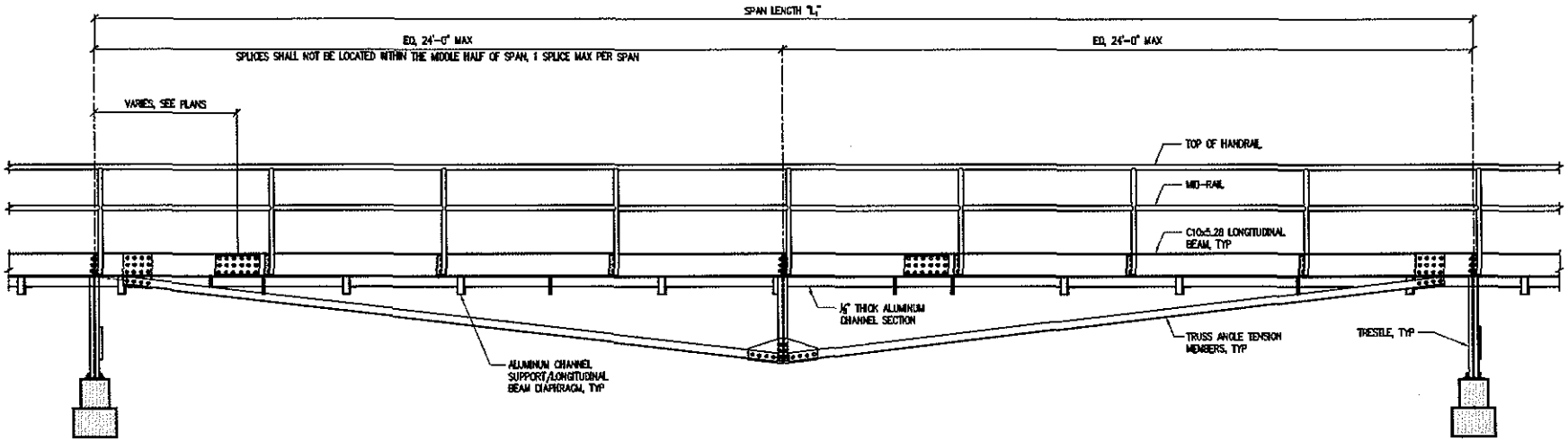
Preliminary Development Plans



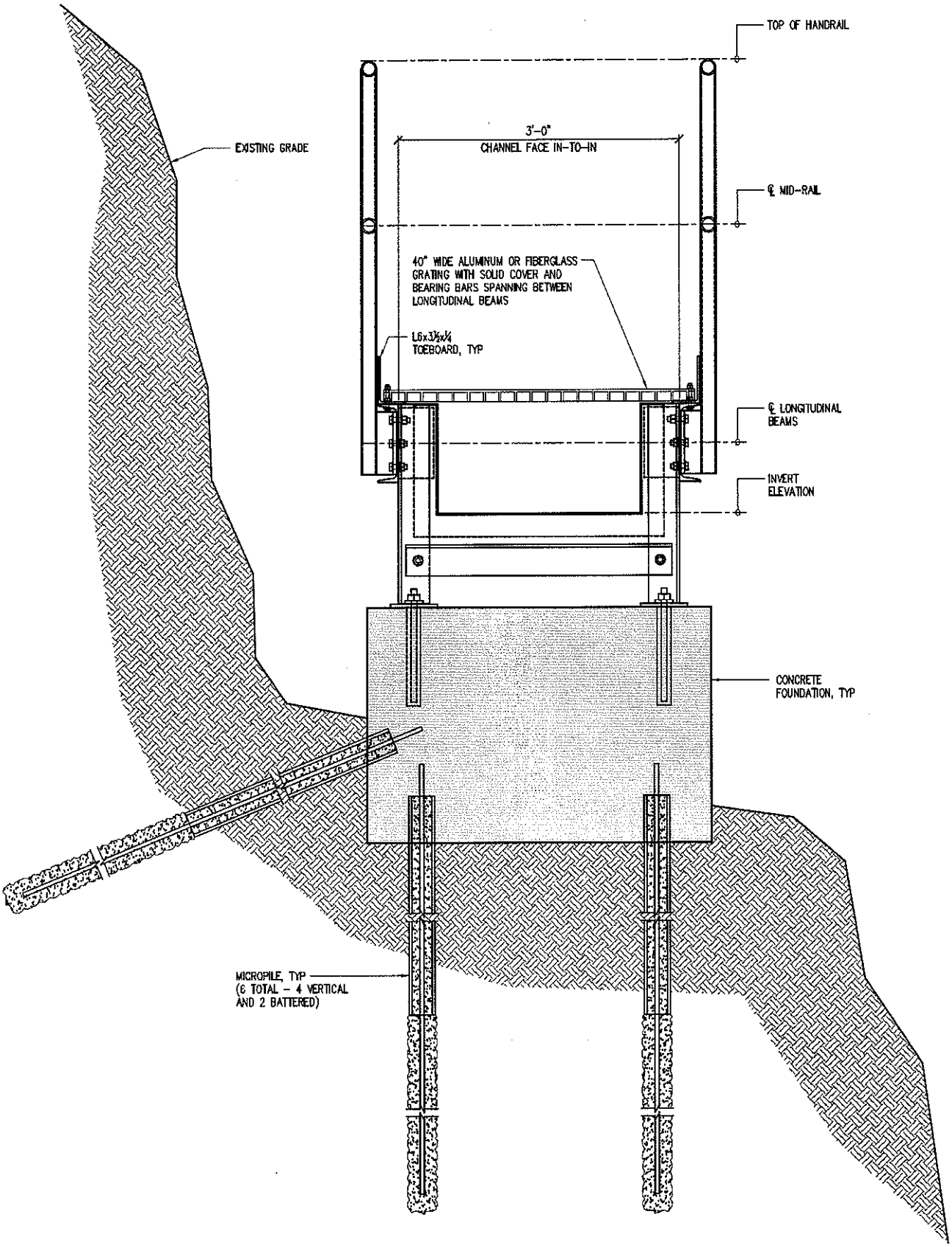
TYPICAL ALUMINUM TROUGH SECTION



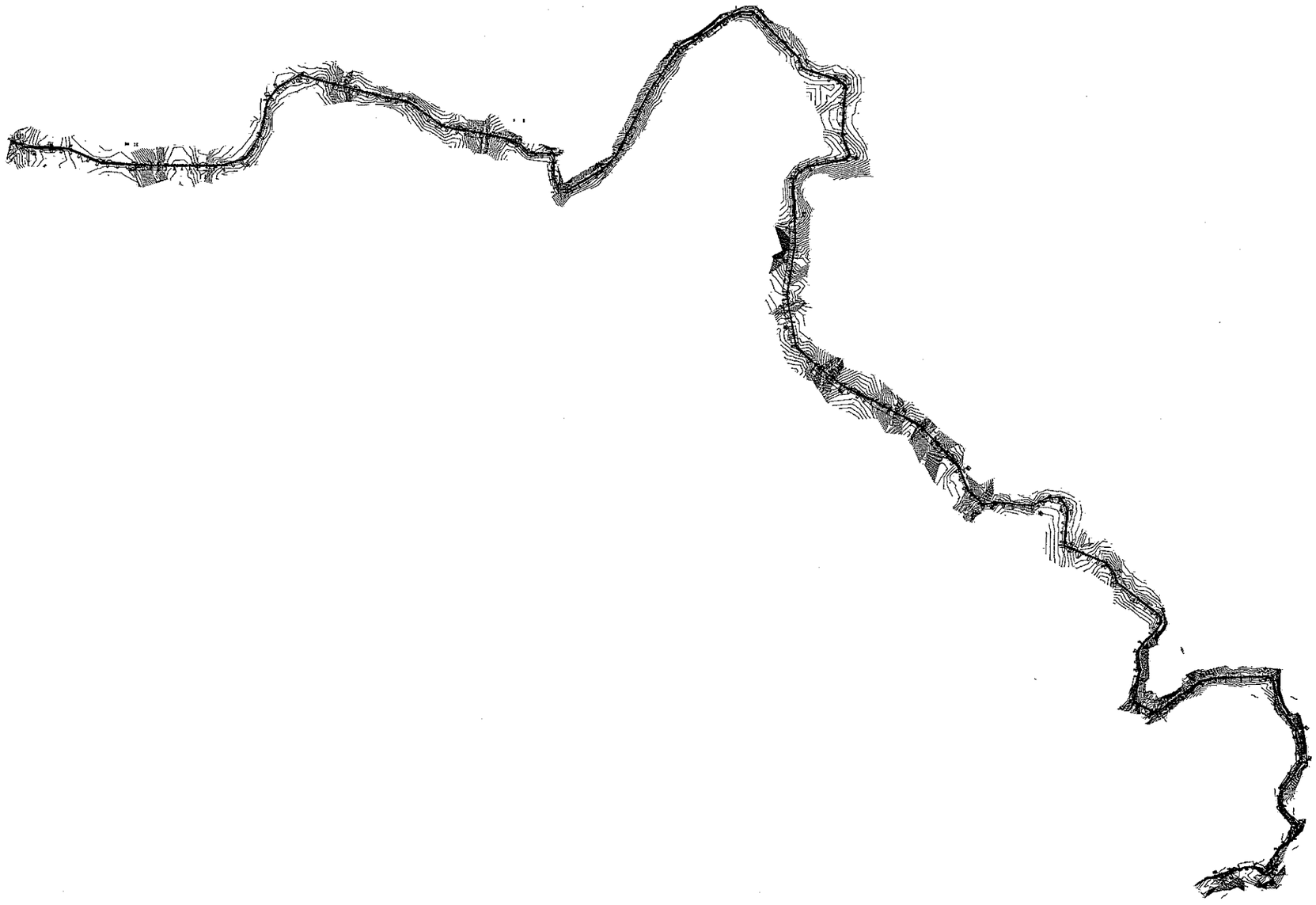
TYPICAL TRESTLE CROSS SECTION



TYPICAL BRIDGE LONGITUDINAL ELEVATION



TRESTLE CROSS SECTION WITH MICROPILE FOUNDATION



1
S1.0
KEY MAP
NOT TO SCALE

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WAIKAMOI FLUME REPLACEMENT

KEY MAP

S1.0

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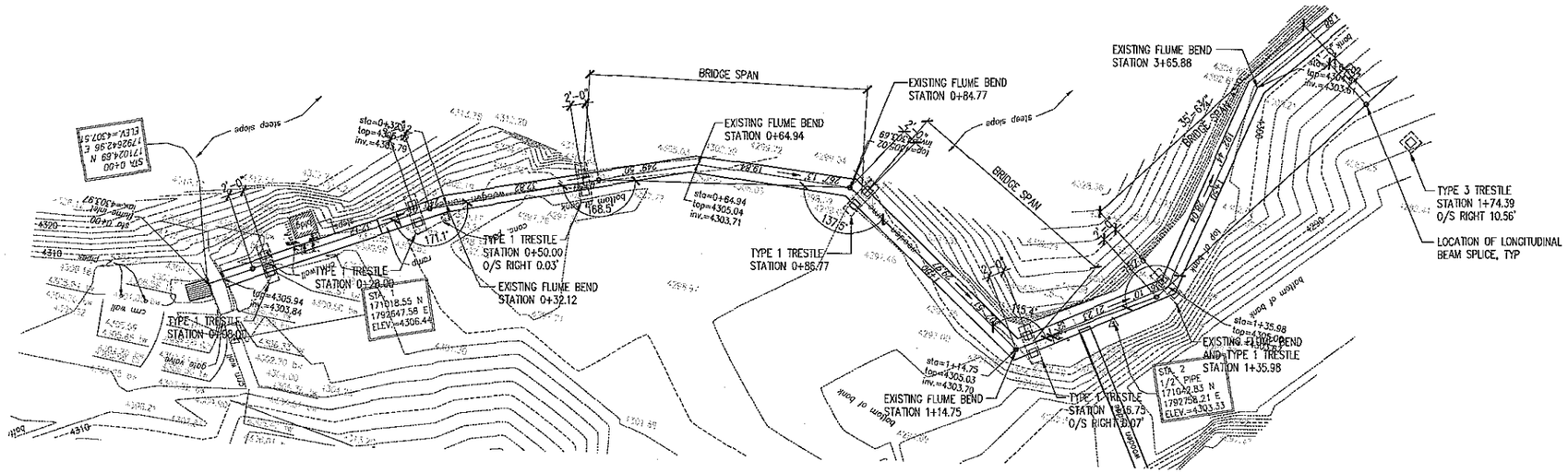
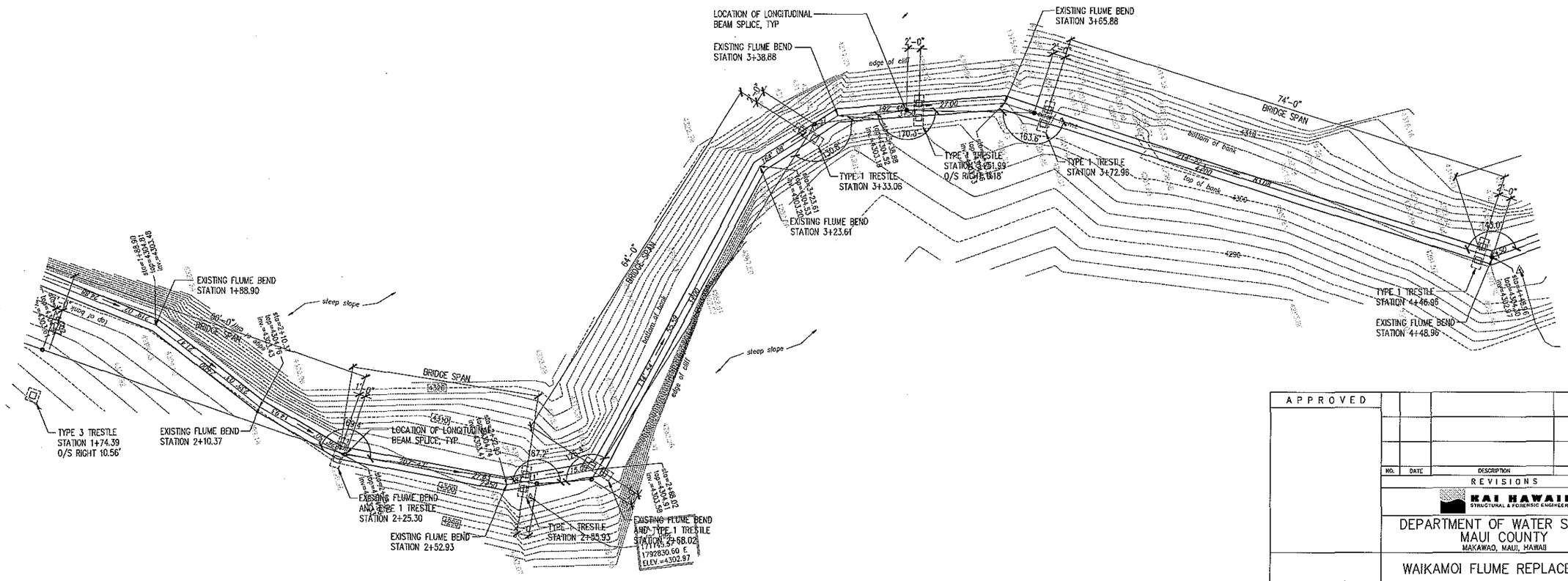
SHEET __ OF 21 SHEETS





1
S1.1

PLAN - STA. 0+00 TO STA. 4+50

SCALE: 1/8" = 1'-0"

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LAYOUT PLAN

S1.1

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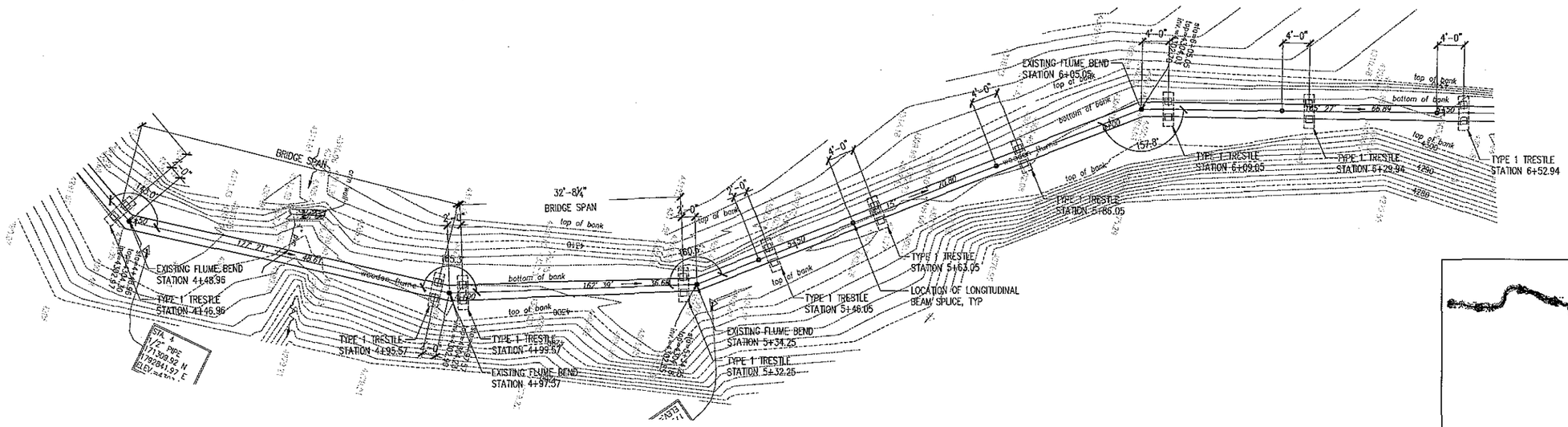

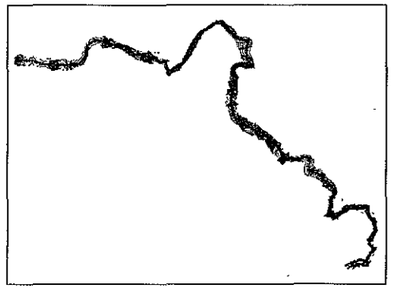

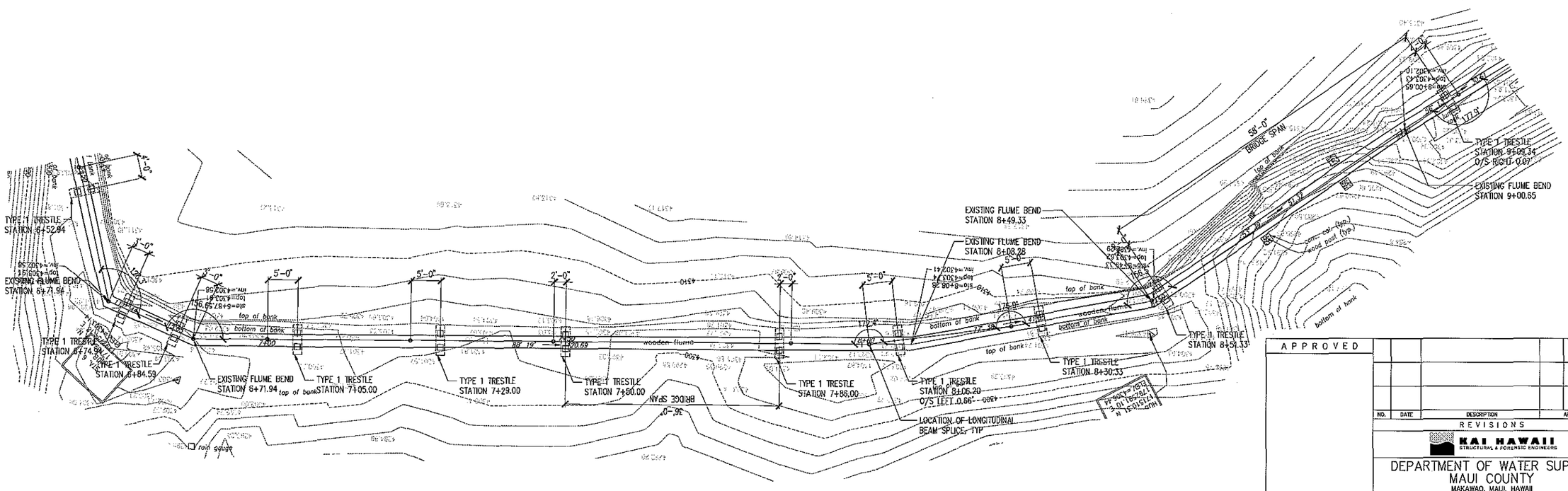

1 / S1.2 **PLAN - STA. 4+25 TO STA. 9+25**

SCALE: 1/8" = 1'-0"

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LAYOUT PLAN

S1.2

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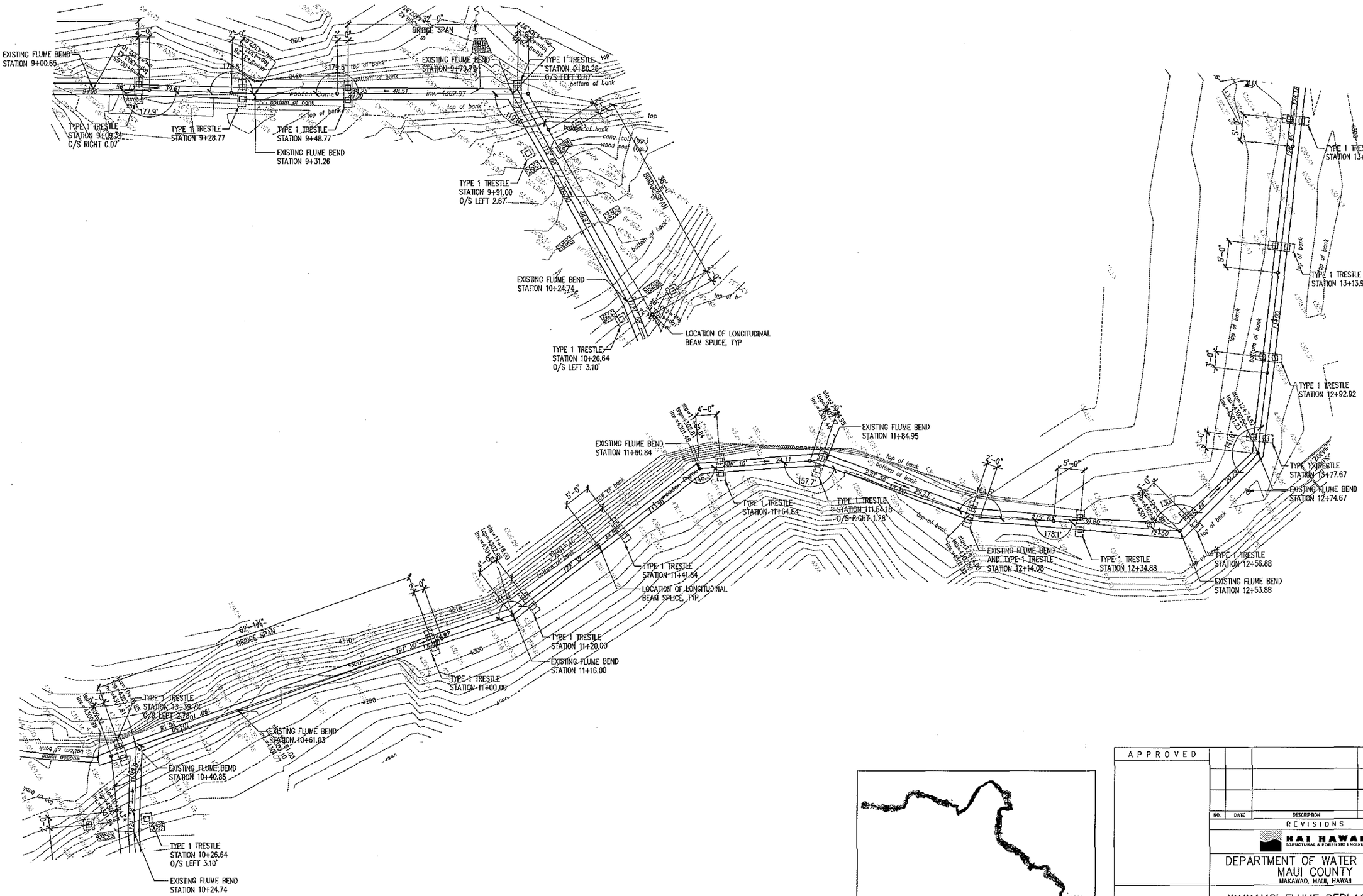

1 / S1.3 PLAN - STA. 9+00 TO STA. 13+50

SCALE: 1/8" = 1'-0"

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LAYOUT PLAN

S1.3

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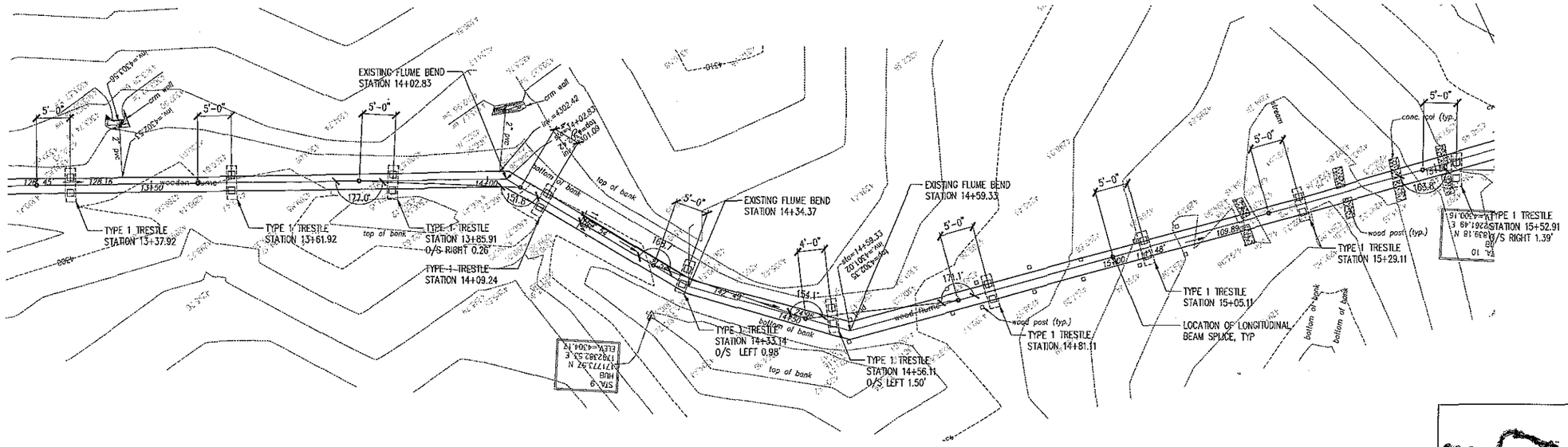

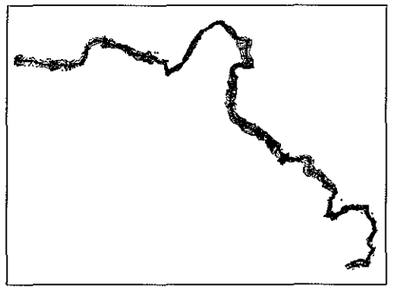

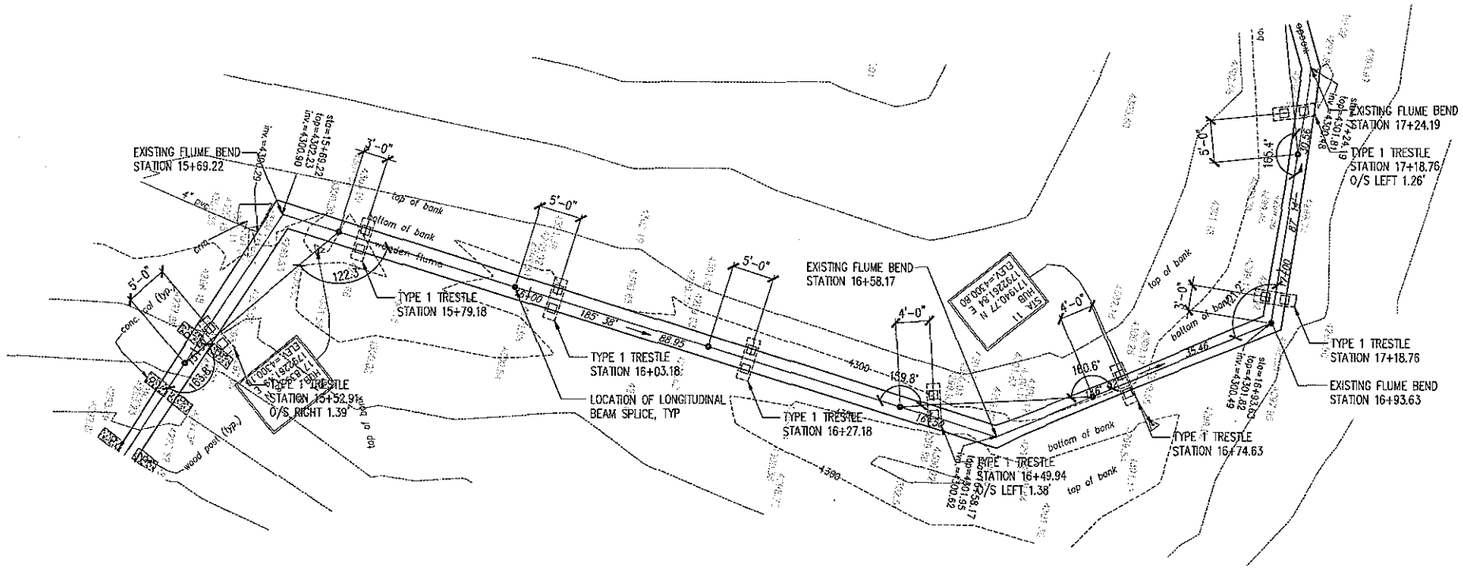

1
S1.4

PLAN - STA. 13+25 TO STA. 17+50

SCALE: 1/8" = 1'-0"

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	NO.	DATE	DESCRIPTION	APPROVED
	REVISIONS			

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LAYOUT PLAN

S1.4

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JOB NO. 09-04
DATE: 09/03/2009

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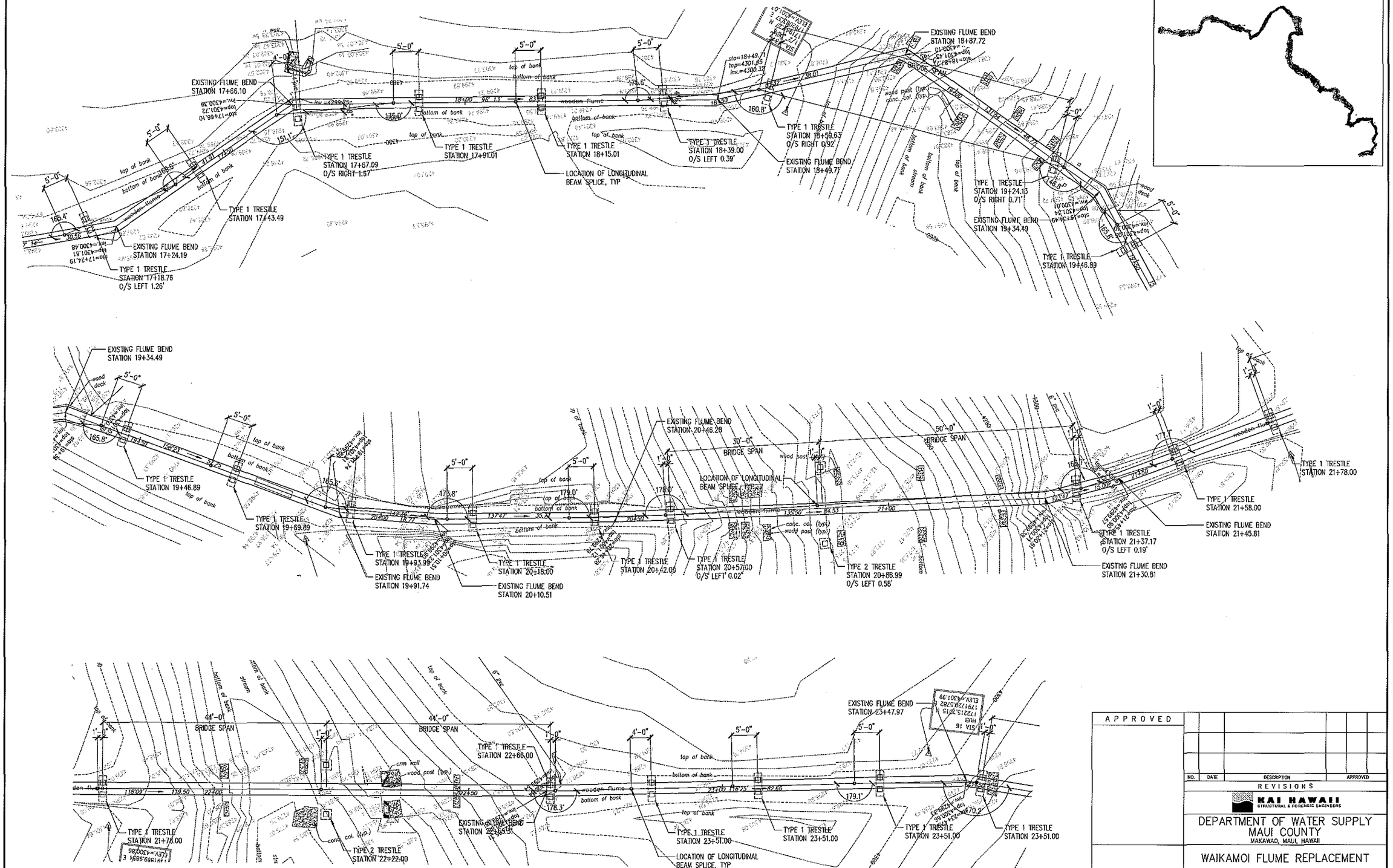

1 / S1.5 **PLAN - STA. 17+00 TO STA. 23+75**

SCALE: 1/8" = 1'-0"

APPROVED

NO.	DATE	DESCRIPTION	APPROVED

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WAIKAMOI FLUME REPLACEMENT

LAYOUT PLAN

S1.5

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DATE: 09/03/2009

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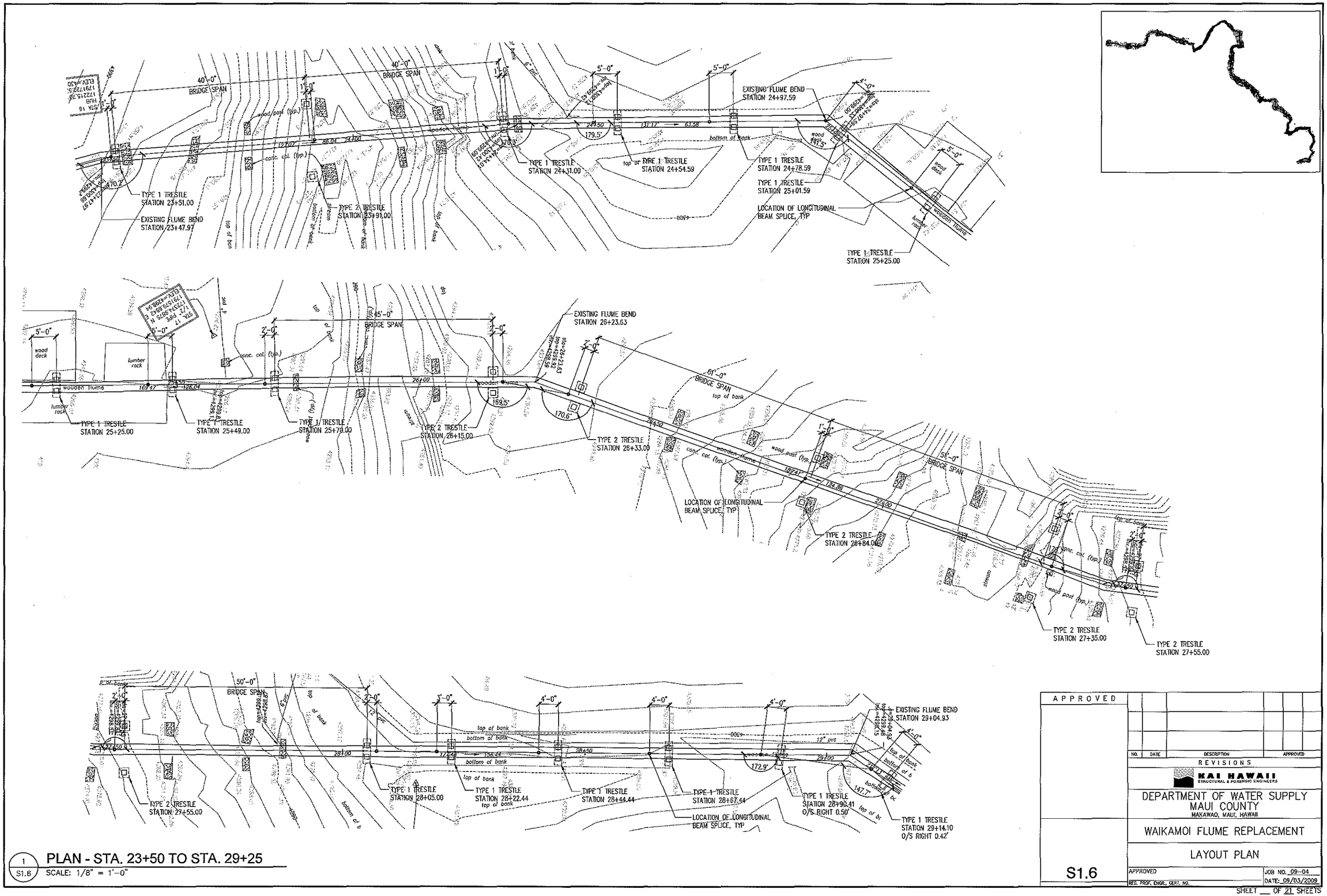

1 / S1.6 **PLAN - STA. 23+50 TO STA. 29+25**

SCALE: 1/8" = 1'-0"

APPROVED	NO.	DATE	DESCRIPTION	APPROVED

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LAYOUT PLAN

S1.6

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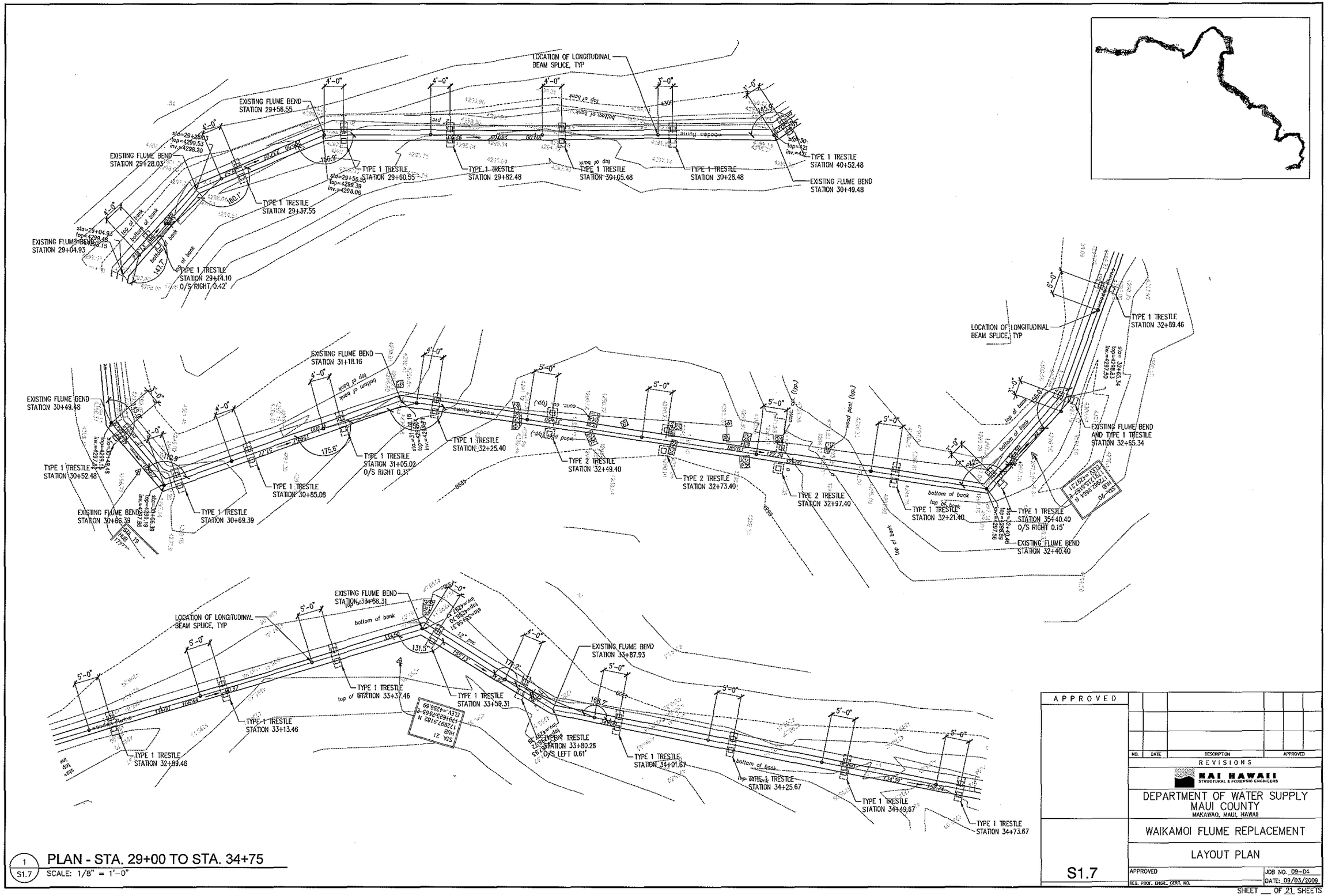

1 / S1.7 **PLAN - STA. 29+00 TO STA. 34+75**

SCALE: 1/8" = 1'-0"

APPROVED				
	NO.	DATE	DESCRIPTION	APPROVED

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LAYOUT PLAN

S1.7

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DATE: 09/03/2009

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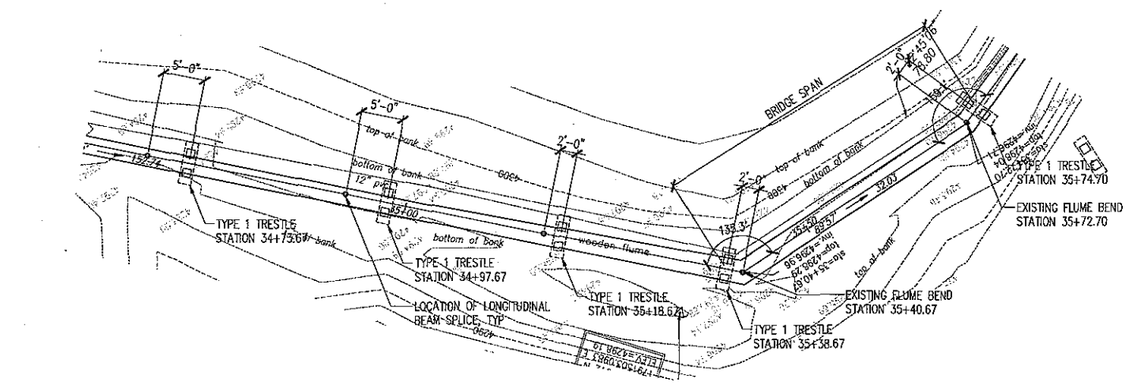

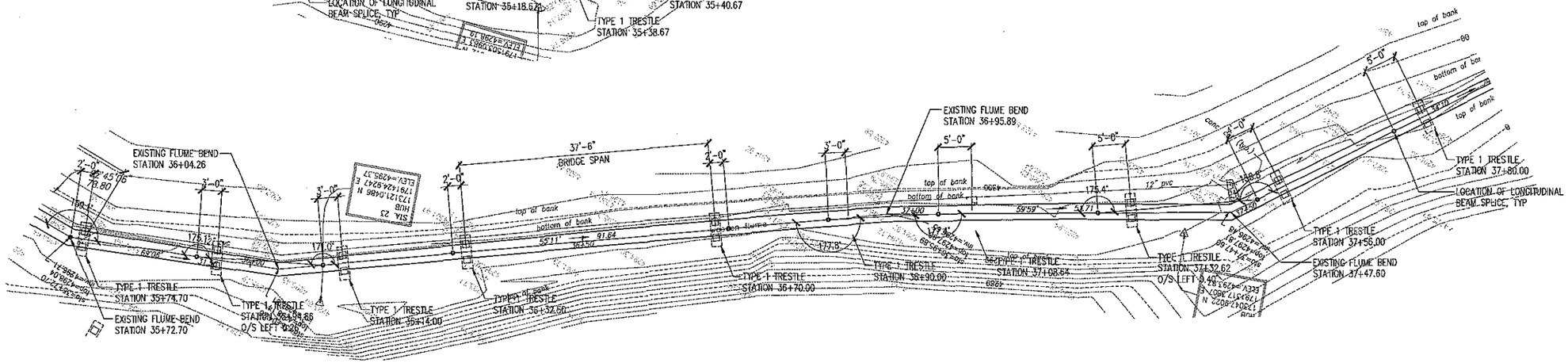

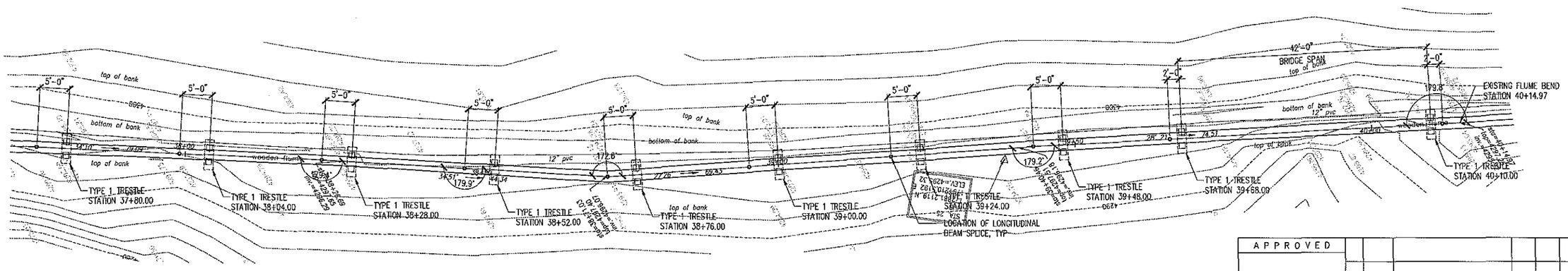

1
S1.8

PLAN - STA. 34+50 TO STA. 40+25

SCALE: 1/8" = 1'-0"

APPROVED

NO.	DATE	DESCRIPTION	APPROVED

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WAIKAMOI FLUME REPLACEMENT

LAYOUT PLAN

S1.8

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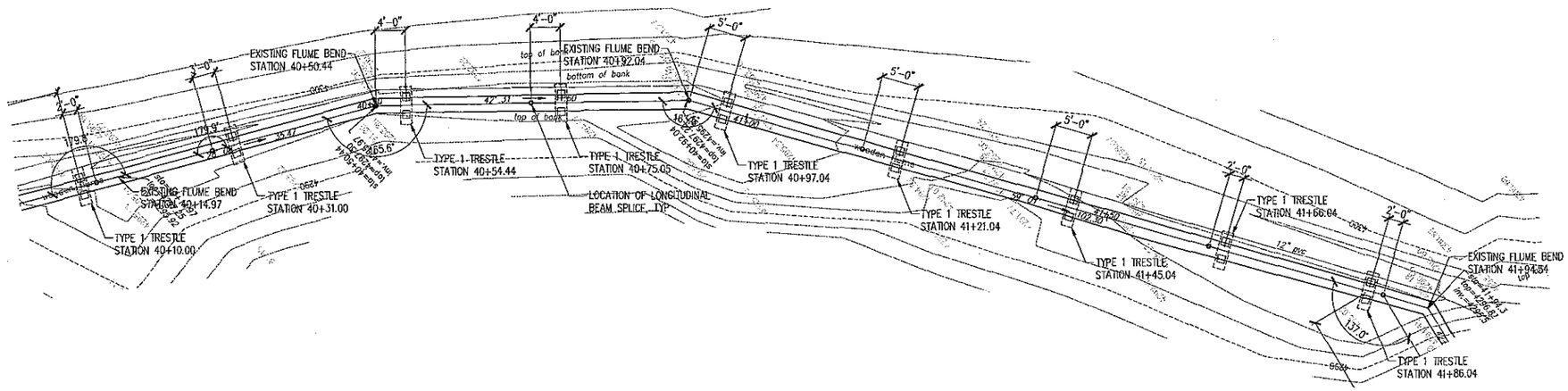
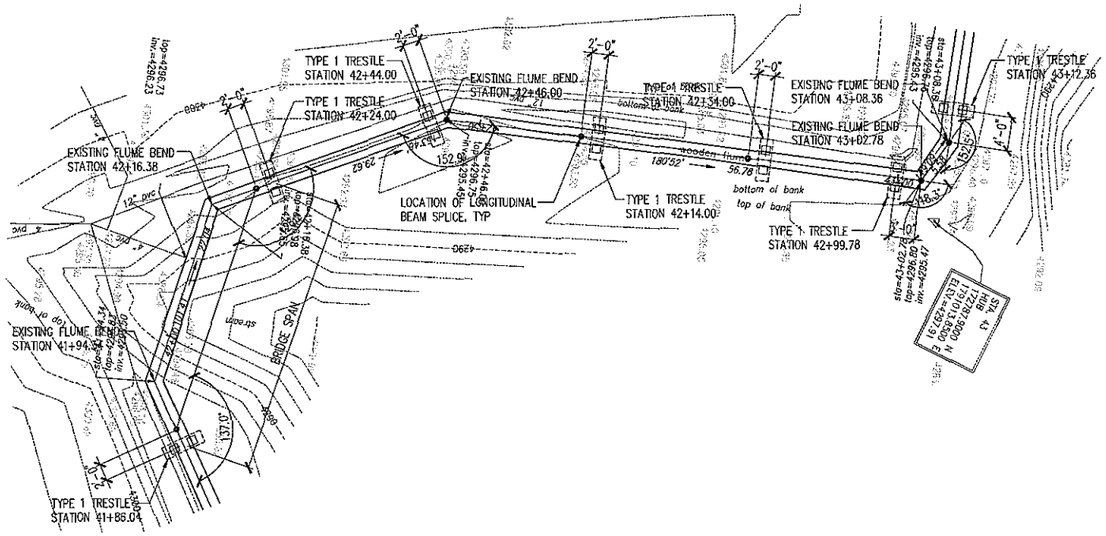
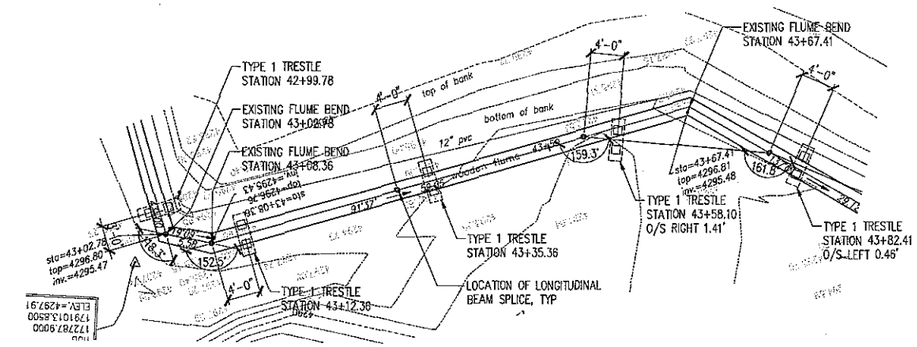
JOB NO. 09-04

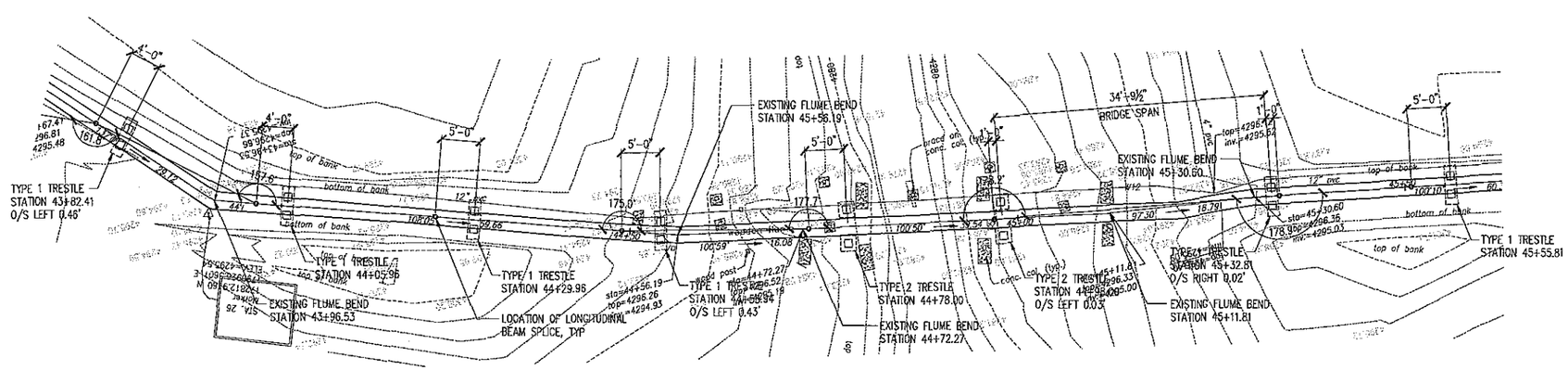
DATE: 09/03/2009

SHEET ___ OF 21 SHEETS









1 / S1.9 **PLAN - STA. 40+00 TO STA. 45+75**

SCALE: 1/8" = 1'-0"

APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

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STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

LAYOUT PLAN

S1.9

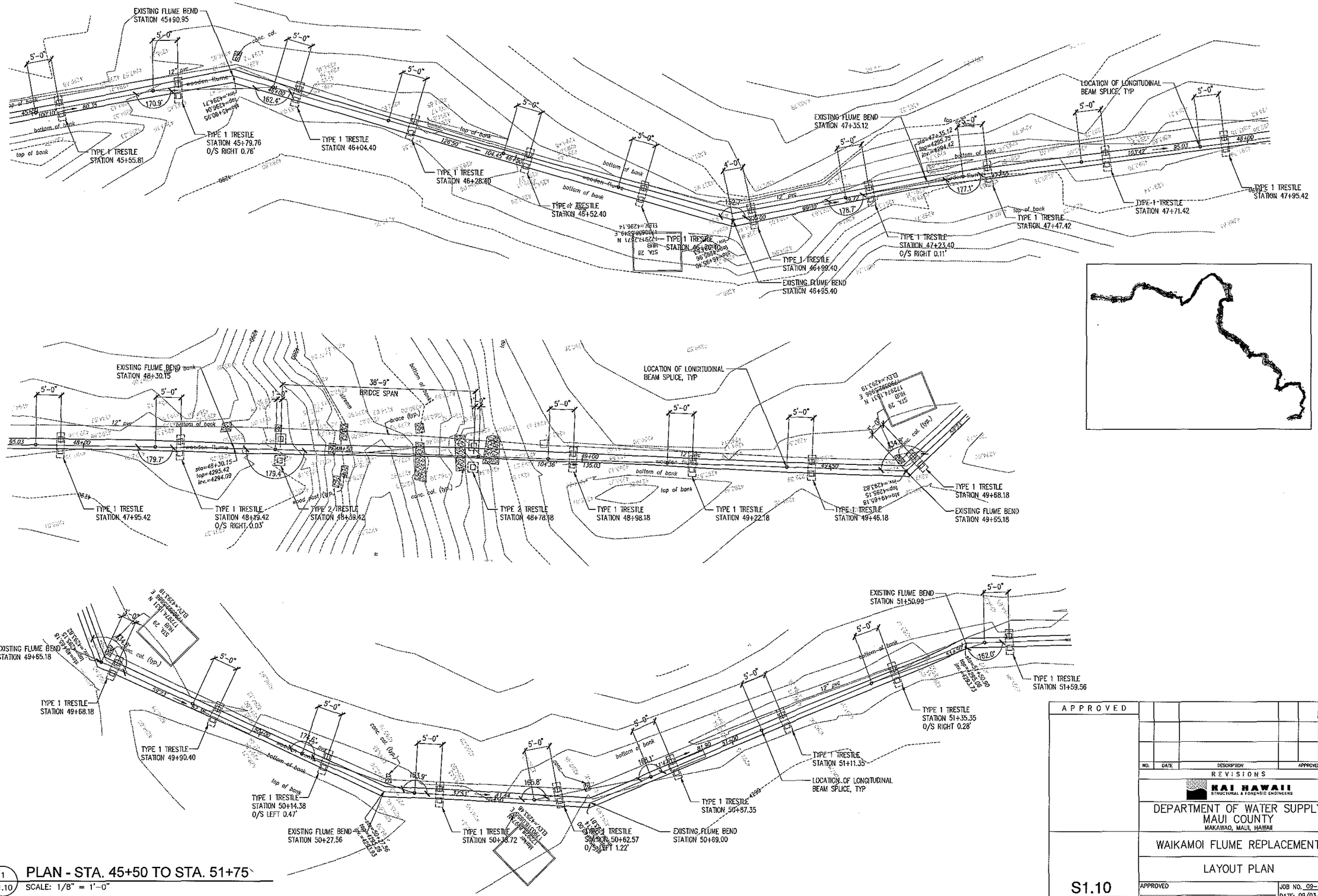
APPROVED

REG. PROF. ENGR. CERT. NO.

JOB NO. 09-04

DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



1 / S1.10 PLAN - STA. 45+50 TO STA. 51+75

SCALE: 1/8" = 1'-0"

APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

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DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

LAYOUT PLAN

S1.10

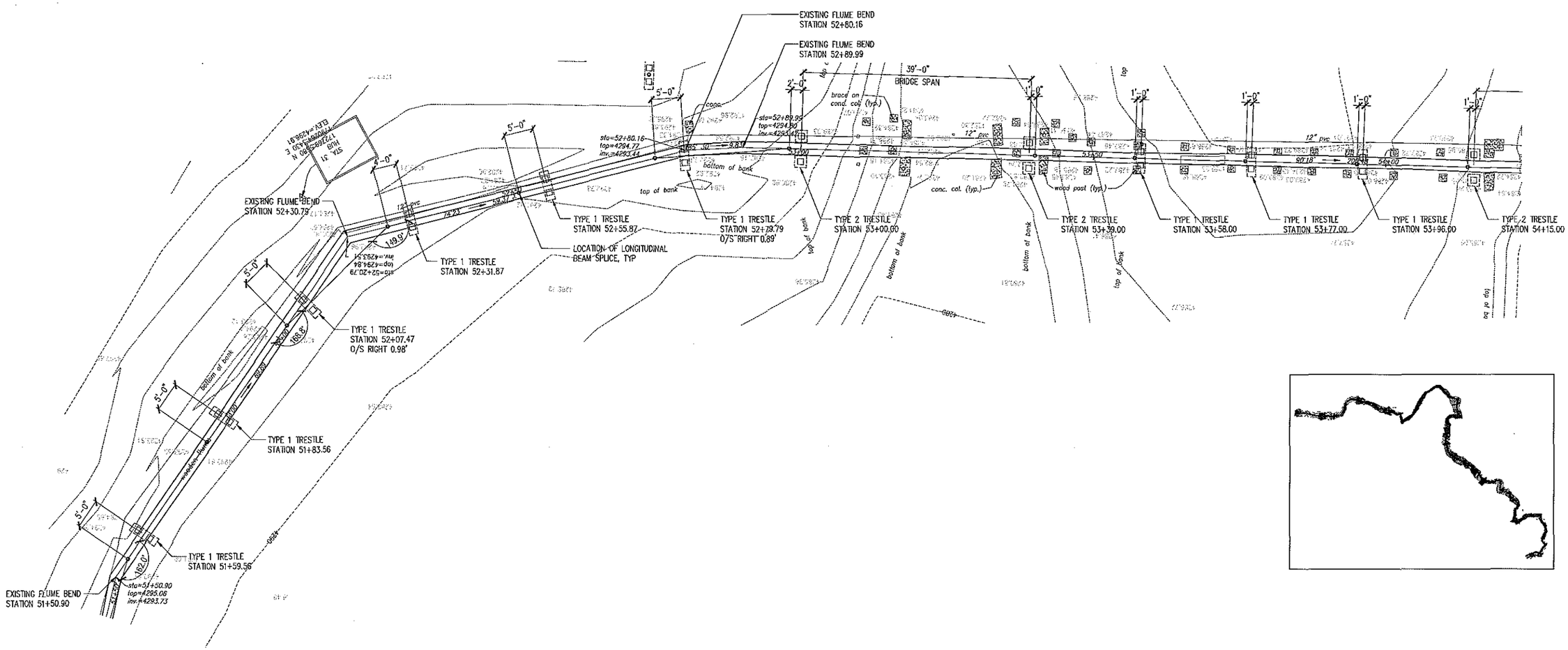
APPROVED

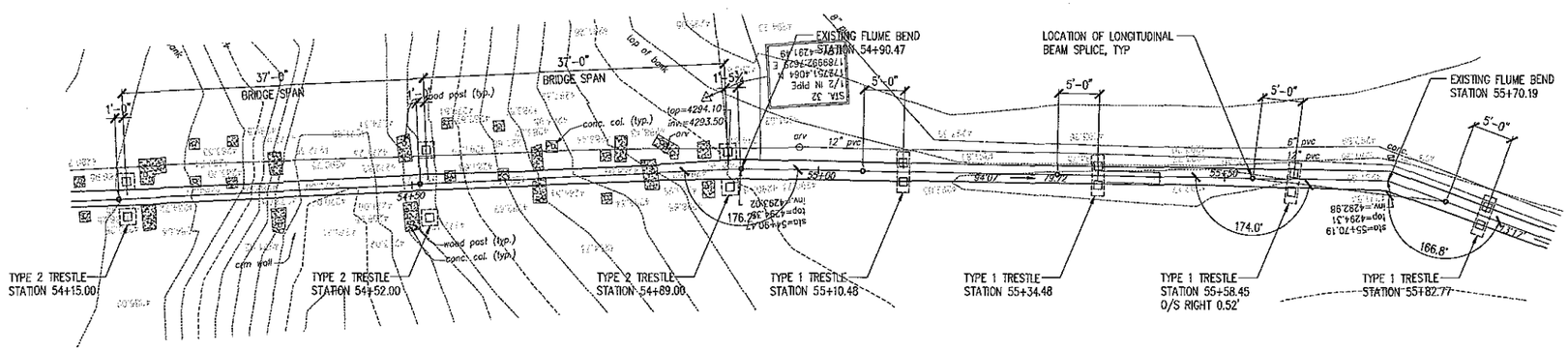
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04

DATE: 09/03/2009

SHEET __ OF 21 SHEETS





1 / S1.11 PLAN - STA. 51+50 TO STA. 56+00

SCALE: 1/8" = 1'-0"

APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

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STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

LAYOUT PLAN

S1.11

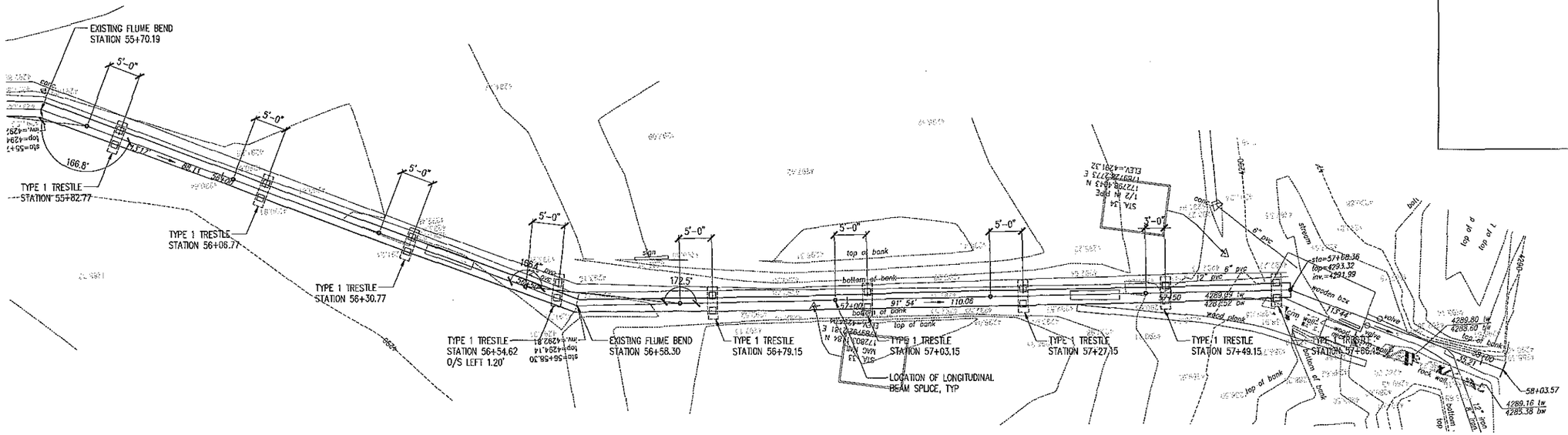
APPROVED

REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04

DATE: 09/03/2009

SHEET ___ OF 21 SHEETS



1 / S1.12 PLAN - STA. 55+50 TO STA. 58+00
SCALE: 1/8" = 1'-0"

APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

LAYOUT PLAN

S1.12

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
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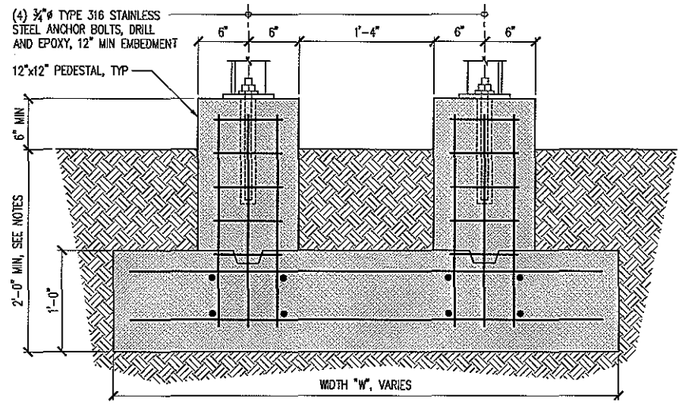
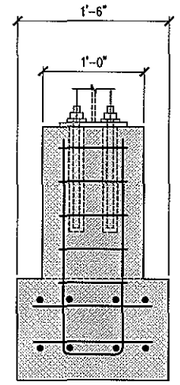
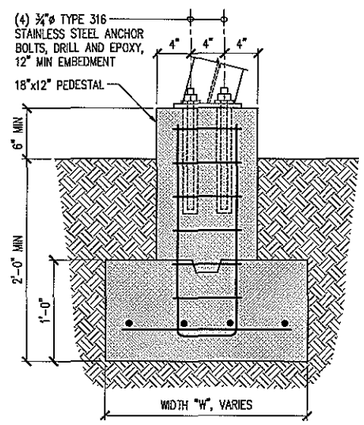
SHEET __ OF 21 SHEETS





1 / S3.0 **DETAIL**
SCALE: 1 1/2" = 1'-0"

TYPICAL TYPE 1 TRESTLE FOUNDATION SCHEDULE						
	WIDTH "W"					
	FOR VARIOUS TRIBUTARY SPAN LENGTHS, ½ * (L_1 + L_2)					
HEIGHT "H"	≤ 24'-0"	≤ 35'-0"	≤ 45'-0"	≤ 55'-0"	≤ 65'-0"	≤ 75'-0"
0'-6"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"
≤ 1'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	–
≤ 2'-6"	4'-6"	5'-0"	5'-6"	6'-0"	–	–
≤ 3'-6"	5'-0"	5'-6"	6'-0"	–	–	–
≤ 4'-6"	5'-6"	6'-0"	–	–	–	–
≤ 5'-6"	6'-0"	–	–	–	–	–



2 / S3.0 **DETAIL**
SCALE: 1 1/2" = 1'-0"

TYPE 2 AND 3TRESTLE FOUNDATION SCHEDULE						
	WIDTH "W"					
	FOR VARIOUS TRIBUTARY SPAN LENGTHS, ½ * (L_1 + L_2)					
HEIGHT "H"	≤ 24'-0"	≤ 35'-0"	≤ 45'-0"	≤ 55'-0"	≤ 65'-0"	≤ 75'-0"
1'-0"	1'-6"				2'-0"	2'-0"
≤ 10'-5"	1'-6"		2'-0"	2'-0"	2'-0"	2'-0"
≤ 20'-5"	1'-9"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
≤ 30'-5"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"

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STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

FOUNDATION SCHEDULE AND DETAILS

S3.0

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER QUALITY AND WATER POLLUTION CONTROL STANDARDS CONTAINED IN HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS" AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL" AS WELL AS CHAPTER 14 OF THE REVISED ORDINANCES OF HONOLULU 1990, AS AMENDED. BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED AT ALL TIMES DURING CONSTRUCTION.
AND OTHER PROTECTIVE FACILITIES, WHICH SHALL CONFORM WITH THE "HAWAII

2. THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS ADMINISTRATION RULES GOVERNING THE USE OF TRAFFIC CONTROL DEVICES AT WORK SITES ON OR ADJACENT TO PUBLIC STREETS AND HIGHWAYS", ADOPTED BY THE DIRECTOR OF TRANSPORTATION AND THE CURRENT U.S. FEDERAL HIGHWAY ADMINISTRATION'S "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, PART VI – TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS".

3. NO MATERIAL AND/OR EQUIPMENT SHALL BE STOCKPILED OR OTHERWISE STORED WITHIN STREET RIGHTS-OF-WAY EXCEPT AT LOCATIONS DESIGNATED IN WRITING AND APPROVED BY THE DEPARTMENT OF WATER SUPPLY.

4. THE CONTRACTOR SHALL INSTALL THE CONSTRUCTION TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH THE MUTCD AND THE HAWAII ADMINISTRATION RULES AS SPECIFIED IN NOTE #5 ABOVE.

5. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 60.1, "AIR POLLUTION CONTROL".

6. THE UNDERGROUND PIPES, CABLES OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS SEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREA. WHEREVER CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES.

7. NONCOMPLIANCE TO THE ABOVE REQUIREMENTS SHALL MEAN IMMEDIATE SUSPENSION OF ALL WORK AND REMEDIAL WORK SHALL COMMENCE IMMEDIATELY. ALL COSTS INCURRED SHALL BE BILLED TO THE PERMITEE. FURTHERMORE, VIOLATORS SHALL BE SUBJECTED TO ADMINISTRATIVE, CIVIL AND/OR CRIMINAL PENALTIES.

STOCKPILING NOTES:

1. ALL STOCKPILING WORK SHALL BE DONE IN ACCORDANCE WITH CHAPTER 14, ARTICLE 13, 14, 15 AND 16, AS RELATED TO STOCKPILING, EROSION AND SEDIMENT CONTROL OF THE REVISED ORDINANCES OF HONOLULU, 1990, AS AMENDED.

2. NO CONTRACTOR SHALL PERFORM ANY STOCKPILING OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW INTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATIONS OCCUR, THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.

3. NO STOCKPILING WORK SHALL BE DONE ON SATURDAYS, SUNDAYS AND HOLIDAYS AT ANY TIME WITHOUT PRIOR NOTICE TO THE DIRECTOR, DEPARTMENT OF WATER SUPPLY, PROVIDED SUCH STOCKPILING WORK IS ALSO IN CONFORMANCE WITH HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 46, "COMMUNITY NOISE CONTROL".

4. THE LIMITS OF THE AREA TO BE STOCKPILED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE STOCKPILING WORK.

5. ALL STOCKPILING OPERATIONS SHALL BE PERFORMED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER QUALITY AND WATER POLLUTION CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS" AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL" AND IF APPLICABLE, THE NPDES PERMIT FOR THE PROJECT.

6. TEMPORARY EROSION CONTROL PROCEDURES SHALL BE SUBMITTED FOR APPROVAL PRIOR TO APPLICATION FOR STOCKPILING PERMIT.

7. IF THE STOCKPILING WORK INVOLVES CONTAMINATED SOIL AND/OR HAZARDOUS MATERIALS, THEN ALL STOCKPILING WORK SHALL BE DONE IN CONFORMANCE WITH APPLICABLE STATE AND FEDERAL REQUIREMENTS. CONTACT THE SOLID AND HAZARDOUS WASTE BRANCH OF THE STATE DEPARTMENT OF HEALTH FOR MORE INFORMATION (PHONE NUMBER: 586-4226).

8. NON-COMPLIANCE TO ANY OF THE ABOVE REQUIREMENTS SHALL MEAN IMMEDIATE SUSPENSION OF ALL WORK AND REMEDIAL WORK SHOULD COMMENCE IMMEDIATELY. ALL COSTS INCURRED SHALL BE BILLED TO THE PERMITEE. FURTHERMORE, VIOLATORS SHALL BE SUBJECTED TO ADMINISTRATIVE, CIVIL AND/OR CRIMINAL PENALTIES.

9. ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATERS FROM DAMAGING THE CUT FACE OF AN EXCAVATION OR THE SLOPED SURFACES OF A FILL. FURTHERMORE, ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE.

10. WHERE APPLICABLE AND FEASIBLE THE MEASURES TO CONTROL EROSION AND OTHER POLLUTANTS SHALL BE IN PLACE BEFORE ANY STOCKPILING WORK IS INITIATED. TEMPORARY EROSION CONTROLS SHALL NOT BE REMOVED BEFORE PERMANENT EROSION CONTROLS ARE IN-PLACE AND ESTABLISHED.

11. TEMPORARY EROSION CONTROL PROCEDURES SHALL BE SUBMITTED FOR APPROVAL PRIOR TO APPLICATION FOR STOCKPILING PERMIT.

12. IF THE STOCKPILING WORK INVOLVES CONTAMINATED SOIL, THEN ALL STOCKPILING WORK SHALL BE DONE IN CONFORMANCE WITH APPLICABLE STATE AND FEDERAL REQUIREMENTS.

13. NON-COMPLIANCE TO ANY OF THE ABOVE REQUIREMENTS SHALL MEAN IMMEDIATE SUSPENSION OF ALL WORK, AND REMEDIAL WORK SHALL COMMENCE IMMEDIATELY. ALL COSTS INCURRED SHALL BE BILLED TO THE VIOLATOR. FURTHERMORE, VIOLATORS SHALL BE SUBJECTED TO ADMINISTRATIVE, CIVIL AND/OR CRIMINAL PENALTIES.

SAFETY:

A. THE CONTRACTOR IS FULLY RESPONSIBLE FOR THE SAFETY OF ALL WORKERS WHILE ON SITE. THE CONTRACTOR SHALL PROVIDE THE PROPER EQUIPMENT, TRAINING, AND PERSONNEL IN ORDER TO COMPLETE THE PROJECT IN A SAFE MANNER.

B. THE CONDITION OF THE EXISTING TIMBER FLUME BRIDGES IS POOR. THE BRIDGE STRUCTURES MAY NOT BE ABLE TO SAFELY SUPPORT PERSONNEL DURING THE CONSTRUCTION OF THE LIFELINE SYSTEM. THEREFORE, THE CONTRACTOR WILL NOT BE ALLOWED TO USE THE BRIDGES TO PERFORM THEIR WORK (WITH THE EXCEPTION OF BRIDGE NO. 1 WHICH IS CONSTRUCTED OF CONCRETE). THE CONTRACTOR SHALL PROVIDE TEMPORARY STRUCTURES TO GAIN ACCESS TO ALL WORK AREAS AND ACROSS ALL GULLIES AND RAVINES THAT THE BRIDGES CROSS OVER. THE TEMPORARY STRUCTURES SHALL NOT RELY ON THE EXISTING STRUCTURES FOR SUPPLEMENTAL SUPPORT.

C. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE APPROPRIATE LEVEL OF PERSONNEL PROTECTIVE EQUIPMENT TO BE USED ON-SITE.

D. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT FOR EMPLOYEE USE DURING OPERATIONS ON-SITE. SAFETY HARNESS, MEETING ANSI A10.14, SHALL BE WORN AND USED WHEN EXPOSED TO ANY FALL OF FOUR FEET OR MORE IN HEIGHT, WHERE THE HEIGHT CANNOT BE PROPERLY GUARDED WITH RAILS OR OTHER MEANS.

E. KEEP ADDITIONAL PERSONAL PROTECTIVE EQUIPMENT ON HAND FOR USE BY VISITORS TO THE SITE.

F. CONTRACTOR SHALL PROVIDE A HEALTH AND SAFETY PLAN FOR THE SITE. THIS PLAN SHALL BE SUBMITTED TO THE DEPARTMENT OF PUBLIC WORKS AT LEAST 2 WEEKS PRIOR TO THE START OF FIELD WORK. THE CONTRACTOR SHALL HAVE RECEIVED THE COUNTY'S APPROVAL OF THE CONTRACTOR'S PROPOSED HEALTH AND SAFETY PLAN PRIOR TO SUBMITTING THE FIRST MONTHLY PROGRESS PAYMENT.

G. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION THAT EMPLOYEES WORKING ON SITE HAVE READ THE HEALTH AND SAFETY PLAN FOR THE SITE.

H. SUBMIT FOR REVIEW AND APPROVAL, THE CONTRACTOR'S PROPOSED SAFETY REPRESENTATIVE'S RESUME IDENTIFYING HIS OR HER WORK EXPERIENCE AND QUALIFICATIONS. THE MINIMUM QUALIFICATIONS SHALL BE FIVE YEARS OF DIVERSIFIED CONSTRUCTION SAFETY EXPERIENCE, AND TWO YEARS EXPERIENCE RELATED TO THE CONTRACT'S SCOPE OF WORK. THE CONTRACTOR SHALL HAVE RECEIVED THE COUNTY ENGINEER'S APPROVAL OF THE CONTRACTOR'S PROPOSED SAFETY REPRESENTATIVE PRIOR TO SUBMITTING THE FIRST MONTHLY PROGRESS PAYMENT.

I. THE CONTRACTOR SHALL NOT REQUIRE ANY EMPLOYEE TO WORK UNDER CONDITIONS THAT ARE UNSANITARY, HAZARDOUS, OR DANGEROUS TO THE EMPLOYEE'S HEALTH OR SAFETY, AS DETERMINED UNDER "SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION" PROMULGATED BY THE SECRETARY OF LABOR UNDER SECTION 107 OF THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT (40 U.S.C. 327 ET SEQ.), AS AMENDED.

J. THE CONTRACTOR SHALL FULLY COMPLY WITH "SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION" PROMULGATED BY THE SECRETARY OF LABOR, WHICH MAY BE OBTAINED FROM THE SUPERINTENDENT OF DOCUMENTS, GOVERNMENT PRINTING OFFICE, WASHINGTON D.C., 20402-9325.

K. THE CONTRACTOR SHALL CONDUCT WEEKLY "TOOL BOX" MEETINGS FOR ALL EMPLOYEES ON SITE. THE PURPOSE OF THESE WEEKLY MEETINGS IS TO:
   A. DISCUSS OBSERVED ACCIDENT TRENDS AND CAUSES
   B. PLAN SAFETY INTO THE WORK ACTIVITIES
   C. TAKE ACTION TO CORRECT WORKERS' SAFETY CONCERNS.
   D. REVIEW EMERGENCY PROCEDURES WITH EMPLOYEES
   THESE MEETINGS SHALL BE DOCUMENTED AND SUCH DOCUMENTATION FORWARDED TO THE COUNTY ENGINEER WITHIN ONE WEEK OF THE MEETING.

TEMPORARY UTILITIES:

A. ELECTRICITY: THERE IS NO ELECTRICAL SERVICE AT THE SITE.

B. WATER SERVICE: THERE IS NO WATER SERVICE AT THE SITE. WATER REQUIRED FOR CONSTRUCTION OPERATIONS AND PERSONNEL USE MUST BE PROVIDED BY THE CONTRACTOR.

C. SANITARY FACILITIES: PROVIDE AND MAINTAIN REQUIRED TEMPORARY SANITARY FACILITIES AT THE TIME OF PROJECT MOBILIZATION. MAINTAIN IN CLEAN AND SANITARY CONDITION. UPON COMPLETION OF CONSTRUCTION, REMOVE TEMPORARY SANITARY FACILITIES.

BEST MANAGEMENT PRACTICES:

A. ALL WORK AREAS SHALL BE PROTECTED FROM EROSION RUNOFF BY THE PROPER INSTALLATION AND MAINTENANCE OF SILT FENCES AND ANY OTHER MEANS NECESSARY TO KEEP DIRT, SILT, OR OTHER CONSTRUCTION RELATED MATERIALS FROM BEING TRANSPORTED/WASHED AWAY FROM THE PROJECT SITE AND INTO THE DRAINAGE SYSTEM. SEE WATER POLLUTION AND EROSION CONTROL NOTES, SHEET C-2.

CONSTRUCTION FACILITIES:

A. CONSTRUCTION ENTRANCE:
   A. THE CONDITION OF THE ENTRANCE ROAD IS ROUGH AND UNIMPROVED.
   B. UTILIZE CONSTRUCTION EQUIPMENT THAT CAN BE ACCOMMODATED ON EXISTING ACCESS ROAD TO THE SITE.

APPROVED

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REVISIONS

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STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

CONSTRUCTION NOTES

S0.0

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 08-04
DATE: 09/03/2009

SHEET 5 OF 21 SHEETS

WATER POLLUTION AND EROSION CONTROL NOTES:

A. GENERAL:

1. THE CONTRACTOR IS REMINDED OF THE REQUIREMENTS OF SECTION 209 – WATER POLLUTION AND EROSION CONTROL, IN THE SPECIAL PROVISIONS. SECTION 209 DESCRIBES BUT IS NOT LIMITED TO: SUBMITTAL REQUIREMENTS; SCHEDULING OF A WATER POLLUTION AND EROSION CONTROL CONFERENCE WITH THE ENGINEER; CONSTRUCTION REQUIREMENTS; METHOD OF MEASUREMENT; AND BASIS OF PAYMENT.

2. THE CONTRACTOR SHALL FOLLOW THE GUIDELINES IN THE "BEST MANAGEMENT PRACTICES MANUAL FOR CONSTRUCTION SITES IN HONOLULU", DATED MAY 1999 IN DEVELOPING, INSTALLING AND MAINTAINING THE BEST MANAGEMENT PRACTICES (BMP) FOR THE PROJECT.

3. THE ENGINEER MAY ASSESS LIQUIDATED DAMAGES OF UP TO $27,500 FOR NON-COMPLIANCE OF EACH BMP REQUIREMENT AND EACH REQUIREMENT STATED IN SECTION 209, FOR EVERY DAY OF NON-COMPLIANCE. THERE IS NO MAXIMUM LIMIT ON THE AMOUNT ASSESSED PER DAY.

4. THE ENGINEER WILL DEDUCT THE COST FROM THE PROGRESS PAYMENT FOR ALL CITATIONS RECEIVED BY THE DEPARTMENT FOR NON-COMPLIANCE OR THE CONTRACTOR SHALL REIMBURSE THE STATE FOR THE FULL AMOUNT OF THE OUTSTANDING COST INCURRED BY THE STATE.

5. FOR PROJECTS THAT REQUIRE A NPDES PERMIT FROM THE DEPARTMENT OF HEALTH, INSTALL A RAIN GAGE PRIOR TO ANY FIELD WORK INCLUDING THE INSTALLATION OF ANY SITE-SPECIFIC BEST MANAGEMENT PRACTICES. THE RAIN GAGE SHALL HAVE A TOLERANCE OF AT LEAST 0.05 INCHES OF RAINFALL, AND HAVE AN OPENING OF AT LEAST ONE-INCH IN DIAMETER. INSTALL THE RAIN GAGE ON THE PROJECT SITE IN AN AREA THAT WILL NOT DETER RAINFALL FROM ENTERING THE GAGE OPENING. THE RAIN GAGE INSTALLATION SHALL BE STABLE AND PLUMBED. DO NOT BEGIN FIELD WORK UNTIL THE RAIN GAGE IS INSTALLED AND SITE-SPECIFIC BEST MANAGEMENT PRACTICES ARE IN-PLACE.

B. WASTE DISPOSAL:

1. WASTE MATERIALS

ALL WASTE MATERIALS SHALL BE COLLECTED AND STORED IN A SECURELY LIDDED METAL DUMPSTER. THE DUMPSTER SHALL MEET ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS. ALL TRASH AND CONSTRUCTION DEBRIS FROM THE SITE SHALL BE DEPOSITED IN THE DUMPSTER. THE DUMPSTER SHALL BE EMPTIED A MINIMUM OF TWICE PER WEEK OR AS OFTEN AS IS DEEMED NECESSARY. NO CONSTRUCTION WASTE MATERIALS SHALL BE BURIED ONSITE. THE CONTRACTOR'S SUPERVISORY PERSONNEL SHALL BE INSTRUCTED REGARDING THE CORRECT PROCEDURE FOR WASTE DISPOSAL. NOTICES STATING THESE PRACTICES SHALL BE POSTED IN THE OFFICE TRAILER AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR SEEING THAT THESE PROCEDURES ARE FOLLOWED.

2. HAZARDOUS WASTE

ALL HAZARDOUS WASTE MATERIALS SHALL BE DISPOSED OF IN THE MANNER SPECIFIED BY LOCAL OR STATE REGULATIONS OR BY THE MANUFACTURER. THE CONTRACTOR'S SITE PERSONNEL SHALL BE INSTRUCTED IN THESE PRACTICES AND SHALL BE RESPONSIBLE FOR SEEING THAT THESE PRACTICES ARE FOLLOWED.

3. SANITARY WASTE

ALL SANITARY WASTE SHALL BE COLLECTED FROM THE PORTABLE UNITS A MINIMUM OF ONCE PER WEEK, OR AS REQUIRED.

C. EROSION AND SEDIMENT CONTROL INSPECTION AND MAINTENANCE PRACTICES:

1. ALL CONTROL MEASURES SHALL BE INSPECTED AT LEAST ONCE EACH WEEK, AND WITHIN 24 HOURS FOLLOWING ANY RAINFALL EVENT OF 0.5 INCHES OR GREATER.

2. ALL MEASURES SHALL BE MAINTAINED IN GOOD WORKING ORDER. IF REPAIR IS NECESSARY, IT SHALL BE INITIATED WITHIN 24 HOURS AFTER THE INSPECTION.

3. BUILT-UP SEDIMENT SHALL BE REMOVED FROM SILT FENCE WHEN IT HAS REACHED ONE-THIRD THE HEIGHT OF THE FENCE.

4. SILT SCREEN OR FENCE SHALL BE INSPECTED FOR DEPTH OF SEDIMENT, TEARS, TO VERIFY THAT THE FABRIC IS SECURELY ATTACHED TO THE FENCE POSTS OR CONCRETE SLAB AND TO VERIFY THAT THE FENCE POSTS ARE FIRMLY IN THE GROUND. THE BOTTOM OF THE SILT SCREEN SHALL BE INSPECTED AND VERIFIED THAT IT IS BURIED A MINIMUM OF 6 INCHES BELOW THE EXISTING GROUND.

5. TEMPORARY AND PERMANENT SEEDING AND PLANTING SHALL BE INSPECTED FOR BARE SPOTS, WASHOUTS AND HEALTHY GROWTH.

6. A MAINTENANCE INSPECTION REPORT SHALL BE MADE PROMPTLY AFTER EACH INSPECTION BY THE CONTRACTOR.

7. THE CONTRACTOR SHALL SELECT A MINIMUM OF THREE PERSONNEL WHO SHALL BE RESPONSIBLE FOR INSPECTIONS, MAINTENANCE AND REPAIR ACTIVITIES AND FILLING OUT THE INSPECTION AND MAINTENANCE REPORT.

8. PERSONNEL SELECTED FOR THE INSPECTION AND MAINTENANCE RESPONSIBILITIES SHALL RECEIVE TRAINING FROM THE CONTRACTOR. THEY SHALL BE TRAINED IN ALL THE INSPECTION AND MAINTENANCE PRACTICES NECESSARY FOR KEEPING THE EROSION AND SEDIMENT CONTROLS USED ONSITE IN GOOD WORKING ORDER.

D. GOOD HOUSEKEEPING BEST MANAGEMENT PRACTICES:

1. MATERIALS POLLUTION PREVENTION PLAN

A. APPLICABLE MATERIALS OR SUBSTANCES LISTED BELOW ARE EXPECTED TO BE PRESENT ONSITE DURING CONSTRUCTION. OTHER MATERIALS AND SUBSTANCES NOT LISTED BELOW SHALL BE ADDED TO THE INVENTORY.
STEEL
CONCRETE
DETERGENTS
PETROLEUM BASED PRODUCTS
CLEANING SOLVENTS
WOOD
EPOXY RESIN

B. MATERIAL MANAGEMENT PRACTICES SHALL BE USED TO REDUCE THE RISK OF SPILLS OR OTHER ACCIDENTAL EXPOSURE OF MATERIALS AND SUBSTANCES TO STORM WATER RUNOFF. AN EFFORT SHALL BE MADE TO STORE ONLY ENOUGH PRODUCT AS IS REQUIRED TO DO THE JOB.

C. ALL MATERIALS STORED ONSITE SHALL BE STORED IN A NEAT, ORDERLY MANNER IN THEIR APPROPRIATE CONTAINERS AND IF POSSIBLE UNDER A ROOF OR OTHER ENCLOSURE.

D. PRODUCTS SHALL BE KEPT IN THEIR ORIGINAL CONTAINERS WITH THE ORIGINAL MANUFACTURER'S LABEL.

E. SUBSTANCES SHALL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER.

F. WHENEVER POSSIBLE, A PRODUCT SHALL BE USED UP COMPLETELY BEFORE DISPOSING OF THE CONTAINER.

G. MANUFACTURER'S RECOMMENDATIONS FOR PROPER USE AND DISPOSAL SHALL BE FOLLOWED.

H. THE CONTRACTOR SHALL CONDUCT A DAILY INSPECTION TO ENSURE PROPER USE AND DISPOSAL OF MATERIALS ONSITE.

2. HAZARDOUS MATERIAL POLLUTION PREVENTION PLAN

A. PRODUCTS SHALL BE KEPT IN ORIGINAL CONTAINERS UNLESS THEY ARE NOT RESEALABLE.

B. ORIGINAL LABELS AND MATERIAL SAFETY DATA SHEETS (MSDS) SHALL BE RETAINED.

C. SURPLUS PRODUCTS SHALL BE DISPOSED OF ACCORDING TO MANUFACTURERS' INSTRUCTIONS OR LOCAL AND STATE RECOMMENDED METHODS.

3. ONSITE AND OFFSITE PRODUCT SPECIFIC PLAN

A. THE FOLLOWING PRODUCT SPECIFIC PRACTICES SHALL BE FOLLOWED ONSITE:

1) PETROLEUM BASED PRODUCTS:
ALL ONSITE VEHICLES SHALL BE MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTIVE MAINTENANCE TO REDUCE THE CHANCE OF LEAKAGE. PETROLEUM PRODUCTS SHALL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED. ANY ASPHALT SUBSTANCES USED ONSITE SHALL BE APPLIED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

2) FERTILIZERS:
FERTILIZERS USED SHALL BE APPLIED ONLY IN THE MINIMUM AMOUNTS RECOMMENDED BY THE MANUFACTURER. ONCE APPLIED, FERTILIZER SHALL BE WORKED INTO THE SOIL TO LIMIT EXPOSURE TO STORM WATER. STORAGE SHALL BE IN A COVERED SHED. THE CONTENTS OF ANY PARTIALLY USED BAGS OF FERTILIZER SHALL BE TRANSFERRED TO A SEALABLE PLASTIC BIN TO AVOID SPILLS.

3) PAINTS:
ALL CONTAINERS SHALL BE TIGHTLY SEALED AND STORED WHEN NOT REQUIRED FOR USE. EXCESS PAINT SHALL NOT BE DISCHARGED TO THE HIGHWAY DRAINAGE SYSTEM BUT SHALL BE PROPERLY DISPOSED OF ACCORDING TO MANUFACTURERS' INSTRUCTIONS OR STATE AND LOCAL REGULATIONS.

4) CONCRETE TRUCKS:
CONCRETE TRUCKS SHALL BE ALLOWED TO WASH OUT OR DISCHARGE DRUM WASH WATER ONLY AT A DESIGNATED SITE. WATER SHALL NOT BE DISCHARGED IN THE HIGHWAY DRAINAGE SYSTEM OR WATERS OF THE UNITED STATES. THE CONTRACTOR SHALL CONTACT DRINKING WATER BRANCH, DEPARTMENT OF HEALTH AT 586-4258 TO RECEIVE PERMISSION TO DESIGNATE A DISPOSAL SITE. THE CONTRACTOR SHALL CLEAN DISPOSAL SITE AS REQUIRED OR AS REQUESTED BY THE OWNER'S REPRESENTATIVE.

B. OFFSITE VEHICLE TRACKING:
A STABILIZED CONSTRUCTION ENTRANCE SHALL BE PROVIDED TO HELP REDUCE VEHICLE TRACKING OF SEDIMENTS. THE PAVED STREET ADJACENT TO THE SITE ENTRANCE SHALL BE CLEANED DAILY OR AS REQUIRED TO REMOVE ANY EXCESS MUD, COLD PLANED MATERIALS, DIRT OR ROCK TRACKED FROM THE SITE. DUMP TRUCKS HAULING MATERIAL FROM THE CONSTRUCTION SITE SHALL BE COVERED WITH A TARPAULIN.

4. SPILL CONTROL PLAN

A. A SPILL PREVENTION PLAN SHALL BE POSTED TO INCLUDE MEASURES TO PREVENT AND CLEAN UP EACH SPILL.

B. THE CONTRACTOR SHALL BE THE SPILL PREVENTION AND CLEANUP COORDINATOR. THE CONTRACTOR SHALL DESIGNATE AT LEAST THREE SITE PERSONNEL WHO SHALL RECEIVE SPILL PREVENTION AND CLEANUP TRAINING. THESE INDIVIDUALS SHALL EACH BECOME RESPONSIBLE FOR A PARTICULAR PHASE OF PREVENTION AND CLEANUP. THE NAMES OF RESPONSIBLE SPILL PERSONNEL SHALL BE POSTED IN THE MATERIAL STORAGE AREA AND IN THE OFFICE TRAILER ONSITE.

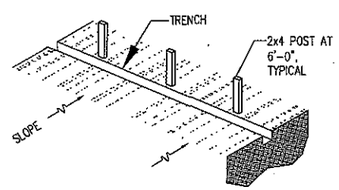
C. MANUFACTURERS' RECOMMENDED METHODS FOR SPILL CLEANUP SHALL BE CLEARLY POSTED AND SITE PERSONNEL SHALL BE MADE AWARE OF THE PROCEDURES AND THE LOCATION OF THE INFORMATION AND CLEANUP SUPPLIES.

D. MATERIALS AND EQUIPMENT NECESSARY FOR SPILL CLEANUP SHALL BE KEPT IN THE MATERIAL STORAGE AREA ONSITE.

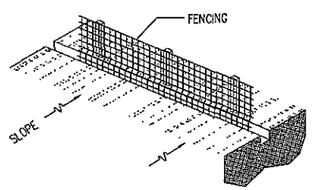
E. ALL SPILLS SHALL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY.

F. THE SPILL AREA SHALL BE KEPT WELL VENTILATED AND PERSONNEL SHALL WEAR APPROPRIATE PROTECTIVE CLOTHING TO PREVENT INJURY FROM CONTACT WITH A HAZARDOUS SUBSTANCE.

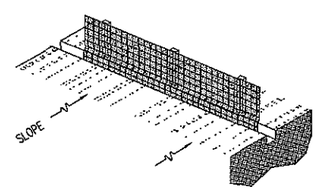
G. SPILLS OF TOXIC HAZARDOUS MATERIAL SHALL BE REPORTED TO THE APPROPRIATE STATE OR LOCAL GOVERNMENT AGENCY, REGARDLESS OF THE SIZE.



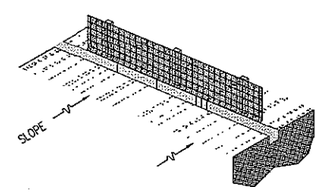
1. SET POSTS AND EXCAVATE A 6"x6" TRENCH UPSLOPE ALONG THE LINE OF POSTS.



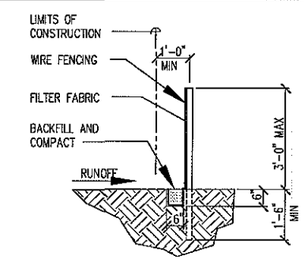
2. STAPLE WIRE FENCING TO THE POSTS.



3. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.



3. ATTACH THE FILTER FABRIC TO THE WIRE



SILT FENCE NOTES

1. A SILT FENCE SHALL SURROUND THE EXCAVATION AREA FOR EACH FOUNDATION PAD .THE HEIGHT OF THE SILT FENCES SHALL NOT EXCEED 36 INCHES (HIGHER FENCES MAY BE IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE).

2. THE FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL, CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP AND SECURELY SEALED.

3. POSTS SHALL BE SPACED A MAXIMUM 10 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 18 INCHES). WHEN EXTRA STRENGTH FABRIC IS USED WITHOUT THE WIRE SUPPORT FENCE, POST SPACING SHALL NOT EXCEED 6 FEET.

4. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 6 INCHES WIDE AND 6 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.

5. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIEWIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 2 INCHES AND SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.

6. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 8 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.

7. WHEN EXTRA STRENGTH FILTER FABRIC AND CLOSER SPACING ARE USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED.. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ITEM NO. 6 APPLYING.

8. THE TRENCH SHALL BE BACKFILLED AND THE SOIL COMPACTED OVER THE FILTER FABRIC.

9. SILT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.

10. FILTER FABRIC SHALL BE MIFARI SILT FENCE, AMOCO SILT STOP (WIDTH 3'-6") #1380 OR APPROVED EQUAL.

MAINTENANCE

1. SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING THE PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. SHOULD THE FABRIC ON A SILT FENCE DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED, USABLE LIFE AND THE BARRIER STILL BE NECESSARY, THE FABRIC SHALL BE REPLACED PROMPTLY.
3. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
4. ANY SEDIMENT REMAINING IN PLACE AFTER THE SILT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND SEEDED.

BMP NOTES

1. CONSTRUCT TEMPORARY SILT FENCE AND MAINTAIN THROUGHOUT PROJECT DURATION. SEE DETAIL THIS SHEET.

2. REMOVE BMP MEASURES AND CLEAN SITE UPON STABILIZATION OF AREA AND COMPLETION OF PROJECT.

3. SILT FENCES TO BE ADJUSTED AS NECESSARY AFTER BACKFILLING OF EXCAVATED AREAS.

4. FIELD GEAR, EQUIPMENT, VEHICLES, HELICOPTER LANDING ZONES, STAGING AREAS, AND TRAVEL ROUTES SHALL BE CLEANED AND INSPECTED PRIOR TO GOING INTO THE FIELD TO PREVENT CONTAMINATION OF WEEDS AND INSECTS.

5. DEMOLITION AND CONSTRUCTION ACTIVITIES TO BE CONFINED TO THE PRESENT FLUME CORRIDOR.

6. ALL DEBRIS AND WASTE MATERIALS TO BE REMOVED FROM THE PROJECT AREA.

7. EFFORTS SHALL BE MADE TO ENSURE THAT MATERIALS AND EQUIPMENTS ARE SANITIZED TO PREVENT THE INTRODUCTION OF POTENTIALLY INVASIVE ORGANISMS INTO THE AREA DURING PROJECT WORK.

8. THE OHA WAI (CLERMONTIA GRANDIFLORA), HAHA (CYANEA ACULEATIFLORA), AND HAHA (CYANEA MACROSTEGIA) ARE RARE LOBELIADS AND SHALL BE FLAGGED AND AVOIDED DURING CONSTRUCTION WORK.

APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

CONSTRUCTION NOTES

S0.1

APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

STRUCTURAL NOTES:

1. GENERAL:

A. WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE BUILDING CODE OF THE COUNTY OF MAUI (AMENDED IBC, 2003 EDITION). HOWEVER WHERE REFERENCE IS MADE TO PERFORMANCE CONFORMING TO OTHER STANDARDS THE MORE STRINGENT SHALL APPLY.
C. THE CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AND VERIFY FIELD CONDITIONS AND SHALL COMPARE SUCH FIELD MEASUREMENTS AND CONDITIONS WITH THE DRAWINGS BEFORE COMMENCING THE WORK. REPORT IN WRITING TO THE ENGINEER ALL INCONSISTENCIES OR OMISSIONS.
D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR METHODS OF CONSTRUCTION, WORKMANSHIP AND JOB SAFETY. THE CONTRACTOR SHALL PROVIDE TEMPORARY SHORING AND BRACING AS REQUIRED FOR STABILITY OF STRUCTURAL MEMBERS AND SYSTEMS.
E. DETAILS NOTED AS TYPICAL ON STRUCTURAL DRAWINGS SHALL APPLY IN ALL CONDITIONS UNLESS SPECIFICALLY SHOWN OR NOTED OTHERWISE.
F. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK OF ALL TRADES.
G. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF THE ADJACENT PROPERTIES, STRUCTURES, STREETS, AND UTILITIES DURING THE CONSTRUCTION PERIOD. ANY DAMAGED OR DETERIORATED PROPERTY SHALL BE RESTORED TO THE CONDITION PRIOR TO THE BEGINNING OF WORK OR BETTER AT NO COST TO THE OWNER.

2. DESIGN CRITERIA:

A. SOIL BEARING CAPACITY ———— 3000 PSF
C. FRICTION FACTOR ———— 0.3
D. LIVE LOAD ———— 40 PSF

3. FOUNDATION:

A. CONTRACTOR SHALL PROVIDE FOR DE-WATERING OF EXCAVATION FROM EITHER SURFACE WATER, GROUND WATER OR SEEPAGE. NPDES PERMIT REQUIRED FOR DISCHARGING INTO STATE WATERS.
B. CONTRACTOR SHALL PROVIDE FOR DESIGN AND INSTALLATION OF ALL CRIBBING, SHEETING, AND SHORING NECESSARY FOR PERSONNEL SAFETY AND TO PRESERVE EXCAVATIONS AND EARTH BANKS, AND ADJACENT STRUCTURES AND PROPERTY FOR DAMAGE.
C. EXCAVATION BOUNDARIES AND GRADE ELEVATIONS FOR FOOTING SHALL BE APPROVED BY THE ENGINEER PRIOR TO PLACING THE CONCRETE AND REINFORCING.
D. FILL AND BACKFILL SHALL CONSIST OF NON-EXPANSIVE GRANULAR MATERIAL SUCH AS CRUSHED CORAL OR BASALT. THE SELECT GRANULAR FILL SHALL BE WELL GRADED FROM COARSE TO FINE WITH NO PARTICLES LARGER THAN 3 INCHES IN LARGEST DIMENSION. THE MATERIAL ALSO SHALL CONTAIN LESS THAN 15 PERCENT PARTICLES PASSING THE NO. 200 SIEVE. THE MATERIAL SHALL HAVE A LABORATORY CBR VALUE OF 25 OR MORE AND SHALL HAVE A MAXIMUM SWELL VALUE OF 1 PERCENT OR LESS.
E. FILL AND BACKFILL SHALL BE PLACED IN UNIFORM LIFTS OF NO MORE THAN 8 INCHES IN LOOSE THICKNESS, MOISTURE-CONDITIONED TO WITHIN 3 PERCENT OF THE OPTIMUM MOISTURE CONTENT, AND UNIFORMLY COMPACTED TO AT LEAST 90 PERCENT, BUT SHOULD NOT EXCEED 95 PERCENT RELATIVE COMPACTION TO MINIMIZE THE LATERAL EARTH PRESSURE AGAINST THE WALL.

4. REINFORCING STEEL:

A. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615, GRADE 60.
B. CLEAR CONCRETE COVERAGE FOR REINFORCING BARS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:
a. FOOTING, WALL, ETC. CAST AGAINST EARTH ———— 3"
b. FOOTING, WALL, ETC. FORMED AND EXPOSED TO EARTH ———— 2"
c. WALL FACES EXPOSED TO EACH OR WEATHER ———— 2"
C. SPLICES:
a. REINFORCING STEEL SHALL BE SPLICED ONLY WHERE INDICATED ON PLANS. PROVIDE LAP SPLICE LENGTH PER TYPICAL DETAILS AND SCHEDULE, UNLESS OTHERWISE NOTED.
D. BAR BENDS AND HOOK SHALL BE "STANDARD HOOKS" IN ACCORDANCE WITH ACI 318.

5. CONCRETE:

A. CONCRETE SHALL BE REGULAR WEIGHT HARD ROCK CONCRETE AND SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,000 PSI.
B. ALL INSERTS, ANCHOR BOLTS, PLATES, ETC. EMBEDDED IN CONCRETE SHALL BE TYPE 316 STAINLESS STEEL UNLESS OTHERWISE NOTED.
C. NON-SHRINK GROUT SHALL BE A PREMIXED COMPOUND CONSISTING OF NON-STAINING, NON-METALLIC AGGREGATE, CEMENT, WATER REDUCING AND PLASTICIZING AGENTS CAPABLE OF DEVELOPING MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI IN 3 DAYS AND 7,000 PSI IN 28 DAYS.
D. CONCRETE DELIVERY TICKETS SHALL RECORD ALL FREE WATER IN THE MIX: AT BATCHING BY PLANT, FOR CONSISTENCY BY DRIVER, AND ANY ADDITIONAL REQUEST BY CONTRACTOR IF PERMITTED BY THE MIX DESIGN.
E. REINFORCING BARS, ANCHOR BOLTS, INSERTS AND OTHER ITEMS TO BE CAST IN THE CONCRETE SHALL BE SECURED IN POSITION PRIOR TO PLACEMENT OF CONCRETE, UNLESS OTHERWISE NOTED.

6. STRUCTURAL STEEL:

A. FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION.
B. STRUCTURAL STEEL SHALL CONFORM TO ASTM A240, TYPE 316 STAINLESS STEEL UNLESS OTHERWISE NOTED.
C. WELDS AND WELDING PROCEDURES SHALL CONFORM TO THE STRUCTURAL WELDING CODE AWS D1.6 OF THE AMERICAN WELDING SOCIETY.
D. WELDING SHALL BE PERFORMED BY WELDERS PREQUALIFIED FOR WELDING PROCEDURES TO BE USED.
E. WELDING ELECTRODES SHALL BE E316.
F. ANCHORS BOLTS SHALL BE ¾"ø, TYPE 316 STAINLESS STEEL UNLESS OTHERWISE NOTED.
G. ALL FASTENERS SHALL BE ⅝"ø, TYPE 316 STAINLESS STEEL UNLESS OTHERWISE NOTED. ALL BOLT HEADS AND NUTS THAT ARE BEARING ON ALUMINUM SURFACES SHALL HAVE WASHERS.

7. STRUCTURAL ALUMINUM:

A. FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE ALUMINUM DESIGN MANUAL, 2010 EDITION.
B. STRUCTURAL STRUCTURAL ALUMINUM ALLOY AND TEMPER SHALL CONFORM TO TYPE 6061-T6 UNLESS OTHERWISE NOTED.
C. WELDS AND WELDING PROCEDURES SHALL CONFORM TO THE STRUCTURAL WELDING CODE AWS D1.2 OF THE AMERICAN WELDING SOCIETY.
D. WELDING SHALL BE PERFORMED BY WELDERS PREQUALIFIED FOR WELDING PROCEDURES TO BE USED.
E. WELDING ELECTRODES SHALL BE 5183 OR 5556.

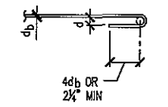
MINIMUM SPLICE AND DEVELOPMENT LENGTHS

BAR SIZE	CONCRETE STRENGTH = 3,000 PSI				
	LAP SPLICE		DEVELOPMENT		
			STRAIGHT		WITH STANDARD HOOK
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	
#3	28"	22"	22"	18"	10"
#4	38"	30"	30"	22"	12"
#5	48"	36"	36"	28"	14"
#6	56"	44"	44"	34"	18"
#7	82"	64"	64"	48"	20"
#8	94"	72"	72"	56"	22"
#9	106"	82"	82"	62"	26"
#10	118"	92"	92"	70"	28"
#11	132"	102"	102"	78"	32"

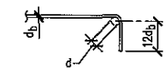
NOTES:

1. LENGTHS ARE FOR CONCRETE WITH REBAR SPACE 6 BAR DIAMETERS MINIMUM. INCREASE 25% FOR BARS SPACED LESS THAN 6 BAR DIAMETERS.
2. "TOP BARS" ARE HORIZONTAL BARS WITH 12" OR MORE OF CONCRETE CAST BELOW.

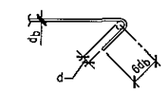
$D = 6d_b$ FOR #8 AND SMALLER
$D = 8d_b$ FOR #9 TO #11



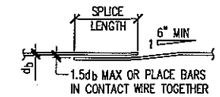
180° BEND



90° BEND



135° BEND



BAR LAP

1 / S0.2 TYPICAL REBAR SPLICE AND EMBEDMENT LENGTH SCHEDULE
NOT TO SCALE

APPROVED

NO.	DATE	DESCRIPTION	APPROVED

REVISIONS

KAI HAWAII
STRUCTURAL & FORENSIC ENGINEERS

DEPARTMENT OF WATER SUPPLY
MAUI COUNTY
MAKAWAO, MAUI, HAWAII

WAIKAMOI FLUME REPLACEMENT

STRUCTURAL NOTES

S0.2

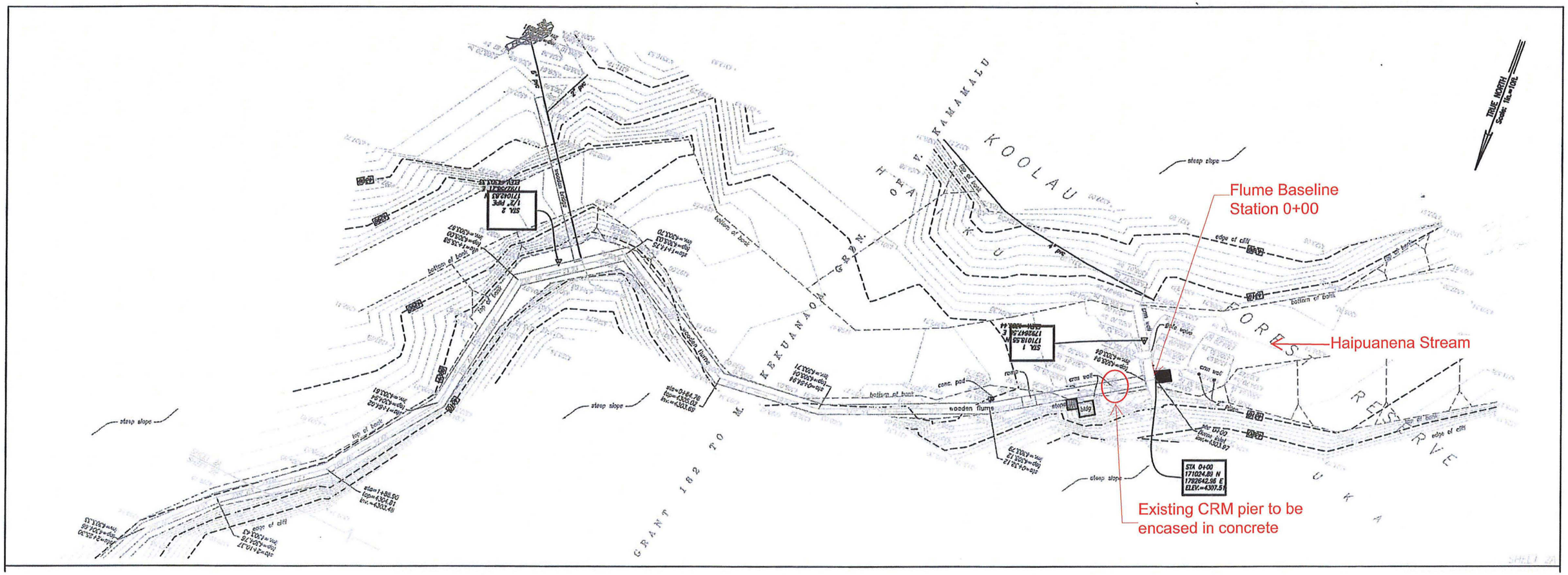
APPROVED
REG. PROF. ENGR., CERT. NO.

JOB NO. 09-04
DATE: 09/03/2009

SHEET 5 OF 21 SHEETS

APPENDIX D-1.

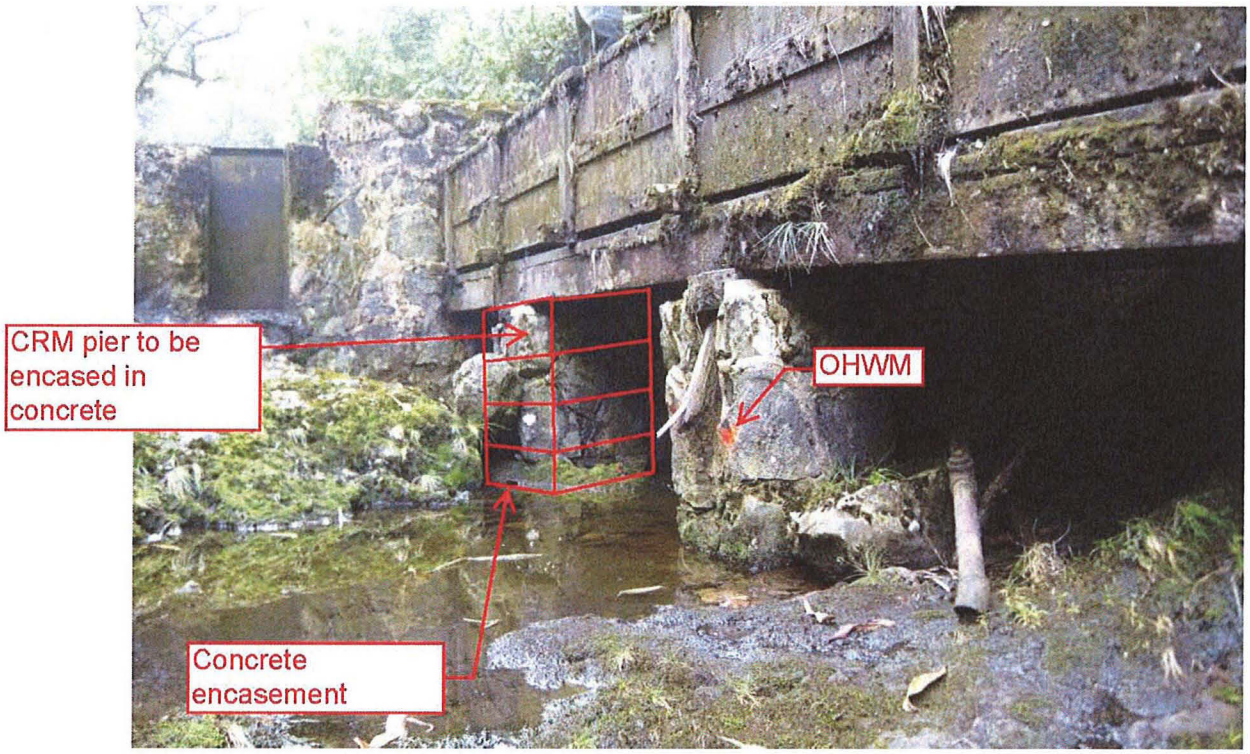
Project Plan for Affected Footing in Haipuaena Stream


Flume Baseline
Station 0+00
Haipuanena Stream
Existing CRM pier to be
encased in concrete
TRUE NORTH
Scale: 1in.=10ft.
KOOLAU
FOREST
RESERVE
GRANT 182 TO M. KEKUANAO
H. W. KAMAKALU
steep slope
edge of cliff
bottom of bank
top of bank
wooden flume
conc. pad
ramp
crm wall
bldg
STA 0+00
171024.89 N
1792642.96 E
ELEV.=4317.51

Photograph No. 1

Haipuaena Stream

Ordinary High Water Mark (red line)



Photograph No. 2: Proposed Encasement of Existing Pier

Haipuaena Stream

Ordinary High Watermark (red line)

APPENDIX E.

Geotechnical Engineering Exploration Report

GEOTECHNICAL ENGINEERING EXPLORATION

WAIKAMOI FLUME REPLACEMENT

COUNTY OF MAUI – DEPARTMENT OF WATER SUPPLY

MAKAWAO, MAUI, HAWAII

W.O. 6378-00 NOVEMBER 14, 2011

Prepared for

KAI HAWAII, INC.

CLAYTON S. MIMURA
LICENSED PROFESSIONAL ENGINEER
No. 4176-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

SIGNATURE 4-30-12
EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.
Geotechnical Engineering and Drilling Services
2006 Kalihi Street • Honolulu, HI 96819

Hawaii • California

GEOLABS, INC.

Geotechnical Engineering and Drilling Services

November 14, 2011
W.O. 6378-00

Mr. Michael Hunnemann
KAI Hawaii, Inc.
31 N. Pauahi Street, 2nd Floor
Honolulu, HI 96817

Dear **Mr. Hunnemann:**

Geolabs, Inc. is pleased to submit our report entitled "Geotechnical Engineering Exploration, Waikamoi Flume Replacement, County of Maui – Department of Water Supply, Makawao, Maui, Hawaii" prepared in support of the design of the project.

Our work was performed in general accordance with the scope of services outlined in our fee proposal dated March 15, 2010.

Please note that the soil samples recovered during our field exploration (remaining after testing) will be stored for a period of two months from the date of this report. The samples will be discarded after that date unless arrangements are made for a longer sample storage period. Please contact our office for alternative sample storage requirements, if appropriate.

Detailed discussion and specific recommendations for the design of the project are contained in the body of this report. If there is any point that is not clear, please contact our office.

Very truly yours,

GEOLABS, INC.

Clayton S. Mimura, P.E.
President

CSM:GB:mj

2006 Kalihi Street • Honolulu, Hawaii 96819
Phone: (808) 841-5064 • Facsimile: (808) 847-1749 • E-mail: hawaii@geolabs.net

Hawaii • California

GEOTECHNICAL ENGINEERING EXPLORATION

WAIKAMOI FLUME REPLACEMENT

COUNTY OF MAUI – DEPARTMENT OF WATER SUPPLY

MAKAWAO, MAUI, HAWAII

W.O. 6378-00 NOVEMBER 14, 2011

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GEOTECHNICAL ENGINEERING EXPLORATION

WAIKAMOI FLUME REPLACEMENT

COUNTY OF MAUI – DEPARTMENT OF WATER SUPPLY

MAKAWAO, MAUI, HAWAII

W.O. 6378-00 NOVEMBER 14, 2011

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Based on our field exploration, the surface conditions along the existing flume alignment consists of basalt rock or a thin layer of organic clay with varying amounts of vegetation and roots. The organic clay layer was relatively thin ranging from about 2 to 6 inches thick. Below the organic clay layer, we encountered basalt rock or residual/saprolitic soils. The residual/saprolitic soils extended to depths of about 0.5 to 3 feet below the existing ground surface. We believe that the following locations may encounter basalt rock deeper than 4 feet below the existing ground surface.

- Station 15+80± to Station 18+75±
- Station 24+35± to Station 25+60±
- Station 40+95± to Station 41+95±
- Station 44+30± to Station 44+70±

Due to the subsurface conditions anticipated at the site and the relatively light structural loads of the flume replacement structure, we recommend supporting the structure on shallow foundations. Most of the shallow foundations would bear on the basalt rock anticipated at relatively shallow depths. The shallow foundations situated in the four areas mentioned above may bear on residual and saprolitic soils consisting of stiff silt and clay.

Based on the above, we recommend using allowable bearing pressures of 3,000 and 6,000 psf for design of foundations bearing on the stiff silt/clay and basalt rock, respectively. These bearing loads are for dead plus live loads and may be increased by one-third (1/3) for transient loads, such as those caused by wind or seismic forces.

Where lateral resistance cannot be attained from passive earth pressure due to the steepness of the slope (steeper than 1H:1V), we recommend supporting the flume replacement structure on vertical rock anchors to resist the anticipated vertical and lateral loading. We anticipate that portable equipment will be used to drill the rock anchors due to the difficulties of mobilizing and demobilizing large construction equipment to and from the project site. Therefore, we recommend using a rock anchor diameter of about 2.25 inches. In general, the rock anchors would derive support principally from the bond between the grout and basalt rock observed at the project site. An average bond stress of 4,500 psf may be used for the basalt rock observed at the site. We recommend locating the top of the lower bonded length about 2 feet below the bottom of the footing level. The lower

bond length should extend a minimum of about 8 feet. The text of this report should be referred to for more detailed discussions and specific site preparation recommendations.

END OF SUMMARY OF FINDINGS AND RECOMMENDATIONS

SECTION 1. GENERAL

1.1 Introduction

This report presents the results of our geotechnical engineering exploration performed for the *Waikamoi Flume Replacement* project in Makawao on the Island of Maui, Hawaii. The project location and general vicinity are shown on the Project Location Map, Plate 1.

This report summarizes the findings and geotechnical recommendations derived from our field exploration, laboratory testing, and engineering analyses. The recommendations presented herein are intended for design of replacement flume foundations and site preparation only. The findings and recommendations presented herein are subject to the limitations noted at the end of this report.

1.2 Project Considerations

The project site is located in Makawao at approximately 4,000-foot elevation level on the slope of Mount Haleakala. We understand that the existing flume is over 40 years old and has experienced many blow outs and continuous leaks. Therefore, it is desired to improve the flume by replacing the existing redwood flume with a High Density Poly-Ethylene (HDPE) pipeline.

The flume alignment traverses many small and large gulches, over hangs, and steep slope conditions. The replacement pipeline is intended to have a support structure to span the gulches, as well as traverse the over hangs along the alignment. Therefore, it is desired to provide foundation recommendations for the various conditions that will be encountered during the new pipeline installation.

Due to the rough terrain and alignment length, access for exploratory equipment is extremely limited. Therefore, visual observations and shallow hand sampling were used.

1.3 Purpose and Scope

The purpose of our field exploration was to obtain information pertaining to the subsurface conditions at the project site for the proposed project. The work was performed in general accordance with our fee proposal dated March 15, 2010. Our scope of work generally included the following tasks and work efforts:

1. Mobilization and demobilization of a service utility truck presently on the Island of Maui and two operators from Honolulu to the site and back.

2. Excavating and sampling a total of 24 hand-excavated test pits extending to depths of about 0.3 to 3.5 feet below the existing ground surface.

3. Coordination of the field exploration and logging of the hand-excavated test pits by our geologist.

4. Laboratory testing of selected soil samples obtained during the field exploration as an aid in classifying the materials and evaluating their engineering properties.

5. Analyses of the field and laboratory data to formulate geotechnical engineering recommendations for the proposed project.

6. Coordination of our overall work on the project by our project engineer.

7. Preparation of this report summarizing our work on the project and presenting our findings and recommendations.

8. Quality assurance of our work and client/design team consultation by our principal engineer.

9. Miscellaneous work efforts, such as drafting, word processing, and clerical support.

Detailed descriptions of our field exploration methodology and the Logs of Test Pits are presented in Appendix A. Results of the laboratory tests performed on selected soil samples are presented in Appendix B.

END OF GENERAL

SECTION 2. SITE CHARACTERIZATION

2.1 Regional Geology

The Island of Maui was built by two major volcanoes, the older West Maui Volcano (Tertiary Epoch) and the more recent East Maui Volcano, also known as Haleakala Volcano (Pleistocene Epoch). The Isthmus of Maui is a narrow, gently sloping plain between these two volcanoes. The Isthmus of Maui was created by lava flows from Haleakala Volcano ponding against West Maui Volcano and is comprised of alluvium washed from the slopes of West Maui and East Maui (Haleakala) Volcanoes.

The project site is generally on the northern flank of Haleakala Volcano. The primitive shield of Haleakala Volcano is composed of pahoehoe and a'a lava flows. Near the end of the eruptions of the Kula Volcanic Series, the Haleakala Volcano rose to a summit possibly 3,500 feet higher than the present crater rim. At the end of the accumulation of the Kula Volcanic Series, volcanic activity became very infrequent, and stream erosion began to make progress in wearing away the mountain and carved master valleys. Finally, after this period of erosion, volcanic activity resumed. The principal rift zones reopened right across the depression at the top of the mountain and down the flanks, and the great erosional valleys were flooded with lava flows and filled with cinder cones.

2.2 Site Description

The project site is within the Makawao Forest reserve on the slopes of Mount Haleakala on the Island of Maui, Hawaii. The project site is shown on the General Site Plan, Plate 2.

The existing water flume was improved from the original design in the year 1975 by Masa Tatayama & Crew and extends approximately 1.1 miles from Haipuaena Stream to the reservoir. During the improvements, the alignment was widened by cutting through moderately weathered rock formations and residual soils to accommodate the 2 foot by 2 foot redwood timber flume system. The surface conditions consist of a rain forest with dense vegetation and soggy marsh-like ground surface with rock outcrops. The topography of the project site generally resembles a mountainous

terrain with gulches ranging from about 8 feet to over 50 feet deep. The flume alignment traverses several gulches that contain scour and high water marks along the banks, which are often signs of flash flooding during high rainfall events. There are also areas where the alignment traverses along a cliff edge that drops off up to several hundred feet to the lower, more level elevations.

Based on the available topographic plan, the existing flume elevations range from about +4,307 feet Mean Sea Level (MSL) near Station 0+00 to about +4,291 feet MSL near Station 57+50. The ground surface elevations vary widely due to the presence of gulches and steep cliff edges.

2.3 Subsurface Conditions

Our field exploration program along the existing flume alignment consisted of hand shoveling a total of 24 test pits, designated as Test Pit Nos. 1 through 3, 3A, and 4 through 23, extending to depths of about 0.3 to 3.5 feet below the existing ground surface. The approximate test pit locations are shown on the Enlarged Site Plans, Plates 3.1 through 3.5.

In general, the surface conditions along the existing flume alignment consist of basalt rock or a thin layer of organic clay with varying amounts of vegetation and roots. The organic clay layer was relatively thin ranging from about 2 to 6 inches thick. Below the organic clay layer, we encountered basalt rock or residual/saprolitic soils. The residual/saprolitic soils extended to depths of about 0.5 to 3 feet below the existing ground surface.

Based on our observations and test pits, we believe that the following locations may encounter basalt rock deeper than 4 feet below the existing ground surface.

- Station 15+80± to Station 18+75±
- Station 24+35± to Station 25+60±
- Station 40+95± to Station 41+95±
- Station 44+30± to Station 44+70±

It should be noted that the Stations were obtained from the Topographic Survey prepared by Austin, Tsutsumi & Associates, Inc. on February 2011.

We did not encounter groundwater in the test pits at the time of our field exploration. However, it should be noted that groundwater levels are subject to change due to rainfall, time of year, seasonal precipitation, surface water runoff, and other factors.

Detailed descriptions of the materials encountered are presented on the Logs of Test Pits in Appendix A. Laboratory tests were performed on selected soil samples obtained during our field exploration, and the test results are presented in Appendix B.

2.4 Seismic Design Considerations

Based on the 1997 Uniform Building Code (UBC) (current code used by the County of Maui), the Island of Maui is located within Seismic Zone 2B with an effective peak ground acceleration of 0.20g. Therefore, the project site may be subjected to seismic activity, and seismic design considerations will need to be addressed for the project. The following sections provide discussions on the seismicity of the Island of Maui, the soil profile for seismic design and the potential for liquefaction.

2.4.1 Earthquakes and Seismicity

In general, earthquakes that occur throughout the world are caused by shifts in the tectonic plates. In contrast, earthquake activity in Hawaii is primarily linked to volcanic activity. Therefore, earthquake activity in Hawaii generally occurs before or during volcanic eruptions. In addition, earthquakes may result from the underground movement of magma that comes close to the surface but does not erupt. The Island of Hawaii experiences thousands of earthquakes each year, but most are so small that they can only be detected by sensitive instruments. However, some of the earthquakes are strong enough to be felt, and a few cause minor to moderate damage.

In general, earthquakes associated with volcanic activity are most common on the Island of Hawaii. Earthquakes directly associated with the movement of magma are

concentrated beneath the active Kilauea and Mauna Loa Volcanoes on the Island of Hawaii. Because the majority of the earthquakes in Hawaii (over 90 percent) are related to volcanic activity, the risk of seismic activity and degree of ground shaking diminishes with increased distance from the Island of Hawaii. The Island of Hawaii has experienced numerous earthquakes greater than Magnitude 5 (M5+); however, earthquakes are not confined only to the Island of Hawaii.

To a lesser degree, the Island of Maui has experienced numerous earthquakes greater than M5+. Therefore, moderate to strong earthquakes have occurred in the County of Maui.

2.4.2 Site Classification

The site generally consists of a thin layer of residual and saprolitic soils underlain by basalt rock. The residual and saprolitic soils consist of stiff clayey silt and ranges from about 0.5 to 4 feet below the existing ground surface.

Based on the 1997 Uniform Building Code and the geologic setting of the area, we believe that the project site may be classified as a "Very Dense Soil and Soft Rock" profile. Therefore, we believe that the seismic design of the structures should be designed based on a Soil Profile Type S_C in accordance with Table 16-J of the Uniform Building Code (1997).

2.4.3 Liquefaction Potential

Based on the 1997 Uniform Building Code (UBC), the project site may be subjected to seismic activity and should be evaluated for the potential for soil liquefaction. Based on the subsurface conditions encountered and a design peak ground acceleration of 0.20g, liquefaction may occur resulting in appreciable settlements to the ground surface. Therefore, the effects of potential liquefaction should be taken into consideration in the design of the proposed development.

Soil liquefaction is a condition where saturated cohesionless soils located near the ground surface undergo a substantial loss of strength due to the build-up of excess pore water pressures resulting from cyclic stress applications induced by

earthquakes. In this process, when the loose saturated sand deposit is subjected to vibration (such as during an earthquake), the soil tends to densify and decrease in volume causing an increase in pore water pressure. If drainage is unable to occur rapidly enough to dissipate the build-up of pore water pressure, the effective stress (internal strength) of the soil is reduced. Under sustained vibrations, the pore water pressure build-up could equal the overburden pressure, essentially reducing the soil shear strength to zero and causing it to behave as a viscous fluid. During liquefaction, the soil acquires a mobility sufficient to permit both horizontal and vertical movements, and if not confined, will result in significant deformations.

Soils most susceptible to liquefaction are loose, uniformly graded, fine-grained sands and loose silts with little cohesion. It is generally acknowledged that liquefaction may not occur if the deposit is greater than 40 to 50 feet below the ground surface. In deeper deposits, the greater overburden pressure is generally sufficient to prevent liquefaction from occurring. The major factors affecting the liquefaction characteristics of a soil deposit are as follows:

1. Grain Size Distribution - Fine and uniform sands and silts are more susceptible to liquefaction than coarse or well-graded sands.

2. Initial Relative Density - Loose sands and silts are most susceptible to liquefaction. Liquefaction potential is inversely proportional to relative density.

3. Magnitude and Duration of Vibration - Liquefaction potential is directly proportional to the magnitude and duration of the earthquake.

In general, the subsurface information obtained from our field exploration indicates that the project site is underlain by a thin layer of clayey silts over basalt rock formation. Based on the subsurface conditions encountered in our field exploration and the geology of the area, we believe that the potential for soil liquefaction is negligible due to the cohesive soils and rock encountered at the site. Therefore, the potential for liquefaction is not a design consideration at this project site.

END OF SITE CHARACTERIZATION

SECTION 3. DISCUSSION AND RECOMMENDATIONS

The surface conditions along the existing flume alignment generally consists of basalt rock or a thin layer of organic clay with varying amounts of vegetation and roots. Below the organic clay layer, we encountered basalt rock or residual/saprolitic soils. The residual/saprolitic soils extended to depths of about 0.5 to 3 feet below the existing ground surface. We believe that the following locations may encounter basalt rock deeper than 4 feet below the existing ground surface.

- Station 15+80± to Station 18+75±
- Station 24+35± to Station 25+60±
- Station 40+95± to Station 41+95±
- Station 44+30± to Station 44+70±

Based on the subsurface conditions anticipated at the site, the new structures may be supported on shallow foundations bearing on the basalt rock anticipated at relatively shallow depths. In areas where basalt rock is anticipated at deeper depths, the shallow foundations supporting the new structures should be designed to bear on residual and saprolitic soils consisting of stiff silt and clay.

There are areas along the flume alignment where lateral resistance cannot be attained from passive earth pressure due to the steepness of the slope (steeper than 1H:1V). In these areas, we recommend supporting the flume replacement structure on vertical rock anchors to resist the anticipated vertical and lateral loading. In general, the rock anchors would derive support principally from the bond between the grout and basalt rock observed at the project site.

We believe that it would be difficult to mobilize and demobilize large construction equipment to and from the project site; therefore, the size and depth of the anchor holes were minimized so more portable equipment may be used for the anchor installation. We believe that a rock anchor diameter of about 2.25 inches should be used in the design to take into account the use of portable equipment for anchor installation.

Detailed discussions of these items and the other geotechnical aspects of the project are presented in the following sections.

3.1 Flume Replacement Structure Foundations

Based on the subsurface conditions anticipated at the site and the relatively light structural loads of the flume replacement structure, we recommend supporting the structure on a shallow foundation system bearing on the basalt rock anticipated at relatively shallow depths. As mentioned above, there are about four areas where we believe that basalt rock may be encountered deeper than 4 feet below the existing ground surface. Foundations situated in these areas would likely bear on residual and saprolitic soils consisting of stiff silt and clay.

We recommend using allowable bearing pressures of 3,000 and 6,000 pounds per square foot (psf) for design of foundations bearing on the stiff silt/clay and basalt rock, respectively. These bearing loads are for dead-plus-live loads and may be increased by one-third (1/3) for transient loads, such as those caused by wind or seismic forces.

Soft and/or loose soils encountered at the bottom of footing level should be over-excavated to expose firm/dense material. The resulting over-excavation may be backfilled with well-compacted select granular fill materials or the bottom of footing may extend down to bear directly on the underlying firm/dense materials.

In general, footings bearing on basalt rock and residual/saprolitic soils should be embedded a minimum of 8 and 18 inches below the lowest adjacent finished grades, respectively. Footings constructed near tops of slopes or on sloping ground should be embedded deep enough to provide a minimum horizontal setback distance of 5 feet measured from the outside edge of the footings to the slope face.

Foundations next to utility trenches or easements should be embedded below a one horizontal to one vertical (1H:1V) imaginary plane extending upward from the bottom edge of the utility trench or as deep as the inverts of the utility lines. This requirement is necessary to avoid surcharging adjacent below-grade structures with

additional structural loads and to reduce the potential for appreciable foundation settlement.

If the foundations are designed and constructed in accordance with our recommendations, we estimate that total settlements of footings may be on the order of less than 1 inch. We estimate that the differential settlements between adjacent foundations to be on the order of about 0.5 inch.

Lateral loads acting on the structure may be resisted by friction between the bottom of the foundation and the bearing soil and by passive earth pressure acting against the near-vertical faces of the foundation system. Coefficients of friction of 0.35 and 0.60 may be used for footings bearing on residual/saprolitic soils and basalt rock, respectively. Resistance due to passive earth pressure may be estimated using an equivalent fluid pressure of 300 pounds per square foot per foot of depth (pcf). Where footings will be located adjacent to slopes as steep as one horizontal to one vertical (1H:1V), the passive earth pressure should be reduced to an equivalent fluid pressure of 75 pcf. This assumes that the footings are poured neat against the foundation excavation sidewalls. Unless covered by pavements or slabs, the passive resistance in the upper 12 inches of soil should be neglected.

Geolabs representative should observe footing excavations prior to placement of reinforcement steel and concrete to confirm the foundation bearing conditions and the required embedment depths.

3.2 Rock Anchors

There are areas along the flume alignment where the footings may be adjacent to slopes steeper than 1H:1V. Where lateral resistance cannot be attained from passive earth pressure due to the steepness of the slope, we recommend supporting the flume replacement structure on vertical rock anchors. The rock anchors will help resist the anticipated vertical and lateral loading. Discussion on the rock anchors is provided below.

A rock anchor is constructed by drilling a borehole, installing a steel tendon or reinforcing bar into the borehole, and grouting the borehole. The basic components of a grouted rock anchor consist of the anchorage and the bonded length of the steel tendon or reinforcing bar. The bonded length of the rock anchor is the portion of the steel tendon (or reinforcing bar) that is directly bonded to the grout allowing it to transfer the applied tensile load into the ground.

We recommend locating the top of the lower bonded length about 2 feet below the bottom of the footing level. Subsequent to anchor testing, the upper bonded length should be grouted up to the bottom of footing level.

Because of the difficulties of mobilizing and demobilizing large construction equipment to and from the project site, the size and depth of the anchor holes were minimized so more portable equipment may be used for the anchor installation.

In general, the rock anchors would derive support principally from the bond between the grout and basalt rock observed at the project site. The bond stress, which is the pullout resistance per unit area of the grout/rock interface contact, is variable depending on the type of rock and grout, the overburden stress, and the construction procedures used in installing the rock anchors. An average bond stress of 4,500 psf may be used for the basalt rock observed at the site. The bond stress used in the design will need to be confirmed in the field during construction. Based on our analyses, detailed recommendations for the rock anchor design are presented in the following table. We have assumed that a 1.25-inch diameter, Grade 75 bar will be used for the anchors. Because of the corrosive environment and small cover thickness between the sides of the borehole and the bar, we recommend that the bars consist of threaded bars Type 316 stainless steel. We have also assumed that the boreholes will be filled with a high strength (f'c = 6,000 psi), non-shrink grout.

ROCK ANCHORS					
Maximum Design Load (kips)	Maximum Test Load (kips)	Rock Anchor Diameter (inches)	Approximate Upper Bonded Length (feet)	Approximate Lower Bonded Length (feet)	Approximate Rock Anchor Length (feet)
10.0	13.3	2.25	2	8	10

Based on our lateral load analyses, the lateral load capacity of a single rock anchor is 2.5 kips. The estimated deflection at the top of the rock anchor should be less than 0.25 inch. We recommend using a minimum of two rock anchors at each footing location to provide lateral load resistance.

3.2.1 Construction Considerations

The performance of the rock anchors depends significantly upon the contractor's method of construction and construction procedures. As a result of the potential variations in the subsurface materials encountered at the project site, a Geolabs representative should be present to monitor the installation of the rock anchors during construction. A specialty contractor experienced in the construction of rock anchors should perform construction of the rock anchors.

Grouting of the rock anchors has a major impact on the load carrying capacities of the rock anchors. Placement of grout should be by tremie methods beginning from the bottom of the hole. The grout should be placed through the tremie pipe by pressure methods. The grouting operations should be conducted promptly (within 8 hours) after drilling to reduce the potential for caving-in of the sides of the drilled holes.

3.2.2 Rock Anchor Testing

In general, we recommend performing preconstruction testing on one sacrificial rock anchor under tension loading before ordering materials for the production rock anchors. Extended creep testing should be performed on the preconstruction anchor. The extended creep test consists of subjecting the rock anchor to at least 133 percent of the design load, and the load should be held for at least 4 hours.

Pullout tests (proof tests) should be performed on the production rock anchors during construction to confirm the bond stresses used in the design. We recommend testing all of the constructed production rock anchors for pullout. The pullout tests should consist of subjecting the rock anchors to at least 133 percent of the design loads and the load should be held for at least 10 minutes. The sacrificial and pullout tests on the rock anchors are integral parts of the design.

3.3 Site Preparation

We anticipate that minimal site grading work will be required. At the on-set of earthwork, the areas within the contract grading limits should be cleared and grubbed thoroughly. Vegetation, debris, deleterious material, and other unsuitable materials should be removed and disposed properly off-site. Soft and yielding areas encountered during clearing and grubbing below areas designated to receive fill should be over-excavated to expose firm material and the resulting excavation should be backfilled with well-compacted fill.

The excavated on-site soils may be re-used as a source of fill materials, provided that they are free of vegetation, deleterious materials, and clay lumps and rock fragments greater than 3 inches in maximum dimension. Based on our field exploration and laboratory test results, it appears that the on-site soils have high in-situ moisture contents. Drying or aerating the excavated materials may not be practical since the site is located in a high rainfall environment. Therefore, fills or backfills may consist of lean concrete.

It should be noted that the fill requirements presented herein are intended as guidelines only and may be modified based on Geolabs additional laboratory testing and field observations on the available fill materials.

A Geolabs representative should monitor the site preparation operations to observe whether undesirable materials are encountered during the excavation process and to confirm whether the exposed soil conditions are similar to those encountered in our field exploration.

3.4 Excavation

Based on our field exploration, the majority of the site grading work for the project will involve cuts into the residual/saprolitic soils and basalt rock. It is anticipated that the residual and saprolitic soils may be excavated readily with normal hand excavation equipment. Excavations encountering basalt rock may require the use of jackhammers.

The above discussions regarding the rippability of the surface materials are based on field data obtained from our site reconnaissance and the test pits excavated at the project site. Contractors bidding on this project should be encouraged to review and understand the geologic environment of the project site and to examine the site conditions and soil data to make their own prudent interpretation.

3.5 Drainage

The finished grades outside the structures should be sloped to shed water away from foundations to reduce the potential for ponding. These drainage requirements are essential for the proper performance of the above foundation recommendations because ponded water could cause subsurface soil saturation and subsequent heaving or loss of strength.

3.6 Design Review

Final drawings and specifications for the proposed construction should be forwarded to Geolabs for review and written comments prior to bid solicitations. This review is needed to evaluate conformance of the plans and specifications with the intent of the earthwork and foundation recommendations provided herein. If this review is not made, Geolabs cannot be responsible for misinterpretation of our recommendations.

3.7 Construction Monitoring

Geolabs should be retained to provide geotechnical engineering services during construction of the project. The following critical items of construction monitoring require "Special Inspection":

- Review of rock anchor installation submittals
- Observation of sacrificial rock anchor installation and testing
- Observation of the production rock anchor installation
- Observation of rock anchor proof testing
- Footing excavation and preparation

A Geolabs representative should monitor other aspects of the earthwork construction to observe compliance with the intent of the design concepts, specifications, and/or recommendations, and to expedite suggestions for design changes that may be required in the event that subsurface conditions differ from those anticipated at the time this report was prepared. The recommendations provided herein contingent upon such observations.

If the actual exposed subsurface conditions encountered during construction differ from those assumed or considered in this report, Geolabs should be contacted to review and/or revise the geotechnical recommendations presented herein.

END OF DISCUSSION AND RECOMMENDATIONS

SECTION 4. LIMITATIONS

The analyses and recommendations submitted herein are based, in part, upon information obtained from our test pits. Variations of subsurface conditions between and beyond the test pits may occur, and the nature and extent of these variations may not become evident until construction is underway. If variations then appear evident, it will be necessary to re-evaluate the recommendations provided herein.

The test pit locations are approximate, having been estimated by pacing and taping from reference points and visible features shown on the Topographic Survey Map prepared by Austin, Tsutsumi & Associates, Inc. on February 8, 2011. Elevations of the test pits were estimated based on the elevation points/contours shown on the same plan. The physical locations and elevations of the test pits should be considered accurate only to the degree implied by the methods used.

The stratification lines shown on the test pit logs depict the approximate boundaries between soil/rock types and, as such, may denote a gradual transition. Water level data from the test pits were measured at the times shown on the graphic representations and/or presented in the text herein. However, it must be noted that fluctuation may occur due to variation in rainfall, temperature and other factors.

This report has been prepared for the exclusive use of KAI Hawaii, Inc. for specific application to the *Waikamoi Flume Replacement* project in Makawao on the Island of Maui in accordance with generally accepted geotechnical engineering principles and practices. No warranty is expressed or implied.

This report has been prepared solely for the purpose of assisting the engineers in the design of the proposed project. Therefore, this report may not contain sufficient data, or the proper information, to serve as the basis for preparation of construction cost estimates. A contractor wishing to bid on this project is urged to retain a competent geotechnical engineer to assist in the interpretation of this report and/or in the performance of additional site-specific exploration for bid estimating purposes.

The owner/client should be aware that unanticipated subsurface conditions are commonly encountered. Unforeseen subsurface conditions, such as soft deposits, hard layers, loose fills or perched groundwater, may occur in localized areas and may require additional probing or corrections in the field (which may result in construction delays) to attain a properly constructed project. Therefore, a sufficient contingency fund is recommended to accommodate these possible extra costs.

This geotechnical engineering exploration conducted at the project site was not intended to investigate the potential presence of hazardous materials existing at the site. It should be noted that the equipment, techniques, and personnel used to conduct a geo-environmental exploration differ substantially from those applied in geotechnical engineering.

END OF LIMITATIONS

CLOSURE

The following plates and appendices are attached and complete this report:

Project Location Map ..... Plate 1

General Site Plan ..... Plate 2

Enlarged Site Plans ..... Plates 3.1 thru 3.5

Field Exploration ..... Appendix A

Laboratory Tests ..... Appendix B

-ΩΩΩΩΩΩΩΩΩ-

Respectfully submitted,

GEOLABS, INC.

By _____
Glenn Barut, P.E.
Project Engineer

By _____
Clayton S. Mimura, P.E.
President

CSM:GB:mj

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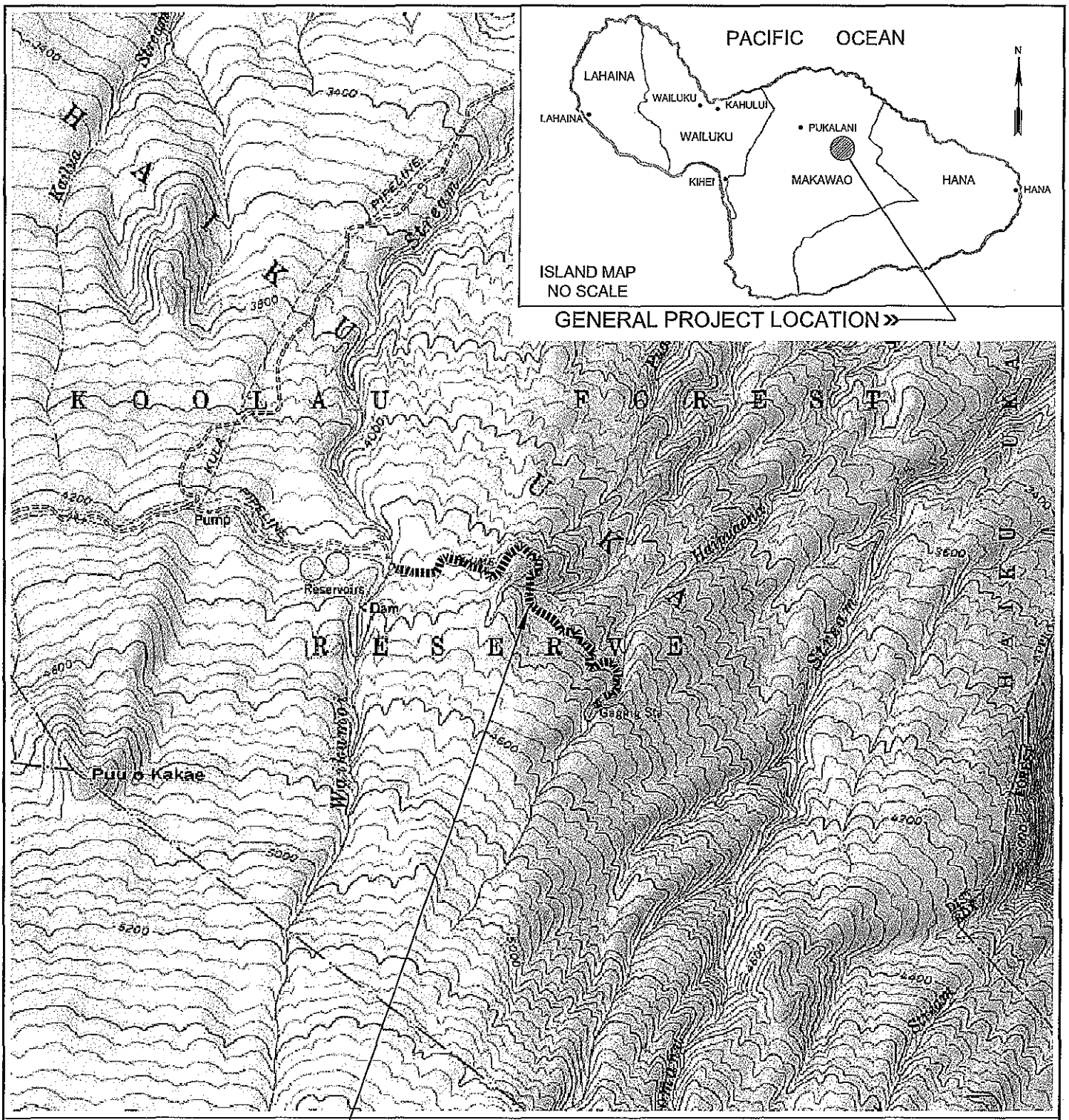
PLATES



PROJECT LOCATION MAP

WAIKAMOI FLUME REPLACEMENT
COUNTY OF MAUI - DEPARTMENT OF WATER SUPPLY
MAKAWAO, MAUI, HAWAII

2000 1000 0 2000 FT.
GRAPHIC SCALE

N

REFERENCE: MAP CREATED WITH TOPO!® ©2001 NATIONAL GEOGRAPHIC (WWW.NATIONALGEOGRAPHIC.COM/TOPO).

GEOLABS, INC.
Geotechnical Engineering

DATE	DRAWN BY	PLATE
NOVEMBER 2011	KHN	1
SCALE	W.O.	
1" = 2,000'	6378-00	

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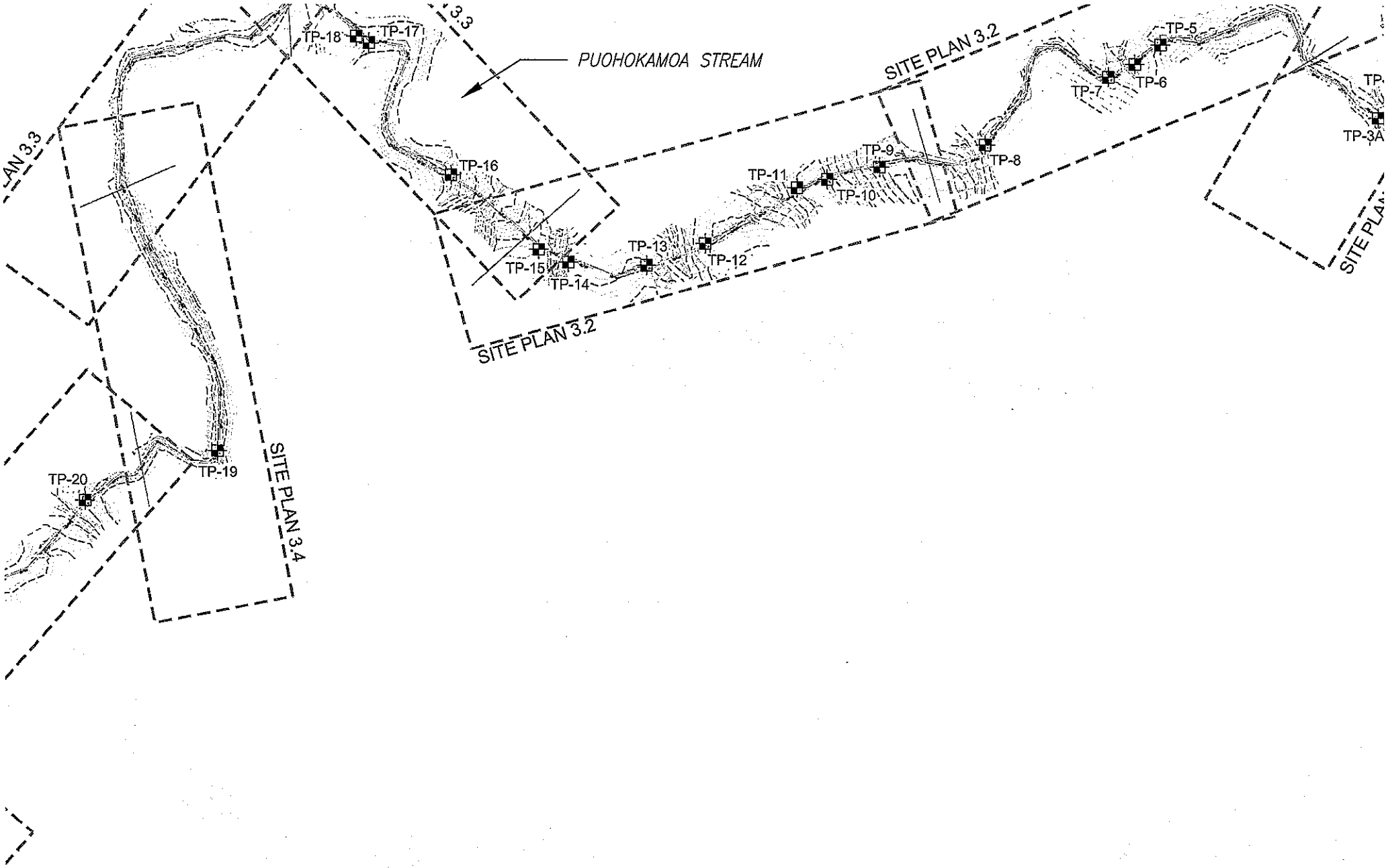
PUOHOKAMOA STREAM
SITE PLAN 3.2
SITE PLAN 3.2
SITE PLAN 3.3
SITE PLAN 3.4
TP-3A
TP-5
TP-6
TP-7
TP-8
TP-9
TP-10
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TP-16
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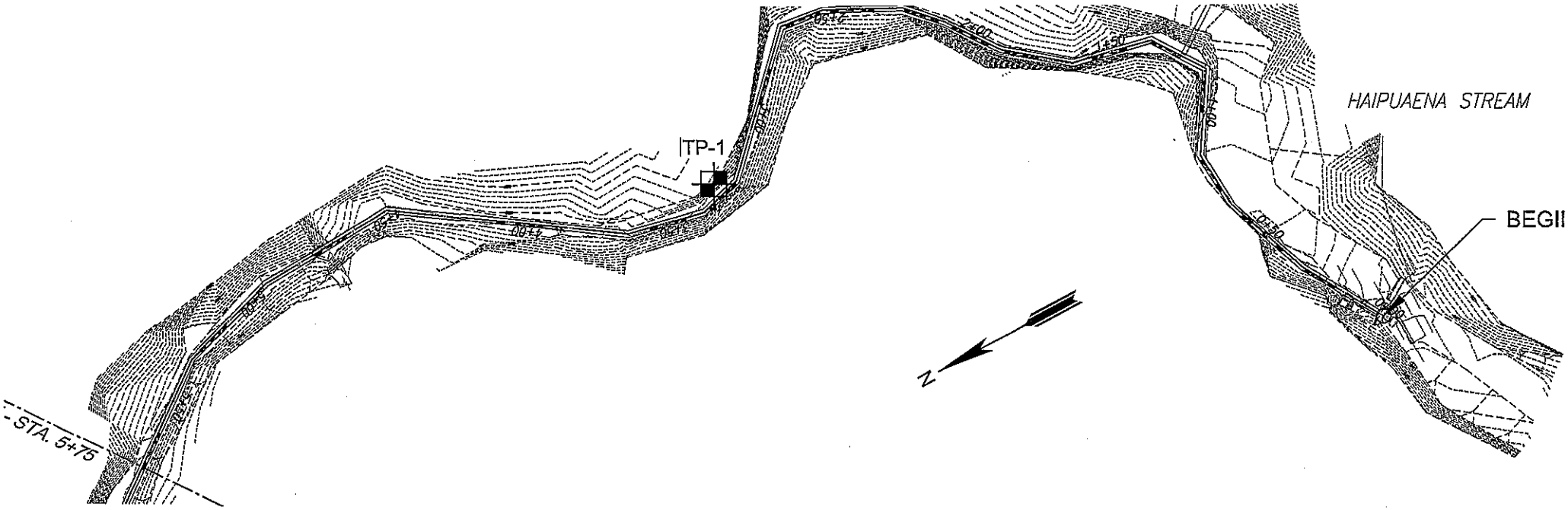
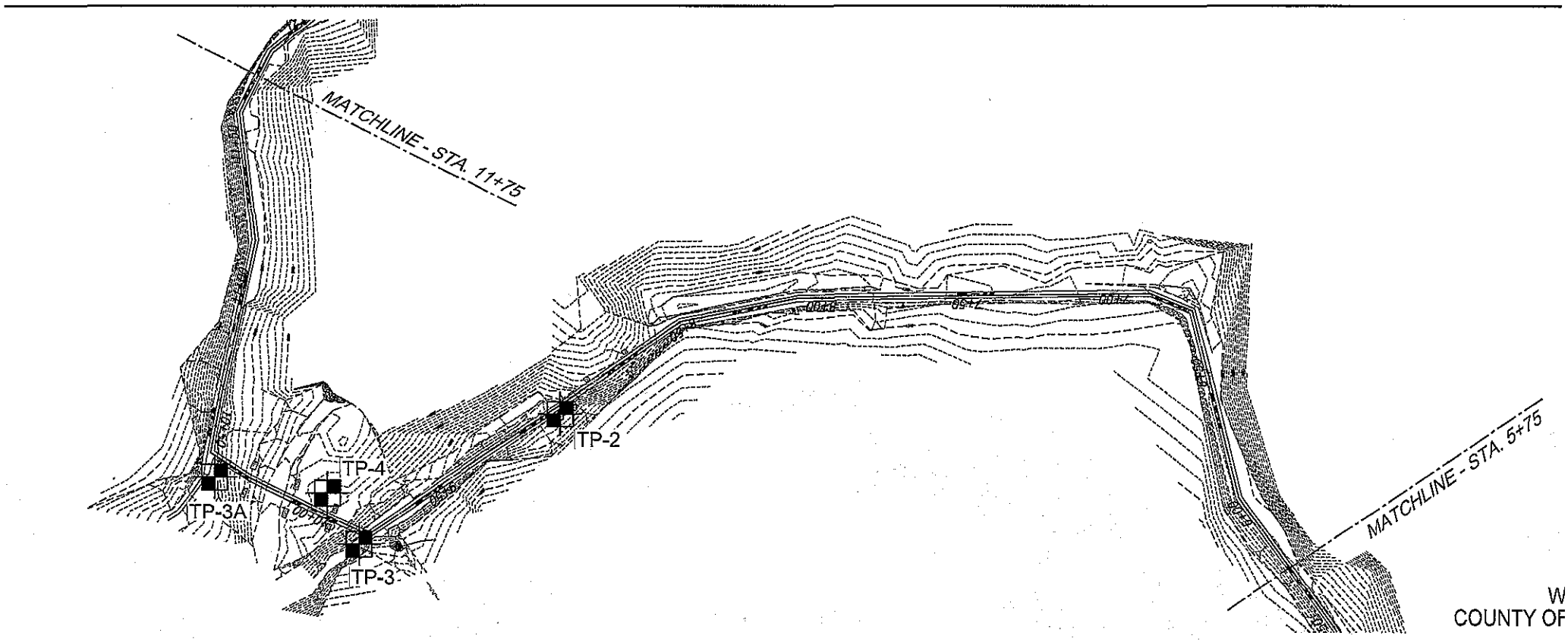
TP-20

COUNTY OF


HAIPUAENA STREAM
TP-1
BEGII
N
STA. 5+75


MATCHLINE - STA. 11+75
TP-2
TP-4
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MATCHLINE - STA. 5+75

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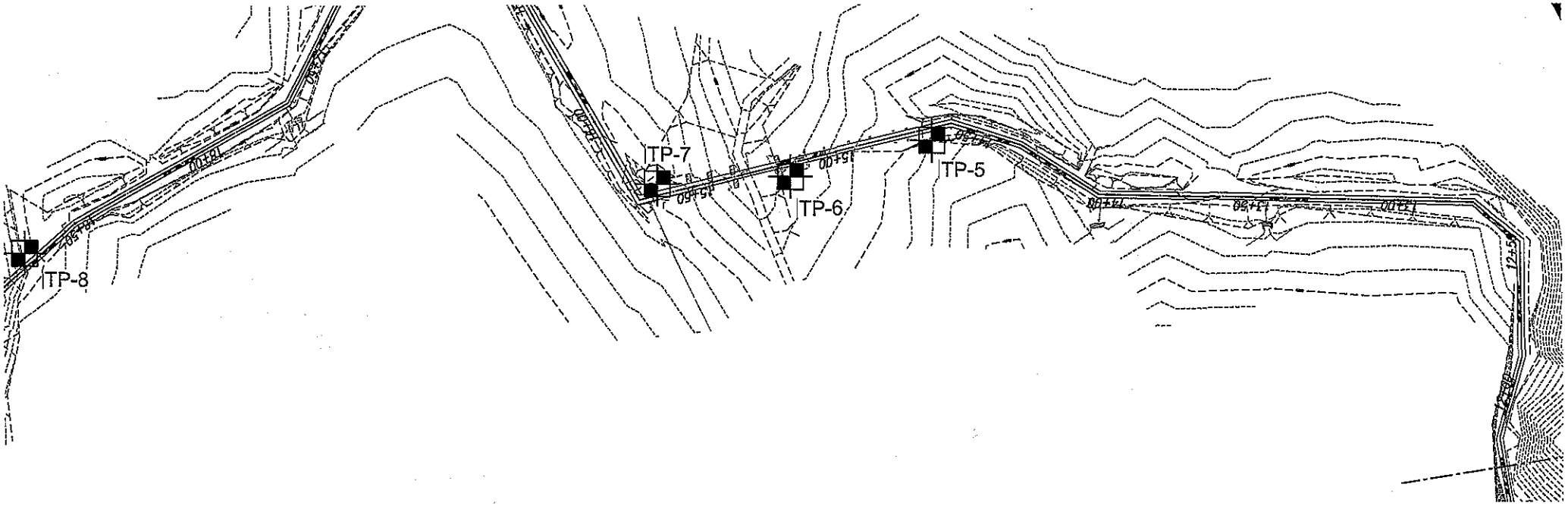

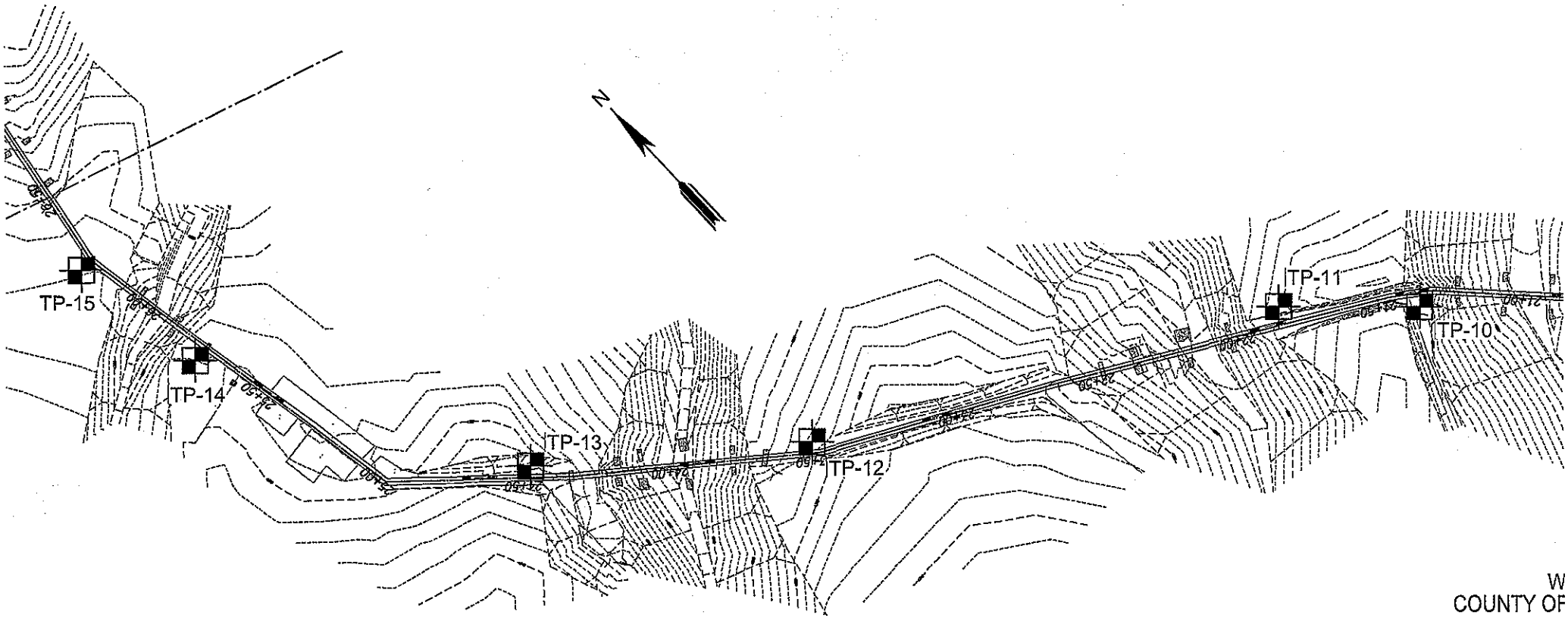

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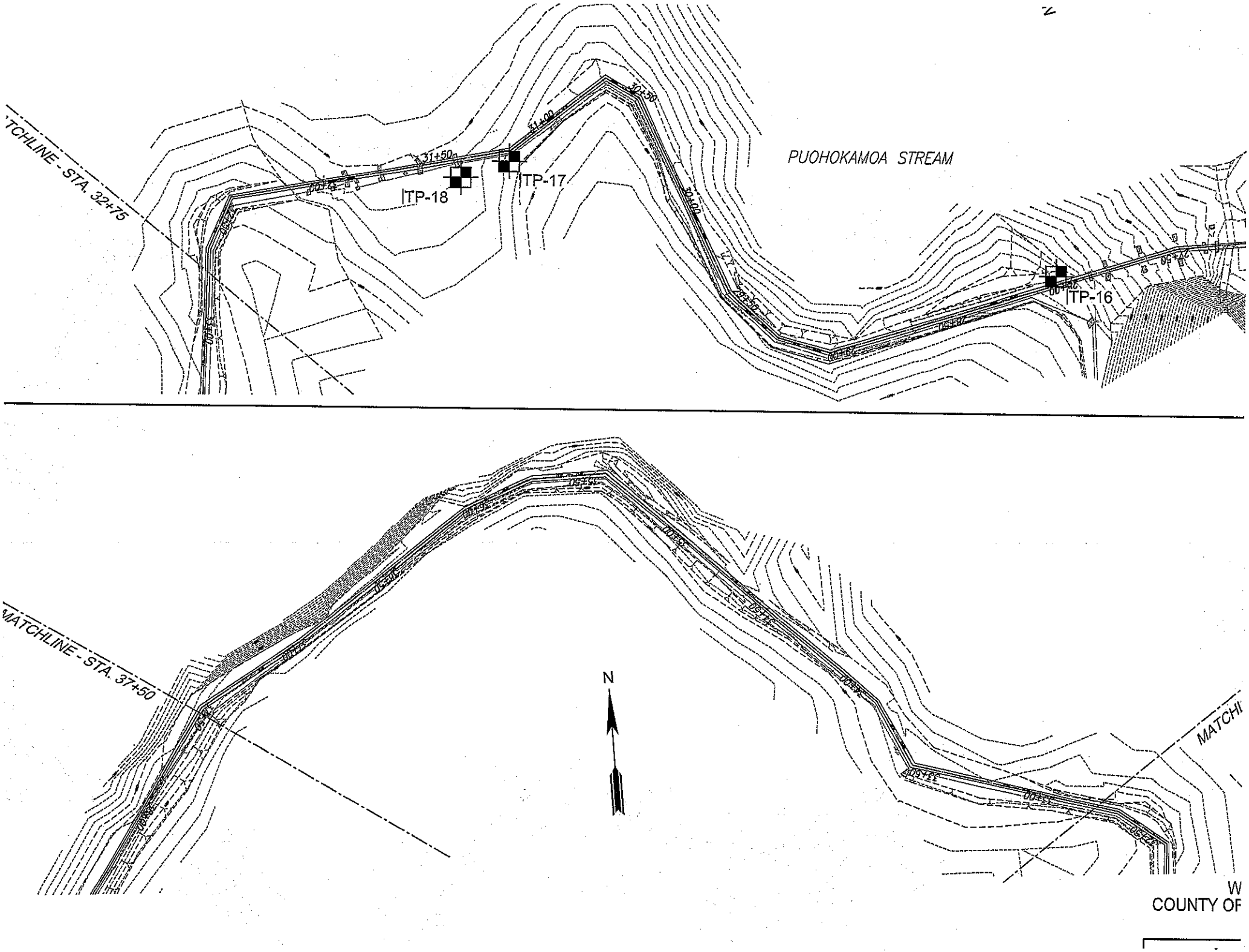
TCHLINE - STA. 32+75
PUOHOKAMOA STREAM
TP-18
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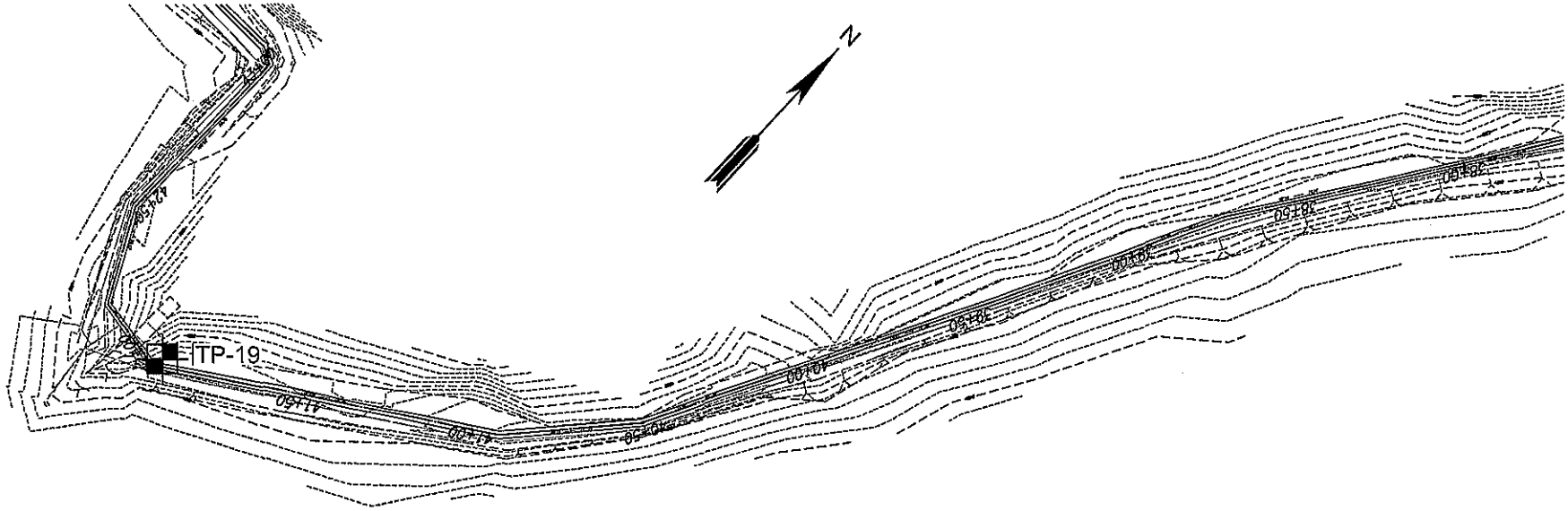

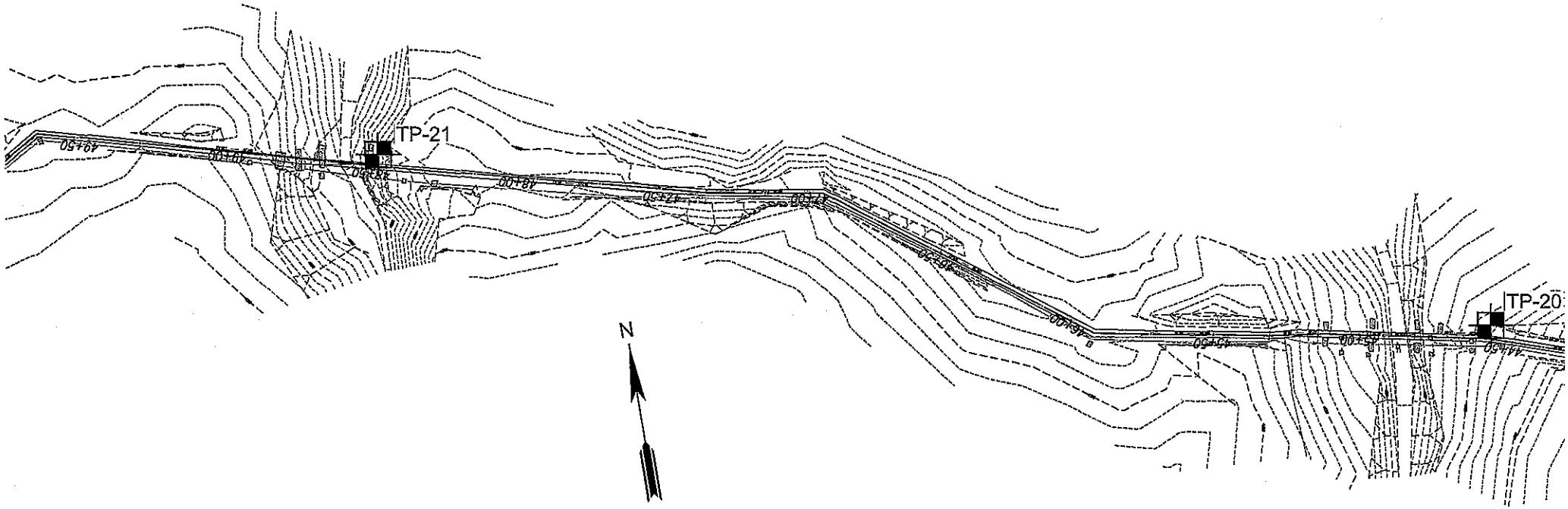

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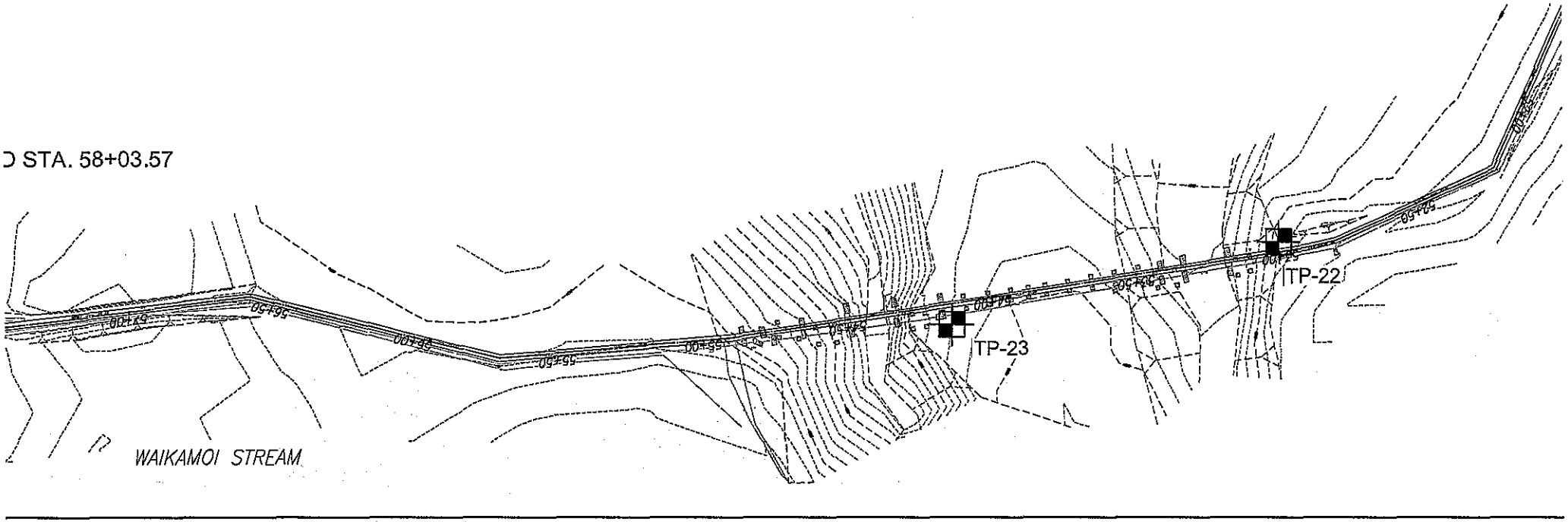

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APPENDIX A

APPENDIX A

Field Exploration

The subsurface conditions at the site were explored by excavating and sampling twenty four test pits extending to depths of approximately 0.3 to 3.5 feet below the existing ground surface. The test pits were excavated with hand shovels at the approximate locations shown on the General Site Plan, Plate 2. The approximate test pit locations are shown on the Enlarged Site Plans, Plates 3.1 through 3.5.

The materials encountered in the test pits were classified by visual and textural examination in the field by our geologist, who observed the field exploration operations on a near-continuous basis. These classifications were further reviewed by visual observation and testing in the laboratory. Soils were classified in general conformance with the Unified Soil Classification System as shown on the Soil Log Legend, Plate A. Logs of the materials encountered are presented on the Logs of Test Pits, Plates A-1 through A-10.

LOGS OF TEST PITS

Waikamoi Flume Replacement
County of Maui – Department of Water Supply
Makawao, Island of Maui, Hawaii

Test Pit No.	Depth Below Surface (feet)	Description
TP-1 Station 3+32± Approx. Elev. +4302 feet MSL	0 – 0.3	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.3 – 1.5	Brown CLAYEY SILT (MH), medium stiff, moist to wet. (Residual) (water content = 120.5%) Refusal on BASALT ROCK at 1.5 feet below ground surface. Test pit terminated at 1.5 feet below ground surface on March 9, 2011. Groundwater was not encountered.
TP-2 Station 9+05± Approx. Elev. +4303 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5 – 1.0	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) (water content = 96.1%) Refusal on BASALT ROCK at 1.0 feet below ground surface. Test pit terminated at 1.0 feet below ground surface on March 9, 2011. Groundwater was not encountered.

Test Pit No.	Depth Below Surface (feet)	Description
TP-3 Station 9+79± Approx. Elev. +4302 feet MSL	0 – 0.2	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet. (water content = 150.6%)
	0.2 – 0.5	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite)
		Refusal on BASALT ROCK at 0.5 feet below ground surface.
		Test pit terminated at 0.5 feet below ground surface on March 9, 2011. Groundwater was not encountered.
TP-3A Station 10+39± Approx. Elev. +4300 feet MSL	0 – 0.3	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.3 – 0.8	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite)
		Refusal on BASALT ROCK at 0.8 feet below ground surface.
		Test pit terminated at 0.8 feet below ground surface on March 15, 2011. Groundwater was not encountered.

Test Pit No.	Depth Below Surface (feet)	Description
TP-4 Station 9+95± Approx. Elev. +4288 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5 – 3.0	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) (water content = 98.4%) Refusal on BASALT ROCK at 3.0 feet below ground surface. Test pit terminated at 3.0 feet below ground surface on March 9, 2011. Groundwater was not encountered.
TP-5 Station 14+71± Approx. Elev. +4300 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet. (water content = 110.1%)
	0.5 – 0.8	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) Refusal on BASALT ROCK at 0.8 feet below ground surface. Test pit terminated at 0.8 feet below ground surface on March 9, 2011. Groundwater was not encountered.

Test Pit No.	Depth Below Surface (feet)	Description
TP-6 Station 15+12± Approx. Elev. +4296 feet MSL	0 – 0.3	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.3 – 1.0	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) (water content = 253.0%)
		Refusal on BASALT ROCK at 1.0 feet below ground surface.
		Test pit terminated at 1.0 feet below ground surface on March 9, 2011. Groundwater was not encountered.
TP-7 Station 15+60± Approx. Elev. +4299 feet MSL	0 – 0.3	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.3	Refusal on BASALT ROCK at 0.3 feet below ground surface.
		Test pit terminated at 0.3 feet below ground surface on March 9, 2011. Groundwater was not encountered.
TP-8 Station 18+72± Approx. Elev. +4299 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5 – 2.0	Gray CLAY (CH), very soft, wet. (Residual) (water content = 139.9%)
	2.0 – 3.5	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite)
		Test pit terminated at 3.5 feet below ground surface on March 9, 2011. Groundwater was not encountered.

Test Pit No.	Depth Below Surface (feet)	Description
TP-9 Station 20+51± Approx. Elev. +4299 feet MSL	0 – 0.3	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.3 – 2.0	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) (water content = 111.9%) Refusal on BASALT ROCK at 2.0 feet below ground surface. Test pit terminated at 2.0 feet below ground surface on March 10, 2011. Groundwater was not encountered.
TP-10 Station 21+36± Approx. Elev. +4298 feet MSL	0 – 0.8	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.8 – 2.5	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) (water content = 87.1%) Refusal on BASALT ROCK at 2.5 feet below ground surface. Test pit terminated at 2.0 feet below ground surface on March 10, 2011. Groundwater was not encountered.

Test Pit No.	Depth Below Surface (feet)	Description
TP-11 Station 21+78± Approx. Elev. +4299 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet. (water content = 115.7%)
	0.5 – 0.8	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite)
		Refusal on BASALT ROCK at 0.8 feet below ground surface.
		Test pit terminated at 0.8 feet below ground surface on March 10, 2011. Groundwater was not encountered.
TP-12 Station 23+48± Approx. Elev. +4297 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet. (water content = 296.1%)
	0.5	Refusal on BASALT ROCK at 0.5 feet below ground surface.
		Test pit terminated at 0.5 feet below ground surface on March 10, 2011. Groundwater was not encountered.
TP-13 Station 24+43± Approx. Elev. +4297 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5 – 1.0	Gray CLAY (CH), very soft, wet. (Residual)
	1.0 – 3.0	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) (water content = 120.2%)
		Test pit terminated at 3.0 feet below ground surface on March 10, 2011. Groundwater was not encountered.

Test Pit No.	Depth Below Surface (feet)	Description
TP-14 Station 25+73± Approx. Elev. +4296 feet MSL	0 – 0.4	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet. (water content = 387.6%)
	0.4 – 0.6	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite)
		Refusal on BASALT ROCK at 0.6 feet below ground surface.
		Test pit terminated at 0.6 feet below ground surface on March 10, 2011. Groundwater was not encountered.
TP-15 Station 26+25± Approx. Elev. +4294 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet. (water content = 469.3%)
	0.5	Refusal on BASALT ROCK at 0.5 feet below ground surface.
		Test pit terminated at 0.5 feet below ground surface on March 10, 2011. Groundwater was not encountered.
TP-16 Station 28+05± Approx. Elev. +4298 feet MSL	0 – 0.4	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet. (water content = 60.0%)
	0.4	Refusal on BASALT ROCK at 0.4 feet below ground surface.
		Test pit terminated at 0.4 feet below ground surface on March 14, 2011. Groundwater was not encountered.

Test Pit No.	Depth Below Surface (feet)	Description
TP-17 Station 31+18± Approx. Elev. +4296 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5 – 0.8	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) (water content = 150.1%)
		Refusal on BASALT ROCK at 0.8 feet below ground surface.
		Test pit terminated at 0.8 feet below the ground surface on March 14, 2011. Groundwater was not encountered.
TP-18 Station 31+42± Approx. Elev. +4291 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5 – 1.5	Gray CLAY (CH), very soft, wet. (Residual) (water content = 345.1%)
	1.5 – 2.0	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite)
		Refusal on BASALT ROCK at 2.0 feet below ground surface.
		Test pit terminated at 2.0 feet below the ground surface on March 14, 2011. Groundwater was not encountered.
TP-19 Station 41+89± Approx. Elev. +4295 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5 – 3.5	Brown SILT (MH) with clay and sand, medium stiff, moist to wet. (Residual) (water content = 279.9%)
		Test pit terminated at 3.5 feet below the ground surface on March 14, 2011. Groundwater was not encountered.

Test Pit No.	Depth Below Surface (feet)	Description
TP-20 Station 44+51± Approx. Elev. +4292 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5 – 1.2	Gray CLAY (CH), very soft, wet. (Residual) (water content = 250.3%)
	1.2 – 1.5	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite)
		Test pit terminated at 1.5 feet below the ground surface on March 14, 2011. Groundwater was not encountered.
TP-21 Station 48+40± Approx. Elev. +4289 feet MSL	0 – 0.3	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.3 – 1.0	Brown with gray and orange mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) (water content = 120.2%)
		Refusal on BASALT ROCK at 1.0 feet below ground surface.
		Test pit terminated at 1.0 feet below the ground surface on March 15, 2011. Groundwater was not encountered.

Test Pit No.	Depth Below Surface (feet)	Description
TP-22 Station 53+00± Approx. Elev. +4291 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5 – 1.0	Brown with gray mottling CLAYEY SILT (MH) with sand and gravel, stiff, wet. (Saprolite) (water content = 157.8%) Refusal on BASALT ROCK at 1.0 feet below ground surface. Test pit terminated at 1.0 feet below the ground surface on March 15, 2011. Groundwater was not encountered.
TP-23 Station 54+15± Approx. Elev. +4286 feet MSL	0 – 0.5	Surface vegetation and root layer, Dark brown ORGANIC SILT (OH), very soft, wet.
	0.5	Refusal on BASALT ROCK at 0.5 feet below ground surface. Test pit terminated at 0.5 feet below the ground surface on March 15, 2011. Groundwater was not encountered.

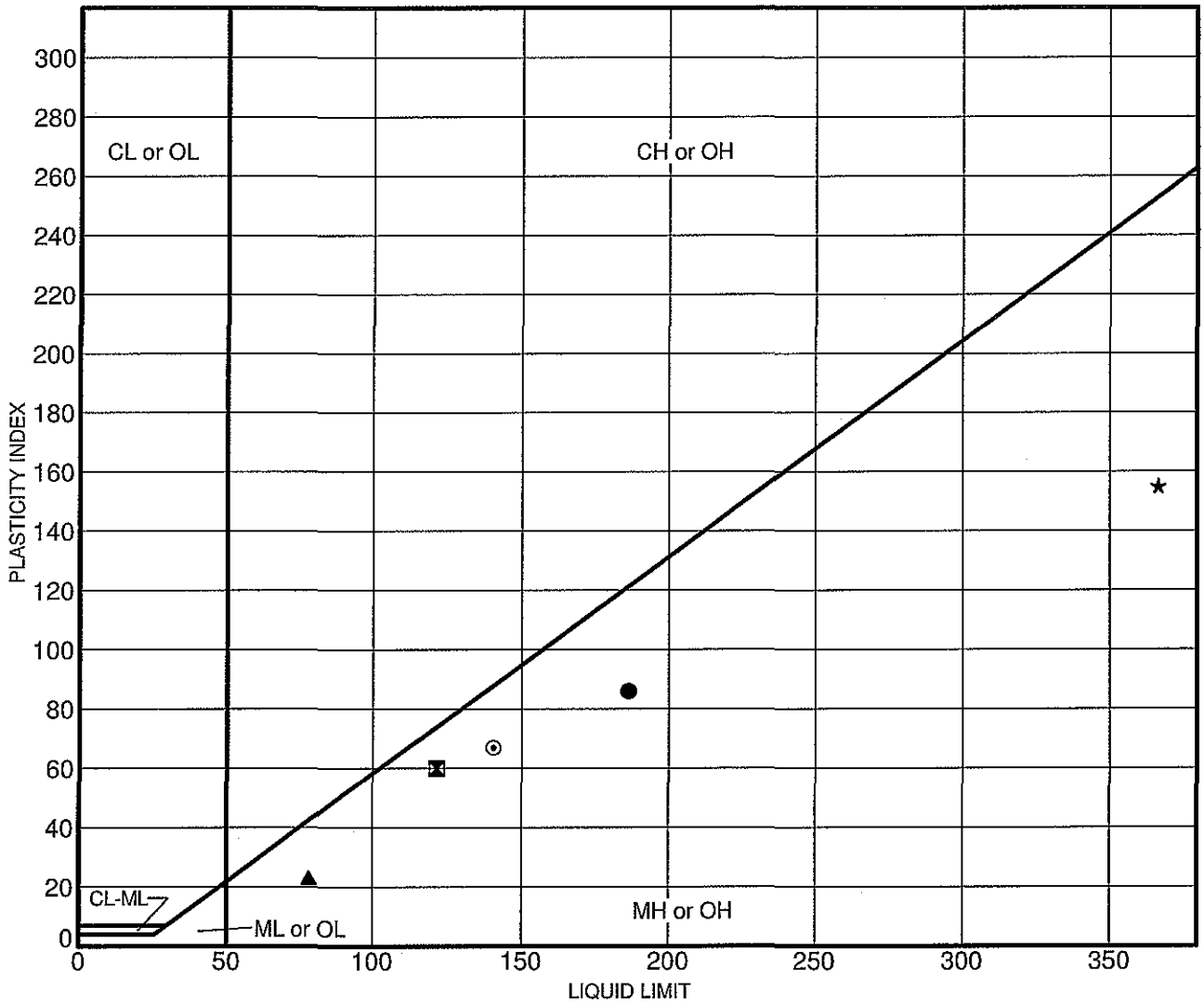
APPENDIX B

APPENDIX B

Laboratory Tests

Moisture Content (ASTM D 2216) and Unit Weight (ASTM D 2937) determinations were performed on selected samples as an aid in the classification and evaluation of soil properties. The test results are presented on the Logs of Test Pits at the appropriate sample depths.

Four Atterberg Limits tests (ASTM D 4318) were performed on selected soil samples to evaluate the liquid and plastic limits and to aid in soil classification. Test results are summarized on the Logs of Test Pits at the appropriate sample depths. Graphic presentations of the test results are provided on Plate B-1.



	Sample	Depth (ft)	LL	PL	PI	Description
●	TP-1	0.3-1.0	186	100	86	Brown clayey silt (MH)
⊠	TP-5	0.5-0.8	121	61	60	Brown with gray and orange mottling clayey silt (MH)
▲	TP-9	0.5-1.5	78	55	23	Bown with gray and orange mottling clayey silt (MH)
★	TP-14	0.4-0.6	367	212	155	Brown with gray and orange mottling clayey silt (MH)
⊙	TP-22	0.5-1.0	140	73	67	Brown clayey silt (MH)

GEOLABS, INC.
GEOTECHNICAL ENGINEERING

W.O. 6378-00

ATTERBERG LIMITS TEST RESULTS - ASTM D 4318

WAIKAMOI FLUME REPLACEMENT
COUNTY OF MAUI
DEPARTMENT OF WATER SUPPLY
MAKAWAO, MAUI, HAWAII

Plate
B - 1

G ATTERBERG (LL UP TO 240) 6378-00.GPJ GEOLABS.GDT 11/28/11

APPENDIX F.

Department of the Army Jurisdictional Determination of Waikamoi, Puohokamoa, and Haipuaena Streams

APR 04 2011

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

REPLY TO
ATTENTION OF:

March 31, 2011

Regulatory Branch

File Number(s): POH-2010-00283
POH-2011-00091
POH-2011-00092

Munekiyo & Hiraga, Inc.
Attention: Mark A. Roy
305 South High Street, Suite 104
Wailuku, Hawaii 96793

APPROVED JURISDICTIONAL DETERMINATION

Dear Mr. Roy:

This letter is in response to your letter dated March 22, 2011 requesting Department of the Army (DA) review and comment on the requested additional information for the proposed Waikamoi Timber Flume Replacement Project at TMK (2) 2-4-016:004, Makawao, Island of Maui, Hawaii.

We completed our review of the submitted documents pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404) and have determined that **the submitted documents, accurately identify waters of the U.S. under the regulatory jurisdiction of U.S. Army Corps of Engineers (Corps).**

Section 10 requires that a DA permit be obtained from the Corps prior to undertaking any construction, dredging, or other activity occurring in, over, or under or affecting navigable waters of the U.S. For tidal waters, the shoreward limit of the Corps' jurisdiction extends to the Mean High Water Mark. Section 404 requires that a DA permit be obtained for the discharge (placement) of dredged and/or fill material into waters of the U.S., including wetlands. For tidally influenced waters, in the absence of adjacent wetlands, the shoreward limit of the Corps' jurisdiction extends to the High Tide Line, which in Hawai'i may be approximated by reference to the Mean Higher High Water Mark. For non-tidal waters, the lateral limits of the Corps' jurisdiction extend to the Ordinary High Water Mark (OHWM) or the approved delineated boundary of any adjacent wetlands.

The perennial Waikamoi, Puohokamoa and Haipuaena Streams discharge terminally into Nuaailua Bay (a navigable water). As such, **the Waikamoi, Puohokamoa and Haipuaena Streams are waters of the U.S., subject to Corps jurisdiction**. Please cite the reference number **POH-2010-00283** for the jurisdictional determination associated with the Waikamoi Stream, **POH-2011-00091** for the Puohokamoa Stream and **POH-2011-00092** or the Haipuaena Stream, respectively, in future correspondence regarding this project.

In addition to the 14 gully, gulch and stream crossings identified in the submitted documents, we have reason to believe the project site also traverses potential palustrine wetlands as identified in the U.S. Fish & Wildlife Service's National Wetland Inventory and as indicated by the hydric soils depicted by the U.S. Department of Agriculture, Natural Resources Conservation Service's Soil

Survey of the area. There is insufficient site-specific information to complete our jurisdictional determination as to whether these potential wetlands are adjacent to any waters of the U.S., or whether they are proposed for impact. We suggest the landowner survey the project site for the presence of adjacent wetlands in accordance with the Corps Wetland Delineation Manual, 1987. Please reference the Public Notice dated July 30, 2010, found at *http://www.poh.usace.army.mil/PA/PublicNotices/PN20100730_DelinMan.pdf*, regarding the Regional Supplement for the Pacific, found in the Public Notice and at *http://www.usace.army.mil/CECW/Pages/reg_supp.aspx*.

The submitted documents contain insufficient information to allow the Corps to determine if construction of the proposed timber flume replacement will involve the discharge of fill material waterward of the OHWM of these waterbodies or the approved delineated boundary of these wetlands. We are concerned especially with the nature of the support structures relative to the three streams and whether reconstruction of the existing support structures will result in the discharge of fill material below the OHWM of these waters of the U.S. **If the proposed flume replacement results in either the temporary or permanent discharge of fill material below the OHWM of either the Waikamoi, Puohokamoa or Haipuaena Stream or below the approved delineated boundary of adjacent wetlands, a DA permit will be required.** Fill material, permanent or temporary, may include, but is not limited to: rock, dirt, sand, sandbags, silt fences or concrete.

Upon finalization of construction plans, we advise your client contact the Corps to determine if any of the proposed work constitutes a "discharge of fill" by submitting a DA Permit application and associated drawings that meet our drawing recommendations found at *http://www.poh.usace.army.mil/EC-R/EC-R.htm* to the Corps. In addition, supporting information submitted with the permit application should include sufficient information concerning the scope of work, including the use of Best Management Practices, i.e. silt fences and sandbag berms within the vicinity and in close proximity to potentially regulated bodies of water. The Corps will at that time review the application to ensure it complies with all necessary federal laws and regulations. Be advised, if the fill results in either temporary or permanent loss of waters of the U.S. and/or associated function, your client may be required to provide compensatory mitigation for any unavoidable impacts to the aquatic environment.

This letter contains an approved JD for the property in question and is valid for a period of five (5) years unless new information warrants revision of the determination before the expiration date. If you object to this determination, you may request an Administrative Appeal under Corps regulations at 33 Code of Federal Regulations (CFR) Part 331. We have enclosed a Notification of Appeal Process and Request for Appeal (NAP/RFA) form. If you request to appeal this determination you must submit a completed RFA form, according to instructions in the RFA, to the Corps' Pacific Ocean Division office at the following address:

Thom Lichte, Appeals Review Officer
U.S. Army Corps of Engineers
Pacific Ocean Division, ATTN: CEPOD-PDC
Building 525
Fort Shafter, HI 96858-5440

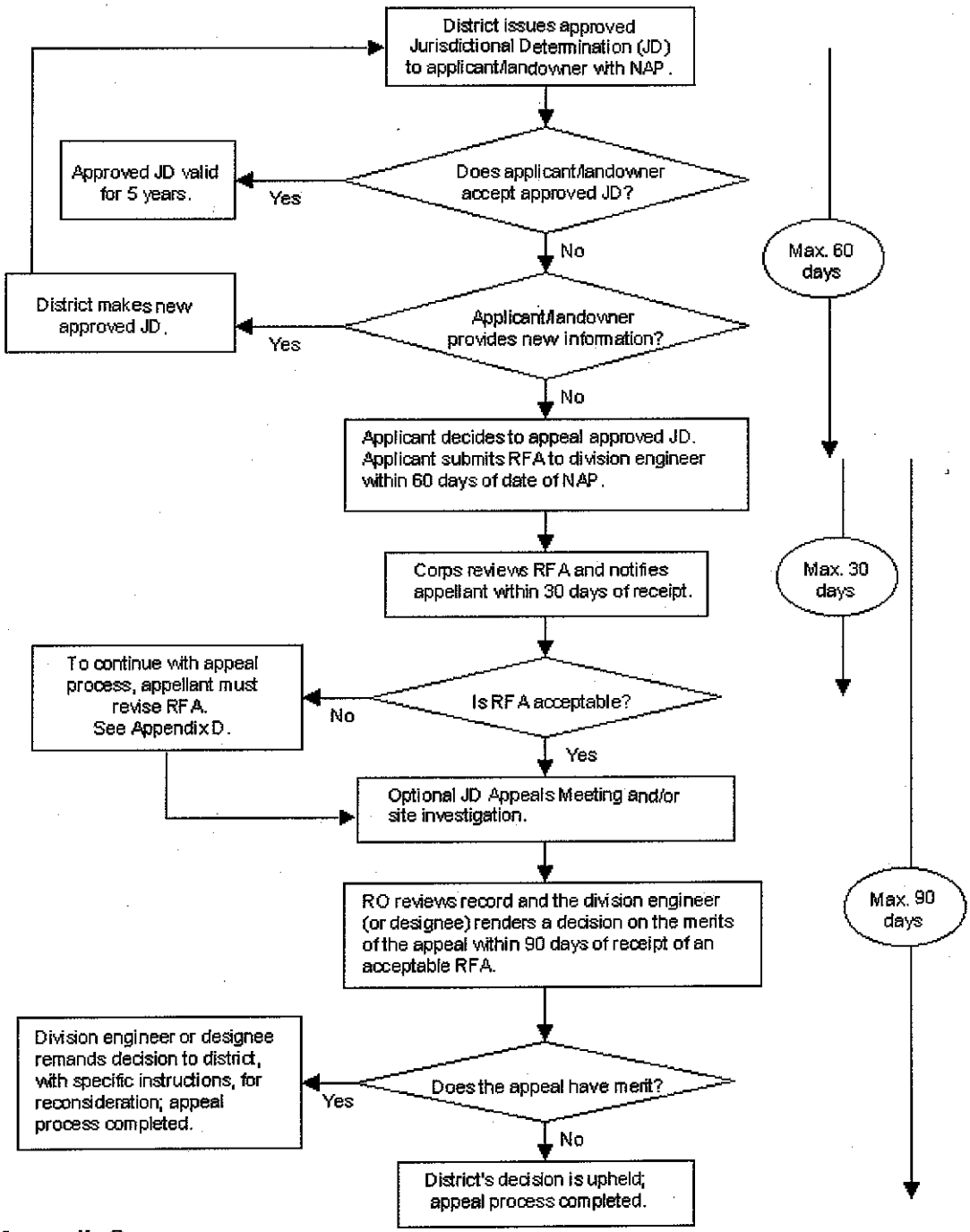
Thank you for contacting us regarding this project and providing us with the opportunity to comment. Should you have any questions, please contact Ms. Jessie Pa'ahana at *808.438.0391* or via email at *Jessie.K.Paahana@usace.army.mil*. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at *http://per2.nwp.usace.army.mil/survey.html*.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Copy furnished:
County of Maui, Dept. of Water Supply, David Taylor, 200 South High St., Wailuku, HI, 96793

Administrative Appeal Process for Approved Jurisdictional Determinations



Appendix C

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: County of Maui, Board of Water Supply		File Number:	Date: March 31, 2011
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
XX	APPROVED JURISDICTIONAL DETERMINATION		D
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: Jessie K. Paahana, Project Manager US Army Corps of Engineers, Honolulu District ATTN: CEPOH-EC-R Building 214 Fort Shafter, HI 96858-5440 Ph: (808) 438-0391	If you only have questions regarding the appeal process you may also contact: Thom Lichte, Appeal Review Officer US Army Corps of Engineers, Pacific Ocean Division ATTN: CEPOD-PDC Building 525 Fort Shafter, HI 96858-5440 Ph: (808) 438-0397

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 31 Mar 2011

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:CEPOH-EC-R, Waikamoi Timber Flume Replacement; Puohokamoa Stream Xing, POH-2011-00091

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State:Hawaii County/parish/borough: Maui County City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.80771° N, Long. -156.22400° W.
Universal Transverse Mercator: UTM Zone 4 North NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Nuaailua Bay, Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):

- [x] Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- [ ] Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- [x] Office (Desk) Determination. Date: 31 Mar 2011
- [ ] Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There [redacted] *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- [ ] Waters subject to the ebb and flow of the tide.
- [ ] Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
  Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There [redacted] *"waters of the U.S."* within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - [ ] TNWs, including territorial seas
   - [ ] Wetlands adjacent to TNWs
   - [x] Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - [ ] Non-RPWs that flow directly or indirectly into TNWs
   - [ ] Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - [ ] Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - [ ] Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - [ ] Impoundments of jurisdictional waters
   - [ ] Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: linear feet: width (ft) and/or acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: Not Applicable
   Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - [ ] Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain:

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW:

   Summarize rationale supporting determination:

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: Pick List
   Drainage area: Pick List
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through Pick List tributaries before entering TNW.

   Project waters are Pick List river miles from TNW.
   Project waters are Pick List river miles from RPW.
   Project waters are Pick List aerial (straight) miles from TNW.
   Project waters are Pick List aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain:

   Identify flow route to TNW[5]:
   Tributary stream order, if known:

---

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain:
- ☐ Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):
- Average width: feet
- Average depth: feet
- Average side slopes: Pick List.

Primary tributary substrate composition (check all that apply):
- ☐ Silts
- ☐ Cobbles
- ☐ Bedrock
- ☐ Other. Explain:
- ☐ Sands
- ☐ Gravel
- ☐ Vegetation. Type/% cover:
- ☐ Concrete
- ☐ Muck

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain:
Tributary geometry: Pick List
Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: Pick List
Estimate average number of flow events in review area/year: Pick List
Describe flow regime:
Other information on duration and volume:

Surface flow is: Pick List. Characteristics:

Subsurface flow: Pick List. Explain findings:
- ☐ Dye (or other) test performed:

Tributary has (check all that apply):
- ☐ Bed and banks
- ☐ OHWM[6] (check all indicators that apply):
  - ☐ clear, natural line impressed on the bank
  - ☐ changes in the character of soil
  - ☐ shelving
  - ☐ vegetation matted down, bent, or absent
  - ☐ leaf litter disturbed or washed away
  - ☐ sediment deposition
  - ☐ water staining
  - ☐ other (list):
  - ☐ the presence of litter and debris
  - ☐ destruction of terrestrial vegetation
  - ☐ the presence of wrack line
  - ☐ sediment sorting
  - ☐ scour
  - ☐ multiple observed or predicted flow events
  - ☐ abrupt change in plant community
- ☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
- ☒ High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- ☒ Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain:
Identify specific pollutants, if known:

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[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width):
- ☐ Wetland fringe. Characteristics:
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings:
  - ☐ Fish/spawn areas. Explain findings:
  - ☐ Other environmentally-sensitive species. Explain findings:
  - ☐ Aquatic/wildlife diversity. Explain findings:

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain:

Wetland quality. Explain:

Project wetlands cross or serve as state boundaries. Explain:

(b) General Flow Relationship with Non-TNW:

Flow is: Pick List. Explain:

Surface flow is: Pick List

Characteristics:

Subsurface flow: Pick List. Explain findings:

- ☐ Dye (or other) test performed:

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain:
  - ☐ Ecological connection. Explain:
  - ☐ Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW

Project wetlands are Pick List river miles from TNW.

Project waters are Pick List aerial (straight) miles from TNW.

Flow is from: Pick List.

Estimate approximate location of wetland as within the Pick List floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain:

Identify specific pollutants, if known:

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width):
- ☐ Vegetation type/percent cover. Explain:
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings:
  - ☐ Fish/spawn areas. Explain findings:
  - ☐ Other environmentally-sensitive species. Explain findings:
  - ☐ Aquatic/wildlife diversity. Explain findings:

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: Pick List

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: Puohokamoa is perennial, w/terminus in Nuaailua Bay(TNW) (DLNR-DAR Atlas of Hwn Watersheds).
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

Provide estimates for jurisdictional waters in the review area (check all that apply):
- ☐ Tributary waters: linear feet width (ft).
- ☐ Other non-wetland waters: acres.
  - Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   - ☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):
   - ☐ Tributary waters: linear feet width (ft).
   - ☐ Other non-wetland waters: acres.
     - Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
   - ☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
   As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
   - ☐ Demonstrate that impoundment was created from "waters of the U.S.," or
   - ☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
   - ☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
- ☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
- ☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- ☐ which are or could be used for industrial purposes by industries in interstate commerce.
- ☐ Interstate isolated waters. Explain: .
- ☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination:

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Provide estimates for jurisdictional waters in the review area (check all that apply):
- ☒ Tributary waters: linear feet width (ft).
- ☒ Other non-wetland waters: acres.
  - Identify type(s) of waters: .
- ☒ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
- ☒ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- ☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- ☒ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- ☒ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
- ☒ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ☒ Lakes/ponds: acres.
- ☒ Other non-wetland waters: acres. List type of aquatic resource: .
- ☒ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
- ☒ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ☒ Lakes/ponds: acres.
- ☒ Other non-wetland waters: acres. List type of aquatic resource: .
- ☒ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:requested add'l info rcv'd 25 Mar 2011.
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☒ Data sheets prepared by the Corps: .
- ☒ Corps navigable waters' study: .
- ☒ U.S. Geological Survey Hydrologic Atlas: .
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☒ U.S. Geological Survey map(s). Cite scale & quad name:1:24000 (ORM website, retv'd 13 Oct 2010).
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation:NRCS Web Soil Survey conducted 31 Dec 2006.
- ☒ National wetlands inventory map(s). Cite name:ORM website, USFWS-NWI Overlay, retv'd 13 Oct 2010.
- ☒ State/Local wetland inventory map(s): .
- ☒ FEMA/FIRM maps: .
- ☒ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☒ Photographs: ☒ Aerial (Name & Date):Aerial Satellite Image (ORM website, retv'd 13 Oct 2010).
  - or ☐ Other (Name & Date): .
- ☒ Previous determination(s). File no. and date of response letter: .
- ☒ Applicable/supporting case law: .
- ☒ Applicable/supporting scientific literature:DLNR-DAR Atlas of Hawaiian Watersheds, April 2008.
- ☒ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: Puohokamoa is a perennial stream with end terminus in a TNW; poss Secttion 404. Referenced data located in physical file POH-2011-00091.

APPENDIX F-1.

Department of the Army Section 404 Permit Exemption Determination Letter

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

REPLY TO
ATTENTION OF:

December 5, 2011

Regulatory Branch

File Number POH-2010-00283
POH-2011-00091
POH-2011-00092

County of Maui
Department of Water Supply
Attention: David Taylor
200 South High Street
Wailuku, Hawaii 96793

RECEIVED
COUNTY OF MAUI
2011 DEC -6 PM 3: 5
DEPT. OF WATER SUPPLY

NO PERMIT REQUIRED

Dear Mr. Taylor:

We have received your letter dated November 9, 2011 requesting a Department of the Army (DA) determination of exemption under the Clean Water Act Subsection 404(f)(1)(C) for the proposed Waikamoi Timber Flume Replacement Project that crosses the Waikamoi, Puohokamoa and Haipuaena Streams in Makawao, Island of Maui, Hawaii.

We have completed our review of the submitted document pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404) and have determined the submitted documents accurately identifies waters of the U.S., subject to U.S. Army Corps of Engineers (Corps) jurisdiction.

For your information, Section 10 requires that a DA permit be obtained from the U.S. Army Corps of Engineers (Corps) prior to undertaking any construction, dredging, or other activity occurring in, over, or under or affecting navigable waters of the U.S. For tidal waters, the shoreward limit of the Corps' jurisdiction extends to the Mean High Water Mark (MHWM). The proposed flume replacement is not subject to regulation under Section10. Section 404 requires that a DA permit be obtained for the discharge (placement) of dredged and/or fill material into waters of the U.S., including wetlands. For non-tidal waters, the lateral limits of the Corps' jurisdiction extend to the Ordinary High Water Mark or the approved delineated boundary of any adjacent wetlands.

The perennial **Waikamoi, Puohokamoa and Haipuaena Streams, their tributaries and adjacent wetlands**, with end terminus in Uaoa Bay are as such **waters of the U.S., subject to Corps jurisdiction**. Based on the information you submitted, the proposed flume replacement would necessitate the discharge of fill material below the OHWM of the subject water bodies, their tributaries and adjacent wetlands resulting from construction of the irrigation ditch footing. Under Subsection 404(f)(1)(c) of the CWA and 40 CFR 232.3(c)(3) discharges of dredged and/or fill material associated with construction or maintenance of irrigation ditches are exempt from the need to obtain a Section 404 permit from the DA. Section 404 permit exemption includes discharges of dredged and./or fill material resulting from construction of necessary appurtenances and support structures functional to the irrigation ditch i.e., siphons, headgates, wingwalls, etc. Per your letter dated November 9, 2011, the Waikamoi flume normally conveys water for both domestic and irrigation purposes. Accordingly, we have determined that the **proposed discharges resulting from**

the flume construction would not be subject to regulation under Subsection 404(f)(1)(C), therefore, a **DA permit will not be required.**

We advise your client consult with this office prior to undertaking any future construction activities involving the discharge of dredged and/or fill material waterward of the OHWM of the subject water bodies, their tributaries and/or adjacent wetlands. This determination does not relieve you of the responsibility to obtain any other permits, licenses, or approvals that may be required under County, State, or Federal law for your proposed work.

Thank you for contacting us regarding this project and providing us with the opportunity to comment. Should you have any questions, please contact Ms. Jessie Pa'ahana at *808.438.0391* or via e-mail at *Jessie.K.Paahana@usace.army.mil*. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at *http://per2.nwp.usace.army.mil/survey.html*.

Sincerely,

George P. Young, P.E.
for Chief, Regulatory Branch

APPENDIX G.

Aquatic Resources Study

WAIKAMOI TIMBER FLUME REPLACEMENT PROJECT

AQUATIC RESOURCES STUDY

HA'IKU'UKA, HAMAKUALOA, MAUI

By: Robert W. Hobdy
Kokomo,Maui
May 2011

Prepared for:
KAI Hawaii/
Dept. of Water Supply
Maui County

WAIKAMOI TIMBER FLUME REPLACEMENT PROJECT

AQUATIC RESOURCES STUDY

HA'IKU'UKA, HAMAKUALOA, MAUI

INTRODUCTION

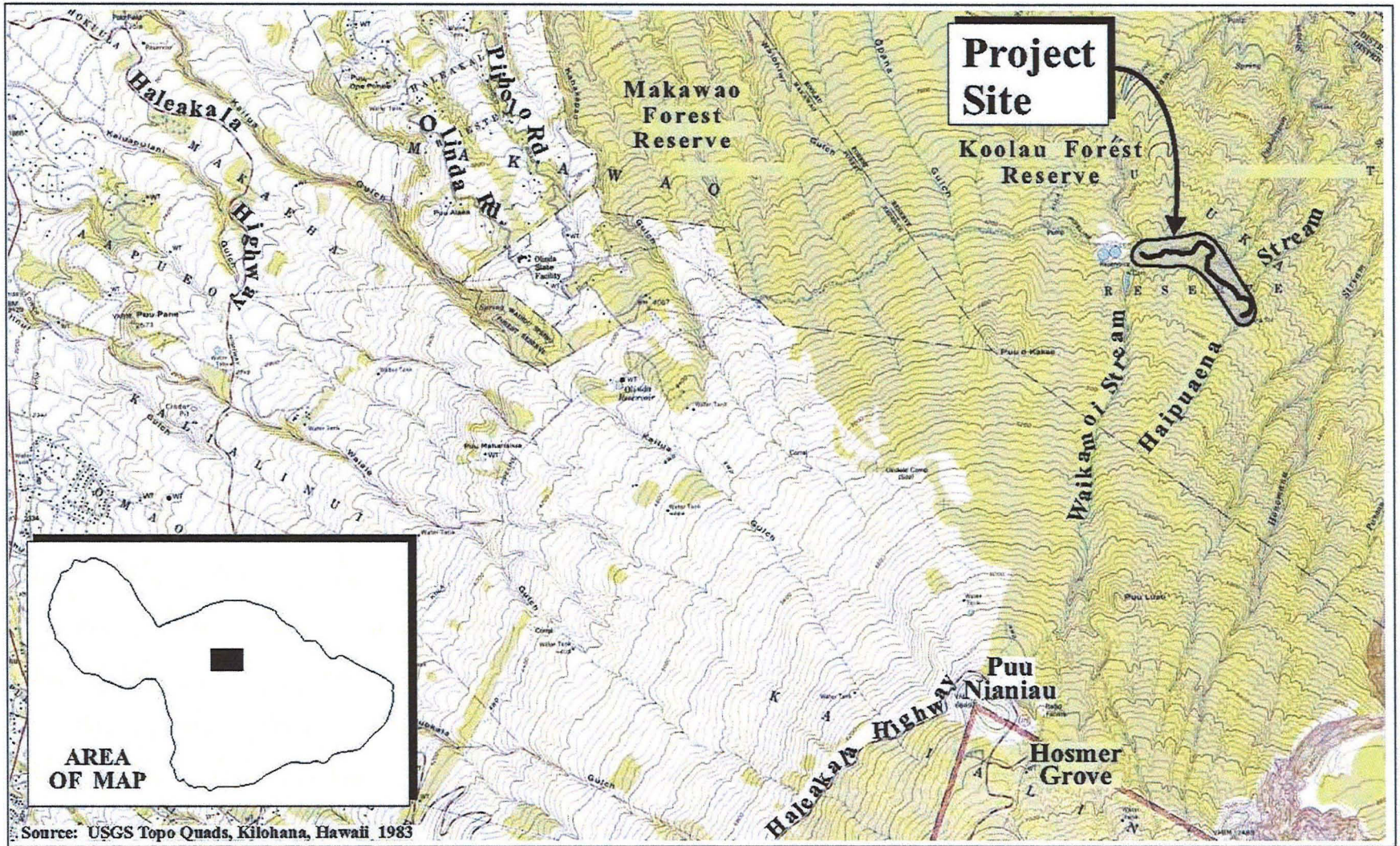
The Waikamoi Timber Flume Replacement Project is located on the northwest flank of East Maui, high in the cloud forests of Ha'ikü'uka between 3 and 4 miles east of Olinda. The 37 year old wooden flume that collects stream waters that supply the upcountry domestic water system is in need of upgrade and replacement. This aquatic resources study was initiated to assess these streams and wet forests for their potential for being jurisdictional federal aquatic resources under provisions of the Clean Water Act (1973) and the Rivers and Harbors Act (1899).

SITE DESCRIPTION

The Waikamoi Flume is a one mile long wooden structure that runs along a slight grade between Haipuaena Stream on the east and its terminus on the west at Waikamoi Stream where the water that is collected from small streams along its length runs into a storage, treatment and distribution system. This structure is situated at an elevation of 4,300 feet along a mountain slope averaging 16% grade in dense native 'öhi'a (*Metrosideros polymorpha*) forest. Besides 'öhi'a, the vegetation consists of a diverse array of native ferns, shrubs, epiphytes and mosses that carpet the ground and tree trunks. The annual rainfall here averages 300 inches, which equates to 25 feet of water. This rainfall is well distributed year round. Typical weather consists of misty clouds and drizzling rain but interspersed with frequent downpours. The soils are classified as Amalu peaty silty clay, 3 – 20% slopes, which is listed as a hydric soil. This soil consists of saturated clay and organic peat and muck that never dries out.

OBJECTIVES

This study consists of two separate but related analyses of aquatic resources. The first of these assesses the forested lands between the streams. These ridge top and sloping lands along the flume corridor were analyzed for their potential for being jurisdictional wetlands following U.S. Corps of Engineers guidelines. Next the streams themselves as discrete aquatic resources were analyzed following separate Corps guidelines to determine if they qualified as jurisdictional Waters of the U.S.. This Jurisdictional Determination will facilitate the planning process for the Waikamoi Timber Flume Replacement Project.



Source: USGS Topo Quads, Kilohana, Hawaii 1983

Figure 1

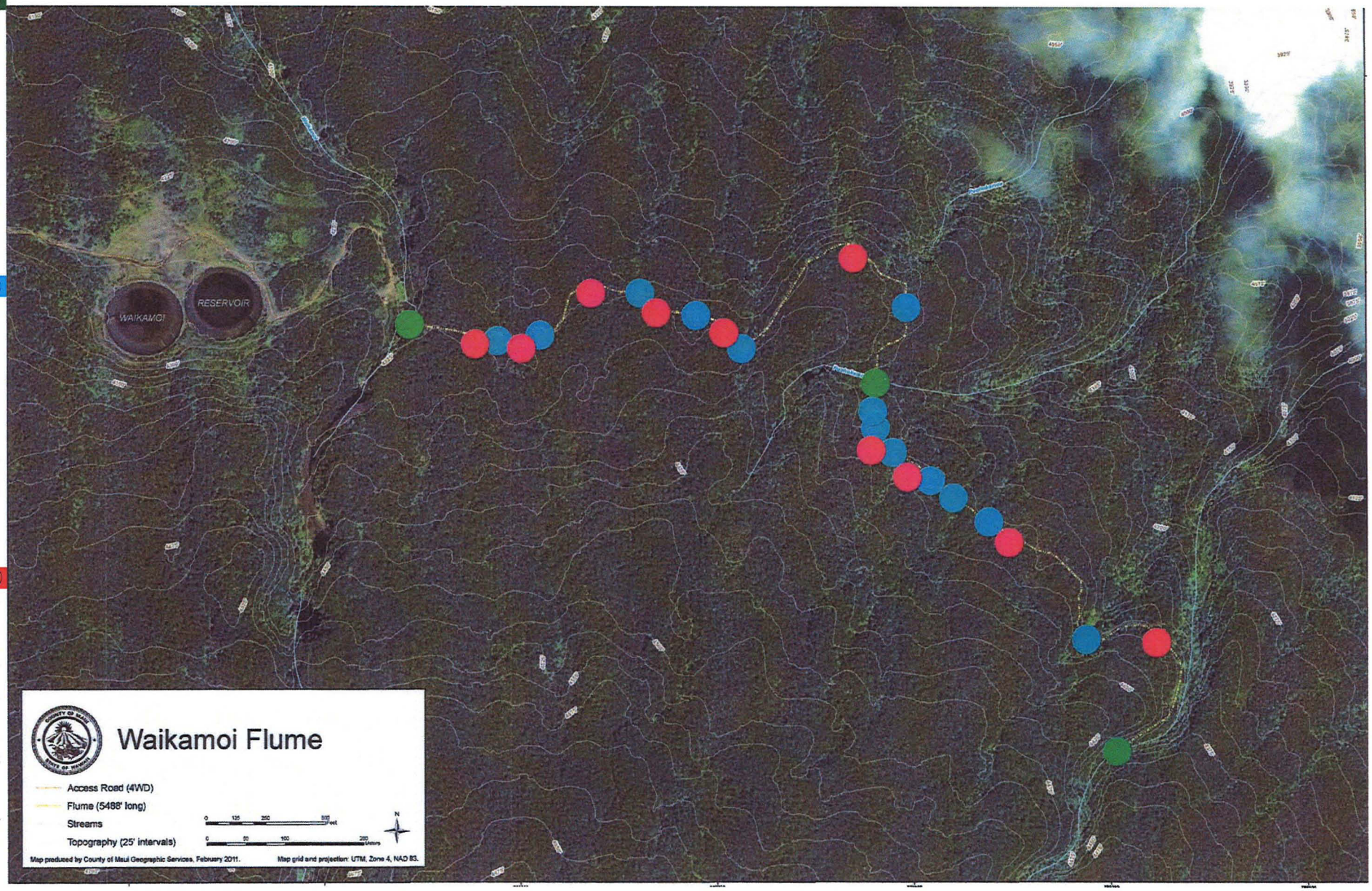
Proposed Waikamoi Timber Flume

Regional Location Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.



Three major named streams

Thirteen unnamed tributaries

Ten wetland sampling points

Waikamoi Stream Reservoir, photo taken from dam

Waikamoi Flume on gently sloping forest terrain

Waikamoi Flume crossing a smaller gully with intake pipes

Waikamoi Flume and trestle system with intake pipe

Waikamoi Flume crossing a ridge top through an old cut.

Waikamoi Flume crossing a steep fern slope near Haipuaena Stream

WETLAND DETERMINATIONS

PHYSICAL AND ENVIRONMENTAL SETTING

The forest in which the Waikamoi Flume is situated is part of a vast windward wet forest that stretches from Ha'ikü to Kaupö and from near sea level to 7,000 feet. Maximum amounts of rainfall occur at elevations between 4,000 and 5,000 feet and range from 200 inches to more than 350 inches per year in some places (Armstrong, 1983). The soils that develop in this high rainfall regime are unique. The Waikamoi Flume lies entirely within a large area of about 7,500 acres, west of Ko'olau Gap that is classified as Amalu peaty silty clay, 3 – 20% Slopes (Foote et al, 1972). This soil is permanently saturated and has thick layers of organic peat, muck and clay overlying a precipitated, impermeable ironstone layer. The forests that have co-evolved with this wet soil are dense, native 'öhi'a (*Metrosideros polymorpha*) mixed forests with a diversity of sub-canopy trees, shrubs, herbs, ferns and mosses. When undisturbed, the mosses thickly carpet the ground and tree trunks acting like sponges to capture rainfall and letting it percolate into the soil. These are environmentally sensistive forests as they provide habitat for numerous native species of birds, insects and plants, some of which are endangered species. These include the bird species 'äkohekohe (*Palmeria dolei*) and the kiwikiu (*Pseudonestor xanthophrys*), and a plant, haha (*Cyanea hamatiflora*). Other endangered species are known from a greater distance on the windward slopes of East Maui.

The forests being assessed for wetland status are moderately to steeply sloping down toward the north. They include the ridge tops and slopes between the numerous steam courses that drain this wet mountain slope. Though these ridges are not stream courses, they do experience surface runoff during heavy rains. During such rains, virtually every ground surface will have water trickling down slope.

METHODS

To assess the wetland potential along the flume corridor 10 sampling points were established at intervals along its one mile length. These were located along the uphill side of the flume to minimize the effects of down slope disturbances. Once a sampling point was established, the vegetation was assessed within a 30 foot radius circle to see if it possessed hydrophytic character. Then a pit was dug to assess the soil for hydric character and the water regime for wetland hydrology. These three parameters were then analyzed following Corps guidelines to make a proposed determination of wetland status. A copy of each Wetland Determination Data Form with photographs is included. A map showing the locations of each of the sampling points is included as well.

RESULTS

The analysis of the 10 sampling points indicated that each of them met the three minimum requirements of hydrophytic vegetation, hydric soil and wetland hydrology, and all of them lie within wetlands. No wetland boundaries are delineated around any of these points because of the uniformity of the resources and their extent across the mountain slope. All of the ridge tops along the flume appear to be wetlands. The wetlands merge seamlessly with the stream corridor aquatic resources and are determined to be adjacent to and directly abutting them. Details of the analyses are documented in the appendix.

STREAM ASSESSMENTS

PHYSICAL AND ENVIRONMENTAL SETTING

The Waikamoi Flume extends almost exactly one mile in length stretching from its first intake on Haipuaena Stream on the east to Waikamoi Stream on the west. Fourteen distinct stream courses between these two named terminal streams feed water into the flume along its length. The three largest streams including Waikamoi, Haipuaena and Puohokamoa Stream, which is situated about half way between the two ends, are the only named streams. The remaining 13 streams are unnamed tributaries of these named streams. Waikamoi, Puohokamoa and Haipuaena Streams flow directly to the Pacific Ocean between one and two miles west of Honomanü and Nuaailua Bays. These three streams are perennial streams that flow directly into a Traditional Navigable Water (TNW) and as such have already been determined by the Corps of Engineers as Jurisdictional Waters of the U.S. under their oversight.

The remaining 13 smaller streams are all tributaries of the three perennial streams and are the subjects of this study. These smaller tributaries are all headwaters of their respective drainages and as such experience relatively low flow levels most of the time even though they are situated in a high rainfall area. The presence of intakes on each of these tributaries further compromises their flow levels. Most stream channels are defined by an Ordinary High Water Mark (OHWM) and a riparian corridor of distinctive vegetation. The tributaries in this study area have fairly distinct OHWMs, but there are no distinct vegetation boundaries apparent, as steamside vegetation grades seamlessly into the surrounding forests. The distribution of native plants and animals including rare and protected species is also relatively evenly spaced between the two habitats. The same protected species mentioned in the previous section occur in the stream habitat as well.

METHODS

Each of the 13 tributaries was analyzed separately with a separate Jurisdictional Determination Form developed for each. Each tributary was assessed for channel width, depth, flow and a variety of physical, chemical and biological characteristics. The size of the drainage area was considered and the presence and effect of any adjacent wetlands, using information from the related wetland analysis. The Jurisdictional Determination Forms were filled out following Corps of Engineers guidelines leading to a proposed Jurisdictional Determination for each. These forms and supporting information are included in the appendix.

RESULTS

Of the 13 tributaries assessed 9 were judged to be perennial with year-round flow. These tributaries were determined to automatically be federally jurisdictional because they were Relatively Permanent Waters that flow into the ocean (a TNW) as defined by the Corps of Engineers. The remaining 4 tributaries were found to have seasonal flow and were thus not automatically jurisdictional but required further, more detailed analysis to determine their status. Ultimately these 4 tributaries also proved to be jurisdictional as well because their seasonal flow was so substantial due to the high rainfall in this watershed.

SUMMARY

The wetland assessment showed that all of the ridges and slopes between the stream corridor within the described project boundaries uniformly exhibited all of the vegetation, soil and hydrological indicators that define a wetland according to Corps of Engineers guidelines and definitions. Following this assessment the stream corridors were assessed for their potential as jurisdictional aquatic features in combination with all of their adjacent wetlands as previously determined above. All of these tributaries were determined to be jurisdictional as well. In summary it is determined that the entire project corridor including all of its continuum of aquatic features is jurisdictional under provisions of Section 404 of the Clean Water Act. This proposed determination should be submitted to the Corps of Engineers for their review, evaluation and certification.

WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 0830

Applicant/Owner: County of Maui State/Terr.: Hawai'i Island: Maui Sampling Point: 1

Investigator(s): Robert W. Hobdy TMK/Parcel (2) 2-4-16:04 (por.)

Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex

Lat: 20.8090° N Long: 156.2233° W Datum: _____ Slope (%): 16

Soil Map Unit Name: Amalu peaty silty clay, 3-20% slopes NWI classification: hydric, PFO3F

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology NO significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks: This sampling point has positive wetland characters in each of the three parameters and is determined to be a wetland. The construction of this flume 100 years ago resulted in the hand-clearing of a 10 ft. wide corridor and the excavation and leveling of the soil. This corridor is still maintained in a condition free of trees and shrubs.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	60	Yes	FAC
2. Cibotium menziesii	5	NO	FACU
3.			
4.			
5.			
	65 = Total Cover		

Sapling/Shrub Stratum (Plot size: 30 ft. radius)			
1. Cheirodendron trigynum	8	Yes	FAC
2. Myrsine lessertianum	5	Yes	FACU
3. Leptecophylla tameiameiae	5	Yes	FAC
4. Ilex anomala	3	NO	FACU
5. Clermontia arborescens	3	No	FAC
	24 = Total Cover		

Herb Stratum (Plot size: 30 ft. radius)			
1. Carex alligata	8	Yes	FACW
2. Dicranopteris linearis	4	Yes	FACU
3. Juncus planifolius	2	No	FACW
4. Hedychium gardnerianum	2	NO	FACW
5. Dryopteris glabra	1	No	FAC
6. Deschampsia nubigena	1	NO	FAC
7. Vaccinium calycinum	1	NO	FAC
8. Astelia menziesii	1	NO	FACW
	20 = Total Cover		

Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	13	x 2 =	26
FAC species	79	x 3 =	237
FACU species	17	x 4 =	68
UPL species	0	x 5 =	0
Column Totals:	159 (A)		331 (B)

Prevalence Index = B/A = 3.03

Hydrophytic Vegetation Indicators:

No 1 - Rapid Test for Hydrophytic Vegetation

Yes 2 - Dominance Test is >50%

NO 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:
The vegetation passes the Dominance Test and is thus rated as hydrophytic.

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	5YR 3/2	100						Moss over peat and fine roots
8-18	5YR 2.5/2	100						Sapric organic muck saturated and dripping

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks: This soil is mapped as Amalu peaty silty clay, 3-20% slopes which is listed as a hydric soil. This plot has a peaty surface layer over a saturated layer of sapric muck.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 3

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: This soil is saturated to near the surface and exhibits wetland hydrology. This area receives an average of 300 in./yr. of rainfall. It lies on a mountain slope of 16 percent grade. Water does not pond but moves down slope through the soil continuously and flows on the surface everywhere during frequent rainfall events.

1.a. Native ‘öhi’a forest setting with sedges, moss, ferns and shrubs

1.b. Moss and peat with fine roots over sapric muck

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 0915

Applicant/Owner: County of Maui State/Terr.: Hawaii Island: Maui Sampling Point: 2

Investigator(s): Robert W. Hobdy TMK/Parcel (2) 2-4-16:04 (Por)

Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex

Lat: 20.8088° N Long: 156.2234° W Datum: Slope (%): 16

Soil Map Unit Name: Amalu peaty silty clay, 3-20% slopes NWI classification: hydric, PFO3F

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks: This plot has positive wetland indicators in each of the three parameters and is determined to be a wetland. The 10 ft. wide flume corridor is maintained free of trees and shrubs but is bordered by a dense native cloud forest.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	40	Yes	FAC
2. Cibotium menziesii	5	No	FACU
3.			
4.			
5.			
	45	= Total Cover	

Sapling/Shrub Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Cheirodendron trigynum	15	Yes	FAC
2. Vaccinium calycinum	15	Yes	FAC
3. Myrsine lessertianum	7	No	FACU
4. Melicope clusiifolia	6	No	FAC
5. Leptecophylla tameiameiae	5	No	FAC
	48	= Total Cover	

Herb Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juncus planifolius	8	Yes	FACW
2. Broussaisia arguta	2	Yes	FAC
3. Dryopteris glabra	2	Yes	FAC
4. Coprosma granadensis	1	No	FACW
5. Hymenophyllum lanceolatum	1	No	FAC
6. Adenophorus pinnatifidus	1	No	FACU
7. Vaccinium calycinum	1	No	FAC
8. Metrosideros polymorpha	1	No	FAC
	17	= Total Cover	

Woody Vine Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	9	x 2 =	18
FAC species	88	x 3 =	264
FACU species	13	x 4 =	52
UPL species	0	x 5 =	0
Column Totals:	110 (A)		334 (B)

Prevalence Index = B/A = 3.04

Hydrophytic Vegetation Indicators:

No 1 - Rapid Test for Hydrophytic Vegetation

Yes 2 - Dominance Test is >50%

No 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:
The vegetation passes the Dominance Test and is thus determined to be hydrophytic.

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	5YR 3/2	100						Peat with fine roots
2-18	5YR 2.5/2	100						sapric muck

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks: This soil has been listed as a hydric soil. The highly saturated sapric muck further qualifies it as hydric.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No No Depth (inches): ___

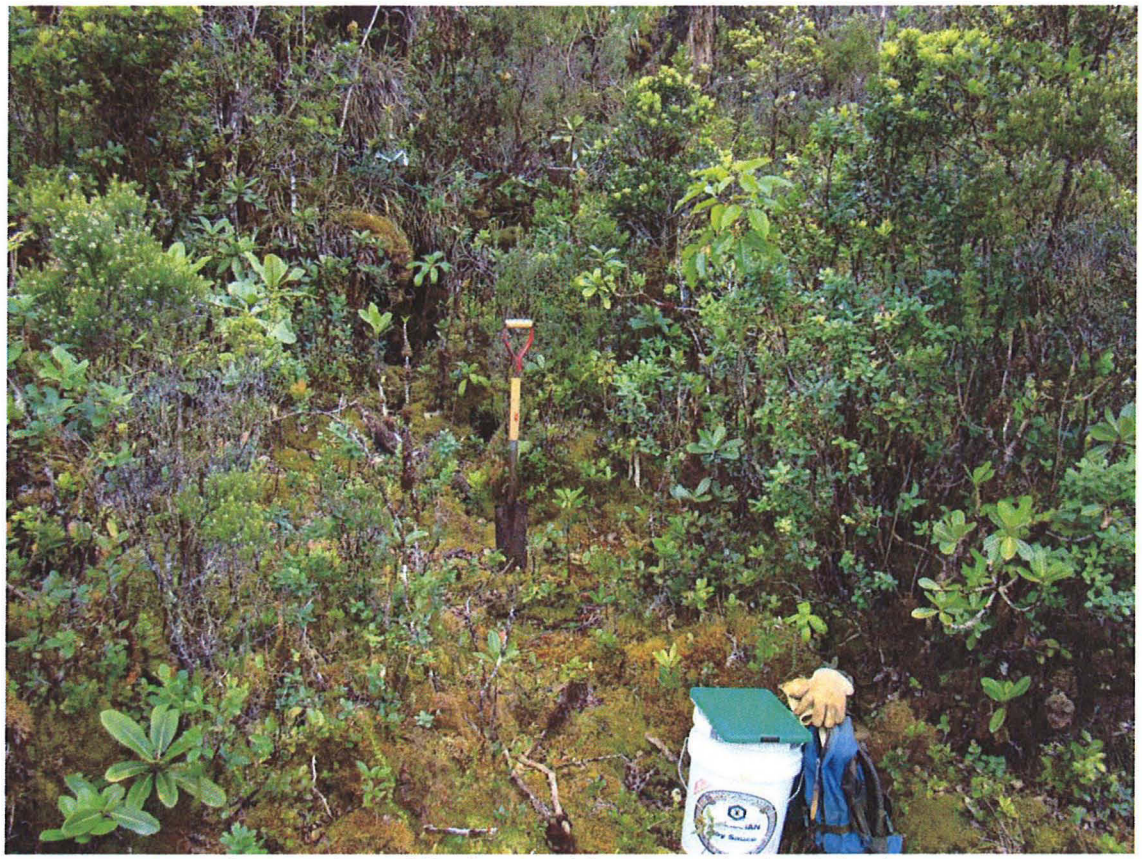
Water Table Present? Yes ___ No No Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 2

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: This soil is highly saturated to near the surface.



2.a. Native ‘öhi’a forest with moss and mixed shrubs

2.b. Moss and peat with fine roots over saturated muck

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 1000

Applicant/Owner: County of Maui State/Terr.: Hawaii Island: Maui Sampling Point: 3

Investigator(s): Robert W. Hobdy TMK/Parcel (2) 2-4-16:04 (Por)

Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex

Lat: 20.8089° N Long: 156.2232° W Datum: Slope (%): 16

Soil Map Unit Name: Amalu peaty silty clay, 3-20% slopes NWI classification: hydric, PFO3F

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: This plot has positive wetland indicators in each of the three parameters and is thus determined to be a wetland. The 10 foot wide flume corridor is maintained free of trees and shrubs but is bordered by a dense native cloud forest.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	25	Yes	FAC
2.			
3.			
4.			
5.			
	25 = Total Cover		

Sapling/Shrub Stratum (Plot size: 30 ft. radius)			
1. Metrosideros polymorpha	30	Yes	FAC
2. Cheirodendron trigynum	10	No	FAC
3. Leptecophylla tameiameiae	10	No	FAC
4. Melicope clusiifolia	5	No	FAC
5. Vaccinium calycinum	5	No	FAC
	60 = Total Cover		

Herb Stratum (Plot size: 30 ft. radius)			
1. Juncus planifolius	10	Yes	FACW
2. Diplazopteris linearis	10	Yes	FACU
3. Deschampsia nubigena	5	No	FAC
4. Paspalum urvillei	4	No	FAC
5. Hypericum mutilum	4	No	FACW
6. Dryopteris glabra	3	No	FAC
7. Rubus glaucus	2	No	UPL
8. Lycopodiella cernua	1	No	FAC
	39 = Total Cover		

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	14	x 2 = 28
FAC species	98	x 3 = 294
FACU species	10	x 4 = 40
UPL species	2	x 5 = 10
Column Totals:	124 (A)	372 (B)

Prevalence Index = B/A = 3.0

Hydrophytic Vegetation Indicators:

No 1 - Rapid Test for Hydrophytic Vegetation

Yes 2 - Dominance Test is >50%

Yes 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:
The vegetation passes the Dominance Test and is thus determined to be hydrophytic.

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 7/1	100						Light gray clay
14-16	10YR 5/1	100						gray clay, Plastic
16	5YR 4/6	100						yellowish-red (impermeable) ironstone layer

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: impermeable ironstone layer

Depth (inches): 16

Hydric Soil Present? Yes X No ___

Remarks: This soil has been listed as a hydric soil. The thick layer of wet clay further qualifies it as hydric.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: This soil is saturated to the surface. It has wetland hydrology.

3.a. Native ‘öhi’a forest with moss, sedges, grasses, ferns and shrubs

3.b. Light gray to gray plastic clay over an impermeable ironstone layer

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 1045

Applicant/Owner: County of Maui State/Terr.: Hawaii Island: Maui Sampling Point: 4

Investigator(s): Robert W. Hobdy TMK/Parcel: (2)2-4-16:04 (por.)

Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex

Lat: 20.8090° N Long: 156.2230° W Datum: Slope (%): 16

Soil Map Unit Name: Amalu peaty silty clay, 3-20% slopes NWI classification: hydric, PFO3F

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: This plot has positive wetland indicators in each of the three parameters and is thus determined to be a wetland. The 10 foot wide corridor is maintained free of trees and shrubs and is bordered by a dense native cloud forest.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	20	Yes	FAC
2. Cibotium glaucum	4	NO	FAC
3.			
4.			
5.			
	24	= Total Cover	

Sapling/Shrub Stratum (Plot size: 30 ft. radius)			
1. Metrosideros polymorpha	40	Yes	FAC
2. Cheirodendron trigynum	15	No	FAC
3. Vaccinium calycinum	10	No	FAC
4. Melicope clusifolia	5	No	FAC
5.			
	70	= Total Cover	

Herb Stratum (Plot size: 30 ft. radius)			
1. Juncus planifolius	15	Yes	FACW
2. Carex alligata	15	Yes	FACW
3. Dicranopteris linearis	5	No	FACU
4. Deschampsia nubigena	5	No	FAC
5. Dryopteris wallichiana	1	NO	FACU
6. Lycopodiella cernua	1	NO	FAC
7. Hedychium gardnerianum	1	NO	FACW
8. Rubus glaucus	1	NO	UPL
	____	= Total Cover	

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	31	x 2 =	62
FAC species	100	x 3 =	300
FACU species	6	x 4 =	24
UPL species	1	x 5 =	5
Column Totals:	138 (A)		389 (B)

Prevalence Index = B/A = 2.82

Hydrophytic Vegetation Indicators:

NO 1 - Rapid Test for Hydrophytic Vegetation

Yes 2 - Dominance Test is >50%

Yes 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: The vegetation passes the Dominance Test and the Prevalence Test and is clearly hydrophytic.

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-15	5YR 2.5/2	100						Dark reddish brown mucky peat
15-18	5YR 6/1	100						gray clay, plastic
18	5YR 4/6	100						yellowish red impermeable ironstone layer

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: impermeable ironstone layer

Depth (inches): 18

Hydric Soil Present? Yes X No ___

Remarks: This soil has been listed as a hydric soil. The presence of a thick mucky layer confirms it.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No NO Depth (inches): ___

Water Table Present? Yes ___ No NO Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: This soil is saturated to the surface. It exhibits wetland hydrology.

4.a. Native ‘öhi’a forest with moss, sedges, grasses, ferns and shrubs

4.b. Mucky peat over gray plastic clay over an impermeable ironstone layer

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 1130
Applicant/Owner: County of Maui State/Terr.: Hawaii Island: Maui Sampling Point: 5
Investigator(s): Robert W. Hobdy TMK/Parcel: (2) 2-4-16:04 (por)
Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex
Lat: 20.8092° N Long: 156.2223° W Datum: Slope (%): 16
Soil Map Unit Name: Amalu peaty silty clay, 3-20% Slopes NWI classification: hydric, PFO3F
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation Yes, Soil Yes, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No
Hydric Soil Present?	Yes X	No
Wetland Hydrology Present?	Yes X	No

Is the Sampled Area within a Wetland? Yes X No

Remarks: This plot has positive wetland indicators in each of the three parameters and is thus determined to be a wetland. The 10 foot wide corridor is maintained free of trees and shrubs and is bordered by a dense native cloud forest.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	40	Yes	FAC
2. Cibotium glaucum	5	No	FAC
3. Cibotium menziesii	2	No	FACU
4.			
5.			
	47 = Total Cover		

Sapling/Shrub Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Cheirodendron trigynum	15	Yes	FAC
2. Metrosideros polymorpha	10	Yes	FAC
3. Vaccinium calycinum	5	No	FAC
4. Leptecophylla tameiameiae	5	No	FAC
5. Broussaisia arguta	3	No	FAC
	38 = Total Cover		

Herb Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juncus planifolius	15	Yes	FACW
2. Deschampsia nubigena	10	Yes	FAC
3. Carex alligata	10	Yes	FACW
4. Lycopodiella cernua	1	No	FAC
5. Astelia menziesii	1	No	FACU
6. Hypolepis hawaiiensis	1	No	FACU
7. Hypericum mutilum	1	No	FACW
8. Dryopteris glabra	1	No	FAC
	40 = Total Cover		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
	= Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	27	x 2 =	54
FAC species	95	x 3 =	285
FACU species	3	x 4 =	12
UPL species	0	x 5 =	0
Column Totals:	125 (A)		351 (B)

Prevalence Index = B/A = 2.81

Hydrophytic Vegetation Indicators:
No 1 - Rapid Test for Hydrophytic Vegetation
Yes 2 - Dominance Test is >50%
Yes 3 - Prevalence Index is ≤3.0[1]
___ Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: The vegetation passes the Dominance Test and the Prevalence Test and is clearly hydrophytic.

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	5YR 3/1	100						very dark gray mucky peat
2-5	5YR 3/2	100						dark reddish brown mucky peat
5-8	5YR 5/1	100						gray clay, plastic
8	5YR 4/6	100						yellowish-red impermeable ironstone layer

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: impermeable ironstone layer

Depth (inches): 8

Hydric Soil Present? Yes X No ___

Remarks: This soil has been listed as a hydric soil. The presence of a thick mucky layer confirms it.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No No Depth (inches): ___

Water Table Present? Yes ___ No No Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes Yes No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes ___ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The soil is saturated to the surface. The soil exhibits wetland hydrology.

5.a. Native ‘öhi’a forest with moss, sedges, ferns and shrubs

5.b. Peaty muck over gray plastic clay over a shallow impermeable ironstone layer

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 1215

Applicant/Owner: County of Maui State/Terr. Hawaii Island: Maui Sampling Point: 6

Investigator(s): Robert W. Hobby TMK/Parcel: (2) 2-4-16:04 (por.)

Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex

Lat: 20.8094° N Long: 156.2225° W Datum: _____ Slope (%): 16

Soil Map Unit Name: Amalu peaty silty clay, 3-20% slopes NWI classification: hydric, PRO3F

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____
Hydric Soil Present?	Yes X	No _____
Wetland Hydrology Present?	Yes X	No _____

Is the Sampled Area within a Wetland? Yes X No _____

Remarks: This plot has positive wetland indicators in each of the three parameters and is thus determined to be a wetland. The 10 foot wide flume corridor is maintained free of trees and shrubs and is bordered by a dense native cloud forest.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	30	Yes	FAC
2. Cheirodendron trigynum	20	Yes	FAC
3. Cibotium glaucum	10	No	FAC
4. Cibotium menziesii	5	No	FACU
5.			
	65	= Total Cover	

Sapling/Shrub Stratum (Plot size: 30 ft. radius)			
1. Metrosideros polymorpha	10	Yes	FAC
2. Vaccinium calycinum	15	Yes	FAC
3. Melicope clusiifolia	10	Yes	FAC
4. Leptecophylla tameiameiae	10	Yes	FAC
5. Broussaisia arguta	5	No	FAC
	50	= Total Cover	

Herb Stratum (Plot size: 30 ft. radius)			
1. Dicranopteris linearis	15	Yes	FACU
2. Hedychium gardnerianum	8	Yes	FACU
3. Lycopodiella cernua	5	No	FAC
4. Carex alligata	4	No	FACW
5. Deschampsia nubigena	3	No	FAC
6. Cibotium menziesii	3	No	FACU
7. Dryopteris glabra	2	No	FAC
8. Coprosma granadensis	1	No	FACU
	41	= Total Cover	

Woody Vine Stratum (Plot size: _____)			
1.			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	13	x 2 =	26
FAC species	120	x 3 =	360
FACU species	23	x 4 =	92
UPL species	0	x 5 =	0
Column Totals:	156 (A)		478 (B)

Prevalence Index = B/A = 3.06

Hydrophytic Vegetation Indicators:

No 1 - Rapid Test for Hydrophytic Vegetation

Yes 2 - Dominance Test is >50%

No 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:
The vegetation passes the Dominance Test and is found to be hydrophytic.

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	5YR 3/2	100						dark reddish brown mucky peat
6-8	5YR 6/1	100						light gray clay, plastic
8	5YR 4/6	100						yellowish-red impermeable ironstone layer

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: impermeable ironstone layer

Depth (inches): 8

Hydric Soil Present? Yes X No ___

Remarks: This soil has been listed as a hydric soil. The presence of a thick mucky layer confirms it.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 3

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: This plot with saturated soil exhibits wetland hydrology.

6.a. Native ‘öhi’a forest with moss, grasses, ferns and shrubs

6.b. Mucky peat over gray plastic clay over a shallow impermeable ironstone layer

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 1300
Applicant/Owner: County of Maui State/Terr. Hawaii Island: Maui Sampling Point: 7
Investigator(s): Robert W. Hobdy TMK/Parcel: (2) 2-4-16:04 (Por)
Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex
Lat: 20-8074° N Long: 156.2225° W Datum: Slope (%): 16
Soil Map Unit Name: Amalo peaty silty clay, 3-20% Slopes NWI classification: hydric, PFO3F
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation Yes, Soil Yes, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks: The plot has positive wetland indicators in each of the three parameters and is thus determined to be a wetland. The 40 foot wide flume corridor is maintained free of trees and shrubs and is bordered by a dense native cloud forest.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	30	Yes	FAC
2. Cheirodendron trigynum	15	NO	FAC
3. Cibotium menziesii	3	NO	FACU
4.			
5.			
	48 = Total Cover		

Sapling/Shrub Stratum (Plot size: 30 ft. radius)			
1. Metrosideros polymorpha	30	Yes	FAC
2. Leptecophylla tameiameiae	8	NO	FAC
3. Melicope clusiifolia	5	NO	FAC
4. Broussaisia arguta	2	NO	FAC
5.			
	45 = Total Cover		

Herb Stratum (Plot size: 30 ft. radius)			
1. Juncus planifolius	35	Yes	FACW
2. Dicranopteris linearis	3	NO	FACU
3. Deschampsia nubigena	2	NO	FAC
4. Hypericum mutilum	2	NO	FACW
5. Dryopteris glabra	2	NO	FAC
6. Carex alligata	2	NO	FACW
7. Sadleria pallida	1	NO	FAC
8. Dryopteris wallichiana	1	NO	FACU
	48 = Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	39	x 2 = 78
FAC species	95	x 3 = 285
FACU species	7	x 4 = 28
UPL species	0	x 5 = 0
Column Totals:	141 (A)	391 (B)

Prevalence Index = B/A = 2.77

Hydrophytic Vegetation Indicators:

NO 1 - Rapid Test for Hydrophytic Vegetation
Yes 2 - Dominance Test is >50%
Yes 3 - Prevalence Index is ≤3.0[1]
__ Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: The vegetation passes the Dominance Test and the Prevalence Test and is found to be hydrophytic.

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	5YR 3/1	100						Very dark gray mucky peat
4-10	5YR 6/1	100						light gray clay, plastic
10	5YR 4/6	100						yellowish red impermeable ironstone layer

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: impermeable ironstone layer

Depth (inches): 10

Hydric Soil Present? Yes X No ___

Remarks: This soil has been listed as a hydric soil. The presence of a thick layer of muck confirms it.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 2

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

This plot with saturated soil exhibits positive wetland hydrology.

7.a. Native ‘öhi’a forest over moss, sedges, ferns and shrubs

7.b. Mucky peat over gray plastic clay over a shallow impermeable ironstone layer

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 1345
Applicant/Owner: County of Maui State/Terr.: Hawaii Island: Maui Sampling Point: 8
Investigator(s): Robert W. Hobdy TMK/Parcel: (2) 2-4-16:04 (Por)
Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex
Lat: 20-8068° N Long: 156.2220° W Datum: Slope (%): 16
Soil Map Unit Name: Amalu peaty silty clay, 3-30 % slopes NWI classification: hydric, PFO3F
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation Yes, Soil Yes, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No
Hydric Soil Present?	Yes X	No
Wetland Hydrology Present?	Yes X	No

Is the Sampled Area within a Wetland? Yes X No

Remarks: This plot has positive wetland indicators in each of the three parameters and is thus determined to be a wetland. The 10 foot wide flume corridor is maintained free of trees and shrubs and is bordered by a dense native cloud forest.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	40	Yes	FAC
2. Cheirodendron trigynum	20	Yes	FAC
3. Cibotium menziesii	5	No	FACU
4.			
5.			
	65	= Total Cover	

Sapling/Shrub Stratum (Plot size: 30 ft. radius)			
1. Metrosideros polymorpha	20	Yes	FAC
2. Leptecophylla tameiameiae	5	No	FAC
3. Melicope clusiifolia	5	No	FAC
4. Vaccinium calycinum	5	No	FAC
5.			
	35	= Total Cover	

Herb Stratum (Plot size: 30 ft. radius)			
1. Juncus planifolius	30	Yes	FACU
2. Dicranopteris linearis	20	Yes	FACU
3. Deschampsia nubigena	2	No	FAC
4. Hypericum mutilum	2	No	FACW
5. Astelia menziesii	1	No	FACU
6. Dryopteris glabra	1	No	FAC
7. Coprosma granadensis	1	No	FACU
8. Hymenophyllum lanceolatum	1	No	FAC
	58	= Total Cover	

Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	34	x 2 = 68
FAC species	99	x 3 = 297
FACU species	25	x 4 = 100
UPL species	0	x 5 = 0
Column Totals:	158 (A)	465 (B)

Prevalence Index = B/A = 2.94

Hydrophytic Vegetation Indicators:

No 1 - Rapid Test for Hydrophytic Vegetation
Yes 2 - Dominance Test is >50%
Yes 3 - Prevalence Index is ≤3.0[1]
— Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks:
The vegetation passes the Dominance Test and the Prevalence Test and is found to be hydrophytic.

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 7/3	100						Light gray clay, plastic
10	5YR 4/6	100						yellowish-red impermeable ironstone layer

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: impermeable ironstone layer

Depth (inches): 10

Hydric Soil Present? Yes X No ___

Remarks: This soil has been listed as a hydric soil. This light gray, saturated clay lying over a shallow impermeable ironstone layer creates an obviously hydric soil.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

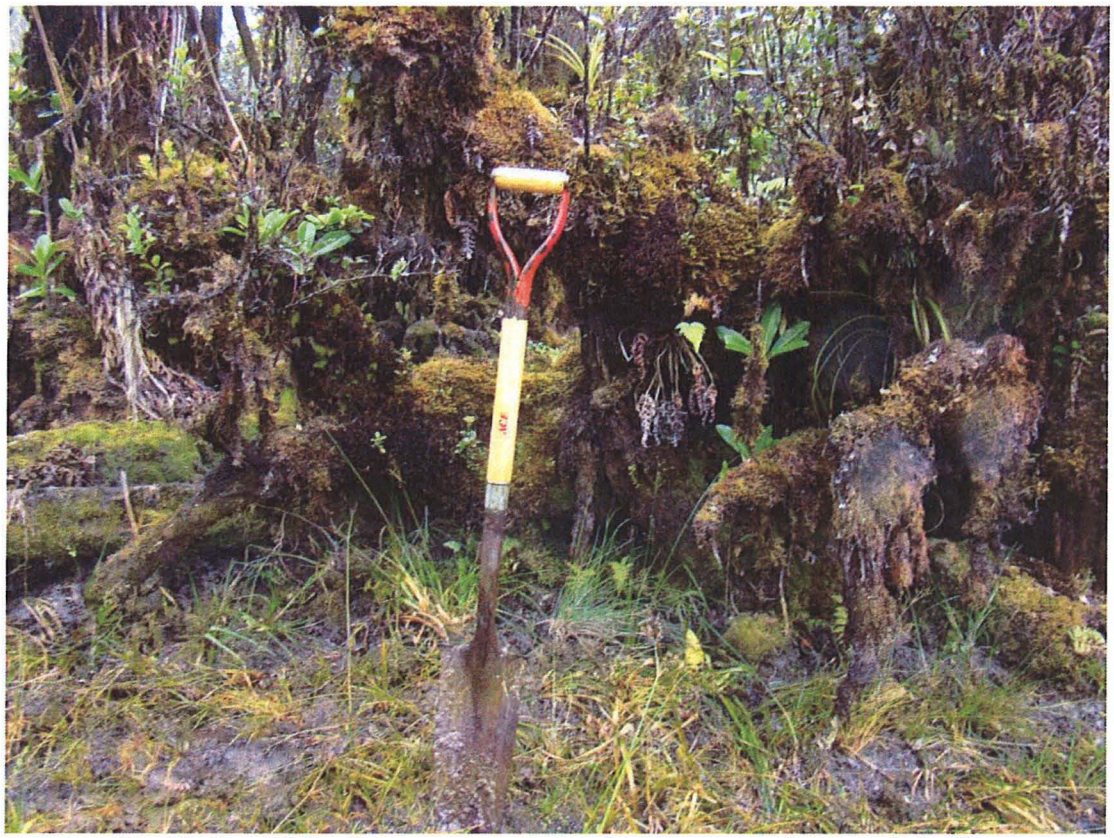
Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

This plot with its saturated, plastic clay soil exhibits wetland hydrology.



8.a. Native ‘öhi’a forest over moss, sedges, grasses, ferns and shrubs

8.b. Gray plastic clay over a shallow impermeable ironstone layer

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 1430
Applicant/Owner: County of Maui State/Terr: Hawaii Island: Maui Sampling Point: 9
Investigator(s): Robert W. Hobdy TMK/Parcel: (2) 2-4-16:04 (Por.)
Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex
Lat: 20.8064°N Long: 156.2216°W Datum: Slope (%): 16
Soil Map Unit Name: Amalu peaty silty clay, 3-20% Slopes NWI classification: hydric, PFO3F
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation Yes, Soil Yes, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks: This plot has positive wetland indicators in each of the three parameters and is thus determined to be a wetland. The 10 foot wide flume corridor is maintained free of trees and shrubs and is bordered by a dense native cloud forest.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	35	Yes	FAC
2.			
3.			
4.			
5.			
	35 = Total Cover		

Sapling/Shrub Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Cheirodendron trigynum	10	Yes	FAC
2. Leptecophylla tameiameiae	8	Yes	FAC
3. Vaccinium calycinum	5	No	FAC
4.			
5.			
	23 = Total Cover		

Herb Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juncus planifolius	45	Yes	FACW
2. Deschampsia nubigena	20	Yes	FAC
3. Carex alligata	15	No	FACW
4. Diplazopteris linearis	10	No	FACU
5. Broussaisia arguta	1	No	FAC
6. Erechtites valerianifolia	1	No	FAC
7. Rubus glaucus	1	No	UPL
8.			
	93 = Total Cover		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
	= Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	60	x 2 =	120
FAC species	80	x 3 =	240
FACU species	10	x 4 =	40
UPL species	1	x 5 =	5
Column Totals:	151 (A)		405 (B)

Prevalence Index = B/A = 2.68

Hydrophytic Vegetation Indicators:
No 1 - Rapid Test for Hydrophytic Vegetation
Yes 2 - Dominance Test is >50%
Yes 3 - Prevalence Index is ≤3.0[1]
__ Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: The vegetation passes the Dominance Test and the Prevalence Test and is found to be hydrophytic.

SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	5YR 3/1	100						Very dark gray mucky peat
8-18	5YR 3/1	100						Very dark gray sapric muck

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks: This soil has been listed as a hydric soil. The presence of a thick layer of muck confirms it.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 2

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

This plot with its abundance of sapric muck exhibits wetland hydrology.

9.a. Native ‘öhi’a forest over moss, sedges, grasses, ferns and shrubs

9.b. Dark gray mucky peat over deep, dark gray sapric muck

WETLAND DETERMINATION DATA FORM – Hawai'i and Pacific Islands

Project/Site: Waikamoi Flume Project City: Makawao Sampling Date: 5-17-11 Time: 1515
Applicant/Owner: County of Maui State/Terr.: Hawaii Island: Maui Sampling Point: 10
Investigator(s): Robert W. Hobdy TMK/Parcel: (2)2-4-16:04 (Por.)
Landform (hillslope, coastal plain, etc.): Hillslope Local relief (concave, convex, none): Convex
Lat: 20.8063° N Long: 156.2210° W Datum: _____ Slope (%): 16
Soil Map Unit Name: Amalu peaty silty clay, 3-20% Slopes NWI classification: hydric, PFO3F
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation Yes, Soil Yes, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation No Soil No or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____
Hydric Soil Present?	Yes X	No _____
Wetland Hydrology Present?	Yes X	No _____

Is the Sampled Area within a Wetland? Yes X No _____

Remarks: This plot has positive wetland indicators in each of the three parameters and is thus determined to be a wetland. The 10 foot wide corridor is maintained free of trees and shrubs and is bordered by a dense native cloud forest.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Metrosideros polymorpha	40	Yes	FAC
2. Cibotium menziesii	10	No	FACU
3.			
4.			
5.			
	50	= Total Cover	

Sapling/Shrub Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Cheirodendron trigynum	5	Yes	FAC
2. Vaccinium calycinum	5	Yes	FAC
3. Melicope clusiifolia	3	No	FAC
4. Leptecophylla tameiameiae	3	No	FAC
5. Broussaisia arguta	1	No	FAC
	17	= Total Cover	

Herb Stratum (Plot size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juncus planifolius	15	Yes	FACW
2. Deschampsia nubigena	12	Yes	FAC
3. Sticherus owhyhensis	5	No	FACU
4. Lycopodiella cernua	3	No	FAC
5. Dryopteris glabra	3	No	FAC
6. Hypericum mutilum	2	No	FACW
7. Sadleria pallida	1	No	FAC
8. Diplazium sandwichianum	1	No	FAC
	42	= Total Cover	

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
	_____	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	17	x 2 =	34
FAC species	77	x 3 =	231
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	109 (A)		325 (B)

Prevalence Index = B/A = 2.98

Hydrophytic Vegetation Indicators:

No 1 - Rapid Test for Hydrophytic Vegetation
Yes 2 - Dominance Test is >50%
Yes 3 - Prevalence Index is ≤3.0[1]
__ Problematic Hydrophytic Vegetation[1] (Explain in Remarks or in the delineation report)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: The vegetation passes the Dominance Test and the Prevalence Test and is found to be hydrophytic.

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	5YR 3/1	100						Very dark gray mucky peat
8	5YR 4/6	100						yellowish-red impermeable ironstone layer

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Muck Presence (A8)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Dark Surface (S7)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Stratified Layers (A5)
- ___ Sandy Mucky Mineral (S1)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: impermeable ironstone layer

Depth (inches): 8

Hydric Soil Present? Yes X No ___

Remarks: This soil has been listed as a hydric soil. The presence of a thick layer of muck confirms it.

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Tilapia Nests (B17)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: This plot with an abundance of saturated muck exhibits wetland hydrology.

10.a. Native ‘öhi’a forest over moss, grasses, ferns and shrubs

10.b. Highly saturated mucky peat over a shallow impermeable ironstone layer

APPROVED JURISDICTIONAL DETERMINATION FORMS

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 1. Tributary of Waikamoi Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8090° N, Long. -156.2238° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Waikamoi Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** *"waters of the U.S."* within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 3,600 linear feet: 6 width (ft) and/or acres.
   Wetlands: 29 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known):2 Feet.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **Not applicable.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": Not applicable.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: This tributary maintains a constant trickle of water that seeps out from the soil from the adjacent palustrine forested hillslope wetland, but during frequent rainfall events it can run to a depth of 2 feet or more. This region averages 300 inches of rain per year that is distributed throughout the year.
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **3,600** linear feet **6** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **This wetland has no clear boundaries as strong wetland indicators run seamlessly into the tributary.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **29** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad, Scale 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name:Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):accompanying wetland delineation, May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

1.a. Rough rocky perennial stream bed, orange OHWM on rocks

1.b. Orange OHWM on trestle pier and rocks

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 2. Tributary of Waikamoi Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8090° N, Long. -156.2233° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Waikamoi Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   ☐ TNWs, including territorial seas
   ☐ Wetlands adjacent to TNWs
   ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   ☐ Non-RPWs that flow directly or indirectly into TNWs
   ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   ☐ Impoundments of jurisdictional waters
   ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 2,060 linear feet: 12 width (ft) and/or acres.
   Wetlands: 17 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known): 0.5 feet.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **Not applicable.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": Not applicable.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) General Area Conditions:
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

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[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: This tributary maintains a constant trickle of water that seeps out from the soil from the adjacent palustrine forested hillslope wetland, but during frequent rainfall events it can run to a depth of 2 feet or more. This region averages 300 inches of rain per year that is distributed throughout the year.
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **2,060** linear feet **12** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **This wetland has no clear boundaries as strong wetland indicators run seamlessly into the tributary.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **17** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .

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[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad, scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name:Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):accompanying wetland delineation, May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

2.a. Perennial streambed from above with sedges and shrubs

2.b. Orange OHWM on trestle pier

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource #3. Tributary of Puohokamoa Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8092° **N**, Long. -156.2231° **W**.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 2,200 linear feet: 3 width (ft) and/or acres.
   Wetlands: 15 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known): 1 foot.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **Not applicable.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": Not applicable.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: 15 **acres**
   Drainage area: 15 **acres**
   Average annual rainfall: 300 inches
   Average annual snowfall: 0 inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through **3** tributaries before entering TNW.

   Project waters are **5-10** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **5-10** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: Tributary to tributary to Puohokamoa Stream to TNW.
   Tributary stream order, if known: 3d.

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[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☒ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: 3 feet
Average depth: 1 feet
Average side slopes: **2:1.**

Primary tributary substrate composition (check all that apply):

☒ Silts	☐ Sands	☐ Concrete
☒ Cobbles	☐ Gravel	☐ Muck
☒ Bedrock	☒ Vegetation. Type/% cover: sedges, grasses & ferns/90%	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: stable.
Presence of run/riffle/pool complexes. Explain: n/a.
Tributary geometry: **Meandering**
Tributary gradient (approximate average slope): 16 %

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: runs for 3 - 10 days per flow event.
Other information on duration and volume: .

Surface flow is: **Discrete.** Characteristics: .

Subsurface flow: **Unknown.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☒ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☒ the presence of wrack line
☒ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☒ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☒ Discontinuous OHWM.[7] Explain:Terrain is irregular with steep gradient.

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: Water is clear, watershed is dense forest with moss and fern ground cover.
Identify specific pollutants, if known: .

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☒ Riparian corridor. Characteristics (type, average width): similar to surrounding forest boundary indistinct, use OHWM.
☐ Wetland fringe. Characteristics: .
☒ Habitat for:
  ☒ Federally Listed species. Explain findings: see III. B.2 iii below.
  ☐ Fish/spawn areas. Explain findings: .
  ☐ Other environmentally-sensitive species. Explain findings: .
  ☒ Aquatic/wildlife diversity. Explain findings: A few common native aquatic insects.

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:
Properties:
Wetland size:15acres
Wetland type. Explain:Palustrine forested hillslope wetland.
Wetland quality. Explain:generally good quality, some pig damage, some invasive weed species.
Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:
Flow is: **Intermittent flow**. Explain: Water flows everywhere on the surface through the forest during significant rainfall events..

Surface flow is: **Overland sheetflow**
Characteristics: Water seeps downslope throught the soil or runs across surface during frequent rainfall events..

Subsurface flow: **Yes**. Explain findings: Soil is permanently saturated and water seeps through it down slope continuously.
☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:
☒ Directly abutting
☐ Not directly abutting
  ☐ Discrete wetland hydrologic connection. Explain: .
  ☐ Ecological connection. Explain: .
  ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW
Project wetlands are **5-10** river miles from TNW.
Project waters are **5-10** aerial (straight) miles from TNW.
Flow is from: **Wetland to navigable waters.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: water is clear.
Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .
☒ Vegetation type/percent cover. Explain:Palustrine forested hillslope wetland, diverse metrosideros/fern forest.
☐ Habitat for:
  ☒ Federally Listed species. Explain findings: While not known to occur on this particular acreage, this native forest is habitat for two endangered birds, the 'akohekohe (Palmeria dolei) and the kiwikiu (Pseudonestor xanthophrys) and one plant, haha (Cyanea hamatiflora). Other endangered species are known to occur further afield in similar habitat on the windward slopes of East Maui.
  ☐ Fish/spawn areas. Explain findings: .
  ☐ Other environmentally-sensitive species. Explain findings: .
  ☒ Aquatic/wildlife diversity. Explain findings: very little. There is no standing water on the sloping forest floor.

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **1**
Approximately (15) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Yes	15		

Summarize overall biological, chemical and physical functions being performed: This small tributary and its adjacent wetland are in a natural cloud forest setting and are draining into streams and aquifers in a normal and healthy manner..

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☒ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: This tributary stops flowing for short periods between frequent rainfall events. Stream flow is compromised by a small stream intake that diverts water to the existing flume.

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **2,200** linear feet **3**width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☒ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: This wetland has no clear boundary as the strong wetland indicators run seamlessly into the tributary.

Provide acreage estimates for jurisdictional wetlands in the review area: **15** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

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[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad, scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name:Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):accompanying wetland delineation, May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

3.a. Orange OHWM on trestle pier and rocks

3.b. Densely vegetated stream bed with seasonal flow

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 4. Tributary of Puohokamoa Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8092° N, Long. -156.2229° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 1,000 linear feet: 4 width (ft) and/or acres.
   Wetlands: 10 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known):1.5 feet.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **Not applicable.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": Not applicable.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain: .
- ☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):
- ☐ Silts
- ☐ Sands
- ☐ Concrete
- ☐ Cobbles
- ☐ Gravel
- ☐ Muck
- ☐ Bedrock
- ☐ Vegetation. Type/% cover:
- ☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
- ☐ Dye (or other) test performed: .

Tributary has (check all that apply):
- ☐ Bed and banks
- ☐ OHWM[6] (check all indicators that apply):
  - ☐ clear, natural line impressed on the bank
  - ☐ changes in the character of soil
  - ☐ shelving
  - ☐ vegetation matted down, bent, or absent
  - ☐ leaf litter disturbed or washed away
  - ☐ sediment deposition
  - ☐ water staining
  - ☐ other (list):
  - ☐ the presence of litter and debris
  - ☐ destruction of terrestrial vegetation
  - ☐ the presence of wrack line
  - ☐ sediment sorting
  - ☐ scour
  - ☐ multiple observed or predicted flow events
  - ☐ abrupt change in plant community
- ☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
- ☐ High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- ☐ Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

---

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: This tributary maintains a constant trickle of water that seeps out from the soil from the adjacent palustrine forested hillslope wetland, but during frequent rainfall events it can run to a depth of 2 feet or more. This region averages 300 inches of rain per year that is distributed throughtou the year.
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **1,000** linear feet **4** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **This wetland has no clear boundaries as strong wetland indicators run seamlessly into the tributary.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **10** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .

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[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad, scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Foote et al, 1972..
☒ National wetlands inventory map(s). Cite name:Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):accompanying wetland delineation, May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

4.a. Densely vegetated perennial streambed with orange OHWM on rock and pipe

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 5. Tributary of Puohokamoa Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION: Puohokamoa Stream
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8092° N, Long. -156.2227° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 500 linear feet: 4 width (ft) and/or acres.
   Wetlands: 5 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known):1 foot.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **not applicable.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": not applicable.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: 5 **acres**
   Drainage area: 5 **acres**
   Average annual rainfall: 300 inches
   Average annual snowfall: 0 inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through **2** tributaries before entering TNW.

   Project waters are **5-10** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **5-10** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: Tributary to tributary to Puohokamoa Stream to TNW.
   Tributary stream order, if known: 3d.

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[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☒ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: 4 feet
Average depth: 1 feet
Average side slopes: **2:1.**

Primary tributary substrate composition (check all that apply):

☒ Silts	☐ Sands	☐ Concrete
☒ Cobbles	☐ Gravel	☐ Muck
☒ Bedrock	☒ Vegetation. Type/% cover: sedges, grasses & herbs / 70%	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: Stable.
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Meandering**
Tributary gradient (approximate average slope): 16 %

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: runs for 3 - 10 days per flow event.
Other information on duration and volume: .

Surface flow is: **Discrete.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☒ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☒ the presence of wrack line
☒ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☒ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☒ Discontinuous OHWM.[7] Explain:Terrain is irregular with steep gradient.

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: Water is clear, watershed in dense forest with moss and fern groundcover.
Identify specific pollutants, if known: .

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**

☒ Riparian corridor. Characteristics (type, average width): similar to surrounding forest, boundary indistinct, use OHWM.
☐ Wetland fringe. Characteristics: .
☒ Habitat for:
☒ Federally Listed species. Explain findings: see III. B.2. iii below.
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☒ Aquatic/wildlife diversity. Explain findings: A few common native aquatic insects.

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:
Properties:
Wetland size:5 acres
Wetland type. Explain:Palustrine forested hillslope wetland.
Wetland quality. Explain:generally good quality, some pig damage, some invasive weed species.
Project wetlands cross or serve as state boundaries. Explain: n/a.

(b) General Flow Relationship with Non-TNW:
Flow is: **Intermittent flow**. Explain: Water flows everywhere on the surface through the forest during significant rainfall events..

Surface flow is: **Overland sheetflow**
Characteristics: water flows everywhere on the surface through the forest during significant rainfall events.

Subsurface flow: **Yes**. Explain findings: The soil is permanently saturated and water seeps through it downslope continuously.
☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:
☒ Directly abutting
☐ Not directly abutting
☐ Discrete wetland hydrologic connection. Explain: .
☐ Ecological connection. Explain: .
☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW
Project wetlands are **5-10** river miles from TNW.
Project waters are **5-10** aerial (straight) miles from TNW.
Flow is from: **Wetland to navigable waters.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**
Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: water is clear.
Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**
☐ Riparian buffer. Characteristics (type, average width): .
☒ Vegetation type/percent cover. Explain:dense diverse metrosideros / fern forest.
☐ Habitat for:
☒ Federally Listed species. Explain findings:While not known to occur on this particular acreage, this native forest is habitat for two endangered birds, the 'akohekohe (Palmeria dolei) and the kiwikiu (Pseudonestor xanthophrys) and one plant; haha (Cyanea hamatiflora). Other endangered species are known to occur further afield in similar habitat on the windward slopes of East Maui.
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☒ Aquatic/wildlife diversity. Explain findings:very little. There is no standing water on the sloping forest floor.

3. **Characteristics of all wetlands adjacent to the tributary (if any)**
All wetland(s) being considered in the cumulative analysis: **1**
Approximately (5) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Yes	5		

Summarize overall biological, chemical and physical functions being performed: This small tributary and its adjacent wetland are in a natural cloud forest setting and are draining into streams and aquifers in a normal and healthy manner.

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☒ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: This tributary stops flowing for short periods between frequent rainfall events. Stream flow is compromised by a small stream intake that diverts water to the existing flume.

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **500** linear feet **4** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☒ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: This wetland has no clear boundary as the strong wetland indicators run seamlessly into the tributary.

Provide acreage estimates for jurisdictional wetlands in the review area: **5** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: **5** acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

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[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad, scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name:Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):accompanying wetland delineation, May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

5.a. Stream with seasonal flow. Flume and intake pipe with orange OHWM on rocks

5.b. Flume and intake pipes with orange OHWM on rocks

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 6. Tributary of Puohokamoa Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8093° N, Long. -156.2224° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 150 linear feet: 60 width (ft) and/or acres.
   Wetlands: 1 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Not established at this time.**
   Elevation of established OHWM (if known):0.5 feet, standing water (swamp).

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **not applicable.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": not applicable.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) General Area Conditions:
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: This is a small swamp at the headwaters of a small tributary. It has a 60 feet wide area with 0.5 feet of standing water that drains into a small tributary.
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **The whole forest is a wetland that seamlessly grades into the swamp that initiates a small tributary.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **1** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

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[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: 150 linear feet 60 width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☒ Wetlands: 1 acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad, scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name:Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):accompanying wetland delineation, May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

6.a. Broad swamp with standing water that feeds a perennial tributary headwater, no OHWM

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 7. Tributary of Puohokamoa Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8072° N, Long. -156.2225° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 450 linear feet: 6 width (ft) and/or acres.
   Wetlands: 4 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known): 1 foot.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **N/A.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": N/A.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: 4 **acres**
   Drainage area: 4 **acres**
   Average annual rainfall: 300 inches
   Average annual snowfall: 0 inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through **2** tributaries before entering TNW.

   Project waters are **5-10** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **5-10** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: Tributary to Puohokamoa Stream to TNW.
   Tributary stream order, if known: 2nd.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☒ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: 6 feet
Average depth: 1 feet
Average side slopes: **2:1.**

Primary tributary substrate composition (check all that apply):

☒ Silts	☐ Sands	☐ Concrete
☒ Cobbles	☐ Gravel	☐ Muck
☒ Bedrock	☒ Vegetation. Type/% cover: grasses, sedges & moss / 50%	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: stable.
Presence of run/riffle/pool complexes. Explain: n/a.
Tributary geometry: **Meandering**
Tributary gradient (approximate average slope): 16 %

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: flows for 3 - 10 days per flow event.
Other information on duration and volume: .

Surface flow is: **Discrete.** Characteristics: .

Subsurface flow: **Unknown.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☒ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☒ the presence of wrack line
☒ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☒ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☒ Discontinuous OHWM.[7] Explain:Terrain is irregular with a steep gradient.

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: Water is clear, watershed in dense forest with moss and fern groundcover.
Identify specific pollutants, if known: .

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☒ Riparian corridor. Characteristics (type, average width): similar to surrounding forest, 6 feet width. Boundary indistinct use OHWM.

☐ Wetland fringe. Characteristics: .

☒ Habitat for:

☒ Federally Listed species. Explain findings: see III. B. 2. iii below.

☐ Fish/spawn areas. Explain findings: .

☐ Other environmentally-sensitive species. Explain findings: .

☒ Aquatic/wildlife diversity. Explain findings: a few common native aquatic insects.

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: 4 acres

Wetland type. Explain: Palustrine forested hillslope wetland.

Wetland quality. Explain: Generally good quality, some pig damage, some invasive weed species.

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Perennial flow**. Explain: Water flows everywhere on the surface through the forest during significant rainfall events..

Surface flow is: **Overland sheetflow**

Characteristics: water flows everywhere on the surface through the forest during significant rainfall events.

Subsurface flow: **Yes**. Explain findings: The soil is permanently saturated and water seeps through it downslope continuously.

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

☒ Directly abutting

☐ Not directly abutting

☐ Discrete wetland hydrologic connection. Explain: .

☐ Ecological connection. Explain: .

☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **5-10** river miles from TNW.

Project waters are **5-10** aerial (straight) miles from TNW.

Flow is from: **Wetland to navigable waters.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: Water is clear.

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .

☒ Vegetation type/percent cover. Explain: desnse, diverse Metrosideros / fern forest.

☐ Habitat for:

☒ Federally Listed species. Explain findings:While not known to occur on this particular acreage, this native forest is habitat for two endangered birds, the 'akohekohe (Palmeria dolei) and the kiwikiu (Pseudonestor xanthophrys) and one plant, haha (Cyanea hamatiflora). Other endangered species are known to occur further afield in similar habitat on the windward slopes of East Maui.

☐ Fish/spawn areas. Explain findings: .

☐ Other environmentally-sensitive species. Explain findings: .

☒ Aquatic/wildlife diversity. Explain findings:very little. There is no standing water on the sloping forest floor.

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **1**

Approximately (4) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Yes	4		

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☒ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: This tributary stops flowing for short periods between frequent rainfall events. Stream flow is compromised by a small stream intake that diverts water to the existing flume.

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **450** linear feet **6** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☒ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: This wetland has no clear boundary as the strong wetland indicators run seamlessly into the tributary.

Provide acreage estimates for jurisdictional wetlands in the review area: **4** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: Kilohana Quad, Scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name: Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date): accompanying wetland delineation, May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

7.a. Streambed with seasonal flow, orange OHWM on rocks

7.b. Orange OHWM on rocks

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 8. Tributary of Puohokamoa Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8071° N, Long. -156.2223° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 750 linear feet: 8 width (ft) and/or acres.
   Wetlands: 6 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known): 1 foot.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: N/A.

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": N/A.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: 6 **acres**
   Drainage area: 6 **acres**
   Average annual rainfall: 300 inches
   Average annual snowfall: 0 inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through **2** tributaries before entering TNW.

   Project waters are **5-10** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **5-10** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: Tributary to Puohokamoa Stream to TNW.
   Tributary stream order, if known: 2nd.

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[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☒ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: 8 feet
Average depth: 1 feet
Average side slopes: **2:1.**

Primary tributary substrate composition (check all that apply):

☒ Silts	☐ Sands	☐ Concrete
☒ Cobbles	☐ Gravel	☐ Muck
☒ Bedrock	☒ Vegetation. Type/% cover: mixed sedges, grasses, shrubs & ferns / 80%	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: stable.
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Meandering**
Tributary gradient (approximate average slope): 16 %

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: runs for 3 - 10 days per flow event.
Other information on duration and volume: .

Surface flow is: **Discrete.** Characteristics: .

Subsurface flow: **Unknown.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☒ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☒ the presence of wrack line
☒ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☒ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☒ Discontinuous OHWM.[7] Explain: Terrain is irregular with a steep gradient.

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: Water clear, watershed in dense forest with moss and fern groundcover.
Identify specific pollutants, if known: .

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**

☒ Riparian corridor. Characteristics (type, average width): boundary indistinct, use OHWM.
☐ Wetland fringe. Characteristics: .
☒ Habitat for:
☒ Federally Listed species. Explain findings: see III. B. 2. iii below.
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☒ Aquatic/wildlife diversity. Explain findings: a few common native aquatic insects.

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:
Properties:
Wetland size: 6 acres
Wetland type. Explain: Palustrine forested hillslope wetland.
Wetland quality. Explain: Generally good quality, some pig damage, some invasive weed species.
Project wetlands cross or serve as state boundaries. Explain: n/a.

(b) General Flow Relationship with Non-TNW:
Flow is: **Intermittent flow**. Explain: Water flows everywhere on the surface through the forest during significant rainfall events..

Surface flow is: **Overland sheetflow**
Characteristics: Water seeps downslope through the soil or runs across surface during frequent rainfall events.

Subsurface flow: **Yes**. Explain findings: Soil is permanently saturated and water seeps through it down slope continuously.
☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:
☒ Directly abutting
☐ Not directly abutting
☐ Discrete wetland hydrologic connection. Explain: .
☐ Ecological connection. Explain: .
☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW
Project wetlands are **5-10** river miles from TNW.
Project waters are **5-10** aerial (straight) miles from TNW.
Flow is from: **Wetland to navigable waters.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**
Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: water is clear.
Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

☐ Riparian buffer. Characteristics (type, average width): .
☒ Vegetation type/percent cover. Explain:dense diverse Metrosideros / fern forest.
☒ Habitat for:
☒ Federally Listed species. Explain findings:While not known to occur on this particular acreage, this native forest is habitat for two endangered birds, the 'akohekohe (Palmeria dolei) and the kiwikiu (Pseudonestor xanthophrys) and one plant; haha (Cyanea hamatiflora). Other endangered species are known to occur further afield in similar habitat on the windward slopes of East Maui.
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☒ Aquatic/wildlife diversity. Explain findings:very little. There is no standing water on the sloping forest floor.

3. **Characteristics of all wetlands adjacent to the tributary (if any)**
All wetland(s) being considered in the cumulative analysis: **1**
Approximately (6) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Yes	6		

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☒ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: This tributary stops flowing for short periods between frequent rainfall events. Stream flow is compromised by a small stream intake that diverts water to the existing flume .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **750** linear feet **8** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☒ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: This wetland has no clear boundary as the strong wetland indicators run seamlessly into the tributary.

Provide acreage estimates for jurisdictional wetlands in the review area: **6** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

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[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name: Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):Accompanying Wetland Delineation May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

8.a. Streambed with seasonal flow, orange OHWM on trestle pier

8.b. Orange OHWM on rocks

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 9. Tributary of Puohokamoa Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8069° N, Long. -156.2221° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 3,750 linear feet: 8 width (ft) and/or acres.
   Wetlands: 40 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known):1.5 feet.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **N/A.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": N/A.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

---

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain: .
- ☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):
- ☐ Silts
- ☐ Cobbles
- ☐ Bedrock
- ☐ Other. Explain: .
- ☐ Sands
- ☐ Gravel
- ☐ Vegetation. Type/% cover:
- ☐ Concrete
- ☐ Muck

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
- ☐ Dye (or other) test performed: .

Tributary has (check all that apply):
- ☐ Bed and banks
- ☐ OHWM[6] (check all indicators that apply):
  - ☐ clear, natural line impressed on the bank
  - ☐ changes in the character of soil
  - ☐ shelving
  - ☐ vegetation matted down, bent, or absent
  - ☐ leaf litter disturbed or washed away
  - ☐ sediment deposition
  - ☐ water staining
  - ☐ other (list):
  - ☐ the presence of litter and debris
  - ☐ destruction of terrestrial vegetation
  - ☐ the presence of wrack line
  - ☐ sediment sorting
  - ☐ scour
  - ☐ multiple observed or predicted flow events
  - ☐ abrupt change in plant community
- ☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
- ☐ High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- ☐ Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

---

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: This tributary maintains a constant trickle of water that seeps out from the soil from the adjacent palustrine forested hillslope wetland, but during frequent rainfall events it can run to a depth of 2 feet or more. This region averages 300 inches of rain per year that is distributed throughout the year.
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: **3,750** linear feet **8** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **This wetland has no clear boundaries as strong wetland indicators run seamlessly into the tributary.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **40** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .

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[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad scale; 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name: Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):Accompanying Wetland Delineation May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

9.a. Stream perennial, orange OHWM on trestle pier and rocks

9.b. Orange OHWM on rocks

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 10. Tributary of Puohokamoa Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State: Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8068° N, Long. -156.2219° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Puohokamoa
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** *"waters of the U.S."* within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   ☐ TNWs, including territorial seas
   ☐ Wetlands adjacent to TNWs
   ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   ☐ Non-RPWs that flow directly or indirectly into TNWs
   ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   ☐ Impoundments of jurisdictional waters
   ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 900 linear feet: 12 width (ft) and/or acres.
   Wetlands: 6 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known): 1.5 feet.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **Not applicable.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": Not applicable.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

---

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List.** Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: This tributary maintains a constant trickle of water that seeps out from the soil from the adjacent palustrine forested hillslope wetland, but during frequent rainfall events it can run to a depth of 2 feet or more. This region averages 300 inches of rain per year that is distributed throughout the year.
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **3,600** linear feet **6** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **This wetland has no clear boundaries as strong wetland indicators run seamlessly into the tributary.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **29** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .

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[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad, Scale 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name:Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):accompanying wetland delineation, May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

10.a. Stream perennial, orange OHWM on rocks and trestle piers

10.b. Orange OHWM on rocks and trestle pier

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 11. Tributary of Puohokamoa Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8066° N, Long. -156.2218° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Puohokamoa Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   ☐ TNWs, including territorial seas
   ☐ Wetlands adjacent to TNWs
   ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   ☐ Non-RPWs that flow directly or indirectly into TNWs
   ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   ☐ Impoundments of jurisdictional waters
   ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 500 linear feet: 8 width (ft) and/or acres.
   Wetlands: 4 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known): 1 foot.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **N/A.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": n/a.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: This tributary maintains a constant trickle of water that seeps out from the soil from the adjacent palustrine forested hillslope wetland, but during frequent rainfall events it can run to a depth of 2 feet or more. This region averages 300 inches of rain per year that is distributed throughout the year.
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **500** linear feet **8** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **This wetland has no clear boundaries as strong wetland indicators run seamlessly into the tributary.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **4** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name: Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):Accompanying Wetland Delination May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

11.a. Stream perennial, orange OHWM on rocks

11.b. Orange OHWM on trestle piers

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 12. Tributary of Haipuaena Stream

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8065° N, Long. -156.2216° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Haipuaena Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 1,100 linear feet: 6 width (ft) and/or acres.
   Wetlands: 10 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known): 0.5 feet.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **n/a.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": n/a.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: This tributary maintains a constant trickle of water that seeps out from the soil from the adjacent palustrine forested hillslope wetland, but during frequent rainfall events it can run to a depth of 2 feet or more. This region averages 300 inches of rain per year that is distributed throughout the year.
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **1,100** linear feet **6** width (ft).
☒ Other non-wetland waters: **10** acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **This wetland has no clear boundaries as strong wetland indicators run seamlessly into the tributary.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **10** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name: Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):accompanying Wetland Delineation May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

12.a. Stream perennial, orange OHWM on rocks and trestle piers

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:
Waikamoi Timber Flume Replacement, Aquatic Resource 13. Tributary of Haipuaena Stream.

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State:Hawaii County/parish/borough: Maui City: Makawao
Center coordinates of site (lat/long in degree decimal format): Lat. 20.8063° N, Long. -156.2214° W.
Universal Transverse Mercator: UTM Zone 4 NAD 83
Name of nearest waterbody: Haipuaena Stream
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 1,300 linear feet: 8 width (ft) and/or acres.
   Wetlands: 12 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
   Elevation of established OHWM (if known): 1.5 feet.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **n/a.**

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": n/a.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):
☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank
☐ changes in the character of soil
☐ shelving
☐ vegetation matted down, bent, or absent
☐ leaf litter disturbed or washed away
☐ sediment deposition
☐ water staining
☐ other (list):
☐ the presence of litter and debris
☐ destruction of terrestrial vegetation
☐ the presence of wrack line
☐ sediment sorting
☐ scour
☐ multiple observed or predicted flow events
☐ abrupt change in plant community
☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by:
☐ oil or scum line along shore objects
☐ fine shell or debris deposits (foreshore)
☐ physical markings/characteristics
☐ tidal gauges
☐ other (list):
☐ Mean High Water Mark indicated by:
☐ survey to available datum;
☐ physical markings;
☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

---

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: This tributary maintains a constant trickle of water that seeps out from the soil from the adjacent palustrine forested hillslope wetland, but during frequent rainfall events it can run to a depth of 2 feet or more. This region averages 300 inches of rain per year that is distributed throughout the year.
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **1,300** linear feet **8** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **This wetland has no clear boundaries as strong wetland indicators run seamlessly into the tributary.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **12** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .

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[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Kilohana Quad scale: 1/24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Foote et al, 1972.
☒ National wetlands inventory map(s). Cite name:Hawaii.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):Accompanying Wetland Delineation May 2011.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

13.a. Stream perennial, orange OHWM on rocks

13.b. Orange OHWM on rocks and trestle pier

LITERATURE CITED

Armstrong, R.W. 1983. Atlas of Hawaii, Second Edition. University of Hawaii Press. Honolulu.

Foote, D.E., E.L. Hill, S. Nakamura & F. Stephens. 1972. Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii. U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C.

APPENDIX H.

Flora and Fauna Survey Assessment Report

FLORA & FAUNA SURVEY AND ASSESSMENT

for the

WAIKAMOI FLUME

REPAIR/REPLACEMENT PROJECT

by

ROBERT W. HOBDY
ENVIRONMENTAL CONSULTANT
Kokomo, Maui
November 2010

Prepared for:
Department of Water Supply
County of Maui

INTRODUCTION

The Waikamoi Flume is a one mile long wooden channel that collects surface flow waters from windward East Maui rainforests and transmits it to the Waikamoi Dam where it is stored and distributed into upcountry domestic drinking water systems. It is the main source of water supply for the upcountry area. This project is calling for the replacement of this aged and dilapidated wooden flume structure and its supporting trestles along its entire length. This study was initiated to satisfy environmental requirements of the planning process. The study encompasses and evaluates a one mile long by 30 foot wide area including and surrounding the flume.

SITE DESCRIPTION

The Waikamoi Flume is situated in the dense wet forests of Haiku Uka at 4,300 feet elevation about 3.5 miles east of upper Olinda (see figure 1). The flume crosses the mountain slope on the contour, extending from Waikamoi Stream, through branches of Puohokamoa Stream and ending at the final intake at Haipuaena Stream (see figures 2,3,4,5). The vegetation consists of dense native cloud forest with an abundance of ferns and mosses. Rainfall averages about 250 inches a year and the area is often immersed in clouds and drizzle. Soils consist of Amalu Peaty Silty Clay (rAMD) which has a saturated black peat layer over gray clay.

BIOLOGICAL HISTORY OF THE AREA

This region has never been used for anything other than a watershed. The Hawaiians referred to this region as Wao Akua, a remote mountain area only inhabited by spirits. The original Waikamoi water system was developed in 1908. It has been replaced and upgraded two times since then. The disturbance created by the construction of the access road and flume maintenance work has allowed entrance to many non-native weed species, some of which have become invasive. Feral pigs have also become common in these forests and are causing damage to the understory and soil layers. The forests remains native in character but the invasive plants and animals are changing its character. The use of herbicides over the years has resulted in a rather open, weedy corridor along the flume.

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed Waikamoi Flume Repair/Replacement Project which was conducted in November 2010. The objectives of the survey were to:

1. Document what plant species occur in the project area.
2. Document the status and abundance of each species.
3. Determine the presence of any native flora, particularly any that are Federally listed as Endangered or Threatened. If such occur, identify what features of the habitat may be essential for these species.
4. Determine if the project area contains any special habitats which if lost or altered might result in a significant negative impact on the flora in this part of the island.

SURVEY METHODS

A walk through botanical survey was conducted along the flume corridor assessing the vegetation in a 30 foot wide swath. A complete inventory of plant species was made, and special focus was made on Endangered, Threatened or relatively rare species. Taxonomy and nomenclature follow Wagner et al (1999).

DESCRIPTION OF THE VEGETATION

The vegetation can be characterized as an 'öhi'a – fern cloud forest. The one species that is dominant along the entire corridor is the 'öhi'a (*Metrosideros polymorpha*). These 40 to 60 foot tall trees form the matrix within which all the other species adapt and find expression. A great array of ferns, mosses and liverworts cover the ground and cling to the tree trunks and branches. Most prominent of these are uluhe (*Dicranopteris linearis*), kilau (*Dryopteris glabra*) and the large tree ferns hapu'u pulu (*Cibotium glaucum*) and hapu'u 'i'i (*Cibotium menziesii*). Common sub-canopy trees and shrubs are also quite diverse. These include pukiawe (*Leptecophylla tameiameiae*), 'öhelo (*Vaccinium calycinum*), puahanui (*Broussaisa arguta*), kukae moa (*Melicope clusiifolia*) and the invasive weeds Florida blackberry *(Rubus argutus*) and Andean blackberry (*Rubus glaucus*).

A total of 90 plant species were recorded during the course of the survey. Of these 66 (73%) were native Hawaiian species. These are highlighted in the checklist of plants.

No Endangered or Threatened native plants were found within the project corridor although a number of such species are known to occur within a two mile radius of the flume. These include three ferns (*asplenium peruvianum* subsp. *insulare*) no common name, (*Diplazium molokaiense*) no common name and (*Pteris lidgatei*) no common name, as well as five lobelioids: 'öha wai (*Clermontia oblongifolia* subsp. *mauiensis*), 'öha wai (*Clermontia peleana* subsp. *singuliflora*), hähä (*Cyanea copelandii* susp. *haleakalaensis*), hähä (*Cyanea hamatiflora* subsp. *hamatiflora*) and hähä (*Cyanea mceldowneyi*).

The Waikamoi Flume is about 3 feet wide, and where it crosses gullies has a supporting trestle structure that is about 10 feet wide at its base. The entire maintained corridor is roughly 10 feet wide over its one mile length. This corridor is periodically trimmed of overhanging vegetation by hand and the ground is sprayed with an herbicide that is cleared for use in watersheds. This corridor is thus vegetated primarily by low, non-native grasses and sedges or is just bare ground. Beyond the boundaries of this corridor is dense native forest which extends for several miles in all directions. The bulk of the 66 native plant species recorded were growing on the edges of this forest and outside of the maintained corridor.

DISCUSSION AND RECOMMENDATIONS

The 10 foot wide corridor along the Waikamoi Flume is heavily impacted by human activities. It is kept free from most vegetation through the periodic use of machetes, chain saws and herbicides. Physical maintenance of the flume itself has degraded the soil into a series of mud holes and bogs by foot traffic along its sides.

This disturbance transitions abruptly to primary native forest at the edge of the maintained strip. Here one encounters the great diversity of the native cloud forest with its trees, shrubs, ferns, vines and herbs. The 66 species of native plants were recorded almost exclusively from this peripheral area. This represents 73% of the list of 90 plant species found during the survey.

No Endangered or Threatened species of plants were found within the 30 foot wide project corridor. One population of the Endangered lobelia, (*Cyanea hamatiflora* subsp. *hamatiflora*), however was found growing in Haipuaena Gulch just beyond the end of the flume. These four plants are situated on the far side of the gulch from the flume and should not be directly impacted by the proposed work. A few of three other rare, but not federally protected, lobeliads grow within the flume corridor: 'öha wai (*Clermontia grandiflora* subsp. *grandiflora*), hähä (*Cyanea aculeatiflora*) and hähä (*Cyanea macrostegia*). These plants grow just outside the heavily maintained corridor. These plants can be flagged so that they can be avoided during construction work. The other Endangered species identified in the previous section all are found more than a mile from this project location and lie well beyond the potential effects of this work.

The forests in this Waikamoi region of northwest Haleakala, although being negatively impacted by feral pigs and invasive plants, remain important and primary habitat for native plants and animals and should be protected from unnecessary disturbance and destructive activities. With this in mind it is recommended that:

1) Demotilition and construction activities be confined to the present flume corridor.

2) All debris and waste materials be removed from the project area.

3) Efforts be made to ensure that materials and equipments are sanitized to prevent the introduction of potentially invasive organisms into the area during project work.

4) The above three rare lobeliads be flagged and avoided during construction work.

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of three groups: Ferns, Monocots and Dicots. Taxonomy and nomenclature of the ferns are in accordance with Palmer (2003). The flowering plants (Monocots and Dicots) are in accordance with Wagner et al. (1999).

For each species, the following information is provided:

1. Scientific name with author citation

2. Common English or Hawaiian name.

3. Bio-geographical status. The following symbols are used:

   endemic = native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.
   indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
   polynesian = those plants brought to the islands by the Hawaiians during their migrations.
   non-native = all those plants brought to the islands intentionally or accidentally after western contact.

4. Abundance of each species within the project area:

   abundant = forming a major part of the vegetation within the project area.
   common = widely scattered throughout the area or locally abundant within a portion of it.
   uncommon = scattered sparsely throughout the area or occurring in a few small patches.
   rare = only a few isolated individuals within the project area.

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
FERNS			
ATHYRIACEAE (Lady Fern Family)			
Athyrium microphyllum (Sm.) Alston	'akölea	endemic	rare
BLECHNACEAE (Chain Fern Family)			
Sadleria cyatheoides Kaulf.	'ama'u	endemic	rare
Sadleria pallida Hook. & Arnott	ama'u	endemic	uncommon
Sadleria squarrosa (Gaud.) T. Moore	'apu'u	endemic	rare
DENNSTAEDTIACEAE (Bracken Family)			
Hypolepis hawaiiensis Brownsey	olua	endemic	rare
DICKSONIACEAE (Dicksonia Family)			
Cibotium glaucum (Sm.) Hook. & Arnott	hapu'u pulu	endemic	uncommon
Cibotium menziesii Hook.	hapu'u 'i'i	endemic	uncommon
DRYOPTERIDACEAE (Wood Fern Family)			
Dryopteris glabra (Brack.) Kuntze	kīlau	endemic	common
Dryopteris wallichiana (Spreng.) Hyl.	'i'o nui	indigenous	uncommon
GLEICHENIACEAE (False Staghorn Fern Family)			
Dicranopteris linearis (Burm.f.) Underw.	uluhe	indigenous	common
Diplopterygium pinnatum (Kunze) Nakai	uluhe lau nui	endemic	uncommon
Sticherus owhyensis (Hook.) Ching	uluhe	endemic	uncommon
GRAMMITIDACEAE (Grammitis Fern Family)			
Adenophorus hymenophylloides (Kaulf.) Hook.& Grev.	pai	endemic	rare
Adenophorus tamariscinus (Kaulf.) Hook. & Grev. var. *montanus* (Hilleb.)L.E.Bishop	wahine noho mauna	endemic	rare
Adenophorus tamariscinus (Kaulf.) Hook. & Grev. var. *tamariscinus*	wahine noho mauna	endemic	uncommon
Adenophorus tenellus (Kaulf.) Ranker	kolokolo	endemic	rare
Grammitis hookeri (Brack.) Copel.	mäku'e lau li'i	indigenous	rare
HYMENOPHYLLACEAE (Filmy Fern Family)			
Hymenophyllum lanceolatum Gaud.	palai hinahina	endemic	uncommon
Hymenophyllum recurvum Hook. & Arn.	'ohi'a kü	endemic	uncommon
LOMARIOPSIDACEAE (Vine Fern Family)			
Elaphoglossum paleaceum (Hook. & Grev.) Sledge	māku'e	indigenous	uncommon
Elaphoglossum wawrae (Luerss.) C.Chr.	hoe a Maui	endemic	uncommon
LYCOPODIACEAE (Club Moss Family)			
Huperzia erosa Beitel & W.H. Wagner	----------	endemic	rare
Lycopodiella cernua (L.) Pic. Serm.	wäwae'iole	indigenous	uncommon
Lycopodium venustulum Gaud.	----------	indigenous	rare
POLYPODIACEAE (Polypody Fern Family)			
Polypodium pellucidum Kaulf.	'ae	endemic	rare
PTERIDACEAE (Brake Fern Family)			
Coniogramme pilosa (Brack.) Hieron.	lo'ulu	endemic	rare
Pteris cretica L.	'öwali	indigenous	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
SELAGINELLACEAE (Spike Moss Family)			
Selaginella arbuscula (Kaulf.) Spreng	lepelepe a moa	endemic	uncommon
THELYPTERIDACEAE (Marsh Fern Family)			
Amauropelta globulifera (Brack.) Holttum	palapalai a kamapua'a	endemic	rare
Christella parasitica (L.) H.Lev.	----------	non-native	uncommon
Pneumatopteris sandwicensis (Brack.) Holttum	hö'i'o kula	endemic	rare
MONOCOTS			
ARACEAE (Aroid Family)			
Zantedeschia aethiopica (L.) Spreng.	calla	non-native	rare
ASTELIACEAE (Astelia Family)			
Astelia menziesiana Sm.	pa'iniu	endemic	uncommon
CYPERACEAE (Sedge Family)			
Carex alligata Boott	----------	endemic	uncommon
Machaerina angustifolia (Gaud.) T. Koyama	'uki	indigenous	uncommon
JUNCACEAE (Rush Family)			
Juncus planifolius R.Br.	----------	non-native	uncommon
Juncus polyanthemos Buchenau	----------	non-native	rare
POACEAE (Grass Family)			
Axonopus fissifolius (Raddi) Kuhlm.	narrow-leaved carpetgrass	non-native	uncommon
Deschampsia nubigena Hillebr.	mau'u	endemic	uncommon
Holcus lanatus L.	velvet grass	non-native	rare
Paspalum urvillei Steud.	Vasey grass	non-native	rare
Pennisetum clandestinum Chiov.	Kikuyu grass	non-native	rare
Poa annua L.	annual bluegrass	non-native	rare
Sacciolepis indica (L.) Chase	Glenwood grass	non-native	uncommon
Setaria palmifolia (J. Koenig) Stapf	palmgrass	non-native	uncommon
SMILACACEAE (Catbrier Family)			
Smilax melastomifolia Sm.	hoi kuahiwi	endemic	uncommon
ZINGIBERACEAE (Ginger Family)			
Hedichyum coronarium J. Koenig	white ginger	non-native	uncommon
Hedichyum gardnerianum Sheppard ex Ker-Gawl.	kahili ginger	non-native	uncommon
DICOTS			
APOCYNACEAE (Dogbane Family)			
Alyxia oliviformis Gaud.	maile	endemic	rare
AQUIFOLIACEAE (Holly Family)			
Ilex anomala Hook. & Arnott	käwa'u	indigenous	rare
ARALIACEAE (Ginseng Family)			
Cheirodendron trigynum (Gaud.) A. Heller	'ölapa	endemic	uncommon
Polyscias oahuensis (A.Gray) Plunkett, Lowery& Ninh	'ohe mauka	endemic	rare
ASTERACEAE (Sunflower Family)			
Dubautia plantaginea Gaud.	----------	endemic	rare
Erechtites valerianifolia (Wolf) DC.	fireweed	non-native	uncommon

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
Hypochoeris glabra L.	smooth cat's ear	non-native	rare
Hypochoeris radicata L.	gosmore	non-native	uncommon
CAMPANULACEAE (Bellflower Family)			
Clermontia arborescens (H.Mann) Hillebr.	'öhä wainui	endemic	uncommon
Clermontia grandiflora Gaud.	'öhä wai	endemic	rare
Cyanea aculeatiflora Rock	hähä	endemic	rare
Cyanea macrostegia Hillebr.	hähä	endemic	rare
CARYOPHYLLACEAE (Pink Family)			
Schiedea diffusa A. Gray	----------	endemic	rare
ERICACEAE (Heath Family)			
Leptecophylla tameiameiae (Cham. & Schlectend.)C.M. Weiller	pükiawe	indigenous	common
Vaccinium calycinum Sm.	'öhelo	endemic	common
FABACEAE (Pea Family)			
Acacia koa A. Gray	koa	endemic	rare
GESNERIACEAE (African Violet Family)			
Cyrtandra platyphylla A. Gray	'ilihia	endemic	rare
GUNNERACEAE (Gunnera Family)			
Gunnera petaloidea Gaud.	'ape'ape	endemic	rare
HYDRANGEACEAE (Hydrangea Family)			
Broussaisia arguta Gaud.	püahanui	endemic	common
HYPERICACEAE (Hypericum Family)			
Hypericum mutilum L.	St. John's wort	non-native	uncommon
LAMIACEAE (Mint Family)			
Prunella vulgaris L.	selfheal	non-native	uncommon
Stenogyne kamehamehae Wawra	----------	endemic	rare
LOGANIACEAE (Logania Family)			
Labordia hedyosmifolia Baill.	kāmakahala	endemic	uncommon
MELASTOMATACEAE (Melastoma Family)			
Tibouchina herbacea (DC.) Cogn.	cane tibouchina	non-native	uncommon
MYRSINACEAE (Myrsine Family)			
Myrsine sandwicensis A. DC.	kölea lau li'i	endemic	uncommon
MYRTACEAE (Myrtle Family)			
Metrosideros polymorpha Gaud.	'öhi'a	endemic	abundant
ONAGRACEAE (Evening Primrose Family)			
Fuschia magellanica Lam.	hardy fuschia	non-native	rare
PIPERACEAE (Pepper Family)			
Peperomia eekana C.DC.	'ala'ala wai nui	endemic	rare
Peperomia membranacea Hook. & Arnott	'ala'ala wai nui	endemic	rare
PLANTAGINACEAE (Plantain Family)			
Plantago major L.	broad-leaved plantain	non-native	rare
ROSACEAE (Rose Family)			
Rubus glauca Benth.	Andean blackberry	non-native	common

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
Rubus argutus Link	Florida blackberry	non-native	common
Rubus hawaiensis A. Gray	'äkala	endemic	uncommon
Rubus rosifolius Sm.	thimbleberry	non-native	rare
RUBIACEAE (Coffee Family)			
Coprosma granadensis (L.fil.) Heads	mākole	indigenous	uncommon
Coprosma ochracea W. Oliver	pilo	endemic	rare
Kadua affinis DC.	manono	endemic	rare
Kadua axillaris (Wawra) W.L. Wagner & Lorence	manono	endemic	uncommon
RUTACEAE (Rue Family)			
Melicope clusiifolia (A. Gray) Wagner & Shannon	kukae moa	endemic	common
SANTALACEAE (Sandalwood Family)			
Korthalsella complanata (Tiegh.) Engl.	hulumoa	indigenous	uncommon
THYMELAEACEAE ('Akia Family)			
Wikstroemia oahuensis (A. Gray) Rock	'akia	endemic	rare
URTICACEAE (Nettle Family)			
Pipturus albidus (Hook. & Arnott) A. Gray	māmaki	endemic	uncommon

FAUNA SURVEY REPORT

SURVEY METHODS

A fauna survey was conducted in conjunction with the botanical survey along the length of the flume and within the fringes of the forest within the corridor. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species, abundance, activities and locations as well as observations of trails, tracks and signs of feeding. In addition an evening survey was conducted to determine if any Hawaiian hoary bats (*Lasiurus cinereus semotus*) were present in the area.

RESULTS

MAMMALS

Just two species of mammals were observed during two site visits. Taxonomy and nomenclature follow Tomich (1988).

Pigs (*Sus scrofa*) – Two pigs were seen in a gulch along the flume. Their extensive diggings were seen throughout the forest understory.

Mongoose *(Herpestes auropunctatus)* – One mongoose was seen darting into the underbrush along the flume. These predators are widespread in diverse habitats and prey on rodents and birds.

No other mammals were seen but it is likely that there would be a significant population of rats (*Rattus* spp.) as well as a few mice (*Mus domesticus*) and an occasional cat (*Felis catus*). The rodents feed on fruits, seeds, insects, eggs and herbaceous vegetation while the cats would prey on the rodents and birds.

An evening survey was conducted at two sites along the corridor to see if any Endangered Hawaiian hoary bats were present. A Batbox IIID was employed, set to the frequency of 27,000 to 28,000 hertz at which these bats are known to use for echolocation. No bats were detected at either site using this device. These bats may utilize this habitat seasonally during the warmer months when flying insect populations are emerging, but were not found during this survey.

BIRDS

There was moderate bird activity observed during the survey but the diversity of species was low. Just four species were observed during two site visits including two endemic forest birds and two non-native species. Taxonomy and nomenclature follow American Ornithologists' Union (2009).

'Apapane (*Himatione sanguinea*) – These small, red native forest birds were common along the length of the flume, flitting among the 'öhi'a trees and feeding on the lehua blossoms.

Red-billed leiothrix (*Leiothrix lutea*) – A few of these small, colorful, non-native birds were seen and heard near the end of the flume.

Japanese white-eye (*Zosterops japonicus*) – Two of these small, green, non-native birds were heard chattering in the understory.

'I'iwi (*Vestaria coccinea*) – One 'i'iwi was heard and then spotted in an 'öhi'a tree near the beginning of the flume.

While not observed, a few other bird species are known from this area. Two Endangered native birds that are very infrequently seen are the 'akohekohe or crested honeycreeper (*Palmeria dolei*) and the kiwikiu or Maui parrotbill (*Pseudonestor xanthophrys*). Both of these species are usually found at elevations between 5,000 and 6,000 feet and both are rare. Five non-native birds that may occasionally be seen here include the Japanese bush warbler (*Cettia diphone*), house finch (*Carpodacus mexicanus*), house sparrow (*Passer domesticus*), common myna (*Acridotheres tristis*) and the migratory kölea or Pacific goden-plover (*Pluvialis fulva*).

No sightings or signs of any native seabirds such as the 'ua'u or Hawaiian petrel were detected, and the habitat is not suitable for their nesting burrows. The 'ua'u, however, could fly over this area in the evenings and early morning hours to reach their burrows that are located on the summit area of Haleakala.

INSECTS

A variety of insect species were seen on vegetation and on mossy banks. Most were native insects, but only one could be identified to species level. Taxonomy and nomenclature follow Nishida et al (1992).

Blackburn's damselfly (*Megalagrion blackburni*) – One of these large, red, native damselflies was seen perched on a twig above a small pool of water.

Hawaiian crane fly (*Limonia* sp.) – Several of these native crane flies were seen hovering around mossy and algae covered rocks on a wet cliff.

(*Dyscritomyia* sp.) no common name – One of these metallic-green, native Calliphorid flies was seen perched on a wet flume wall.

A few medium sized to small moth species were seen on vegetation or in flight. These exhibited excellent evasion skills, plunging into dense vegetation and disappearing. I was unable to get close enough to identify any of these. There are undoubtedly many other native insects that inhabit this diverse cloud forest that could be found only by examining a much larger search area than this corridor and employing other techniques like light trapping at night. No currently Endangered insect species, however, are known to inhabit this Waikamoi Flume area.

MOLLUSKS

One native snail of the genus (Succinea) was found on vegetation within the corridor. These snails are fairly common on understory plants in middle elevation wet forests. No other snails were seen.

DISCUSSION AND RECOMMENDATIONS

During this survey a variety of animal species were recorded. These included 2 non-native mammals, two native birds and 2 non-native birds, 3 native insects and 1 native snail. None of these species are presently listed as Endangered or Threatened species. There is the possibility, however, that the Endangered Hawaiian hoary bat as well as the crested honeycreeper and the Maui parrotbill may at least infrequently or seasonally utilize the habitat in and around the project area, and such possible use needs to be considered.

The Waikamoi cloud forest is part of a great expanse of intact native habitat across the upper windward slopes of Haleakala. It is inhabited by a diverse array of unique plant and animal species, some of which are federally protected. This forest is also an important watershed serving domestic and agricultural needs. It is vital that it be protected from destruction or undue disturbances.

The three recommendations proposed for the botanical section including keeping construction work confined within the project corridor, the cleaning up of all project debris and the sanitization of project materials and equipment apply equally to the fauna survey report. It would appear the protection of the habitat in total would make more sense than trying to address the protection of many individual components.

There are not likely to be construction elements that would pose significant threats to Hawaiian hoary bats or Hawaiian petrels as no guy wires or moving parts are involved and no lighting is proposed in this remote area.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within four groups: Mammals, Birds, Insects and Mollusks. For each species the following information is provided:

1. Common name

2. Scientific name

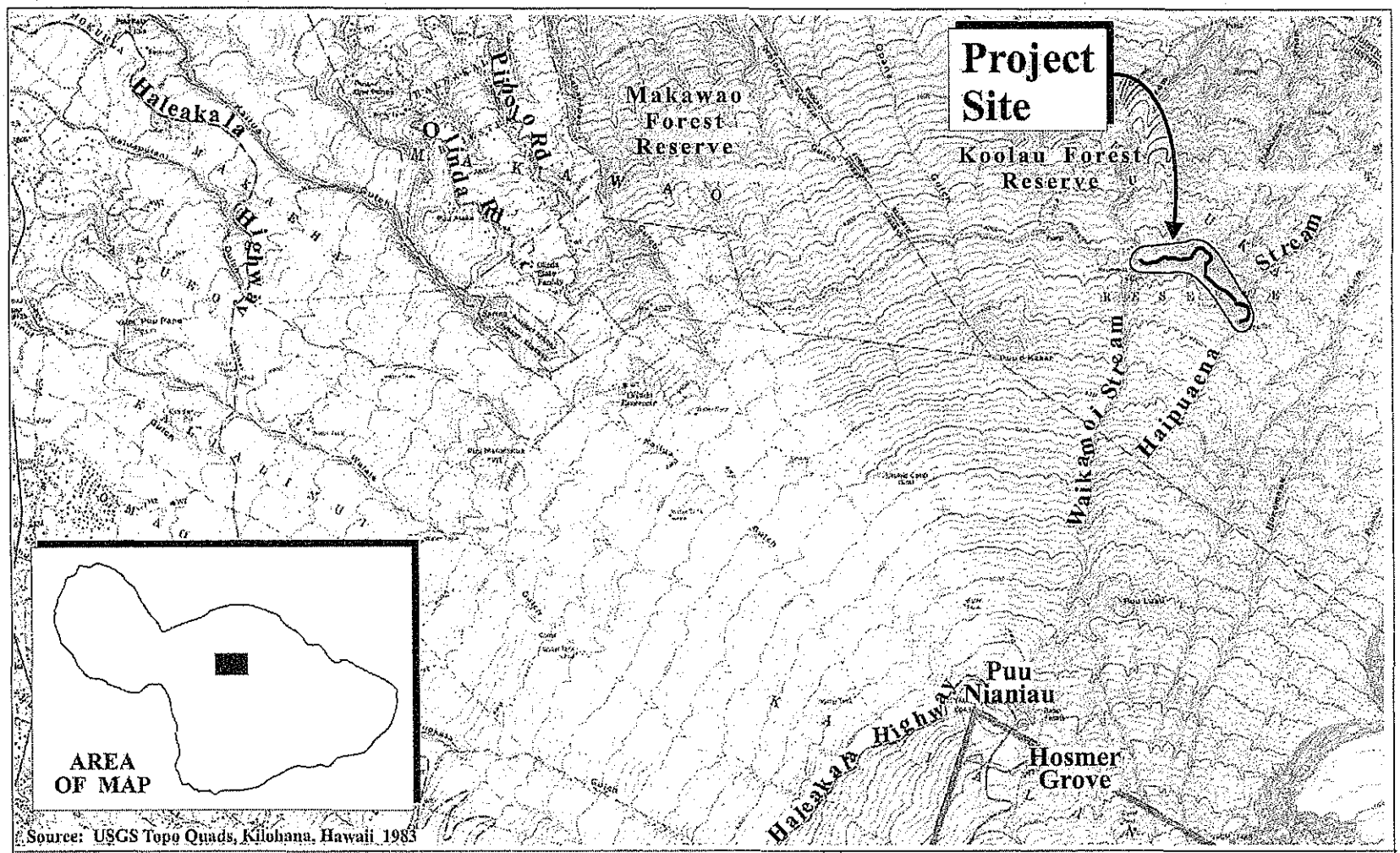
3. Bio-geographical status. The following symbols are used:

   endemic = native only to Hawaii; not naturally occurring anywhere else in the world.
   indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
   non-native = all those animals brought to Hawaii intentionally or accidentally after western contact.
   migratory = spending a portion of the year in Hawaii and a portion elsewhere. In Hawaii the migratory birds are usually in the overwintering/non-breeding phase of their life cycle.

4. Abundance of each species within the project area:

   abundant = many flocks or individuals seen throughout the area at all times of day.
   common = a few flocks or well scattered individuals throughout the area.
   uncommon = only one flock or several individuals seen within the project area.
   rare = only one or two seen within the project area.

COMMON NAME	SCIENTIFIC NAME	STATUS	ABUNDANCE
MAMMALS			
Pig	*Sus scrofa*	non-native	common
Mongoose	*Herpestes auropunctatus*	non-native	rare
BIRDS			
'Apapane	*Himatione sanguinea*	endemic	common
Red-billed leiothrix	*Leiothrix lutea*	non-native	uncommon
Japanese white-eye	*Zosterops japonicus*	non-native	rare
'I'iwi	*Vestiaria coccinea*	endemic	rare
INSECTS			
Hawaiian crane fly	*Limonia sp.*	endemic	uncommon
Blackburn's damselfly	*Megalagrion blackburni*	endemic	rare
(no common name)	*Dyscritomyia sp.*	endemic	rare
MOLLUSKS			
(no common name)	*Succinea sp.*	endemic	rare



Source: USGS Topo Quads, Kilohana, Hawaii 1983

Figure 1

Proposed Waikamoi Timber Flume

Regional Location Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

Figure 2 Waikamoi Flume – Portion of the one mile long contour, covered box flume in native 'ohi'a / fern cloud forest

Figure 3 Waikamoi Flume – Section of covered box flume in a mossy-walled cut.

Figure 4 Waikamoi Flume – Section with supporting trestle crossing a gully. Blue pipe feeding water into flume from a stream intake.

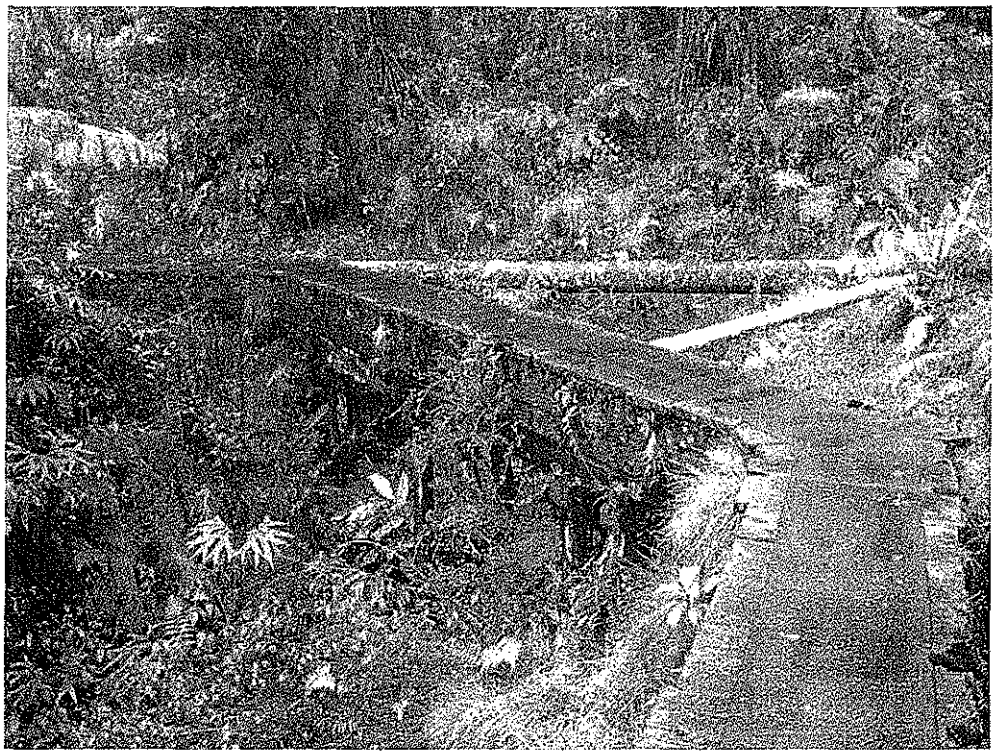


Figure 5 Waikamoi Flume – Dilapidated section of the 35 year old box flume and the even older supporting structure, parallel aluminum backup pipe and smaller white intake pipe.

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APPENDIX I.

Archaeological Inventory Survey

AN ARCHAEOLOGICAL INVENTORY SURVEY FOR THE PROPOSED REPLACEMENT OF WAIKAMOI FLUME, HA`IKU *AHUPUA`A*, MAKAWAO DISTRICT, ISLAND OF MAUI

TMK: (2) 2-4-016: PORTIONS OF 001, 002, 003, 004, AND TMK: (2) 2-3-005: PORTIONS OF 004, 025, AND 029

Prepared on behalf of:
County of Maui
Department of Water Supply
Wailuku, Maui

Prepared by:

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Pukalani, Maui

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11 April 2012

ABSTRACT

Xamanek Researches LLC conducted an archaeological inventory of a c. 12.12 acre portion of land in the Ko`olau Forest Reserve in Olinda, Maui. Project elevations extend from c. 4,050 ft. AMSL to 4,300 ft. AMSL. Two previously undocumented historic properties were located during the inventory survey. These cultural resources consist of the remnants of the Waikamoi Flume (Site 50-50-06-7193), and the water delivery system access road (Site -7194). Both site remnants date to at least the 1930s. There are a total of 24 component features (A-X) associated with the original c. 1.1-mile long Waikamoi Flume system. The wooden components of this site were replaced in the mid-1970s, and overall site integrity has been impacted. The component features consist of cut rock and cement supports, some of which have been repaired. The 3.9-mile long access road (Site 7194) contains 8 component features that consist of rock and cement walls surrounding metal culverts. The inventory survey was carried out in advance of scheduled replacement work for the existing wooden Waikamoi Flume, which was replaced in the mid-1970s and is currently in very poor condition.

The overall condition of features within both sites ranges from fair to good. As noted above, the wooden components of Site 7193 were replaced in the mid-1970s, and the site's integrity overall has been substantially altered. The previously installed wooden components must be again replaced. Some of the rock and cement support structures have been repaired. Portions of the access road (Site 7194) crossing features have been repaired, as well. Nevertheless, each site is deemed significant under Criterion "a". The rock and cement support remnants of the original Waikamoi Flume are good examples of post-contact water delivery system infrastructure. The Site 7194 dirt access road and its component features are associated with this water delivery system. Both sites are also considered significant for their information content (Criterion "d"). Consultation with the State Historic Preservation Division Architecture Branch is recommended; because it appears that Feature X of Site 7193 will be altered (i.e. encased by concrete) by actions of the proposed flume replacement project. The remaining 23 features (Features A-W) will not be impacted by actions of the project, and will remain in place. Preservation, through conservation, may be warranted for Features A-W of Site 7193. At the writing of this report, improvements to the access road (Site 7194) will not impact any of the associated rock and cement culvert crossing features (Features A-H).

No further archaeological work within the project area appears warranted at this time. In the event that the SHPD concurs that preservation of the remaining components of Site 7193 is warranted, then a preservation plan will need to be prepared. Precautionary archaeological monitoring is recommended for any future construction activities within the overall Waikamoi Flume replacement project area.

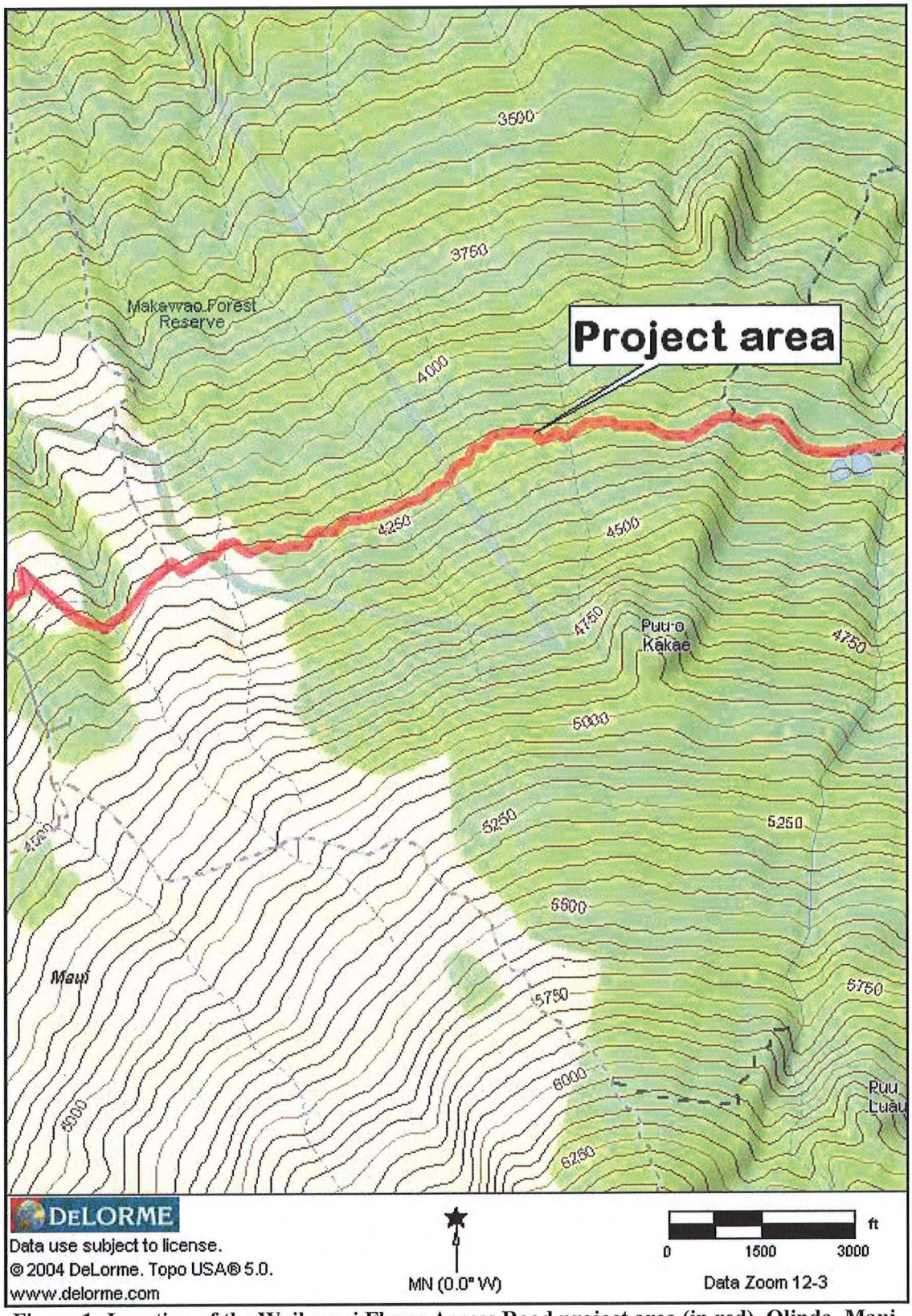


Figure 1: Location of the Waikamoi Flume Access Road project area (in red), Olinda, Maui.

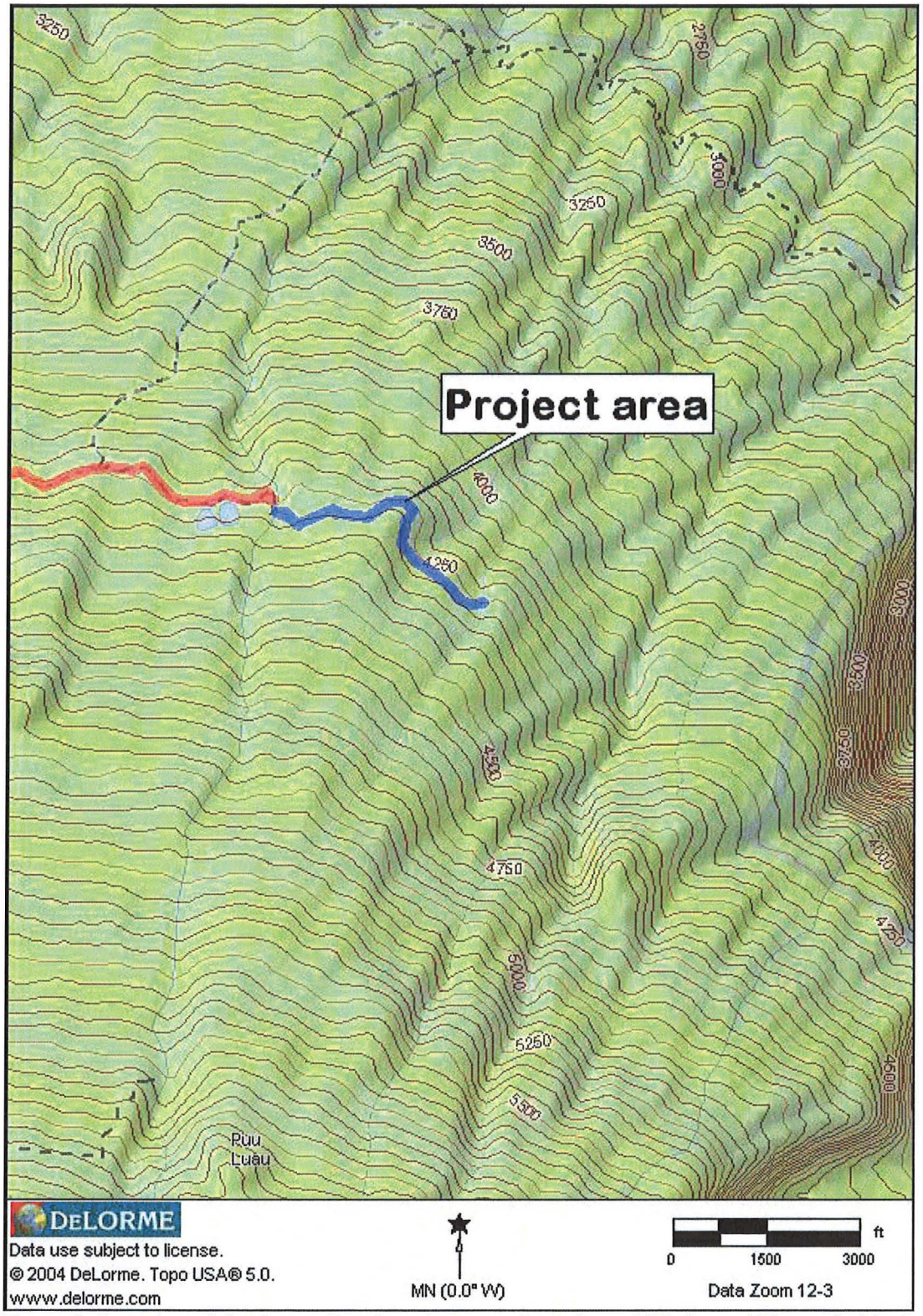
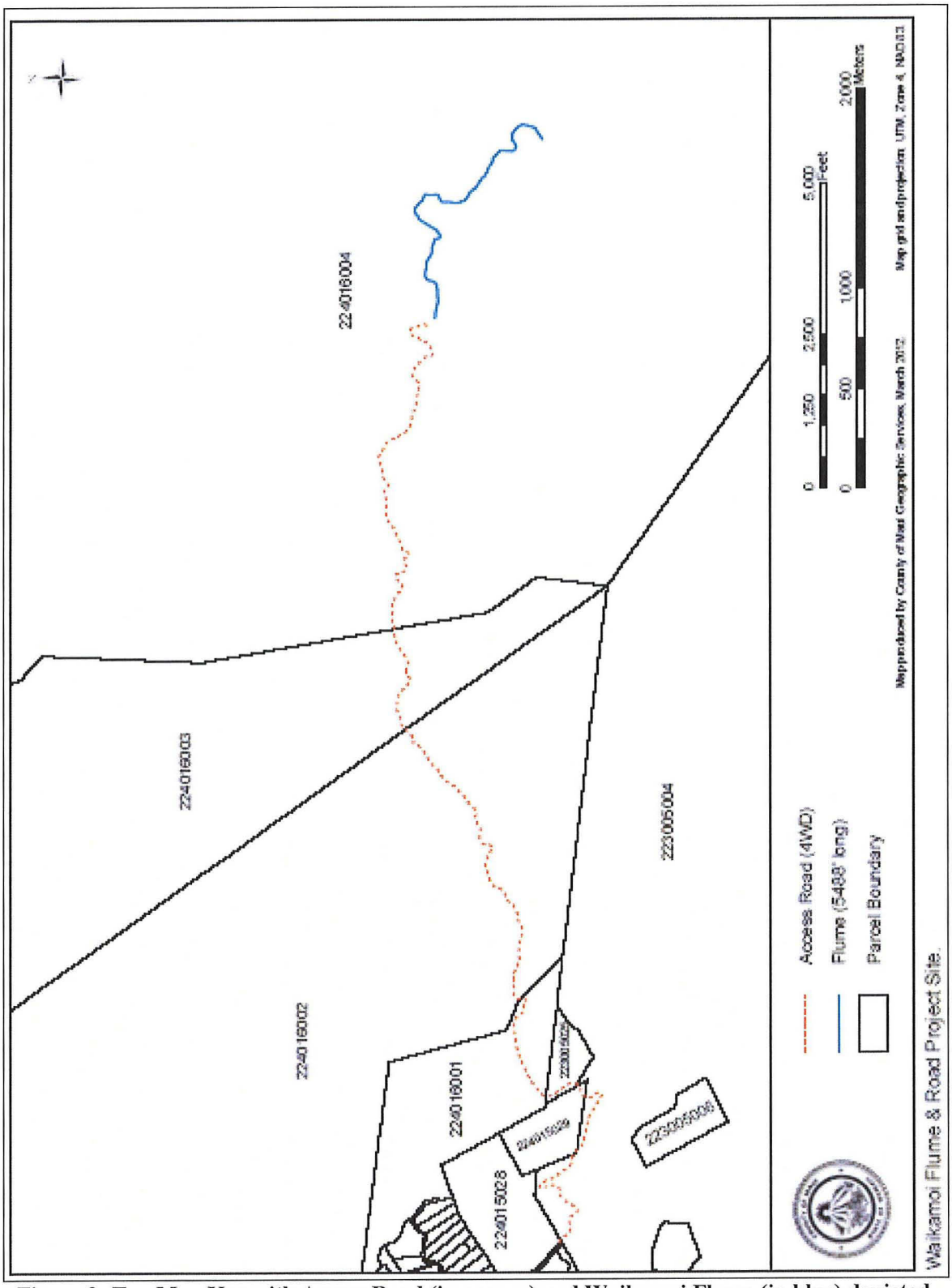


Figure 2: Location of the Access Road project area (in red), and Waikamoi Flume (in blue), Olinda, Maui.



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INTRODUCTION

Xamanek Researches LLC was first contacted about this project on a portion of land in the Ko`olau Forest Reserve in Olinda, Maui in late 2010. At the time, the design phase of the project scope was in process. Erik Fredericksen (SHP Permit #11-07, #12-06) met with Morgan Davis, State Historic Preservation Division Maui Lead Archaeologist to discuss the upcoming project. Given the location of the project and the presence of the Waikamoi Flume, the SHPD recommended that an archaeological inventory survey be conducted. Project elevations extend from c. 4,050 ft. AMSL to 4,300 ft. AMSL. Xamanek Researches LLC subsequently carried out initial work in the summer of 2011. Given that the scope of work would likely impact the associated c. 3.9-mile long dirt access road, the SHPD was again consulted, and the inventory survey was expanded to cover this portion of the overall project. As a result, the expanded project area consists of a c. 5-mile long by 20 ft. wide corridor (528,000 square ft. or 12.12 acres).

The archaeological inventory survey was carried out in advance of scheduled replacement work for the existing wooden Waikamoi Flume. This survey has been conducted on behalf of the County of Maui Department of Water Supply. The results of our survey are presented in the following report.

STUDY AREA

The study area lies on the windward side of East Maui within the dense wet forests of Haiku *Uka*. The study area encompasses the existing c. 3.9-mile long dirt access road to the flume, as well as the c. 1.1-mile long water delivery system itself. Project elevations range from a low of c. 4,050 ft. AMSL at the gate off of Olinda Road to c. 4,300 ft. AMSL at the water intake for the flume system at Haipuaena Stream. The Waikamoi Flume stretches across three stream systems along the mountain slope. These systems include Waikamoi, Puohokamoa, and Haipuaena Streams. The dense forest is often shrouded in mist and the rainfall averages 250 inches per year. The soils consist of the Amalu Peaty Silty Clay and the ground is covered with black peat and gray clay (Foote, et al., 1972). Many native plant species are contained within the project area, although there are no listed, endangered species in the project area (Hobdy, 2010).

Photo 1: Typical vegetation of the project area.

BACKGROUND INFORMATION

Haiku Uka Ahupua`a

The Waikamoi Flume project area is situated in the upper (*uka*) portion of Haiku *ahupua`a*. The study area is located in a dense native forest habitat consisting of *ohi`a* and native ferns and mosses. It is believed that this area has never been used as anything but a watershed. Hawaiians referred to this region as *Wao Akua*, a remote mountain area only inhabited by spirits and for this reason it was not generally utilized.

The original watershed system was developed in 1908. The flume appears to have been first constructed in the 1930's. Since then it has been replaced and upgraded only twice. The latest upgrade to the flume was in the mid-1970s. The area has not been substantially disturbed since the construction of the flume and the access road associated with it.

Haiku Ahupua`a

In precontact times, the lower portion of Haiku *ahupua`a* probably supported a considerable population. Maliko Gulch to the south and west of the current project offered an extensive valley that was ideal for the production of wetland *kalo*, breadfruit, *kukui* nut trees, yams and sugar cane. The bay provided excellent fishing grounds. Sweet potatoes were probably grown on the flat land between valleys as well. Handy and Handy mention Maliko Stream and adjacent *ahupua`a* (1972, p. 498):

> *"Hamakua Poko (Short Hamakua) and Hamakua Loa (Long Hamakua) are two coastal regions where gently sloping kula lands intersected by small gulches come down to the sea along the northern coast line of East Maui. Maliko Stream flowing in a gulch that widens and has a flat bottom to seaward, in pre-sugar-plantation days had a considerable number of lo`i. East of Maliko the number of named ahupua`a is evidence of habitation along this coast. Kuiaha Gulch, beyond Maliko, has a good stream and there were probably a few lo`i. Two kama`aina at Ke`anae said that there were small lo`i developments watered by Ho`olawa, Waipi`o, Hanehoi, Hoalua, Kailua and Na`ili`ilihaele Streams, all of which flow in deep gulches. Stream taro was probably planted along the watercourses well up into the higher kula land and forest taro throughout the lower forest zone. The number of very narrow ahupua`a thus utilized along the whole of the Hamakua coast indicates that there must have been a very considerable population. This would be despite the fact that it is an area of only moderate precipitation because of being too low to draw rain out of trade winds flowing down the coast from the rugged and wet northeast Ko`olau area that lies*

beyond. It was probably a favorable region for breadfruit, banana, sugar cane, arrowroot; and for yams and `awa in the interior. The slopes between gulches were covered with good soil, excellent for sweet-potato planting. The low coast is indented by a number of small bays offering good opportunity for fishing. The Alaloa, or "Long-road," that went around Maui passed through Hamakua close to the shore, crossing streams where the gulches opened to the sea."

Kamakau (1992, p. 23) relates the story of Kiha-a-Pi`i-lani concerning a famine that befell Kula and Makawao.... "and the people subsisted on *laulele, pualele, popolo* and other weeds." The legend goes that he set out to clear a patch of ferns in order to plant sweet potatoes to ease the famine. In a single night he cleared a patch so large that it was thought to be impossible to obtain enough slips to plant such a vast area. Kamakau continues (Ibid., p. 24):

"The people said skeptically of this great undertaking, 'Where will he find enough sweet-potato slips to cover the patch?' Next day Kiha-a-Pi`i-lani went to Hamakuapoko[1] and Hali`imaile to ask for potato slips. The natives gave him whole patches of them wherever he went. ...Kiha-a-Pi`i-lani returned to his dwelling place with his huge bundle of sweet-potato slips. One bundle of slips was sufficient to cover every mound of the whole field. No sooner were they planted than a shower fell, and the chief who made efforts at farming was pleased."

Although the Hamakua area did not appear to be an area with a great deal of political importance, Kamakau relates that during the wars waged by the great Hawaii chief Kalani`opu`u, (Ibid., p. 91): "Ka-lani-`opu`u decided to go on to Ko`olau, Maui, where food was abundant.[2] He went to Ka`anapali and fed his soldiers upon the taro of Honokahua. ... At Hamakualoa Ka-lani-`opu`u landed and engaged in battle, but Ka-hekili hastened to the aid of his men, and they put up such a fierce fight that Ka-lani-`opu`u fled in his canoes. Landing at Ko`olau he slew the common people and maltreated the captives by urinating into their eyes."

During Kamehameha's conquest of Maui—Wailuku and Iao Valley—in c. 1790, Kamehameha's vast canoe fleet landed at various places along the Hamakua coast (Ibid., p. 112). Research conducted by Theresa Donham indicates that the mouth of Maliko Gulch was a precontact canoe landing (personal communication). Other landings on the Hamakua coast were at Kuiaha, Ho`olawe, Waipio, and Huelo. These would have been—more or less—all weather landing sites. It is quite likely that other landings were used in times when the north swell was calm. These locations probably would have been ones used by the invading forces, and the inhabitants of the areas would have suffered in the ensuing hostilities.

In 1828, missionaries William Richards, Lorrin Andrews and J.S. Green conducted a tour around the island of Maui. In a notation dated August 22, 1828 they relate: "This day we came on to a pavement said to have been built by Kihapilani, a king, contemporary with Umi, and ancient king of Hawaii. He is said to have built it, that his name might not roll out. It extends more than 30 miles, and is a work of considerable magnitude. This pavement afforded us no inconsiderable assistance in traveling as we ascended and descended a great number of steep and

[1] Maliko is situated nearly on the border between Hamakuapoko and Hamakualoa.
[2] This was after having ravaged the island of Lanai, and food to sustain his warriors had run out.

difficult paries (palis)." [Sterling, 1998, p. 104]. The remnants of the road could still be seen well into the 19th century, and are referred to as "Kipapa of Kihapi`ilani" (Ibid.).[3]

Mahele Awards

There are 30 Land Commission Awards listed in the Indices of Awards for Haiku *ahupua`a.* A sample of Land Commission Awards in lower Maliko Gulch is presented in the table below.

All of the awards indicate that within gulches in the lowlands of Haiku *ahupua`a,* there existed a zone of agricultural usage and associated habitation. In addition, topography unsuitable for *taro* production was utilized as pasturage.

Table 1: LCA Information

LCA #	Area	Awardee	Land use	
3304-B: 2	0.58 acres	Onaha	*Taro* cultivation	
3905-C	1.07 acres	Kaili	*Taro* cultivation	*[4]
5453	2.04 acres	Paele	Pasture land and *taro* cultivation	*
6510-L:2 and 3	c. 2.5 acres	Ku	Pasture land and *taro* cultivation	*
6510-O: 2	1.75 acres	Kamakaeu	*Taro* cultivation	

While no Land Commission Awards are contained within the current project area, one LCA is contained on a portion of TMK: (2) 2-3-05: 04. A short section of the access road to the Waikamoi Flume passes through near the western boundary of this TMK. Land Commission Award 7124 R.P. 8167 was granted to Kamaikaaloa and consisted of 1 apana of 19.838 acres. This award was used for pasturage (see Appendix A).

Post-1850

Bureau of Conveyances records indicate that Richard Armstrong purchased land from M. Kekuana`oa on five occasions between April of 1850 and July of 1855 (Masterson, Chiogioji, Hammatt, 1995, p. 11). One sale included Grant 165. In March 1861, this land was obtained by Haiku Sugar Company. Haiku Sugar Company was one of the early successful sugar companies and it ran Hamakuapoko Mill from 1884 to 1905. In 1903 the Maui Agricultural Company was formed by Samuel T. Alexander and Henry P. Baldwin, when Haiku Sugar Company was merged with their Paia Plantation. The sugar processing operation was then moved to Paia Mill.[5]

Sugar production in this part of Maui was highly dependent on water. In 1876, Alexander and Baldwin realized that more water was needed for their East Maui sugar operation. They

[3] The Belt Road, constructed between Hana and Kahului, was built along this historic trail. Begun at Hana in the late 1800s, it was finally connected to Central Maui in 1926.

[4] Reference (*) Masterson, Chiogioji, and Hammatt, 1995, p. 9. Others—Waihona `Aina.

[5] This mill continued to produce sugar until its closing on September 23, 2000.

formed the Hamakua Ditch Company[6] and began construction of a system of ditches, pipes and tunnels through 17 miles of rainforest on the windward side of Haleakala. Known as the Hamakua Ditch, this was an engineering achievement during its time. The crossing of Maliko Gulch was perhaps the largest obstacle, as the steep sides had to be connected by a bridge, which, when built, became the longest and highest in the Hawaiian Kingdom. There is an often told incident about the one-armed man Henry Baldwin, who during construction of the bridge, rappelled into the deep ravine to show workers it was not as dangerous as it seemed (Bartholomew and Bailey, 1994, p. 46).

Not to be outdone, Claus Spreckels, owner of Hawaiian Commercial & Sugar Company (HC&S) began the construction on the Haiku Ditch, which brought water from the East Maui Mountains to his plantation in Central Maui. Its route was *makai* of the Hamakua Ditch. Control of HC&S was wrested from Claus Spreckels in 1898 by Alexander and Baldwin in a stock manipulation.

During the early part of the 20th century, more and more sugar plantations were grafted onto the Maui Agricultural Company, including Kailua, Kula, Makawao, Pulehu, and Kalialinui. The sugar operations of HC&S were based in Puunene, while Maui Agricultural Company continued to be based in Paia. In 1948, the two companies merged, consolidating all of A&B's sugar production on Maui under HC&S. In 1962 HC&S merged with and became a division of Alexander and Baldwin, and East Maui Irrigation Company (EMI) became a subsidiary of A & B (Wilcox, 1996, p. 121).

Waikamoi Water System

The original water collection system was developed in 1908. Given its location in this wet portion of East Maui, it has been replaced and upgraded two times. The first major replacement/upgrade occurred in the mid-1930s, when the County of Maui (Territorial Government) constructed the wooden flume in approximately its present form. This redwood water transport system began at its intake point at Haipuaena Stream and extended some 1.1 miles across the mountain slope along the 4,300 ft. contour, crossing branches of Puohokamoa Stream and emptying into Waikamoi Stream (and later Waikamoi Reservoirs). The Waikamoi Dam was completed in 1961, and the Waikamoi Reservoirs were constructed in 1963.

The cloud forest conditions that prevail in this portion of East Maui necessitated a major replacement of the wooden flume and support structure in 1974-75 (Garrett Hew, personal communication). East Maui Irrigation, Ltd., in a Memorandum of Understanding with the Board of Water Supply was appointed the exclusive manager of the Waikamoi Flume on 1/1/1974. The wooden flume was completely replaced after this agreement took effect. This management agreement terminated on 12/31/1993, but was extended with a series of Amendments for a few years. The County of Maui presently manages the flume system, which is in a state of disrepair.

[6] This later became East Maui Irrigation Company in 1908, succeeding the 1876 Hamakua Ditch Company (Wilcox, 1996, p. 117).

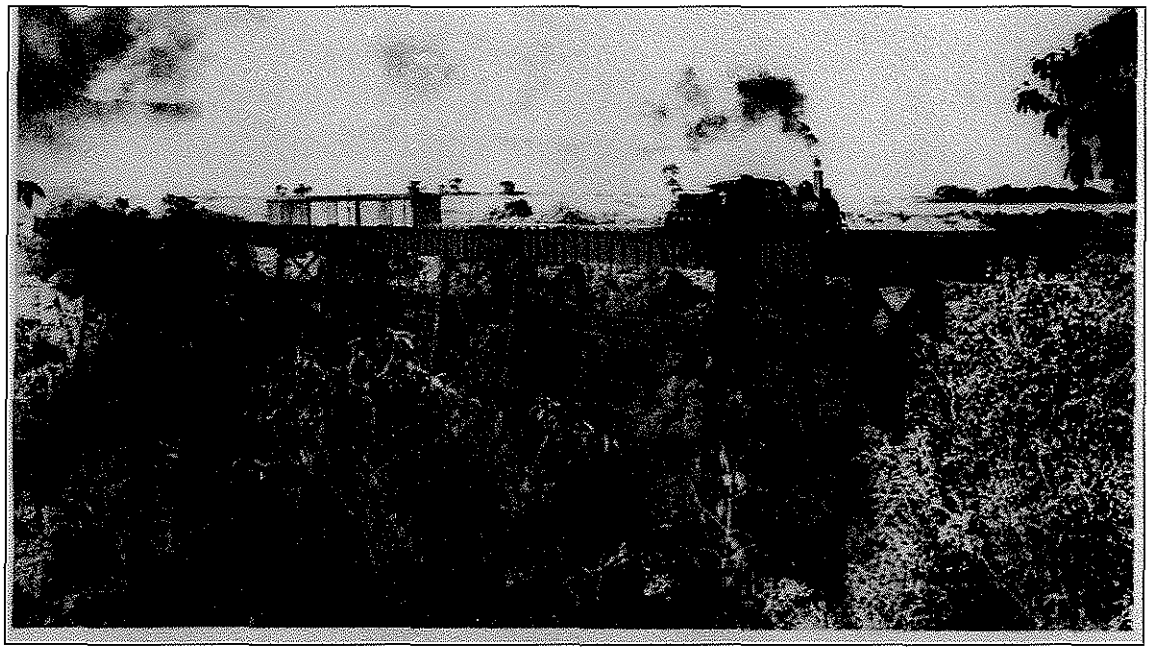

Photo 2: Bridge over Maliko Gulch that carried water for the Hamakua Ditch and later converted for the Kahului Railroad.

Previous archaeological work

Perusal of documents at the SHPD office in Kahului, Maui, provided information on a number of sites that have been identified on the U.S.G.S. Paia Quadrangle, along the Hamakua coast. As can be seen on the table below, many of these sites are burial sites along the coastline. Site 1064 is a site from which both precontact burials and historic coffin burials are constantly eroding. Xamanek Researches was called to that area on several occasions over a period of 30 years, to retrieve human remains that have washed out of the sand bank after a storm. The broken long bones, and drilled shark's teeth[7] found, suggest that some of the burials may have been looted in precontact times, in search of material for the manufacture of fishhooks. A list of sample coastal and near coastal site sites in Hamakua and Ha`iku is presented on Table 2.

In 1995, Cultural Surveys Hawaii conducted an archaeological inventory survey of Lot 2 of the Haiku Agricultural Subdivision of A & B Properties. This c. 64 acre parcel lies *mauka* of the Lot 1 property (see discussion below), and had been in pineapple cultivation for many years. Nothing was found during the pedestrian survey, and further work was not recommended (Masterson, Chiogioji and Hammatt, 1995, p. i). The authors did note that during a site inspection in June 1994, conducted by Maui SHPD archaeologist, Theresa Donham on Lot 1 (the neighboring lot *makai* of Lot 2), traditional Hawaiian artifacts were found. These included an *`ulu`maika* stone, a partial adze, a ground pebble tool, and a polished basalt flake. They conclude: "These artifacts could indicate the presence of a formerly intact archaeological deposit in the neighboring Lot 1 parcel." (Ibid., p. 7).

Xamanek Researches carried out an inventory survey during 1999 on Maliko Point, which lies on the *makai* (north) side of Hana Highway and across from Lot 2. During the course of this fieldwork, an extensive subsurface waterworn pavement, a habitation deposit, and precontact and post-contact burials were documented. The pavement and habitation deposit were designated Site 50-50-054969, while the burials were designated Site 4833. Two charcoal samples returned radiocarbon date ranges for the precontact habitation/ceremonial site between AD 1455 to 1800 – with both intercept dates between 1640 and 1680. Two additional dates extended into the 20th century, indicating that use at this site continued well into the post-contact period. This is also attested to by the presence of the Kalawai`a Cemetery (Site 4833). A large portion of the Site 4969 has been placed in passive preservation along with the Kalawai`a *ohana* cemetery (Fredericksen and Fredericksen, 2001).

In contrast to the coastal area, there has been little archaeological work carried out in the Ko`olau Forest Reserve in Ha`iku (*Uka*) *ahupua`a*. In 1988 (Griffin, 1988) a reconnaissance survey for a 36-inch water line in the general vicinity of the Waikamoi Flume replacement project area did not reveal any historic or cultural sites. This survey was conducted for the Kula water line project on behalf of the Department of Water Supply. Cultural Surveys Hawai'i conducted a reconnaissance survey for the proposed Kahakapao Reservoirs in 1990 (Borthwick, 1990). This project examined portions of two Tax Key Maps that are in the vicinity of the current project area. While there were no significant finds documented during the reconnaissance level survey, two old water pipeline cut rock and cement support structures were noted (no site

[7] Similar shark's teeth, attached to wooden handles, and used as knives, can be seen in Buck, 1964, Vol. X, p. 447.

numbers assigned). No further work appears to have been carried out in this forest reserve and the surrounding area.

Table 2
Sample of coastal and near coastal sites of Hamakua and Ha`iku

Site #	Site type	Remarks
1063	Petroglyphs	Hamakuapoko petroglyphs
1064	Burials	Kalahau Burial Complex
1221	Agricultural complex	Kaupakalua Complex. Rectangular terraces (15), irrigation canal, and retaining wall. (Not shown on Figure 3)
1253	Habitation and burial	Paia House and Grave complex. Well-preserved house outline, with rectangular pit. Surface artifacts include grindstone, basalt flakes. Food midden is also present around periphery.
1255	Platform	Ho`okipa platform. Badly eroded terraces (2) without surface artifacts or midden evident.
1271	Burial	Ho`okipa burial. Outline of burial pit in parking area.
1265	Burials	Hamakuapoko Burial Complex
1700	Burials	Pauwela Light House Burials
1779-1782	Burials and habitation	Located during monitoring of the Spreckelsville Sewer Line project
4482	Historic	World War II Pill Box in Paia

Settlement Patterns and Expectations of Findings

This area of Maui is characterized by flat plains intersected by deep gullies. Maliko Gulch, although not as wet as valleys to the east, provided sufficient water for some *taro* production, as the LCA information notes. Sweet potatoes were thought to have been cultivated in the *kula* areas between drainage gulches according to Handy and Handy (1972). The relatively large bay at the mouth of Maliko Stream provided access to the abundant shore and deep-ocean resources. The vantage point provided by Maliko Point aided in the securing of these resources. A traditional canoe-landing site at Maliko is further evidence of the importance of marine resources to the inhabitants (Theresa Donham, personal communication). All in all, people living in the lower portion of Haiku *ahupua`a* in late precontact times were probably fairly numerous. Human graves have been noted all along the Hamakua coast, both to the west and to the east.

In contrast, the upper portion of Haiku *ahupua`a* lies in a region referred to as Wao Akua, a remote mountainous area inhabited by spirits. This cloud-shrouded area is cold and receives in excess of 200 inches of annual precipitation. It is covered in dense native fern and *ohi`a* and *koa* forests. In post-contact times the bulk of the region has functioned as a watershed.

ARCHAEOLOGICAL METHODOLOGY

Xamanek Researches, LLC conducted an archaeological inventory survey of the proposed Waikamoi Flume replacement project area in 2011, with follow-up work carried out in December 2011, and January-February 2012. The archaeological investigation consisted of a 100% of pedestrian survey and no subsurface testing, because of safety considerations. The pedestrian inspection of the project area was carried out with systematic sweeps oriented in a roughly north/south direction using c. 5 m intervals between sweeps. Our field team consisted of Hugh Coflin, B.A., Marco Molina, B.A., and Erik Fredericksen (SHPD Permit #11-07, #12-06). Erik Fredericksen was also the principal investigator for this survey. Jennifer Frey, B.A. carried out lab work for the project. Project notes and photographs are on file at the Xamanek Researches LLC facility in Pukalani, Maui.

ARCHAEOLOGICAL FINDINGS

The archaeological inventory survey of the project area identified two post-contact sites. The c. 1.1-mile long Waikamoi Flume and its associated features, designated Site 7193, transport water to the Waikamoi Reservoirs. Site 7194 is a c. 3.9-mile long dirt road with associated crossings that provides access to the wooden flume. Construction of both of these sites has previously impacted this portion of the Ko`olau Forest Reserve. These sites are discussed below. There was no evidence of other cultural resources noted in the surveyed area.

SITE 50-50-06-7193

The wooden Waikamoi Flume system was constructed in the 1930s. The County of Maui (Territorial Government) developed this water delivery system. By the 1970s, the redwood flume was badly weathered and in need of replacement. The County of Maui subsequently entered into a Memorandum of Understanding with East Maui Irrigation, Ltd. in 1973, and EMI took over management of the flume. All wooden components were replaced in 1974-75. This rebuilt water delivery system contains 24 associated features. Features A-X consist of the rock and concrete supports that date to the 1930s, which are located along the 1.1 mile long Waikamoi Flume. These are made of cut rock and concrete and are generally considered to be in "good" condition. See the table below for details of each feature. Three of the 24 pillars have been repaired in recent years by adding new concrete above them to avoid collapse. These pillars are still in use today. Site 7193 continues in use as a water delivery system for transporting water to the nearby Waikamoi Reservoirs, which were constructed in the 1960s.

Table 3: Summary of pipe support and concrete rock masonry
Waikamoi Flume Site 7193 (Features A-X)

Feature	Descriptions	Remarks	Condition
A	Pipe Support Cut rock and concrete	Distance from the access road circa 20-30 meters On the left side of the access road due East Located by station 31+00	Good
B	Pipe Support Cut rock and concrete	Distance from the access road circa 20-30 maters On the left side of the access road due North Located by station 39+00	Good
C	Pipe Support Cut rock and concrete	Distance from the access road circa 20-30 maters On the left side of the access road due East Located by station 69+00	Good
D	Pipe Support Cut rock and concrete	Distance from the access road circa 20-30 meters On the left side of the access road due East Located by station 73+00	Good
E	Pipe Support Cut rock and concrete	Distance from the access road circa 20-30 meters On the left side of the access road due East Located by station 76+00	Good
F	Pipe Support Cut rock and concrete	Distance from the access road circa 20-30 meters On the left side of the access road due NE Located by station 81+00	Good
G	Pipe Support Cut rock and concrete	Distance from the access road circa 20-30 meters On the left side of the access due North Located by station 94+00	Good: Still in use to support the existing ductile pipe carrying water
H	Pipe Support Cut rock and concrete	Distance from the access road circa 20-30 meters On the left side of the access due East Located by station 155+00	Good: Still in use to support the existing ductile pipe carrying water

Feature	Descriptions	Remarks	Conditions
I	Pipe Support Cut rock and concrete	Distance from the access road circa 10-15 meters On the right side of access road due East Located by station 171+00	Good: Still in use to support the existing ductile pipe carrying water
J	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
K	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
L	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
M	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
N	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume between STA. 19 HUB and STA. 20 HUB	Good: Some of the cut rock and concrete support has new concrete added above it
O	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
P	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good: Some of the cut rock and concrete support has new concrete added above it
Q	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good: Some of the cut rock and concrete support has new concrete added above it

Feature	Descriptions	Remarks	Conditions
R	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
S	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
T	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
U	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
V	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume in the gulch crossing.	Good
W	Concrete Rock Masonry Cut rock and concrete supporting the existing flume.	Located below the flume on the side of the mountain Between stations number 8+49.33 and 9+00.65 (STA. 7 HUB)	Good
X	Concrete Rock Masonry Cut rock and concrete supporting the existing flume. Flume dam	Located below the flume that connects to the dam.	Good

SITE 50-50-06-7194

Site 7194 consists of the c. 3.9-mile long dirt access road that was developed in support of construction and maintenance of the Waikamoi Flume (Site 7193). This site contains 8 component features that are associated with the road. Features A-H, consist of culverts and rock and concrete walls within the access road. These culverts are constructed of steel corrugated pipes, with rock (some cut) and concrete wall supports. These culvert crossings are in generally fair to good condition, and exhibit some repair work. This access road is c. 4.1 miles long, and passes through the Ko`olau Forest Reserve. As noted above, it was constructed to develop and service the flume water system. There are 8 of these crossings in total. See the table below for details of each feature. Two of these culverts have had repair work done on them. The Feature C culvert is damaged and is no longer in use. Site 7194 is presently used for transport to access and service the Waikamoi water delivery system.

Table 4: Summary of Culvert Crossings
Waikamoi Flume Access Road: Site 7194 (Features A-H)

Feature	Description	Remarks*	Conditions
A	Culvert 1: cut rock and concrete crossing with an old concrete pipe culvert inserted with a corrugated pipe	Located by Station Number 73+00	Fair: Roughly constructed, repair had been done at base on the new concrete work.
B	Culvert 2: Cut rock and concrete crossing with corrugated pipe culvert.	Located by Station Number 77+00	Good: Both ends consist of 10-15 courses of cut rocks.
C	Culvert 3: Cut rock and concrete crossing with corrugated culvert	Located by Station Number 81+00, 15-20 meters from existing road	Poor: Access road is no longer ni use due to the damage on the west end, road was diverted.
D	Culvert 4: Cut rock and concrete crossing with ductile pipe culvert	Located by Station Number 111+00	Good: Structure consists of 4-7 courses of cute rocks.
E	Culvert 5: Cut rock and concrete crossing with ductile pipe culvert.	Located by Station Number 114+40	Fair: Roughly constructed, 3-6 courses of cut rock.
F	Culvert 6: Cut rock and concrete crossing with ductile pipe culvert.	Located by Station Number 118+45	Good: 5-10 courses of cut rock.
G	Culvert 7: Cut rock and concrete crossing with old concrete pipe culvert.	Located by Station Number 138+00	Fair: Stone work is rough with some repair evident.
H	Culvert 8: Cut rock and concrete crossing with corrugated pipe culvert.	Located by Station Number 169+65	Fair: Stone work not very visible.

SUMMARY AND CONCLUSIONS

As noted above, the remnants of the Waikamoi Flume water delivery system, constructed in the 1930s, as well as the access road have been assigned SIHP site numbers. The Waikamoi Flume site remnant has been assigned SIHP Number 50-50-06-7193. A total of 24 component features (A-X), consisting of the remains of rock and cement support bases, are associated with this post-contact site remnant. It is important to note that this site's integrity has been substantially altered. The entire wooden flume and all associated wooden support infrastructure were replaced in 1974-75. The access road built to service the flume has been assigned SIHP Number 50-50-06-7194. This transportation site contains 8 component features (A-H), which consist of rock and cement support walls and steel culvert crossings. The general condition of both sites ranges from "fair" to "good". Some portions of features within both sites have collapsed and have been repaired (possibly during the replacement of the wooden portions of the flume in the 1970s).

SITE SIGNIFICANCE ASSESSMENT

Archaeological resources are subject to the broad criteria established for the State and National Register of Historic Places classified below:

- Criterion "a"—Be associated with events that have made an important contribution to the broad patterns of our history;
- Criterion "b"—Be associated with the lives of persons important in our past;
- Criterion "c"—Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
- Criterion "d"—Have yielded, or is likely to yield, important information for research on prehistory or history;
- Criterion "e"—Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts.

The Waikamoi Flume site remnant, Site 50-50-06-7193, is considered significant under Criterion "a" for its role as an important water delivery system for the up country area. The

flume access road, Site 50-50-06-7194, also qualifies for significance under Criterion "a" because of its association with the Waikamoi Flume water delivery system. Both sites are also considered significant for their information content under Criterion "d".

PROJECT MITIGATION RECOMMENDATIONS

Given that the c. 1.1-mile long wooden flume (Site 7193) and all associated wooden support structures were completely replaced in the mid-1970s, the integrity of this site has been substantially impacted. The 24 features consisting of rock and cement flume base supports are all that remain of the original site. At the writing of this report, it appears that only Feature X of this site will be altered (i.e. encased in concrete) during the proposed construction project. Consultation with the SHPD Architecture Branch is recommended for mitigation measures for this portion of Site 7193. The remaining components of this site will be avoided and remain in place. Given that the remaining cut rock and concrete flume supports are all that remain of Waikamoi Flume, preservation (through conservation) may be warranted.

At the writing of this report, scheduled improvements to the 3.9-mile long access road will not directly impact Features A-H of Site 7194. In the event that major repairs/replacements become needed, consultation with the SHPD Architecture Branch is, again, recommended. Possible further work may be necessary in this event.

No further archaeological work within the project area appears warranted at this time. In the event that the SHPD concurs that preservation of the remaining components of Site 7193 is warranted, then a preservation plan will need to be prepared. Precautionary archaeological monitoring is recommended for any future construction activities within the overall Waikamoi Flume replacement project area.

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APPENDIX A: LAND COMMISSION AWARD IN GENERAL VICINITY OF PROJECT AREA

Document Delivery

Mahele Database Documents
Number: 07124

Claim Number:	**07124**
Claimant:	**Kamaikaaloa**
Other claimant:	
Other name:	
Island:	**Maui**
District:	**Kula**
Ahupuaa:	**Kalialinui**
Ili:	

Apana:	**1**	Awarded:	**1**
Loi:		FR:	
Plus:		NR:	**429v6**
Mala Taro:		FT:	
Kula:		NT:	
House lot:		RP:	**8167**
Kihapai/Pakanu:		Number of Royal Patents:	**1**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**

Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	

No. 7124, Kamaikaaloa
N.R. 429v6

Kalialianui Ahupua`a of Kula, Maui. Kindly enter it to quiet title.
S.P. Kalama, Secretary
February 3, 1848

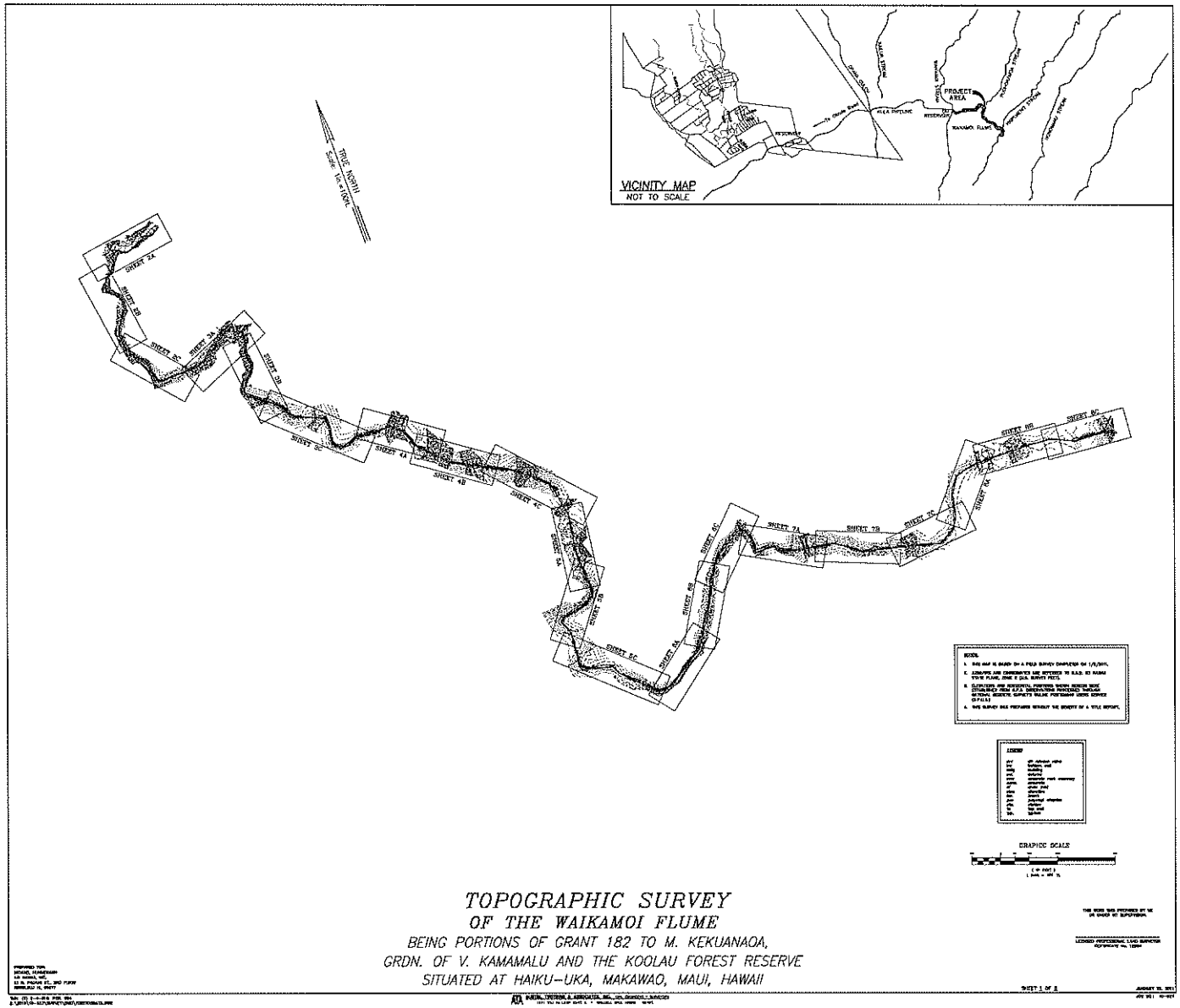
N.T. 456v10
No. 7124, Kamaikaaloa

Kalialianui ahupuaa, Kula, Maui.
I hereby approve this distribution, it is correct and this land written above is for Kamaikaaloa, for which approval has been granted for it to be presented to the land officers who settle claims.
(Sign) Kamehameha
3 Febrary 1848
COPY from "Mahele Book," S. Spencer, clerk, Department of Interior.

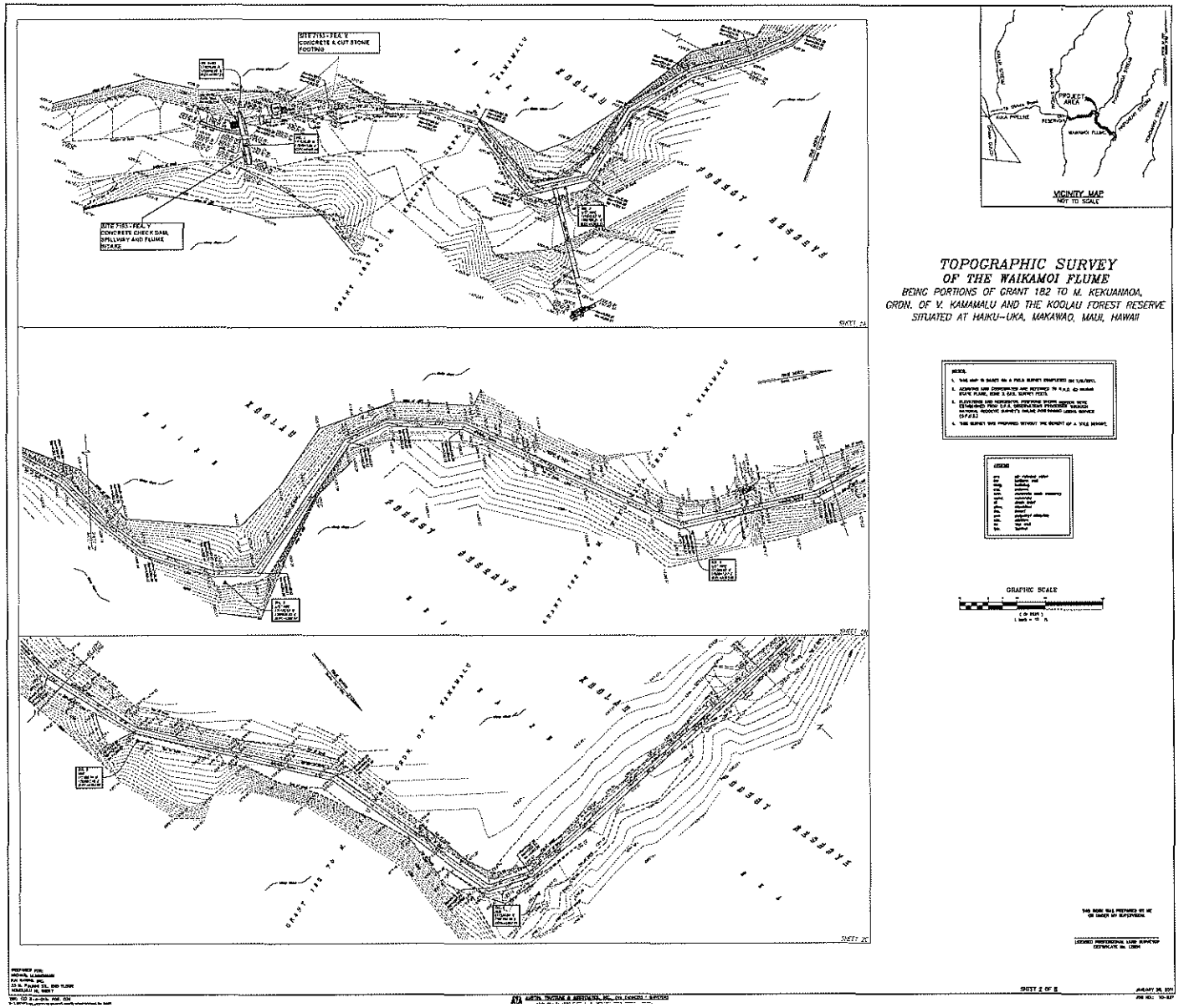
[Award 7124; Land Patent 8167; Kalialinui Kula; 1 ap. 19.838 Acs.; See also No. 4460 for another Native Register document for Kalialinui]

×

APPENDIX B: SITE 50-50-06-7193 FEATURES A-X



TOPOGRAPHIC SURVEY
OF THE WAIKAMOI FLUME
BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA,
GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE
SITUATED AT HAIKU–UKA, MAKAWAO, MAUI, HAWAII



TOPOGRAPHIC SURVEY
OF THE WAIKAMOI FLUME

BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA, GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE SITUATED AT HAIKU-UKA, MAKAWAO, MAUI, HAWAII

NOTES:

1. THIS MAP IS BASED ON A FIELD SURVEY PERFORMED ON 1/15/2011.
2. ACREAGE HAS CONVERTED AND REFERRED TO U.S.D. AS MEASURE STATE PLANE, ZONE 3 DATA SURVEY FEET.
3. ELEVATIONS HAS ACCURATE ON ELEVATIONS SHOWN WITH ELEVATIONS FROM USGS MAPS. ELEVATIONS STANDARD TO NATIONAL GEODETIC SURVEY'S VALUE FOR PARKED GEOD. SERVICE DATA.
4. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.

LEGEND

GRAPHIC SCALE

THIS MAP WAS PREPARED BY ME OR UNDER MY SUPERVISION.

LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 12884

PREPARED FOR:
MICHAEL LANDMAN
ALEX G. ROSS
ALEX G. ROSS, INC.
1132 BISHOP ST., 2ND FLOOR
HONOLULU, HI. 96817

SHEET 2 OF 8

JANUARY 26, 2011

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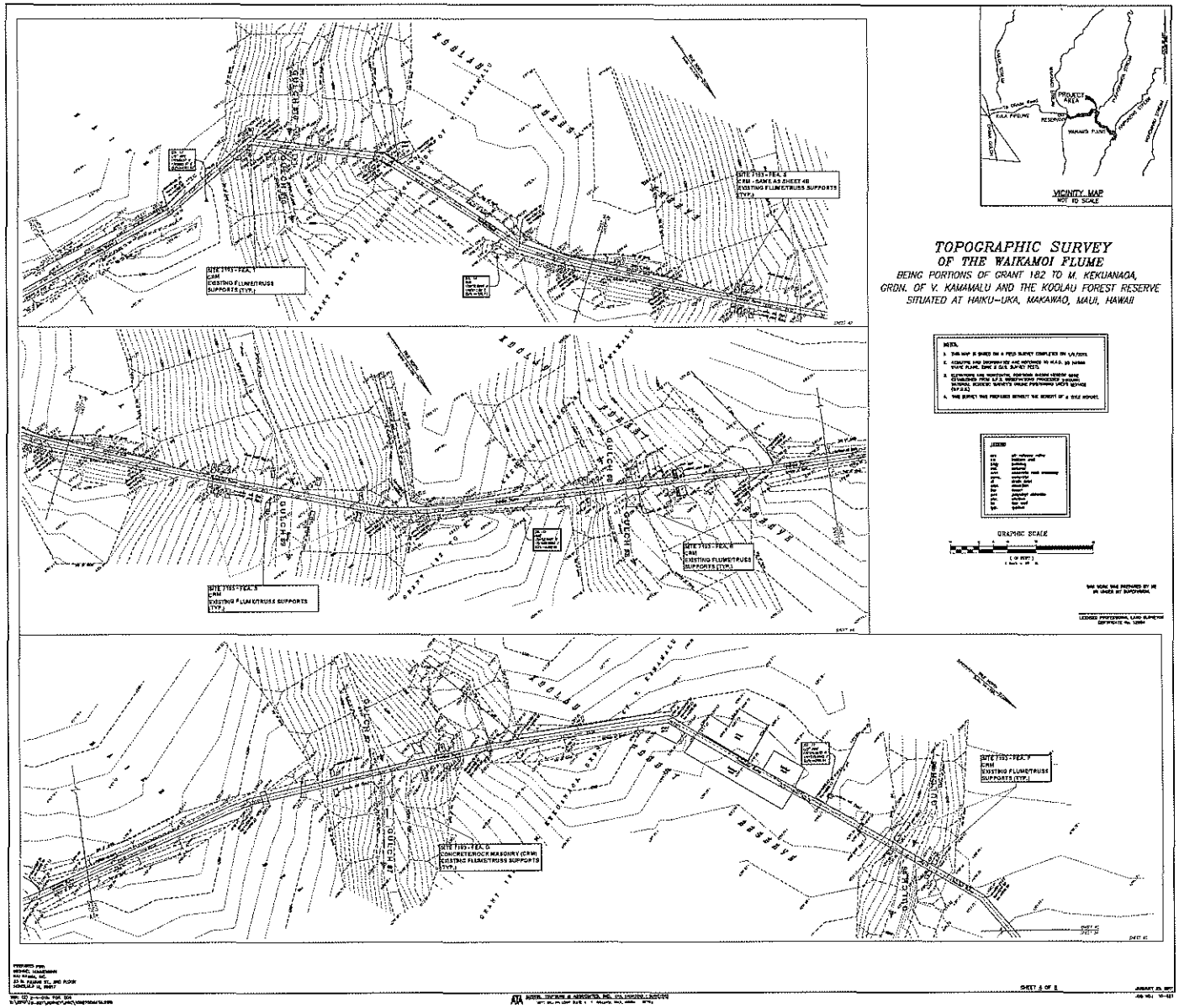
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OF THE WAIKAMOI FLUME
BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA,
GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE
SITUATED AT HAIKU-UKA, MAKAWAO, MAUI, HAWAII
VICINITY MAP
NOT TO SCALE
GRAPHIC SCALE
SITE 7193-FEA. 7
CRM
EXISTING FLUME/TRUSS SUPPORTS (TYP.)
SITE 7193-FEA. 6
CRM - SAME AS SHEET 4B
EXISTING FLUME/TRUSS SUPPORTS (TYP.)
SITE 7193-FEA. 5
CRM
EXISTING FLUME/TRUSS SUPPORTS (TYP.)
SITE 7193-FEA. 8
CRM
EXISTING FLUME/TRUSS SUPPORTS (TYP.)
SITE 7193-FEA. 9
CRM
EXISTING FLUME/TRUSS SUPPORTS (TYP.)
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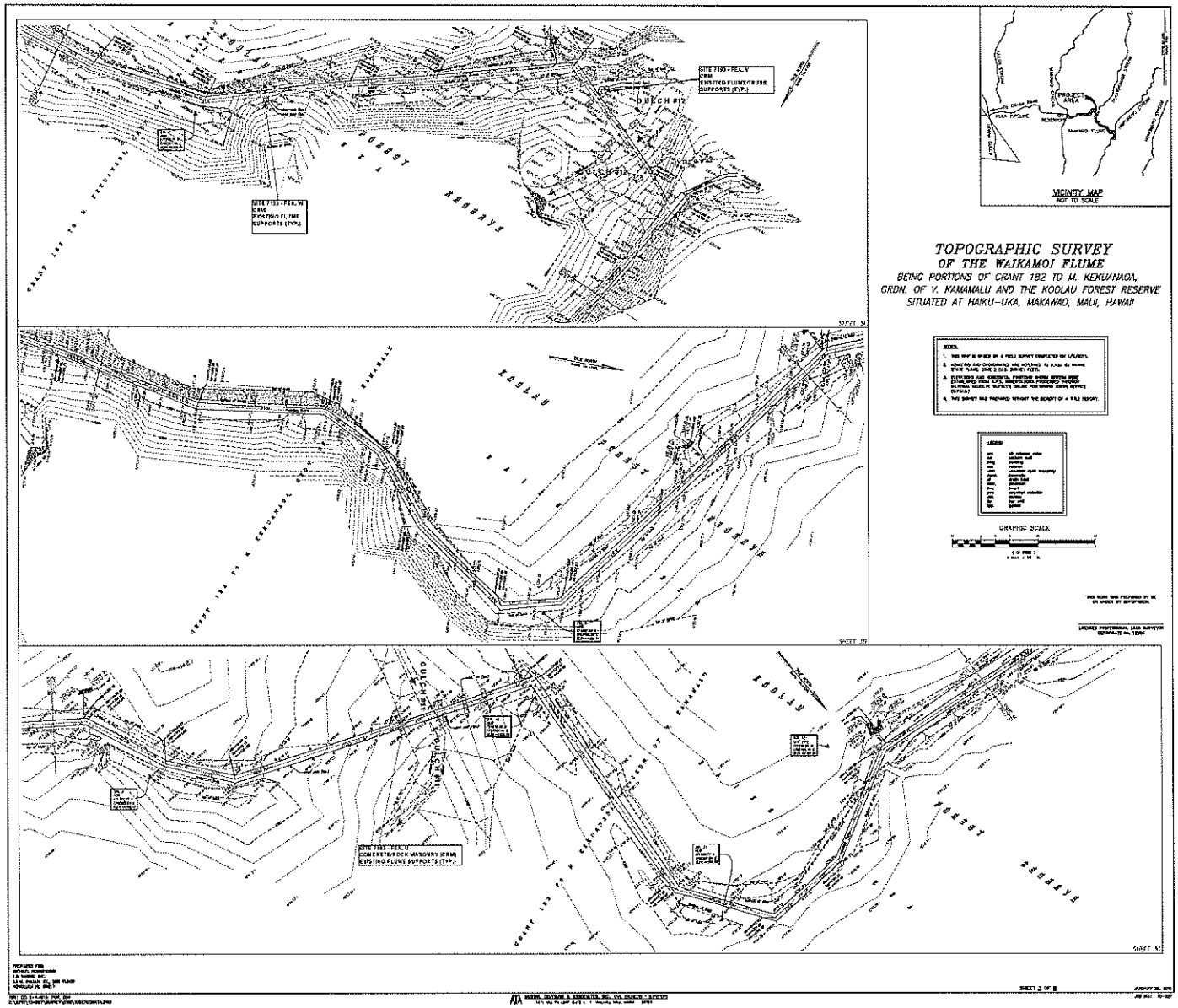
EXISTING FLUME/TRUSS SUPPORTS (TYP.)
SHEET 5 OF 8


TOPOGRAPHIC SURVEY
OF THE WAIKAMOI FLUME
BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA,
GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE
SITUATED AT HAIKU-UKA, MAKAWAO, MAUI, HAWAII
VICINITY MAP
NOT TO SCALE
PROJECT AREA
GRAPHIC SCALE
SITE 7193-FEL-W
CONCRETE/ROCK MASONRY (CRM)
EXISTING FLUME SUPPORTS (TYP.)
SITE 7193-FEL-V
CRM
EXISTING FLUME/TRUSS
SUPPORTS (TYP.)
SITE 7193-FEL-W
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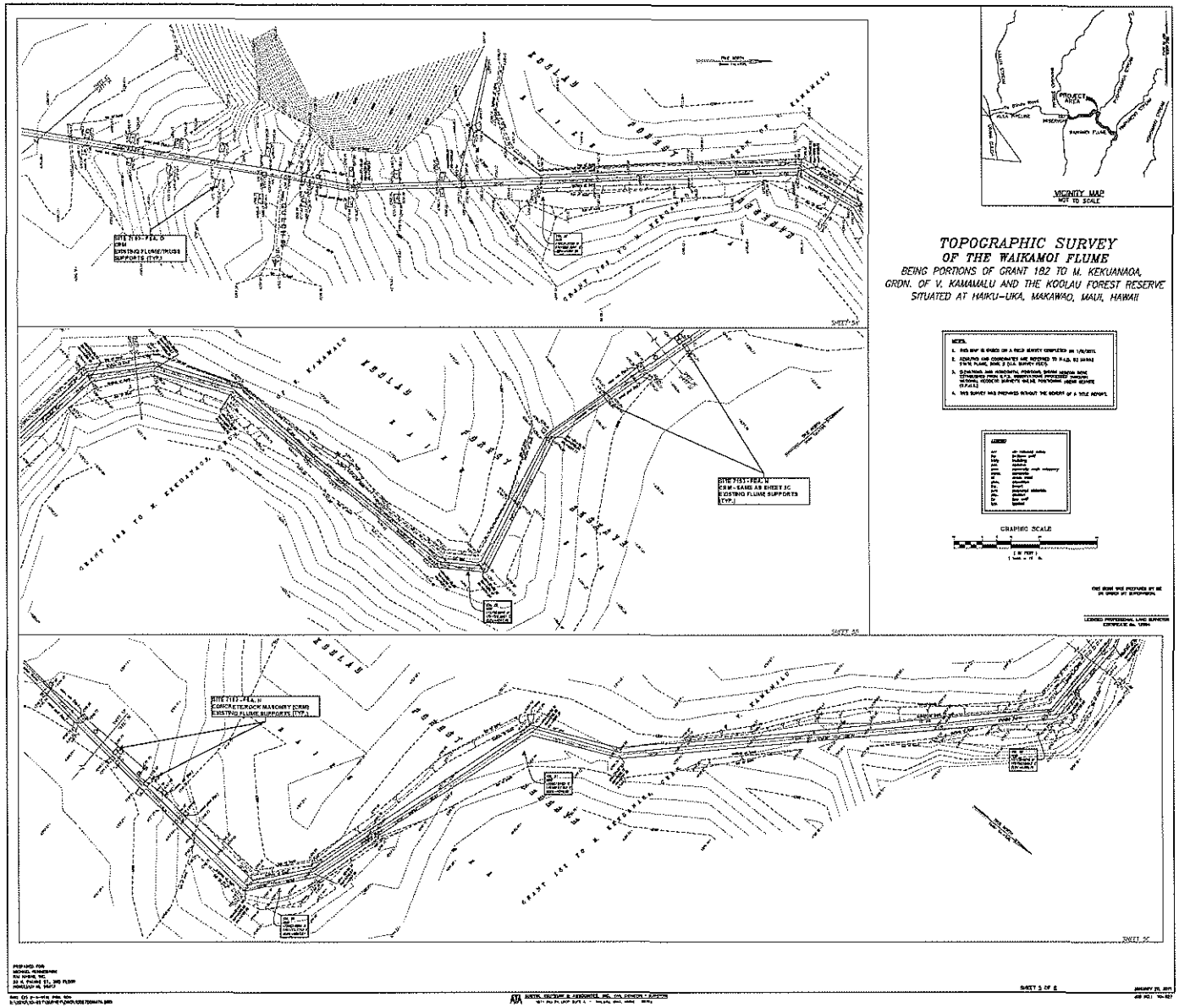
KOOLAU
FOREST
RESERVE
GRANT 182 TO M. KEKUANAOA
SHEET 2 OF 8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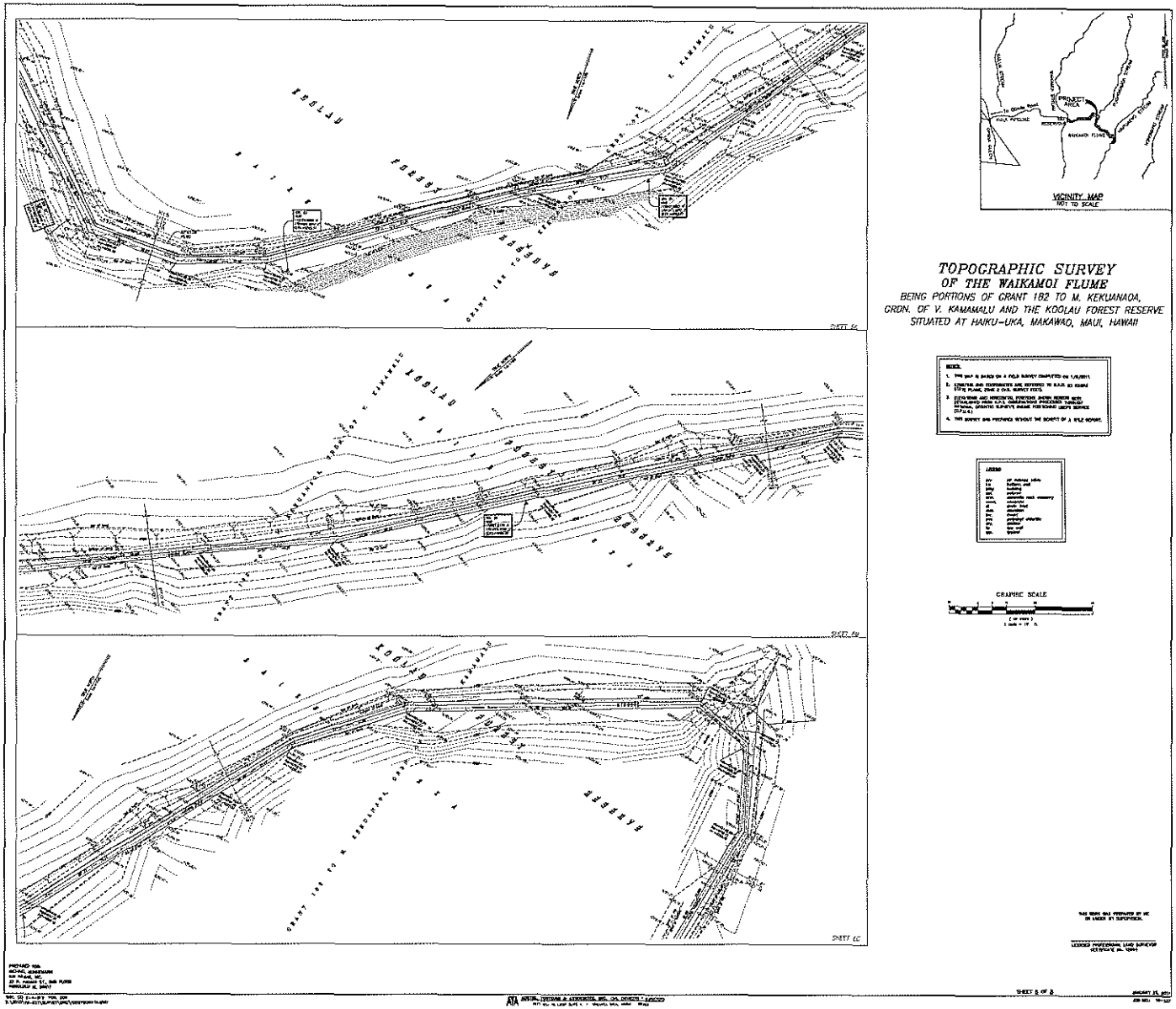
OF THE WAIKAMOI FLUME
BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA,
GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE
SITUATED AT HAIKU-UKA, MAKAWAO, MAUI, HAWAII
VICINITY MAP
NOT TO SCALE
GRAPHIC SCALE
SHEET 5 OF 6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NOT TO SCALE
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OF THE WAIKAMOI FLUME
BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA,
GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE
SITUATED AT HAIKU-UKA, MAKAWAO, MAUI, HAWAII
GRAPHIC SCALE
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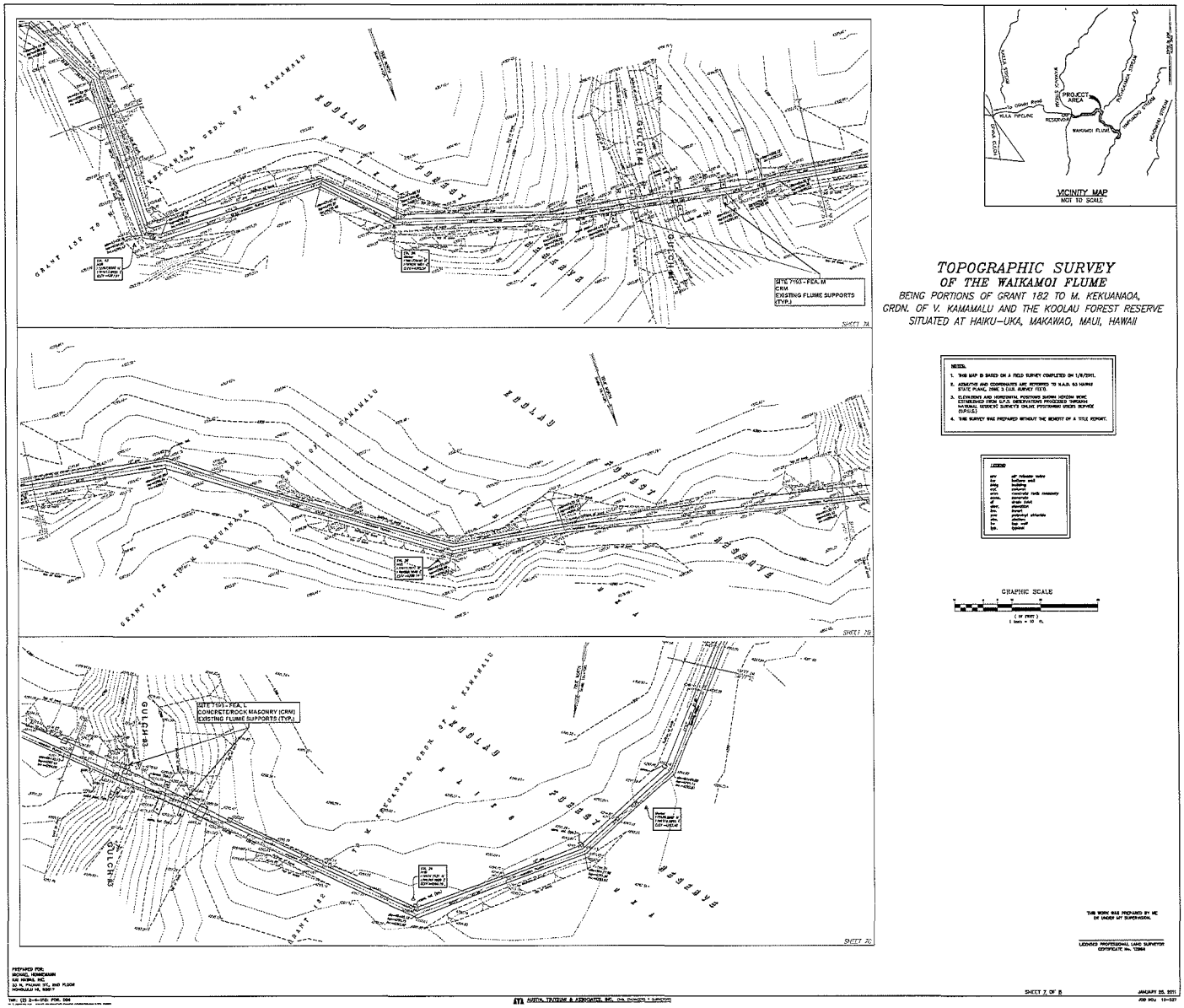
GRANT 182 TO M. KEKUANAOA
KEKUANAOA GRDN. OF V. KAMAMALU
KOOLAU FOREST RESERVE
GULCH #3
SITE 7193 - FEA. M
CRM
EXISTING FLUME SUPPORTS
(TYP.)
SHEET 7A
SHEET 7B
SITE 7191 - FEA. L
CONCRETE/ROCK MASONRY (CRM)
EXISTING FLUME SUPPORTS (TYP.)
SHEET 7C
VICINITY MAP
NOT TO SCALE
PROJECT AREA
WAIKAMOI FLUME
KULA PIPELINE
RESERVOIR
TO GRAND ROAD
PIPIWAI STREAM
HONOMANU STREAM
KOPIPO GULCH
TOPOGRAPHIC SURVEY
OF THE WAIKAMOI FLUME
BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA,
GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE
SITUATED AT HAIKU–UKA, MAKAWAO, MAUI, HAWAII
NOTES:
1. THIS MAP IS BASED ON A FIELD SURVEY COMPLETED ON 1/8/2011.
2. ANGLE(S) AND COORDINATES ARE REFERRED TO N.A.D. 83 HAWAII STATE PLANE, ZONE 3 (US. SURVEY FEET).
3. ELEVATIONS AND HORIZONTAL POSITIONS SHOWN HEREON WERE OBTAINED USING A TRIMBLE R8 GPS RECEIVER WITH REAL TIME NATIONAL GEODETIC SURVEY ONLINE POSITIONING USER SERVICE (NPUS).
4. THE SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.
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LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 12884
PREPARED FOR:
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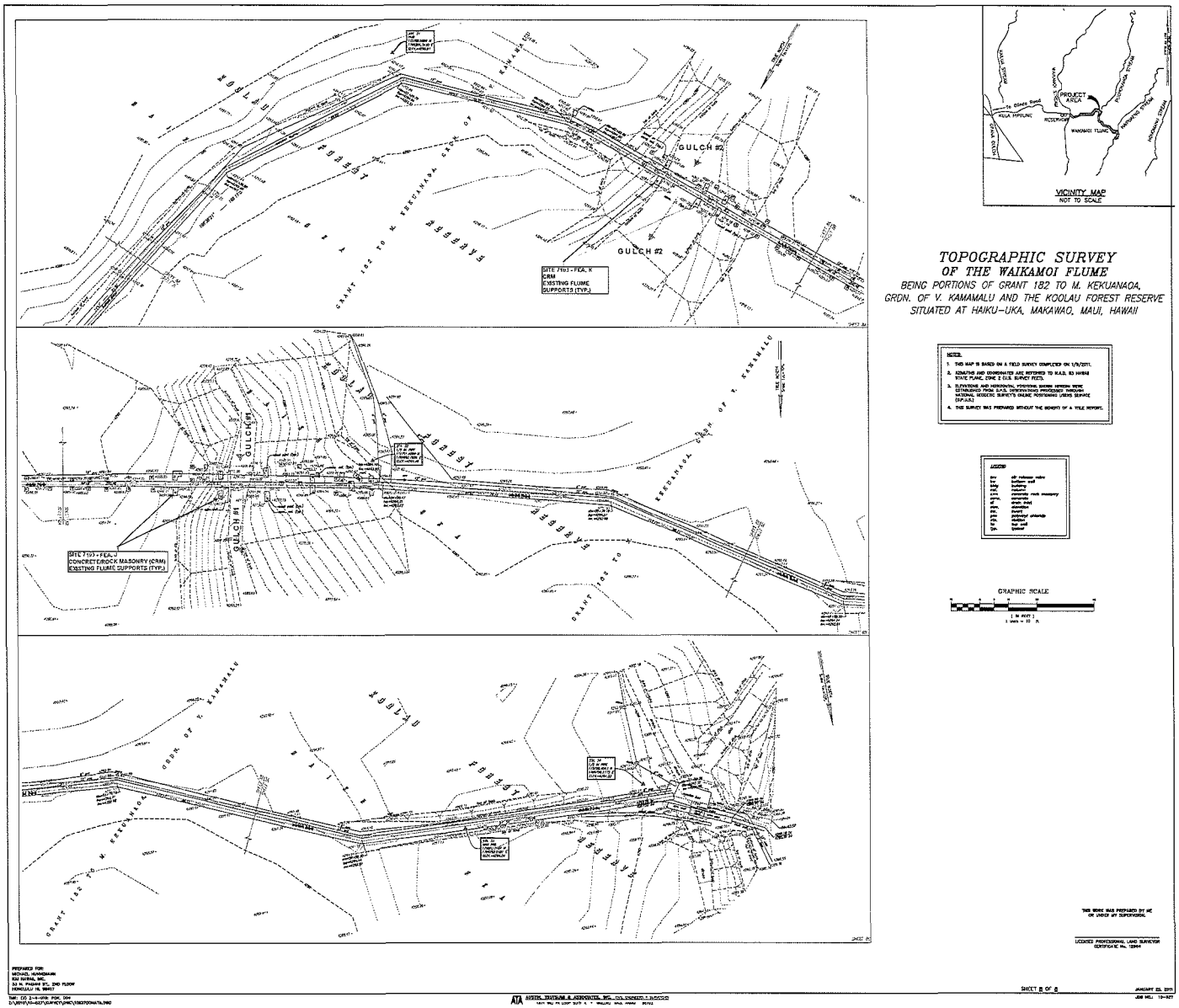
SHEET 7 OF 8
JANUARY 25, 2011
AYA AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
JOB NO.: 10-527



TOPOGRAPHIC SURVEY
OF THE WAIKAMOI FLUME

BEING PORTIONS OF GRANT 182 TO M. KEKUANAOA, GRDN. OF V. KAMAMALU AND THE KOOLAU FOREST RESERVE SITUATED AT HAIKU-UKA, MAKAWAO, MAUI, HAWAII

NOTES:

1. THIS MAP IS BASED ON A FIELD SURVEY COMPLETED ON 1/5/2011.
2. ELEVATIONS AND COORDINATES ARE REFERRED TO N.A.D. 83 (1993) STATE PLANE, ZONE 2 (U.S. SURVEY FEET).
3. ELEVATIONS AND HORIZONTAL POSITIONS SHOWN WITHIN THIS DRAWING WERE DETERMINED FROM G.P.S. OBSERVATIONS PROCESSED THROUGH NATIONAL GEODETIC SURVEY'S ONLINE POSITIONING USERS SERVICE (OPUS).
4. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.

LEGEND

BV	air release valve
BLDG	building
CMP	corrugated metal
CO	cleanout
CRM	concrete/rock masonry
EP	edge of pavement
FLUME	wood flume
GRD	guardrail
GUL	gulch
HYD	hydrant
PP	power pole
PVC	polyvinyl chloride
RR	railroad
TP	telephone pole
TRK	trunk

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CERTIFICATE NO. 12868

PREPARED FOR:
MICHAEL KUNIGKAMI
E&A MARINE, INC.
33 N. MAUNA KEA, 2ND FLOOR
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SHEET 8 OF 8

JANUARY 03, 2011

JOB NO.: 10-227

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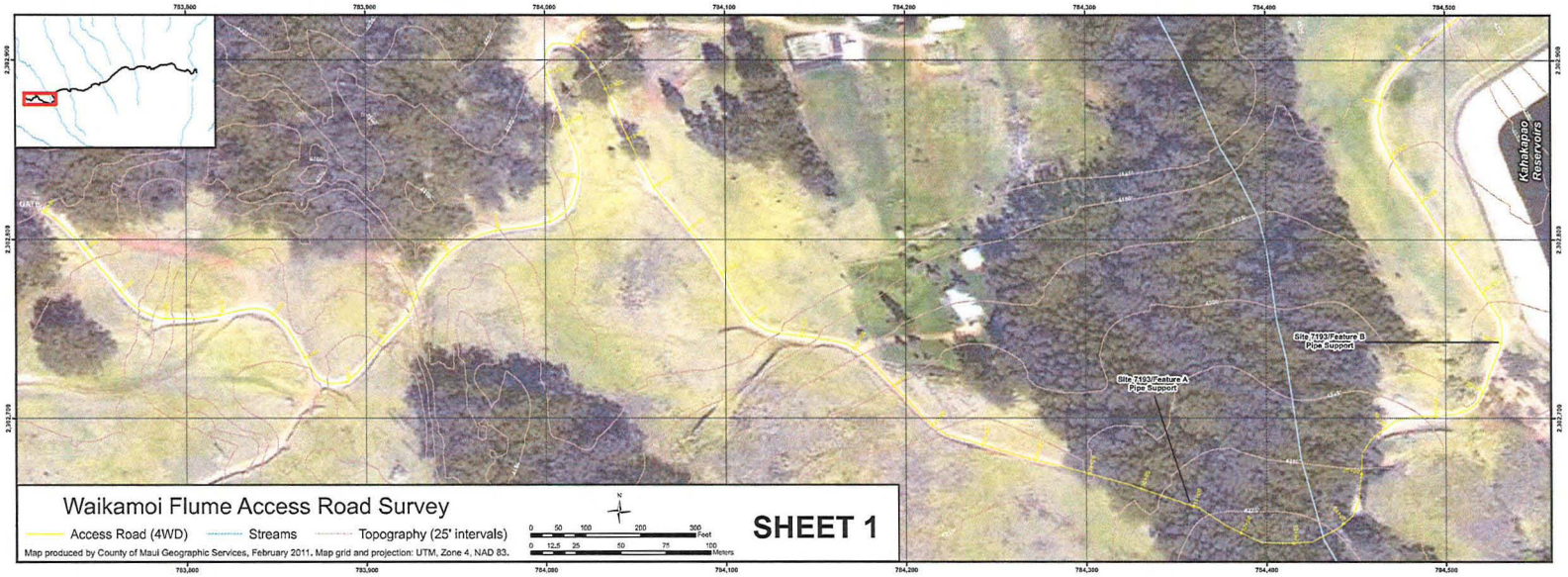
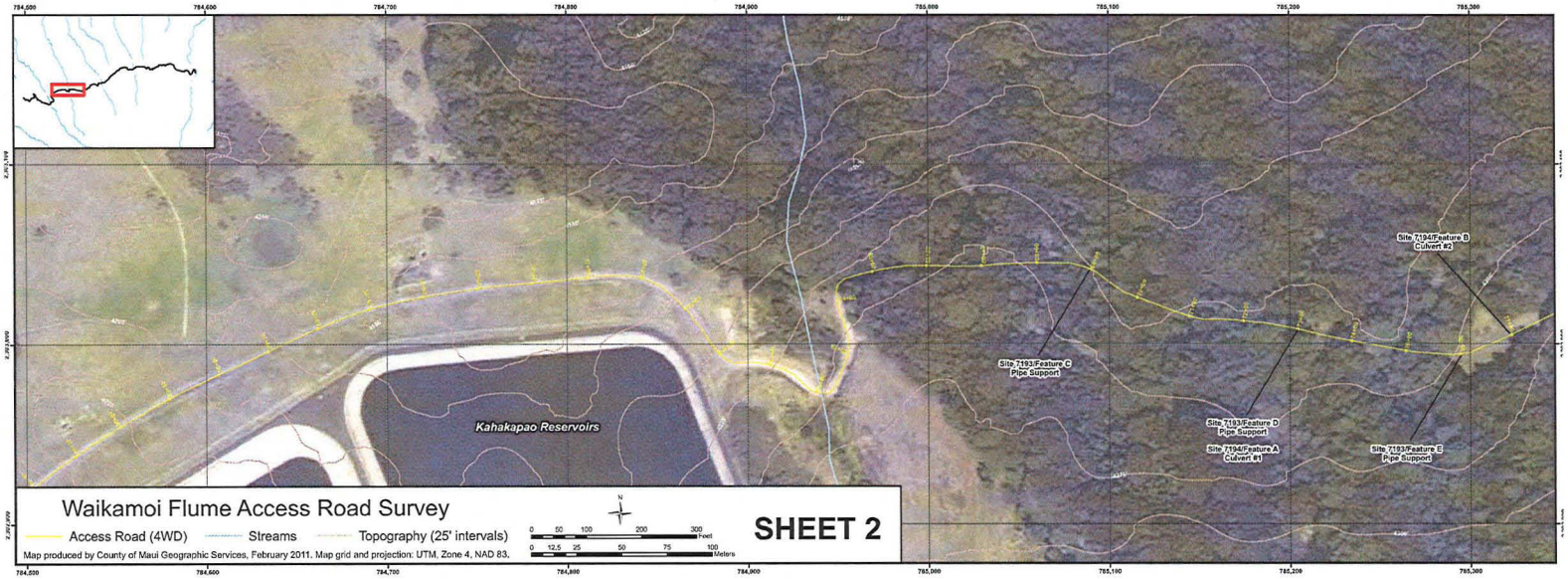
1501 WILI PA LOOP SUITE A • WAILUKU, MAUI, HAWAII 96793

APPENDIX C: SITE 50-50-06-7194 FEATURES A-H


Kahakapao Reservoirs
Site 7193/Feature B
Pipe Support
Site 7193/Feature A
Pipe Support
Waikamoi Flume Access Road Survey
Access Road (4WD)
Streams
Topography (25' intervals)
Map produced by County of Maui Geographic Services, February 2011. Map grid and projection: UTM, Zone 4, NAD 83.
SHEET 1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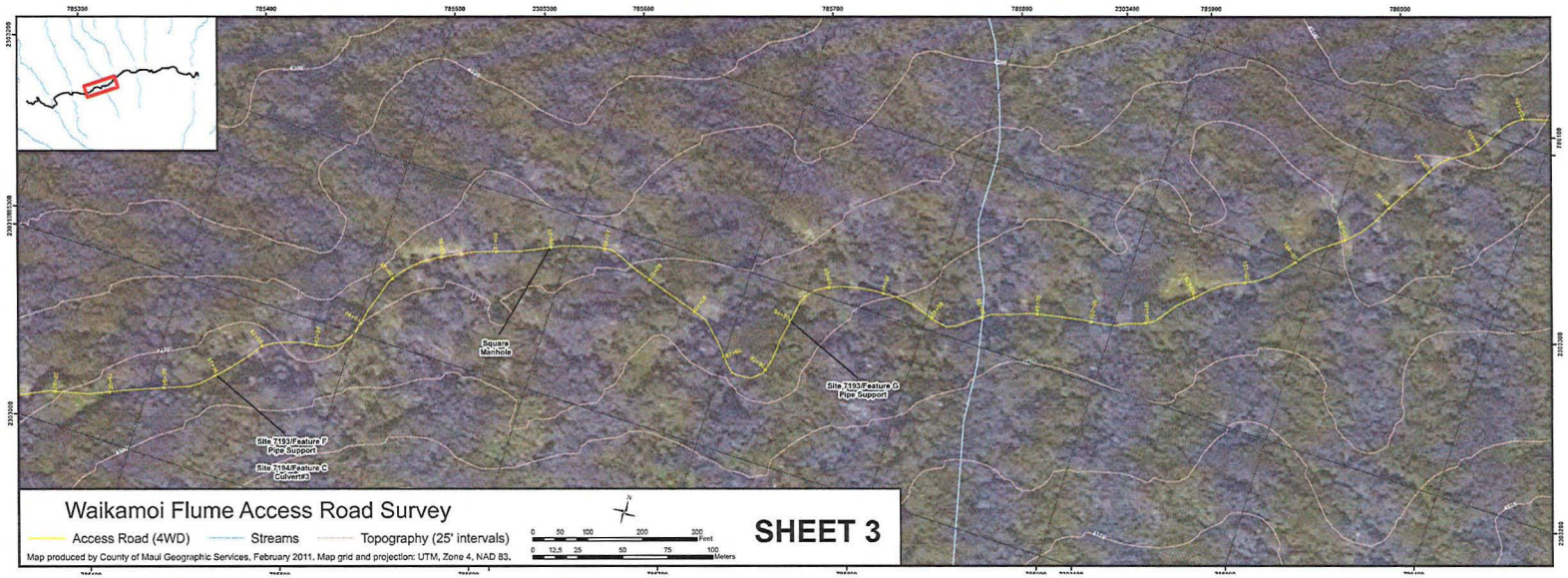
Culvert #2
Site 7193/Feature C
Pipe Support
Kahakapao Reservoirs
Site 7193/Feature D
Pipe Support
Site 7194/Feature A
Culvert #1
Site 7193/Feature E
Pipe Support
Waikamoi Flume Access Road Survey
Access Road (4WD)
Streams
Topography (25' intervals)
Map produced by County of Maui Geographic Services, February 2011. Map grid and projection: UTM, Zone 4, NAD 83.
SHEET 2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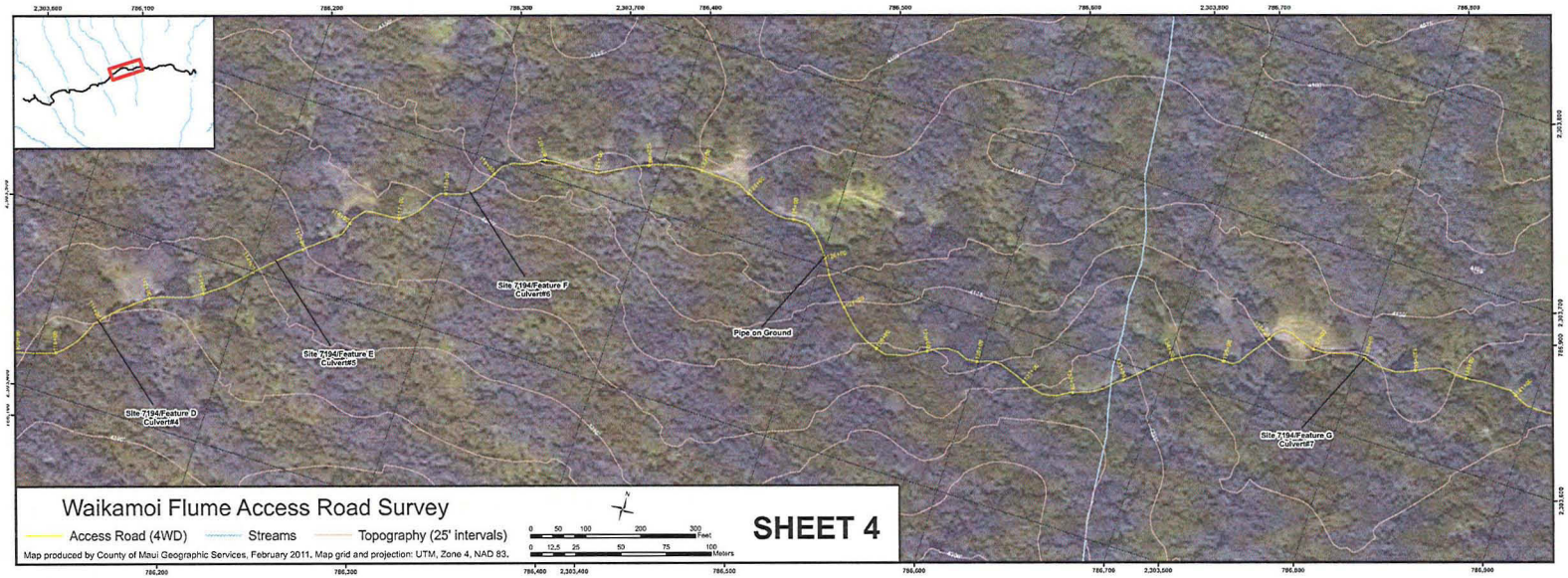
Site 7193/Feature G Pipe Support
Site 7193/Feature F Pipe Support
Site 7194/Feature C Culvert#3
Waikamoi Flume Access Road Survey
Access Road (4WD)
Streams
Topography (25' intervals)
Map produced by County of Maui Geographic Services, February 2011, Map grid and projection: UTM, Zone 4, NAD 83.
SHEET 3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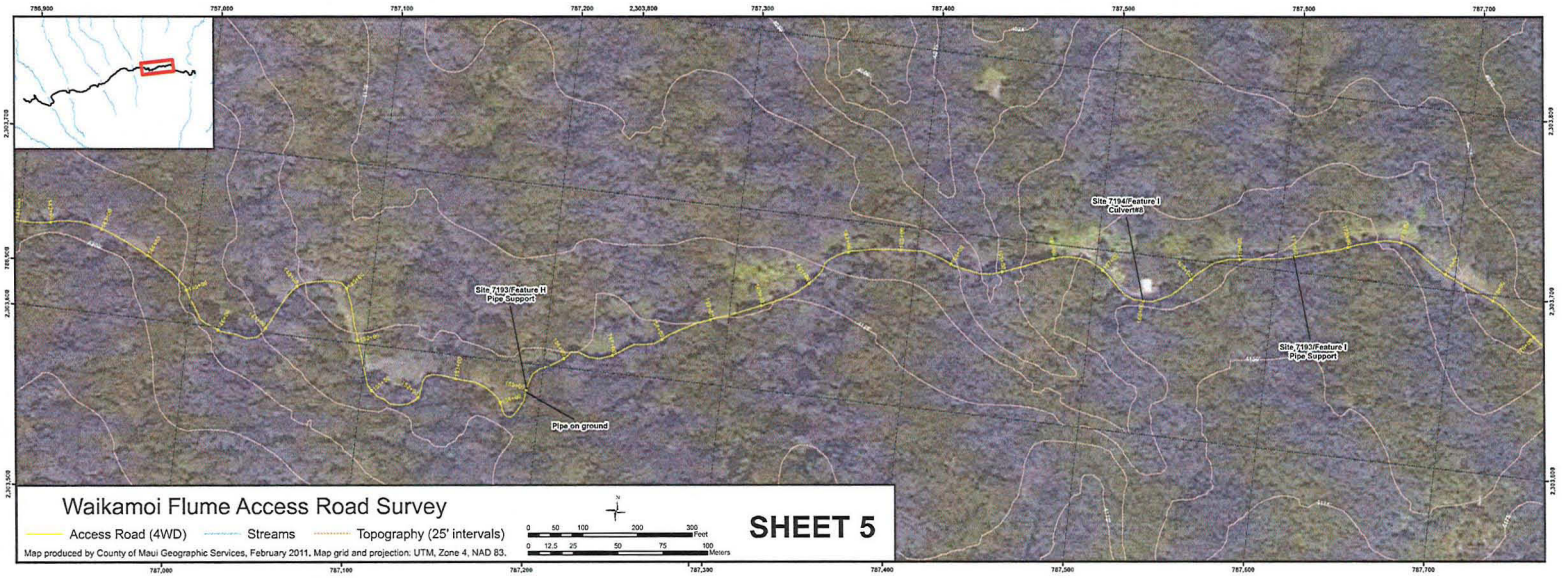
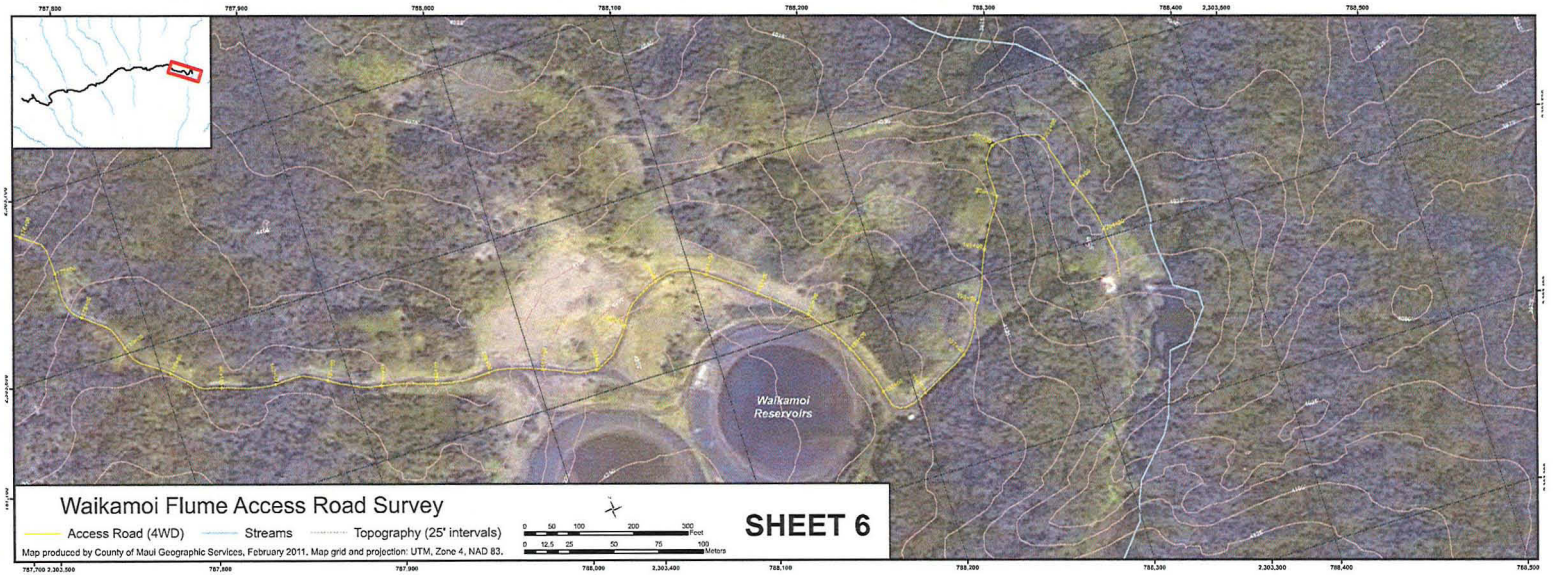
Pipe on Ground
Site 7194/Feature E Culvert#5
Site 7194/Feature D Culvert#4
Site 7194/Feature G Culvert#7
Waikamoi Flume Access Road Survey
Access Road (4WD)
Streams
Topography (25' intervals)
Map produced by County of Maui Geographic Services, February 2011, Map grid and projection: UTM, Zone 4, NAD 83.
SHEET 4


Site 7194/Feature I
Culvertas
Site 7193/Feature H
Pipe Support
Site 7193/Feature I
Pipe Support
Pipe on ground
Waikamoi Flume Access Road Survey
Access Road (4WD)
Streams
Topography (25' intervals)
Map produced by County of Maui Geographic Services, February 2011. Map grid and projection: UTM, Zone 4, NAD 83.
SHEET 5


Waikamoi Reservoirs
Waikamoi Flume Access Road Survey
Access Road (4WD)
Streams
Topography (25' intervals)
Map produced by County of Maui Geographic Services, February 2011. Map grid and projection: UTM, Zone 4, NAD 83.
SHEET 6

APPENDIX D: SITE 50-50-06-7193 PHOTOS

Photo 3: Site 7193 - Feature A, east view

Photo 6: Site 7193 -Feature D, north view

Photo 4: Site 7193 -Feature B, west view

Photo 7: Site 7193 -Feature E, north view

Photo 5: Site 7193 -Feature C, NNW view

Photo 8: Site 7193 -Feature F, north view

Photo 9: Site 7193 -Feature G, north view

Photo 12: Site 7193 - Feature J, top view

Photo 10: Site 7193 -Feature H, NNW view

Photo 13: Site 7193 - Feature J, side view

Photo 11: Site 7193 -Feature I, south view

Photo 14: Site 7193 - Feature K, top view

Photo 15: Site 7193 - Feature K, side view

Photo 16: Site 7193 - Feature L, WNW view

Photo 17: Site 7193 - Feature L, ESE view

Photo 18: Site 7193 - Feature M, ENE view

Photo 19: Site 7193 - Feature M, WNW view

Photo 20: Site 7193 - Feature N, south view

Photo 21: Site 7193 - Feature N, north view

Photo 22: Site 7193 - Feature O, south view

Photo 23: Site 7193 - Feature O, south view, looking down

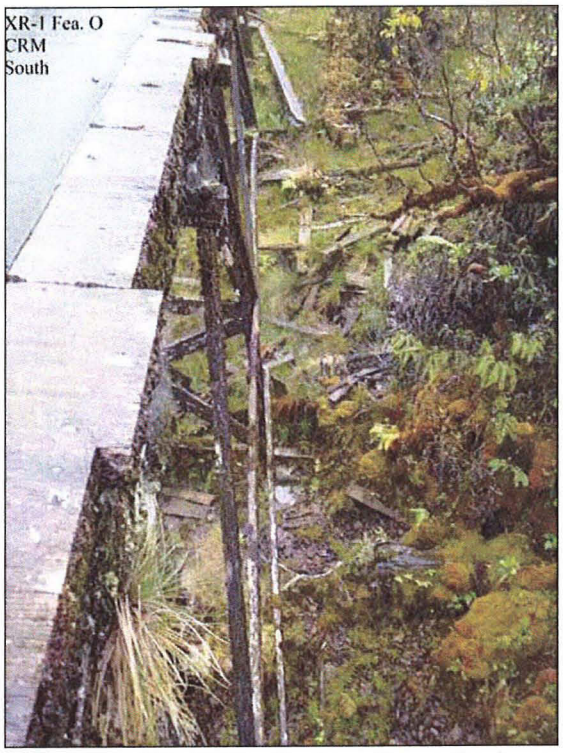


Photo 24: Site 7193 - Feature O, south view, overview

Photo 25: Site 7193 - Feature O, north view

Photo 26: Site 7193 - Feature P, SSE view

Photo 27: Site 7193 - Feature P, NNW view

Photo 28: Site 7193 - Feature P, NNW view, looking down

Photo 29: Site 7193 - Feature Q, SE view

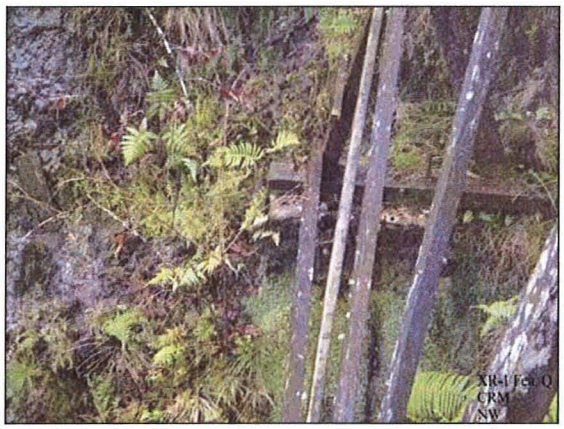


Photo 30: Site 7193 - Feature Q, NW view

Photo 31: Site 7193 - Feature Q, NW view, showing stone footing

Photo 32: Site 7193 - Feature R, ENE view

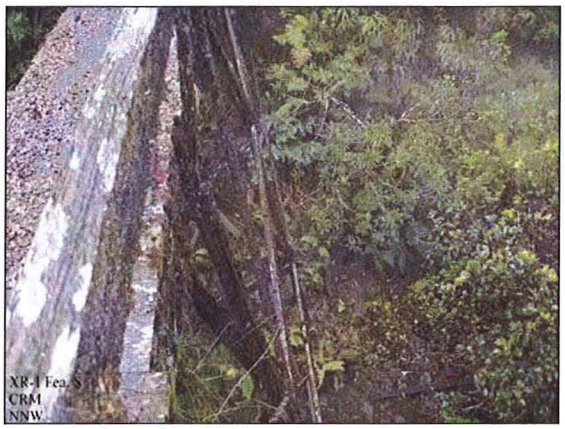


Photo 33: Site 7193 - Feature S, NNW view

Photo 34: Site 7193 - Feature T, WNW view

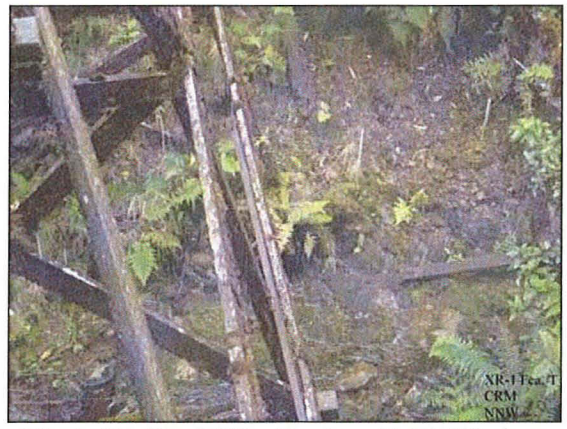


Photo 35: Site 7193 - Feature T, NNW view

Photo 36: Site 7193 - Feature U, ESE view

Photo 37: Site 7193 - Feature U, SE view

Photo 38: Site 7193 - Feature V, SE view

Photo 41: Site 7193 - Feature X, NW view

Photo 39: Site 7193 - Feature W, NE view

Photo 40: Site 7193 - Feature X, north view

APPENDIX E: SITE 50-50-06-7194 PHOTOS

Photo 42: Site 7194 - Feature A, north view

Photo 43: Site 7194 - Feature B, north view

Photo 44: Site 7194 - Feature C, south view

Photo 45: Site 7194 - Feature D, north view

Photo 46: Site 7194 - Feature E, WNW view

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Photo 49: Site 7194 - Feature H, ENE view

APPENDIX I-1.

State Historic Preservation Division Receipt of Archaeological Inventory Survey

Date: 16 April 12

Submittal Sheet for Historic Preservation Review Filing Fees

State Historic Preservation Division
601 Kamokila Blvd., #555, Kapolei, Hawai'i 96707

Agency/Firm (Requesting Review): Kamanek Researches, LLC

Contact: Erik Fredericksen
Phone: 808-572-8900 Fax: 808-572-6118 E-Mail: kamanekresearchesllc@gmail.com
Address: P.O. Box 880131, Pukalani, HI 96788

Title of Report/Plan: An Archaeological Inventory Survey for the Proposed Replacement of Wailuku Flume

Island: Maui District: Makawao Ahupua'a: Ha'iku
TMK [(1) 1-1-001:001]: (2) 2-4-016: Por. of 001, 002, 003, 004 AND (2) 2-3-005: Por. of 004, 025 and 029

Submitted Plan/Report Fee & Type: (All reports or plans submitted to the SHPD for review shall be accompanied by the appropriate fee in accordance with HAR §13-275-4 and §284-4).

____		Indicate here (X) if report is a re-submittal (no fee charged)
____	$50	Archaeological Assessment
____	$150	Archaeological Inventory Survey Plan
✓	$450	Archaeological, Architectural or Ethnographic Survey Report
____	$150	Preservation Plan
____	$25	Monitoring Plan
____	$150	Archaeological Data Recovery Plan
____	$250	Burial Treatment Plan
____	$100	Archaeological Monitoring Report, if resources reported
____	$450	Archaeological Data Recovery Report
____	$450	Ethnographic Documentation Report
____	$25	Burial Disinterment Report
____	$50	Osteological Analysis Report

Make check payable to "Hawai'i Historic Preservation Special Fund." A service charge of $15 will be assessed on all dishonored checks pursuant to HRS §40-35.5" A copy of this form will be mailed or faxed back to you and will serve as your receipt.

Fee Total: $ 450.00

2012 APR 25 A 8:20

For Office Use Only:

Date Received: 25 APRIL 2012	Receipt No.: 3456
	Payment Method: Cash ____ $ 450.00 Check: ✓ Check No.: 2575
Log. No.:	Receipt Issued by: ____
	Treasury Deposit Receipt No:

STATE OF HAWAII

OFFICIAL RECEIPT

No. 003456

STATE HISTORIC PRESERVATION DIVISION

Department or Agency

DATE: 30 APRIL 2012

RECEIVED from XAMANEK RESEARCHES, LLC

Four hundred fifty and 00/100 DOLLARS

Archaeological Inventory Survey Report: Proposed Replacement of Waikamoi Flume.

Haiku, Makawao, Maui. Check #2575

TMK (2)2-4-016: Portions of 001,002,003,004 ; (2)2-3-005: portions of 004,025,029

$ 450.00

C. Lolunao Farin

Authorized Signature

STATE ACCOUNTING FORM B-24

July 1, 1999 (Revised)

AN ARCHAEOLOGICAL INVENTORY SURVEY FOR THE PROPOSED REPLACEMENT OF WAIKAMOI FLUME, HA`IKU *AHUPUA`A*, MAKAWAO DISTRICT, ISLAND OF MAUI

TMK: (2) 2-4-016: PORTIONS OF 001, 002, 003, 004, AND TMK: (2) 2-3-005: PORTIONS OF 004, 025, AND 029

Prepared on behalf of:
County of Maui
Department of Water Supply
Wailuku, Maui

Prepared by:

Xamanek Researches, LLC
Pukalani, Maui

Erik M. Fredericksen
Jennifer J. Frey

11 April 2012

APPENDIX J.

Cultural Impact Assessment

CULTURAL IMPACT ASSESSMENT
For the
PROPOSED
Waikamoi Flume Reconstruction Project

June 2011

HANA PONO

Hana Pono, LLC - PO Box 2039 Wailuku, HI 96793 – hanapono@gmail.com

CULTURAL IMPACT ASSESSMENT
For the

PROPOSED

Waikamoi Flume Reconstruction Project

TMK: (2) 2-4-016: 004 (por.)

Prepared for:
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Prepared by:
Hana Pono, LLC
PO Box 2039
Wailuku, Maui, Hawai'i 96793

June 2011

Management Summary

Report	Cultural Impact Assessment for the proposed Waikamoi Flume Reconstruction project
Date	June 2011
Project Location	County of Maui; Makawao district (modern), Hamakualoa Moku, multiple ahupua'a, TMK: (2) 2-4-016: 004 (por.)
Acreage	Approx. 1.1 miles in length
Ownership	County of Maui, through perpetual easement from East Maui Irrigation Company, Ltd.
Developer/Applicant	County of Maui
Project Description	Reconstruction of the Waikamoi Flume. Involves dismantling the old wooden flume and trestles and constructing a new aluminum and fiberglass one in its place. From Haipuaena to Puohokamoa, water flow will need to be temporarily suspended during that phase of construction. For the portion below Puohokamoa the existing aluminum pipe that runs alongside the flume may be used unless otherwise needed.
Region of Influence	Hamakualoa, Makawao district, Upcountry Maui water users
Agencies Involved	Maui County Department of Water Supply, Department of Land and Natural Resources Office of Conservation and Coastal Lands (OCCL)
Environmental Regulatory Context	Chapter 343, HRS and State Conservation District Use Application
Results of Consultation	Concerns center on the protection of the existing native forest resources and minimizing the potential for destruction of habitat, removal of natives, and especially the introduction of invasive species, whether on purpose or accidentally.
Recommendations	• Minimize the destruction of the native habitat • Protections against the introduction or spread of invasive species • Cultural Orientation regarding Wao Akua • Appropriate re-usage of any native plants • Cultural Advisor on-call to help with all cultural concerns

Cultural Summary

The Waikamoi Flume in the Makawao region of upcountry Maui run 1.1 miles in length through multiple ahupua'a within the Ko'olau Forest Reserve. The flume is a man-made channel that moves water from multiple gulches and valleys to the East of Makawao and funnels them into the County Upper Kula water system to be used by the residents of Upcountry Maui. The flume's path, constructed in the early 1900's, carved out a swath between 10 and 30 feet into the native cloud forest disturbing the native ecosystem and displacing massive amounts of native flora and fauna. Since that time the habitat has normalized to a degree and this new project will not significantly impact the existing state of the forest provided care is taken.

There are a number of rare and endangered plants within the flume region and care should be taken to follow all applicable laws related to these endemic or indigenous native plants and the findings of the Botanical Survey. The recommendations put forth in this report are for the purpose of protecting the resources that remain in the region and preventing further damage to the delicate ecosystem, in addition to respecting the host culture's view of this revered place, the Wao Akua.

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Introduction

At the request of Ms. Kimberly Skog of Munekiyo & Hiraga Inc., Hana Pono, LLC has completed a report for the Cultural Impact Assessment of the proposed Waikamoi Flume Reconstruction project located at Tax Map Key number: TMK: (2) 2-4-016: 004 (por.). This study was completed in accordance with State of Hawaii Chapter 343, HRS, and the State of Hawaii Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts (1997).

Guiding Legislation for Cultural Impact Assessments

It is the policy of the State of Hawaii under Chapter 343, Hawaii Revised Statutes, to alert decision makers about significant environmental effects that may occur due to actions such as development, re-development, or other actions taken on lands. Articles IX and XII of the State Constitution, other state laws, and the courts of the state require the promotion and preservation of cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups.

The Guidelines for Assessing Cultural Impacts, as adopted by the Environmental Council, State of Hawaii 1997 and administered by the Office of Environmental Quality Control, including HAR Title 11 Chapter 200-4(a), include effects on the cultural practices of the community and state. The Guidelines also amend the definition of "significant effect" to include adverse effects on cultural practices.

Goal and Purpose

The goal of this study is to identify any and all Native Hawaiian, traditional, historical, or otherwise noteworthy practices, resources, sites, and beliefs attached to the project area in order to analyze the impact of the proposed development on these practices and features. Consultations with lineal descendents or kupuna (Hawaiian elders) with knowledge of the area in gleaning further information are a central part of this study.

Scope

The scope of this report compiles various historical, cultural and topographical accounts and facts of the project area and its adjacent ahupua'a. "The geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. An ahupua'a is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua'a and the geographical extent of the study area should take into account those cultural practices." (OEQC, Guidelines for Assessing Cultural Impacts, Nov 9, 1997)

Data will be compiled beginning with the first migrations of Polynesians to the area, progressing through the pre-contact period of Hawaiian settlement, containing data on the post-contact period, through to the current day and any cultural practices or beliefs still occurring in the project area. Hawaiian kupuna with ties to the area will be interviewed on their knowledge of the area and its associated beliefs, practices, and resources. Additionally, any other individuals

or organizations with expertise concerning the types of cultural resources, practices and beliefs found within the geographical area in question will be consulted.

Project Area

The project is located in the State of Hawaii, County of Maui, at Tax Map Key number: (2) 2-4-016: 004 (por.). Spanning approximately 1.1 linear miles with an approximate average width of 10 feet the Waikamoi Flume spans deep gulches and cuts into the hillside in order to create the appropriate descent necessary to transport the water without the aid of pumps. The flume crosses through many valleys and ahupua'a starting deep in the native cloud forest of Haleakala's windward region at a gulch called Haipuaena. It then crosses through numerous other gulches, Puohokamoa being one of the larger, until terminating in the Waikamoi gulch. From there the flume ends, depositing its water into the Waikamoi reservoirs which is then transported by pipeline to the Kahakapao reservoirs and into the Olinda Water Treatment Plant, which is part of the county water system.

The island of Maui is comprised of twelve (12) traditional land districts, called moku. Each moku is made up of numerous ahupua'a, smaller land divisions wherein a self-inclusive community could find all the things needed for a satisfactory life. Usually these ahupua'a ran from the heights of the mountain peak to the edge of the outer reef like a giant pie slice, although many ahupua'a did not fit this template. Of Maui's 12 Moku, 9 of them are on the mountain of Haleakala, and all but one of them radiates from a single point on land. Pohaku Palaha, a sacred site located on the mountaintop, is a large *pohaku* (rock) from which the Moku of Maui *palaha* (spread out in all directions) like the tentacles of an octopus.

As both Moku and Ahupua'a rise in elevation they become narrower with less distance between their two boundaries. In these modern times there is less of an understanding of crossing over these unseen boundaries, but appreciation should be taken in recognizing the ancient ones' understanding of landforms. Access to the flumes is through the Moku of Hamakuapoko, the one moku that is *poko* (cut short) from Pohaku Palaha. But the flumes actually run through the entire moku of Hamakualoa and begin in the westernmost reaches of the Moku of Ko'olau.

Approach & Method

The approach taken in this study was two-fold. Foremost, historical, involving as appropriate, a review of: mahele (land division of 1848), land court, census and tax records, previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs and other archival documents. Secondly, an in-depth study involving oral interviews with living persons with ties, either lineal or cultural, to the project area and the surrounding region.

Objectives

The objectives of the Cultural Impact Assessment are as follows:

- to compile and identify historical and current cultural uses of the project area,
- to identify historical and current cultural beliefs & practices associated with project area,
- To assess the impact of the proposed action on the cultural resources, practices, and beliefs.

Tasks

Data gathered combined oral interviews of knowledgeable kupuna and families/individuals with long-standing ties to the area with all available written and recorded background information.

Archival Research

All sources of historical written data, old maps, and literature were culled for information.

Oral Interviews

Tasks completed for oral interviews included: identification of appropriate individuals to be interviewed, determination of legitimate ties to project area and surrounding region, interview recorded in writing and by digital audiocassette, transcription of interview, compilation of pertinent data.

Level of Effort Undertaken

Interviewees are contacted and selected for inclusion in this report based on a sliding scale of legitimate authority based on the following characteristics: lineal descendents, cultural descendents, traditional practitioners, cultural practitioners, knowledgeable area residents of Hawaiian ancestry, knowledgeable concerned citizens. Every effort is made to obtain the highest quality interviewees and determination of appropriate individuals follows this criteria.

Historical & Current Cultural Resources & Practices

First migrations

Traditional stories start with the creation chant called "Kumulipo." The Kumulipo brings darkness into light. Embedded in this all-encompassing chant is the tale of the coming of the Hawaiian Islands through the mythical stories of Pele and another demigod named Maui who, with his brothers, pulls up all the islands from the bottom of the sea. Geologically speaking, the island of Maui formed in six separate volcanic "series" beginning with the Wailuku Volcanic Series (WVS) that formed the mass of Mauna Kahalawai. The WVS took Mauna Kahalawai up to 6 kilometers in height whereupon the summit collapsed forming a sunken crater that would later become the back of Iao Valley. The massive hulk of Haleakala was formed in three separate volcanic series named the Honomanu, Kula, and Hana series (Kyselka & Lanterman, 22). Haleakala is far younger than its sister mountain with its last flow occurring a mere 200 years ago, with the lava pouring down the south-western slope.

Another part of the creation story tells of two of the major deities, Kane and Kanaloa. It was said that Kane, the god of fresh running water, and Kanaloa, god of the ocean and the 'awa plant, traveled around the islands and sat and drank awa wherever they went. They would often stop to rest in locations with no water and Kane would pound his *o'o*, his digging stick, into the ground and produce a freshwater spring. Many areas in the wet, windward side of the island are named for these feats, bearing names like Waiakane, Kawaiolaokane, and Waiola.

The occupation of the Hawaiian archipelago after its mythical creation came in distinct eras starting around 0 to 600 A.D. This was the time of migrations from Polynesia, particularly the Marquesas. Between 600 and 1100 A.D. the population in the Hawaiian Islands primarily

expanded from natural internal growth on all of the islands. Through the course of this period the inhabitants of the Hawaiian Islands grew to share common ancestors and a common heritage. More significantly, they had developed a Hawaiian culture and language uniquely adapted to the islands of Hawai'i which was distinct from that of other Polynesian peoples (Fornander, 222).

Between 1100 and 1400 A.D., marks the era of the long voyages between Hawai'i and Tahiti and the introduction of major changes in the social system of the Hawaiian nation. The chants, myths and legends record the voyages of great Polynesian chiefs and priests, such as the high priest Pa'ao, the ali'inui (Head Chief) Mō'ikeha and his sons Kiha and La'amaikahiki, and high chief Hawai'iloa. Traditional chants and myths describe how these new Polynesian chiefs and their sons and daughters gradually appropriated the rule over the land from the original inhabitants through intermarriage, battles and ritual sacrifices. The high priest Pa'ao introduced a new religious system that used human sacrifices, feathered images, and enclosed heiau (temples) to facilitate their sacred religious practices. The migration coincided also with a period of rapid internal population growth. Remnant structures and artifacts dating to this time suggest that previously uninhabited leeward areas were settled during this period.

Settling of Hamakualoa Moku & related Ahupua'a

When travelling along Maui's northern shoreline miles of white sandy beach pockmarked by rocky points stretch on from Wai'ehu across the Kahului bay, through to the town of Pa'ia and beyond. As one travels east of Pa'ia the coastline changes, long beaches giving way to high cliffs and rocky bays. The waters continuously falling in the upper reaches of Haleakala carve deep valleys and gulches into the mountains slopes, eroding the sides and sending rocks tumbling downward and towards the ocean. Many areas suitable to farming with easy access to freshwater would have been cleared of forest enough for a family to live comfortably. Handy relates, "Presumably stream taro used to be planted along the beds of these water courses well into the uplands, and forest taro throughout the lower forest. The minute ahupua'a characteristic of this coast indicates a dense population" (Handy, 109).

Place Names Associated With This Area

The Hawaiian culture places a particular importance on place-names. Throughout Polynesia, cultures are for the most part ocean-based, surviving and building their cultures around the bounty of the sea. While Hawaiians share common history with all Pacific peoples, because of the unique factors of these high-islands, their culture turned decidedly more land-oriented than many other Pacific cultures. The abundant access to fresh water sources, fertile soil, relative lack of reef and reef fish compared to older south pacific islands all contributed to their formation of a completely unique and distinct culture; a culture that placed a high inherent value on land and landforms, landscapes and their relationship to people's lives. In place-names one can find its purpose, their purpose, and the hidden *kaona* (symbolism) behind the word.

Waikamoi

Waikamoi takes its name from a variety of taro named for a variety of fish, the *moi*. The moi taro is a very nice tasty variety good for wetland, flood style irrigation taken to great heights by the Hawaiians system of aqueducts and lo'i kalo. The gulch being called Waikamoi indicates that in the lower elevations it was a place to farm taro and the moi variety was a favorite of the people living in that area.

Makawao

Makawao is the town that one passes through to access the flume system and has come to be synonymous with upcountry Maui and the area of the flume. Makawao, literally translates into the *maka* (eyes) of the *wao* (inland forest region). It is a notice to those passing through that they are approaching and crossing over a boundary. It is notice that here is where you would make preparations or protocols such as chants or offerings in recognition of entering a higher plane.

Haipuaena

Haipuaena is the stream in which the flumes begin their water collection. All of the interviewees and other knowledgeable cultural practitioners did not have knowledge of a literal or descriptive definition for this stream. There is also some confusion in the spelling of this place, as different sources have it spelled as Ha'ipuaena or Haipuaena or Haipua'ena. Below we list literal translations of the individual words that make up this name.
Hai-to offer, to sacrifice
Ha'i-to break or snap, like a stick; to say, tell, or mention; an edge, or border; to act flirtatious
Pua- flower; to bloom, or spring forth; a child, or descendent
Ena- red-hot, glowing; figuratively meaning angry or raging.

Ko'olau

Ko'olau, the next moku eastward of Hamakualoa, where the streams of Haipuaena, Puohokamoa, and Waikamoi spill into the ocean is so named in connection to Haleakala and ancient Hawaiian concepts of land. *Ko'o* is literally a support staff, crutch, or cane. *Lau* is the general word for the leaves of a plant (i.e.: lauhala). All islands contain an area or ridgeline called Ko'olau. It is this ridgeline that is symbolically and geographically aligned with the wet, windward side of the island. The placement and rise in elevation of this ridgeline provides the buffer which the clouds rest up against (ko'o) and break open yielding the land below with rain to sustain the forests and greenery (lau).

Puohokamoa

Puohokamoa is literally, the startled, *puoho*, chicken, *ka moa*.

Traditional Hawaiian Uses & Practices

Hawaiians were genius in their ability to categorize and compartmentalize different land divisions according to their use, purpose, abilities. The most famous of these is the oft-mentioned Moku and Ahupua'a system of land resource management. But they also broke down land into further divisions vertically as one moved from the seashore to the mountaintops. Typically, people lived in either the Kahakai, meaning along the ocean extending a little ways inland but with easy access to the shoreline; or in the Wao Kanaka, or the inland region meant for human habitation. Those living in the Kahakai would have focused their livelihoods on the bounty of the sea and its related resources. Those living in the Wao Kanaka would be more focused on agriculture, taro as the staple but also cultivating sweet potato, banana, breadfruit, and a number of other plants as well as hunting for birds and pigs. Those living in the Wao Kanaka also could have sustained themselves by gathering the resources of the forest regions, and of these peoples there were legion. Many families were made favorites of the chiefs for their

masterful carving, weaving, medicinal healing, or other talents gained from resources inside the forest regions.

The area located towards the mountaintop from the Wao Kanaka was called the Wao Akua, the Region of the Gods. Just as the name Makawao, eyes of the forested region, was a notice to be aware of the boundary, the name Wao Akua was clear notice that humans were not meant to live in this area, only to visit for a certain purpose and not without paying respect first. The Upcountry flumes exist totally in the Wao Akua. The traditional Hawaiian would have been loath to desecrate the land of the gods for his own benefit, considering how much they already lived in the graciousness of the God's goodwill. Access to the Wao Akua would have been done by trained professionals only, those who descended from families of feather workers, carvers of canoes or other implements. And typically, if a resource could be gathered from the forest region below the Wao Akua they would shy toward crossing the boundary. A publication by the State Department of Land and Natural Resources (DLNR) aptly describes this idea,

> Hawaiians did not as a matter of course penetrate the wao akua if the trees they needed could be gotten elsewhere, because of the priority of promoting new growth through non-disturbance of seed-producing forest areas. Hawaiians realized the importance of the food source and the regenerative energy of the forest. Therefore it was necessary to leave some areas or groves of trees as they stood originally, thus the name Wao Akua. (DLNR, 14)

The people of old were keenly aware that their downstream livelihoods depended on the health of the forest and watersheds. The concept of balance was taught to be necessary not only for personal health but also for ecosystem health. The taking of forest resources were heavily regulated by the *konohiki*, land manager, and all in the community so as to make sure that one specific area, plant, tree, or habitat was not degraded to the point of no return.

In ancient times and still in practice today, a practitioner that was venturing into a new area, crossing over a boundary would offer an *oli*, a chant; stating who they were, what their purpose was for entering, and asking for acceptance and forgiveness. There are many different chants depending on the purpose of the journey into the Wao Akua, but here is an example of a chant used by those entering the forest region to gather its resources,

Li'u-li'u aloha ia'u,
Ka uka o Koholá-lele,
Ka nahele mauka o Ka-papala.
Komo, e komo aku hoi au maloko.
Mai ho'ohewahewa mai oe ia'u; oau no ia,
Ke ka-nae-nae a ka mea hele,
He leo, e-e,
A he leo wale no, e-e!
Eia ka pu'u nui owaho nei la,
He ua, he ino, he anu, he ko'e-ko'e.
E ku'u aloha, e,
Maloko aku au.

Long, long have I tarried with love
In the uplands of Koholá-lele,
The wildwood above Ka-papala.
To enter, permit me to enter, I pray;
Refuse me not recognition; I am he,
A traveler offering mead of praise,
Just a voice,
Only a human voice.
Oh, what I suffer out here,
Rain, storm, cold, and wet.
O sweetheart of mine,
Let me come in to you.

Post-Contact Historical Uses & Practices

At first the arrival of outsiders had very little impact upon the dense upper cloud forests of Maui. Travel to and through the region would have been near impossible to the uninitiated and the early explorers had little idea of the resources and biodiversity within these areas. As the influx of outsiders grew they also brought with them domesticated animals unfamiliar to Hawaiians. The first cattle, goats, large domesticated pigs, and sheep were gifts to the chiefs of the islands. The ali'i let them roam the island with impunity, banning their harassment or slaughter on pain of death. These roaming bands of livestock were famous for scaring travelers across Maui's central isthmus, trampling centuries old lo'i and gardens, and being a general nuisance to all. They also slowly made their way into the upper forest lands, many of them bordering previously cleared pastureland.

These new additions to the Hawaiian landscape had no natural predators save man and his gun and the native habitat was not equipped to deal with the destruction they caused. The large pigs brought to Hawaii by the Westerners rooted up the ground, turning fertile soil into mud bogs devoid of much life. This was made worse by the heavy hooves of cattle, trampling and killing any remaining seedlings poking through the surface.

What destruction wasn't done by the free-roaming livestock was carried out by the short-lived Sandalwood trade. Although the project area was not heavily populated by *ili'ahi*, native sandalwood, there would have been forays to remove any that were there. Luckily, in the late 1800's some were being made aware of this destruction and made moves to protect the remaining forestlands.

Able to see what would happen with the total loss of the native rainforest,

The legislature of 1876 appropriated $25,000 for a new, larger reservoir to be built [due to the lessening rainfall because of deforestation]. The legislature also passed 'An Act for the Protection and Preservation of Woods and Forests'. This was the first step in what would later become the forest reserve program in which Maui played a crucial role. 'Act 44, approved by the territorial legislature on April 25, 1903 created Hawaii's forest reserve system and sparked the largest public-private conservation partnership in the history of the state. Ralph S. Hosmer was Hawaii's first Superintendent of Forestry, charged with creating Hawaii's forest reserve system' (dlnr, xv).

Part of the Waikamoi forest system still bears the name of this visionary public servant and Hosmer's Grove in Haleakala National Park remains a part of Maui's great history. Maui set the stage also for the creation of partnerships between the large landowners in the area to protect the forests. The East Maui Watershed Partnership brought together federal, state, county, and private landowners to pool their resources in protecting the giant watershed.

Current Uses, Practices, & Resources of Project Area

The original Waikamoi flume, built in 1930, and the access roads leading to it have long been access points for local hunters looking for pigs. Because of the remote nature of the flumes and the relative difficulty of travel there are not many, if any, cultural practitioners that gather resources in the project area. Many similar resources, of wood, ferns and other greenery, can be found in regions more easily accessible and without the high level of protocol required for entering the Wao Akua. To whatever extent the current owners/leaseholders allow subsistence hunting in the region, dialogue should be made with those parties if access is to be changed.

Synthesis of Archival, Literary, & Oral Accountings

The project area rests in the Wao Akua, that upland region of the island above the habitations and agriculture of common people and chiefs alike. Entered into only by the priestly class and those needing the resources of the region, the area lay devoid of human development. In fact, it was almost a practice in itself to not take from or disturb these culturally significant pieces of land and instead let them remain in pristine format, capturing the sky's clouds to fill the island's aquifers. This balance was only broken by the post-contact livestock allowed to run rampant and the destruction of virgin forest for expanded pastureland.

Further destruction to this sensitive area should be minimized as much as possible in the hopes of continuing the difficult work of rebuilding our watersheds. The threat of invasive species of plants taking over these forestlands has cultural experts, environmentalists, and politicians alike concerned at the potential repercussions. All of the people we spoke with in the process of fulfilling the requirements of this CIA were understanding of the need to supply clean water to the residents of upcountry Maui and recognized the benefits of the flume system in that regard. Some were skeptical about how exactly this new flume would be built as the terrain is difficult.

Potential Effects of Development & Proposed Recommendations

This report finds that the proposed Upcountry Flume Renovation project located at TMK: (2) 2-4-016: 004 (por.), sits in a culturally significant, environmentally fragile location. The ancient Hawaiians called this area the Wao Akua, land of the gods, and restricted access with the intent of protecting the forest ecosystem. The potential to exacerbate the damage done by past generations of people ignorant of the destruction they cause by bringing in new invasive species, trampling native habitat, and disrespecting the Hawaiian's view of this special place is great. When this flume was built there were no environmental laws in place, no cultural supervision as foreigners entered into the gods' sacred space. Today we have the ability and the opportunity to change that. No longer ignorant of our potential to destroy and disrespect, this project can be executed for the betterment of Maui while minimizing the impacts to the forest and honoring the protocols of the host culture.

Minimize destruction of Native Habitat

The primary concern is the potential for further destruction of native habitat. Every square inch of earth in a healthy cloud forest acts as a sponge soaking up the rain and clouds and slowly filtering it down into our islands aquifers. Every inch that gets graded, grubbed, or removed of its vegetation increases the likelihood of erosion and runoff. In addition, the land is so biologically packed with diversity the chances for destroying rare and endangered plants multiplies the more earth moving activities take place.

To every extent possible, destruction or manipulation of intact native forest should be prevented. Hand work should take precedence over machine work, unless a machine will create less damaged space both in its operation and its transport to site. Workers as well should take great care in not walking off the path, not leaving any trash whatsoever, and having a general sense of respect whenever they are working.

Preventing spread of Invasives

Another paramount concern is the potential for spreading invasive species. Workers can unknowingly bring in seeds clinging to their clothes, tools, and especially their shoes. A system should be setup to prevent this from occurring, by a wash for tools and shoe scrub, and daily adherence should be mandatory. Also, the potential for bringing in invasive species along with the materials should be noted. Packages of building materials should be checked in whatever manner appropriate so that there are no "hitchhikers" making their way into the forest.

Cultural Training

The Wao Akua is a sacred place, previously only entered into for specific purposes and only after proper protocol was observed. As many of the workers will not be aware of the Hawaiians view of this place, a cultural orientation should be made available and all workers made to attend before the start of their work on the project. The orientation should discuss Hawaiian's view of land, the ahupua'a, the Wao Akua, and proper character when entering. Chants like the one mentioned in this report should also be made available during the orientation.

Cultural Advice

In order to assure the cultural integrity of the project, a qualified cultural specialist should participate in various cultural-related activities. Activities would include the development and implementation of the cultural orientation for construction personnel, advice concerning inadvertent finds and related protocol, and any other cultural concerns during the length of the project.

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Appendix A: Description of Interviewees

Interviewee #1: Steven Cabral
Mr. Steven Cabral was born and raised on the island of Maui, and began working for East Maui Irrigation in 1947. In 1949 he was assigned the responsibility of maintaining the Waikamoi Flumes. He carried on this responsibility for many years, spending considerable amount of time daily and weekly on-site. He is concerned for the native plants that will be impacted by the construction.

Interviewee #2: Bob Hobdy
Mr. Bob Hobdy was born on Oahu and raised on the island of Lanai. He moved to Maui in 1971 to work for the Department of Forestry, where he worked for 37 years before retiring. His focus has always been on native, endemic and indigenous plants, which in the last 20-30 years have become the focal point of forestry efforts. Mr. Hobdy is intimately familiar with all of the native plants and animals in the project site, compiling a list of critically endangered plants (66 in total) that could be affected by the project.

Interviewee #3: Andrew Honokaupu
Mr. Andrew Honokaupu is a lineal descendent of the larger moku that the project resides in and was also a East Maui Irrigation employee during the 70's working on the flume construction. He is concerned about the use of large machinery to rebuild the flume and would prefer to see less invasive methods.

Interviewee #4: Lyman Ko'omoa
Mr. Lyman Ko'omoa is a cultural descendent of the area and long time Ditchman for EMI. He took over his father's job of maintaining appropriate water levels and has been doing so for over 26 years now. He sees the benefit of providing a safer environment for all workers on the flume at the same time as honoring the distribution of water to county users.

Interviewee #5: Norman Saito
Mr. Norman Saito, 84 years of age, was born and raised on Maui, and worked for the Water Department as an engineer until he retired. He has an intimate knowledge of the Waikamoi flume area in particular as he worked in the area on a daily basis for some years. He remembers seeing native birds in the area and hunters looking for pigs. He has concerns over the destruction to the native ecosystem by large machinery and questions the size and carrying capacity of the flume.

Appendix B: Interview Transcripts

Interview: Steven Cabral

By: Keli'i Tau'a
February 14, 2011
Transcribed by: Hokuloa

SC: Steven Cabral
KT: Keli'i Tau'a
DS: Dale Souza

SC: They gave us that, they gave us, I forget what year, I got to look back, but they gave us for twenty we told them for twenty years we put a new flume, you know, and I took care of that place for twenty seven years. When I retire they gave it back to the county and now the flume is all rotten and I found out that it all rotted away.
KT: Yeah
SC: But that's nothing to do with EMI. That's county.
KT: Yeah, that's why the county contacted this company who contacted us because now they got to put something more strong so they capture the water again. But that's why we got to go out and talk to people who
SC: No, you see, when that flume was small, only one by one, and when we took over, me and my big boss we went over there
KT: Who was that?
SC: Bob Wazeka
KT: Ok
SC: No, Phils Cup was at that time. Afterwards was Bob Wazeka. Well anyway, we went check all the trestle, you know all the high trestle
KT: Yeah
SC: So hey, we went check, check, check everything, this last twenty years guaranteed and so we built the big flume. We put it on the same trestle. Hey, came twenty years, I still was working, you know still stay. Hey I worked till seventies and for seven years I took care of the place. I was starting to fix the bad places then I retired. Then these new guys in the LR turned it over to the county. And then they just let um go.
KT: Aue
KT: So that is why they said, eh you guys get out there, go talk to the people who know up there.
SC: Well but they, it's too far gone now. I don't know, they have to build something new.
KT: Yeah, they going build something nice.
SC: And I went up, I went up to the flume and we had a, when we built the flume, we hauled everything as far as Waikamoi where we could take the truck and the rest, we built a big flume and we put like one track, one two by two in the center and we made a small car, you know, one guy pusher.
KT: Yeah

SC: In fact, when I was doing the work, the guy went bring his dog and the dog pushed the cart on the flume, go all the way the one mile. I went up there now, they threw the entire track out of the flume, and they put the paper on for no slide. Pau, nothing, that's gone. Nobody knows all the work.
KT: You no can retire.
SC: I retired, I worked till seventy that's enough. And you know, I wasn't going to retire right at that time because I wanted to bring in my nephew over here from HC&S. He used to work HC&S and every time I needed help for, you know, all the jobs that I don't have the ability to think about, they used to lend me him. So, before I retired I said me and the new boss, Bob Wazecker got cancer and he left. So he died. But the new boss, the boys went fight him, the union went fight him, so my nephew retired. I mean he quit and went on his own for HC&S. But we were going to build reservoirs. In all the years they have been putting the valves outside the reservoirs and we were suppose to be inside. And that's what we planned. I said, ok I'm going to stay one two years more. And we go put all the valves inside the reservoir for EMI. Now they have two reservoirs that they cannot use. Nobody knows how to fix them.
KT: Aiya.
SC: The government jumped in, eh you guys you got to do this. Kapolaia reservoir same thing now I just heard yesterday that they said that they abandoned the reservoir which is sad. I don't know what's going on. But these young guys, they don't know the real Hawaiian culture.
SC: But you know James Will? You remember James Will?
KT: My cousin, Ke'anae.
SC: James and I would work together and we are close friends. He would take like Ohi'a Springs right there where he owns the property. That spring never get less, in fact every time I go, maybe once a week, I stop and I go look because I know the history of Ohi'a Spring. Do you know why that spring is named Ohi'a?
KT: Not from the tree? The ohi'a tree.
SC: Get the Ohi'a Lehua.
KT: Right
SC: Get the Ohi'a Pahihi. Get the Ohi'a Mountain Apple.
KT: Ok, I don't know the second one.
SC: The legend is the two chiefs stood there and was talking about water. And before they plant taro they cut a mountain apple straight so the mountain apple they point and they poke and they plant their taro dry land. So one chief was over there and they were talking. So one chief said Ah! He hit this thing down. The water come. Now the chief said give me that and hit the other side. That's why get two springs right there. But that one never get less and always cold. That's why now, they grow watercress, still growing watercress over there.
SC: But you know before James used to handle Keanae and I was this side and we had one crew over there, same like if you go up in Iao. Up in Iao is a government county road. All the way till the forest gate. That's county. Now they put a lock. Because I used to get the county once or twice a year lawn mower or whatever till the gate. Now they don't because they lock the gate. EMI locked the gate. I don't know what happened. I don't blame the county. They no like take care because it's all overgrown, but that is a county road.
KT: They still get that boy Ko'omoa.
SC: Ko'omoa worked for me.
KT: Yeah, Lyman.
SC: Oh ok, Joe Ko'omoa the father.

KT: Yeah, Joe.
SC: He worked with me many years. He started EMI before me. He's a little older than me. We were born Nahiku. I started work in 1947 and then in 1949 they sent me over here, but I worked Nahiku the first two years. We drilled the first well on this island. The Kuhiwa well and it's still there. Maui Pine used to use it but now no more Maui Pine but get the pumps and everything. The well is sitting there doing nothing. You take like Hanawi stream, there is a spring below the ditch, before the main road. Maui pine put a pump there and they pumped that water back into our ditch, but below there Hanawi get one spring about 8 million gallons steady but get waterfalls. You go down there when it's 'o'opu season for hatch, you go down by the ocean, you go below Nahiku and you go down there Hanawi 'o'opu by the thousands, but they cannot climb up.
KT: So coming back to the flume over here, because you were going up the mountain and stuff, were there any native birds still flying around up there?
SC: Yeah
KT: What kind of native birds?
SC: I don't know.
KT: But you know it's native cause it's different.
SC: Yeah.
KT: What about the other kinds of plants?
SC: Well even that, up there was pretty good because our forest what happened is in the 30's, I was a young boy, there was like now, the economy was down so they formed a construction cult called the CCC.
KT: Yeah
SC: They made the camp and all and they went go plant all that. In fact, us kids went go plant in Nahiku. If I know now I used to pull them I would pull every plant. You know the forest next to us my house is there.
KT: Yeah, so my partners and I are all Hawaiians and we are trying to do our best to hold on.
KT: So again, Mr. Cabral, your full name is Steven Cabral. You're 80, 77?
SC: 81. Born in 1929.
KT: See, when we make this kind of report, they present it to the county council, they present it to the land board.
SC: All of the Hawaiian things are going. I just can't take it. These damn palms, everywhere you go they plant palm trees. Our forest is gone. Nobody respect. Now everybody is in the forest. No more end. They wonder why no more rain. I don't know. I hope something is going to be done.
KT: Well, like I said we going try.
SC: You know these Hawaiians. Even the plants, you take like the ohi'a pahihi, it's just disappearing. The plant is dying. The lehua, some places are alright but where get banyan look out. I've seen trees when I was working EMI, I started with the ladies with Hawaiian jobs. We would go kill banyan. I've killed banyan trees and when they fall down you see the red lehua in the center. They just cover the whole tree.

Interview: Bob Hobdy

By: Kimokeo Kapahulehua
Date:
Transcribed by: Hokuloa

BH: Bob Hobdy
KK: Kimokeo Kapahulehua
KT: Keli'I Tau'a

KT: How much time we have with you?
BH: I don't have any restrictions.
KT: It's an important part of our reporting that we do talk to knowledgeable people of the area. And who better than Mr. Bob Hobdy to speak on the upcountry flume. So can I start with, can you pronounce and spell your name? So when we transcribe it we get it all correct.
BH: Yeah, it's Robert Hobdy, HOBDY.
KT: When did you start with getting involved, in my eyes, I say this sincerely, you leave a legacy of your footprints up at Mauna Haleakala, down to wao akua, so forth, but when did you or what inspired you to move to where you are today?
BH: Well, as a kid on Lana'I, I grew up on Lana'i. Actually, I was born on O'ahu and we moved over there when I was like in third grade. And I grew up, I was just like any young kid on Lanai which is country living and there aren't too many distractions over there. So anyway when I got to be fifteen, my dad says, you fifteen now, we go get license. Your car license, those days were really simple, you just go down there and you start up the car, you drive down the street and you come back, pau.
KT: No more stop light.
BH: Not Lanai. So anyway, I just got my license and this renowned Hawaiian botanist came to Lanai to collect Hawaiian plants from the mountain and his name was Otto Dangeter. Otto and his wife Isa Dangeter.
KT: He was Caucasian?
BH: Yeah, he was German descent, but anyway, he came to Lanai and he stayed, I don't know if you know the Deshay family from Lana'i. Sweet and Eden Deshay, they had a little house in the back. They stayed there for two months. They needed somebody to drive them around and here I was fifteen and I had my license, I was too young to work in the pineapple field yet so my dad says, Why don't you take them around go holoholo, go look, you might learn something. So anyway, it was, he had a really outgoing personality and he made a big impression on me. The first day he tells me, well I asked him, I said, What do you want to go look at? And he goes I want you to take me someplace where there is native plants. And I go, what do you mean by native plants? And he goes, I got to back up a little bit, so he tells me where have you seen near the road somewhere some flowers? And I said, when you drive down Manele there are some bushes with yellow flowers on them, I saw that and he goes, that's go look. So we jump on the jeep and I drive him down about half way down Manele. We get to the place and there are these bushes on the side and I said over there. And he looks over at the thing and he jumps out of the jeep. He goes across the road and he looks at this thing and he goes, Oh Isa come look! This is a nehe, this is a variety of nehe that I haven't seen before. This is fantastic! And I am just taking this all in. So we go over there and he starts talking about this nehe and he says, this is a variety

that I haven't seen before so I want to make collections of it for museums. There was quite a bit of it, so he takes one with flowers and seeds on it and he takes it off and holds it up and says, This is for the New York botanical gardens and puts it in his bag. Takes another one and says this is for the herbarium in Berlin and puts it in his bag. Takes another one and says this is for the herbarium in Paris and he took about twenty of these specimens and he told all the names of these institutions he was going to send them to and I'm just like wow. Then he started to tell me, he says, you know in World War II all of the botanical collections of William Hillabrand, the botanist on O'ahu, all of his collections of Hawaiian plants were destroyed during the war. They bombed the museum and all the rare Hawaiian plants that he collected were all gone and many of them were never seen again as far as growing because they were all going extinct already. And he said, that must never happen again. This is just the first day. I spent a couple of months with them. Almost the whole summer with him driving around, showing him different places and walking with him and the wife, learning sfuff. So that's how I began.
KT: So from that introduction into eventually your profession or how did you move into your profession?
BH: Well, I went to school on Lanai and then I went to the big island. My parents sent me over there. They wanted, you know when you live on Lanai, it's like you look at the world through a pipe. You don't get that big picture so they wanted me to experience more. I went over there for two years and then I went to California for my junior and senior years because my brother went up there before and lived with my aunt and uncle and he came back in the summer with all these stories of California and I was like wow. So I went up there for two years. My cousins, who are a little bit older than me, used to go hiking in the Sierra every summer. They would go up in the mountains and spend two weeks hiking around in the high country so they had this love for the 'aina. I was trying to decide what I was going to do for college and they talked me into taking forestry. So that is how I went to forestry school. I went to Oregon State, graduated from there and came home. I got a job on Kauai in 1965, then in '71 I moved to Maui and I have been forester for 37 and a half years before I retired.
BH: Yeah, and so I carried over this interest in the native plants with me and as I started out in forestry everything was they trying to create a forest industry in Hawaii and plant pine trees, plant eucalyptus, thousands of acres trying to make a timber base that would support sawmills and stuff. So they were talking about mowing down some of the native forest planting these other trees that would grow fast and straight. Anyway, I had this interest in the native stuff so I was kind of a little, not black sheep but I was kind of off of the message. Over the period of my career, I went from off center to front and center as they abandoned that idea and they started talking about protecting and enhancing the native forest. So I ended up being more respected I guess you can say for that after all of those years.
KT: By the way, how old are you?
BH: I'm 68 now.
KT: So if you were able to look from taking that occupation, taking that desire to preserve or conserve, whatever the proper word is, what steps would you take from the top to this level of where we are at in Haiku what is this five thousand?
BH: We are at fourteen hundred feet here.
KT: Did you have a plan on how to preserve?
BH: Well, it's kind of discouraging because over the last two hundred something years the native stuff is just being pushed back and back. First it was the cattle and the goats and the sheep. By the mid 1800's they were already destroying a lot of the low land forest and there was

this great concern as the sugar plantation started to take hold. They were concerned about water supply. These animals were destroying the water sheds. So it was like this great concern about the protection of the forest, not so much for the native stuff, but for the water to produce. So they created the territorial forestry division in 1903, which is interesting because the US forest service started in 1904. So we actually predated that. The guy that they hired was Ralph Hosmer. You know Hosmer's Grove? He just graduated from Yale in forestry and he was recommended by the American Forester Gilford Pinshaw to come to Hawaii and so he did. He was here from 1904 to 1914. During that period they established over a million acres of forestry reserves and they started fencing these forest reserves and they started shooting animals, goats and sheep's primarily, mostly on the Big Island. They had huge numbers on the Big Island, thousands and thousands of goat and sheep just eating up the place and so that is what they did. Create the forest reserve, fence the forest reserve, shoot animals and try to bring the population down. They were successful and they continued up to the 20's and the 30's up through the depression and then World War II and then with statehood in 1959, that's when they got more influence from the mainland coming in. They started developing this concept of these animals being hunting species, game management concept. Now they started looking at these animals as being something new. They always were. The local people were eating these animals from way back when but now there was this focus on not removing these animals but just managing them, making sure there was enough for people to hunt. That started the shift in concept of land management back into these animals. Now we see the affects of that. It's like we went backwards.
KK: There are more animals than us.
KT: So you pretty well picked up on what was created and just managed it for lack of a better word.
BH: Yeah, well as we got into the 80's we started to shift again with the endangered species act and the concern about the native birds in the forest and all the various species. This thing was fed by federal funding. The feds start throwing money at this thing and at the same time the state was growing broke so this is how they kept their program going but now the Feds are in charged telling you what to do, how to spend that money. So it started to shift back again and it's heavy on the conservation side now again. It's interesting how it goes up and down.
KT: So share with us just off the top of your head how can we as natives of the island who care for these plants and animals be sure that we insert in our presentation the important thoughts to be able to make sure that they highly take into consideration some of the thoughts that you will provide.
BH: Well, it's no problem with plants growing on these islands. But what is happening is less and less of the Hawaiian stuff and more and more of the introduce things taking over and as new things come in, new species of plants and animals come in they change the balance of what is going on and you see something that for eons has been a stable native environment suddenly it's like a new factor in there that changes the balance that starts to deteriorate and in the old days it was the low lands, the coastal areas and the kula lands all started getting opened up, grazing, agriculture, all these things started to change along the coast line
KK: Hotels
BH: Yeah hotels are a big deal and all the population growth. So it seems like every time there is a change the native stuff takes a licking. It's not as competitive as some of these things that come from other environments around the world. Like we got a thing like miconia come in and we saw what it did in Tahiti and what it's doing on the Big Island. They kind of gave up over

there. We are still fighting it over here but if we ever stop the thing. We see for instance the great forest of Ko'olau in which Waikamoi is apart for many, many, many years that thing seemed like the thing was bullet proof. It was beautiful native forest all the way out. Then in the early 1900's we started to see the affects of pigs in the wet forest. It's not the black Hawaiian pig. They start bringing in these big breeds from the mainland and Europe. When these things got let loose in the forest they started moving up into the forest and there are no natural enemies except man, his gun and his dog. We started to see some real damage starting to happen. The first one started to happen, it was documented in the state for territorial time was here on Maui and they called it the Maui Forest Problem, this is 1907. The whole area between Haiku and pass Kailua, all of the forest just started to die out between the low lands all the way to about two thousand something feet. All the ridge tops ohi'a trees started dying and they go what the heck is going on. They brought in entomologist and pathologist to study to try to figure out what is driving this thing and it was not conclusive. They said yeah the insect are affecting the environment, the fungus diseases are affecting certain species but they are not the primary cause and they didn't know what the primary cause was, but in looking back at it was the pigs moving up into the forest, these big pigs and they were turning and eating up all the under story of the forest and turning it into mud holes and then the ohi'a trees and the other native trees in the area was starting to die because they were suddenly living in swamps and I've seen this in other areas since then. So that was the first one when I first moved to Maui in 71, I was working under West Wong and one day in 72 we took a helicopter ride around the east Maui just to take a lot at the forest and see if there is any problems going on in the environment up there. It was a huge area. So we went around Kahikinui and of course that's all goats, thousands of goats over there and has it's problems. So we got around Kaupo and Kipahulu, all beautiful nice forest there. We came on the pass of Kipahulu and Waiho'e valley above Maka'alae area, but we are up at 4,000 ft flying and all of a sudden we came on this couple hundred acre area that looked like somebody had taken a tractor in and plowed it up. It almost looked like a potato field. This is real wet area and kind of low ohi'a forest up there and the place was so plowed up that the small ohi'a trees was falling over because all of the soil was being taken from underneath them and we looked at that and went, This is really something! It was too far up and the hunters weren't getting up to where we were and the pig population got up there and plowed it all up and now you go up in there and that's all sedges, non-native sedges and kahili ginger and stuff like that just took over the area. So the pigs had that affect and they moved from one area to another in the mountains. Anyway, we started the East Maui Watershed partnership in 1991 and it was in response to this kind of damage that was going on in these remote areas. If the hunters can go in and knock the animals down, then you are not going to get that kind of problem, but without access, these real remote areas, Haleakala is huge, the north windward side, you go from the highway all the way to 8,000 ft and the hunters are lucky that they get up to 3,000. So there is this huge area up there that really we have no management ability to handle that problem. We started the partnerships. We started fencing. The first ones went fence a big area off was the National Park on the top. They put a fence all the way around and then later on they went down to Kipahulu, all the way down the two sides, those two ridges, Cable Ridge and the other one is the other ridge on the north between Waiho'e. We had the forest in Hanawi which is up around 7,000 ft going down towards Hana side. All of a sudden, the pigs started piling up again at that fence at 7,000 ft and they were tearing up that whole forest along that fence line. The fence just kind of concentrated the action. So they created the Hanawi natural area reserve and they started fencing down all the way to 5,000 ft around that mountain. So we took another big chunk down below, but it's still

5,000 ft, still a long ways down to the ocean or to the highway. That's the kind of actions that were started we quickly realized that the kind of problems that happen in these vast mountain areas, they don't care if it's A&B land or State land or Haleakala Ranch. They going to the damage wherever.
KK: They don't go by ownership.
BH: So that kind of thinking doesn't work. It really doesn't work. So that was a good thing about the partnerships. So we created that one and it was so successful. Two things happened. One, funding, the people who had the money, the Feds and other money sources saw this as a real positive thing and so they started funding it. The other islands started looking at that and saying this thing is the way to go. So now we have partnerships on almost all the island.
KK: Real protected now.
BH: So there is funding going into these watersheds protection. It's very encouraging that's the way
BH: Ultimately, we the ones that are going to make the difference here.
KK: The people
BH: Yup
BH: But, It all needs continuing maintenance.
KK: Totally
BH: Yeah, and new thinking and new action and learn as you go. We have to do stuff that makes a difference. I always look back at the Hawaiians way of handling it was you had all these ahupua'as that went all the way to the top and every ahupua'a had it's info structure of ali'I and all the maka'ainana. They knew the land within their ahupua'a very intimately and they knew all the resources that were there and they recognized when there was a problem with something. The most clear cut ones were the ocean. When something was going downhill, you put a kapu on it and managed it that way until it recovered. Then you move on, some of the land stuff are difficult because once the weeds take over, the native stuff is choked and then you have hard time coming back. The only way it could come back at all if you were to completely take the animals out. The concept of having only a few in there, they go straight for the Hawaiian stuff, the native stuff.
KK: They love it.
BH: That's the ice cream. They eat that all up. Because it's not like Lantana or some of the mainland stuff with poisonous leaves or poisonous stuff. The Hawaiian stuff didn't evolve with that kind of action. So the stuff is 'ono. They just rack um. The forest is typically destroyed from the ground up. They go in and eat all the under story from underneath the trees and in the wet countries, it all turns into mud up there and that's a problem. In the dry country, it takes away that ground cover and we have seen this on Lanai especially where the, it's not a high rainfall rain forest, but the ground is covered with a lot of undergrowth and ferns and stuff and it's kind of hihia. It's thick and it holds the moisture. Even during the droughts you go underneath the fern and you feel the soil, it's still damp under there because it's not being burned by the sun, the winds. It retains the moisture. You take that away, the trees that have their roots right at the surface suddenly dries out and the tree just dies. We see all these ohi'a trees dying off left and right and you go, Wow, if you lose the understory that's the first step in the change.
KT: So in the target area where we are researching for the upcountry flumes that you folks walked, what is your recommendation that whoever is going to develop it is going to pay attention to the thoughts you shared?

BH: Well, it seems that the flume is going to be an important resource to the people upcountry and I don't see any way that they are not going to upgrade this thing because they need that capacity for collecting water up there. So it's more of how can we mitigate that, how can we make it the least damaging up there and my thoughts are you have to keep the damage to a narrow quarter cause if you let guys loose in the forest and bulldoze, they going open up a huge area and a lot of the people that do that kind of work don't have the understanding up what they are destroying.
KT: So I want to pose the question so that it's in this interview, so would the idea of having those who work up there get training or anything to get more acclimated to the importance of the native things that still exist up there?
BH: Yeah, I think that is important and the training needs to be, I think it may be too much to ask contractors to learn all of the complexities and all the different species and stuff. Just to have this sensitivity towards the whole of it and be sensitive to the idea that there are some very special things up there. One way and what we did when we went on that walk along the flume was I put flagging on some of the rare things that were growing right next to the flume so that they could be worked around kind of thing. But in the big picture, you want this work to be done in a low impact way. For instance, when the last flume was replaced in 73/74 they built and had the trestles in place and they didn't mess with the trestles but changed the box, the flume on the top and they would build like an 8ft section or 10ft section flume, the box. They put it on the flume they had already built. They had a cover on it and had like a little monorail. They had this car that would ride over this board. It was like a two by two inch board. They had wheels. It would keep on track and they would just wheel this new section and they would wheel it all the way out to the end. They would install it and put the cover on it. Then they would put the two inch by two inch thing on it and they would continue working like that. They would just continue working their way out along the flume. So that was very low impact as far as disturbing the ground, but now in this time around they got to change the underneath part too now. They didn't change that last time. I don't know when that was built but it was probably thirty years before that. So like in the fifties or forties or something, all that trestle and all that stuff. You look at the flume and it looks all alualu. In fact, when I started on Maui in 1971 it was just before I changed that. They were having a big drought up in Kula. I went up just to take a look at this flume and at that time the flume was one foot wide and one foot deep, one box like this, and one mile long and it fed all of Kula, this little box like that. It was inadequate in that sense, but as I walked out the flume I got about half way out to where that puka is on the side, the whole section of the flume, about fifty feet collapsed. It went down the gulch. You get to that thing and you go holy smokes. So all the water came from the first half mile was just running down the gulch. So that made it even worse. The farmers finally got wind of this state of repair, the inadequacies of the sides and they raised hell. Then they contracted EMI to build a new one and that's how that crew was up there, Takeama and Joe Range, all the EMI crew went up there
KK: Cabral went up there too?
BH: Cabral. He was kind of an over seer of the thing.
BH: So the guy on the ground was everyday Masa Takeama who lived in Kailua. He's passed away now. But anyway, that's some of the background on that. So how do you built this new structure in there with the least damage? It really requires man on the ground, not tractor on the ground. You just look at it and you go how can we do that? What they did before was good. They built these big concrete blocks to hold the bases of the post going up. This is all expensive

to do that, to make the concrete and pour these things in there and at least you get the water to work within there but you got to haul the cement in and you got to haul all the lumber and stuff in there and if you build it like from 74 to now it's approaching forty years.
KK: Well they said the last time the water made the thing like this. Went lift up the wood like this. So some of the wood on top is only sitting.
BH: And they used this clear redwood because redwood can survive with being wet for much, much longer than Pine or Douglas fern or something that is going to rot in just a few years. Redwood, you say ok forty years, but that is still, you know that down the road you need to change the thing again at some point.
KK: On that last walk we had, there was some special plants seen and you talked about. You can tell us about that special plants?
BH: Yeah, I made a checklist of the plants that were found on the survey that I did and it's a really extensive list of plants. There was 66 species of native plants recorded.
KK: On that walk. One mile.
BH: On that one mile quarter. And I have it all listed here. As you can well imagine, a big chunk of that were ferns. That's the land of ferns up there and that really holds that ground cover together up there. Some of the rare plants species are in the ovilia family and it was two species of clearmante and two species of siania that were in there right on the edge of the trail. They are rare species and I flagged them.
KK: I seen you flag that.
BH: But this is 66 species of native plants and maybe another 20 species of non-native plants that are in there. As one of the very few if not the only research that was ever done where the native stuff out numbered the non-native stuff. It's symbolic of how this place is still almost all native.
KK: Any of these plants affect our birds?
BH: Yeah, yeah.
KK: And which birds live off of these plants generally?
BH: Well those birds, I mean those plants I named, the clearmania and sianias are species that have these long curled flowers and so it was the birds with the bigger beaks that curved flowers were adapted to the birds and the birds to the flowers and they kind of worked together. Probably one of the major ones is the 'I'iwi.
KK: 'I'iwi
BH: The 'I'iwi bird. Some of the other birds in there that are users like the akohekohe, the crested honey creeper, that one in there. Those are the both crested honey creepers are fairly rare. 'I'iwi you can see almost every time you go out there. But they are not like they used to be and if you go some places like Hakalau, the refuge on the big island, when the ohi'a are in bloom, you look up there and get ten/fifteen 'I'iwis in one tree going for the flowers. You don't see that on Maui. The common birds in there are the 'amakihi and the 'apapane. The 'apapane is the most common really and then there are a couple others that are rare like the kiwikiu, the Maui parrot bill. But that one mostly eats insects so it's not so much a flower feeder. The maui parrot bill is a bird, to our knowledge, didn't have a Hawaiian name.
KK: That's the one no more name?
BH: They just named it. They got a committee together to look at all the characteristics of the bird and its lifestyle and its habitat and stuff and they came up with this name kiwikiu. The common name for this bird is the maui can opener cause it has this curved beak like a parrot almost. It pries open the twigs and gets the grubs out from inside and it's really a strong beak.

The I'iwi has a long, long beak about like this and its quite curved so it's perfect for going into those flowers, those curved flowers and getting the nectar.
KT: What other type of animal would be found in this area that are important to consider to be preserved?
BH: Well, we hardly have any native mammals. Up in there, the only Hawaiian native mammal would be the Hawaiian bat, 'ope'ape'a. And they are undoubtedly there some time of the year. They are kind of like birds, they fly. They can fly around the mountain. They eat insects. So if there is something going on around one part of the mountain where there are a lot of insect activity, they'll fly over there and take advantage of it and then maybe two weeks later they will be some where else. They move around like that. They come all the way down to the ocean those things. In fact, the first Hawaiian bats were ever identified by westerners were seen a half mile off shore in Hilo. One of the explorer ships came in and they anchored off shore. Some people went in, but one guy was on the boat. He recorded these bats flying around over the ocean a half mile off shore. You can still see them doing that. They have been seen in Makena, Napili, places like that. Actually off shore over the ocean, flying around. Evidently there are insects that fly out over the water and they grab them.
KK: What's the elevation difference between where we're at, at the flume compared to Haleakala Waikamoi Mauka? How far are we from Waikamoi up at Hosmer's Grove?
BH: Probably close to three miles, something like that.
KK: Because up there is beautiful native forest. They get the canopies and then they get the needle pot and then they get the ground.
BH: That is an area within a protected fence area. The Nature Conservancy has the area below the national park. That's all owned by Haleakala Ranch, from Hosmer's Grove down 2,000ft-5,000ft. But that ahupua'a goes all the way to Pohaku Palaha on the north rim of the crater. The piko of East Maui and it's this long triangle shape thing and Haleakala Ranch had no use for that because it's not grazing country so TNC came in and made a proposal to the ranch that they manage that area, but still owned by the Ranch. It goes down through the Ko'olau Gap up to Hanakauhi and all the way over to Pualaea to Pohakupalaha. It's a long thing. I forget how many, 5,000 acres or something I think. So that's the upper Waikamoi.
BH: But you say Waikamoi, that's an ahupua'a yeah?
KK: Right
BH: So it goes from all the way up there all the way down to the ocean. So you tell an EMI guy Waikamoi and he thinks you are talking about the area down by the highway. You talk to the water board people and Waikamoi is the flume. You talk to Haleakala Ranch, they have an intake of Waikamoi at about 5,000 something feet. You talk to the National Park, Waikamoi is Hosmer's Grove.
KK: It's who you talk to.
BH: Everybody has a different idea of it and you can do the same thing in Kula. Like Kamaole, everybody thinks that's the ocean but the thing goes all the way.
KT: Were there any evidence of people residing in this area?
BH: No, I think this area is what's known as Wao Akua. Maybe the bird catchers went in there from time to time in the old days. There just wasn't any major human activity, although, the area further back is a lower flume road that goes down, lower Waikamoi.
KK: The pipeline?
BH: Yeah, before we got to the new, to the old reservoirs.
KK: Right.

BH: That road down.
KK: Down.
BH: That area down in there, I was down, I went down with Art Medeiros and Chuck Kaimara one time to look at a rare plant that was down in there and I knew where this population was so we stopped the car and we went in and looked at the plant and they haven't seen this one before so they were really studying it. So I came back out to the road. I was standing on the road and I looked down in the mud, the EMI guys recently fixed the road and ran their tractor down the road. I looked in the mud on the side of the road and see this stone sticking out. I picked it up and I went son of a gun. It was half of an adze and as soon as I recognized what it was something told me turn around. I turned around and about ten feet away was
KK: The other piece
BH: the other piece sticking out of the mud. I put them together and it was perfect fit. It was a beautiful adze about this big.
KK: Wow.
BH: And that tells me, because there was koa in there, the Waikamoi flume, there is no koa in there, it's like too wet for koa, but all the area before the flume is koa forest.
KK: The downside.
BH: So there was human activity in that area but a little further back I think. I know in the early 60's when they were clearing the Makawao forest reserve for planting trees, they went through an area that had small koa and as they went further mauka, they started getting into the bigger older koa. The forester at the time told me that as they were clearing this land at the bottom they uncovered these cashes of these huge koa adzes. I mean they are like this wide and this long. The thing weighs about five pounds. Big, big koa adzes and they were finding those in the area between the 2,000 feet up to about 3,000 feet and there was no big koas in there and at the top there was big koas which they left and just cleared around them. After they hit the big koas there were no more adzes found, which tells me that's where all the big koas went in the bottom cause they were harvested and then they got up to the top and it was either too far to bring them down or they just haven't gotten that far yet.
KK: Probably had enough then.
BH: And so those are indications there were people in the forest but mostly where the koa were. But not living, you don't find heiau and structures or house sites up in that kind of country.
KK: They probably take them down.
BH: Yeah.
KK: So you think when we were talking about lower Waikamoi and going up Haleakala like Hosmer's Grove and then Waikamoi went in Haleakala or on the side of Haleakala, the ahupua'a?
BH: Well, it ends up in the area around Hosmer's Grove. Up in there is where the upper regions of that stream are but you run into the big ahupua'a of Kalealenui, which runs up from over this direction, goes all the way up through the crater and it ends up in Pohakupalaha and that cuts off the top of Waikamoi ahupua'a.
KK: When I walked on the top with Randy Bartlett, there were a lot of streams and forms of water.
BH: You went down the boardwalk?
KK: I went down the boardwalk. So had a lot of nice grass, but the birds were just jumping in front you. When we got to the beginning of the forest
BH: The Maui Creeper, there are a lot of them down there.

KK: They would just jump all over me, all around you on the ground.
BH: Those are the most tames ones, the creepers that come up a few feet from you and look at you.
KK: That forest is in top shape.
BH: Yeah, it's beautiful.
KK: It's beautiful.
BH: IT shows what the whole thing, all the different layers from the ground up. You got mosses and stuff and then the ferns and then the small shrubs, alaenuis and all that stuff all the way up to the mid size and then all the koa and the ohi'a on top.
KK: They did a great job on that boardwalk. It's pretty solid.
BH: Yeah, that's a good example.
KT: So what is your recommendation on what you would like to see, they are going to go back and fix it up, so what would you like to see that we can notate and recommend.
BH: Well, no equipment goes in that quarter. It's all human labor. It makes it more expensive in some ways, but you really don't want to mess with that environment in there cause you do and suddenly you going have a big corridor, wide corridor.
KK: One puka.
BH: And this list of things, the 66 species that I recorded in there are just a piece of the pie in there. I have botanized all through that forest up and down from the flume and all the way in over the years. The total species list is much higher. It's just, I only recorded what I saw.
KK: On the trail.
BH: Yeah, right.
KK: Not going around.
BH: Yeah.
KK: It's right off or right under yeah? Not going any further than that.
BH: Yeah, you look at what the corridor is right now and you have this pretty nice forest on both sides and then you have this, all this swampy mud underneath the thing and all this non-native sedges and rubbish stuff growing underneath but it's only about, not more than 20 feet wide and some places it's narrower than that and then it's a pretty sharp line between that disturbed area and the nice forest and so you want to keep it that way and I think you can. It's just a matter of
KK: working it
BH: Yeah, when you get engineers involved and they have free range to do whatever they want
KK: They going bust it up.
BH: They going bust it up.
KK: Even what they have left behind all that 'opala is unnecessary.
BH: Well that's the thing, in the maintenance of it, you know if they try to replace a section of it, the box got rotten, they just throw it down the gulch and all that stuff eventually rots away but it's kind of like
KK: they no care
BH: keeping your house clean.
KK: They no care. But that could be even one special species that throw that 2x6 or whatever it is could kill them because they just throw it down.
KT: Did you develop that list for some kind of reporting?
BH: Yeah, this was the report I did for when Moki Hiraga was contracted to handle the project for the county.

KK: The Waikamoi?
BH: Yeah.
KK: Same like ours. He is contracted for Flower and Founder for Waikamoi stream.
BH: So this is a report that I turned in to them until it gets to be a public
KK: Library notice. It's private.
BH: Yeah, right now it's privileged information until this thing becomes public and then it will be over.
KK: If we need that we can ask them, because they own it but right now
KT: I just wanted to know.
BH: Well if you guys are doing the work on the same project, it's just like a different angle on the same thing.
KK: Right
KT: Yup. I can make reference to your report. What do you have as title?
BH: Well, it's a Florafana Survey and an Assessment for the Waikamoi flume of the care and replacement project.
KT: Ok.
BH: I submitted it in November, last November, 2010.
Wife: Good morning.
BH: Look, it's the queenie.
KK: Aloha!
KT: Aloha!
KK: We woke you up?
Wife: Nope, he was waking me up from early.
BH: She never go sleep till late last night.
KK: Aue.
BH: Working on her computers.
Wife: My kupuna come to visit me late at night and give me my inspiration and guide me for my genealogy project. That's it all in a nut shell.
KK: I went back to Haleaku. I went back to your place.
Wife: Where is that?
KK: Haleaku, Kaua'i.
Wife: You know on the Kaua'I connection, I am not really sure how we are connected to the Halemanu there.
KK: Halemanu yeah.
Wife: Yeah, because my kupuna is actually from Pi'ihonua, Hilo. So I know there is Halemanu family shown there

Interview: Andrew Honokaupu

April 20, 2011

By Reccie Keawe

KT: OK, can you give me a full name?

AH: Oh, my name Andrew Moikeha Honokaupu.

KT: So, when were you born?

AH: I was born January 25th, 1943.

KT: Yeah, so, you know, people who live out here, even locals, they don't have a feel of country rights, like you guys growing up over there in Kailua. 'Cause your grandson over there, he has no idea of what we talking about. But, when he grow up he gonna be able to read this kind of stuff, and, you know—

AH: He getting A's in reading. You know, he's 9 years old.

KT: So, he go high school?

AH: No, he go Makawao School.

KT: Ah!

AH: So, every morning I take him go Makawao and pick him up before school.

KT: Mmm.

AH: Yeah, I live down here for a while, uh, by the Ha'iku Community Center.

KT: But, you were associated with E.M.I.?

AH: Yeah, I went work E.M.I. 1972, I went start working there. I work 35 years.

KT: Wow! You remember Joe Ko'omoa?

AH: Right! I was working when he was still working with Tokomura, Range—

KT: Range...

AH: Israel Cabral. Camerello was my boss.

KT: So, one of the reasons why the county was wanting this to start to happen is—there's a large, one-mile flume out there.

AH: Waikamoi?

KT: Yeah. And, so, it's going, uh, *palahu (rotten)*. But, the concern is, "They going take big machines to fix 'em for long time or not?" 'Cause this is where people concern, yeah, they just up there, you know, get lot of natural, Hawaiian plants, and none of 'em—

AH: Yeah, when we start work up the mountain, we worked on the float. They changed all the boards from outside, all of 'em. *(Noisy Background)* And then, I real sorry braddah, and not only me lumber, and then I let the boys do 'em. But, now stay all falling down. So, over 20 years already.

KT: The weather, wet weather yeah?

AH: Yeah.

KT: Wears it down!

AH: When they use to fix the flume they had only change the top, they never change the leg.

KT: Oh.

AH: So, then after that, the legs getting rough; we tried to fix them. But, uh, all the parts came off. All red wood, but—

KT: How did you get the lumber up there?

AH: Uh, we drive with—just over A&B, and then we—we go over there and we drive 'em right up to, uh, the old crazy truck. We went up there get the things. We drive 'em all the way about 2 miles or few, when they have somebody in. And then we carry them. But, they cut 'em outside and then they carry them in.

KT: Oh

AH: Was there! Like a, you know, wagon on Honokapu. They get the train and catch. And then they pull! I—I didn't go inside there, no need go inside. They need me to unload, and I take off.

KT: You never, um, looked at any of, da kine, the plants (Hawaiian plants) that you would over there?

AH: Uh, only get the *kapu*; that's all I know, and pohole.

KT: When you folks used to go up, up there usually wet, yeah?

AH: Sometimes. Summertime it's windy, all right. Sometimes, um, summertime so dry that hardly get too much water around.

KT: Oh.

AH: Just—maybe one stream, that's all. Few, yeah, drink 'em.

KT: None of your boys were interested in working for E.M.I.?

AH: Oh. This boy is young already, ah. So, the boy interested in something else. One boy, the oldest one, I was working with. But, he went get trouble with the boss. He said, "Dad, I like quit!" He went quit and he went move to Vegas for two years. Then he came—he came back. Now he work for the County.

KT: Oh.

AH: My *tutu* work with Steven one time. Yeah, he live right—he been to other places, too ah?

KT: Yeah.

AH: Now, all da kine guys—they like that guy, they no like you, and all.

KT: He'll—he'll be happy to know that you're supportive of his leadership.

KT: From what your *kuleana* was with, um, with the company that's about the extent of questions I would, be able to ask, but one of the important questions, uh, would you like to continue to see that they keep the pace as much as possible like it is, 'cause, you know, in the Hawaiian beliefs, that height is called Wao Akua. Wao Akua means, "Where the gods exist.

AH: Akua?

KT: Yeah.

AH: Big machines will destroy the place.

KT: So, that's why no can bring in big machines! They're going run over all the plants!

AH: Over there they get—I'm counting they no get big machines over there. 'Cause they gotta see it. This is their first thing for them to do; good in the water.

KT: Did you stay by the job?

AH: No!

KT: He's tall enough!

AH: He ain't tall, but he's staying up there. (*KT laughs*).

KT: Well, mahalo nui loa for taking time out.

AH: I'm sorry no can get *too* much information—

KT: No, no, no.

AH: I know Steve, he was one of the brothers. He know more, ah.

KT: What your behavior, from all the things that he was living with then some others didn't know. That's why we put it all together.

AH: During—oh no, not during, was kind of long time.

KT: People keep telling me that he *hana*—he went—(*someone interrupts*)—I no can interview him and keep him focus. I know him 'cause he was, uh, paddling canoe, you know after.

AH: (*Mumbles*)

KT: Yeah (*in agreement*). Good man, but, you know, wouldn't work out. More valuable to talk to you than to talk to him because I wouldn't be able to understand him! Yeah!

AH: K.

Interview: Lyman Ko'omoa
By: Keli'i Tau'a
Date:

LK: Lyman Ko'omoa
KT: Keli'i Tau'a

KT: Please give me your full name.
LK: My name is Lyman Lymana Ko'omoa.
KT: What does Lymana stand for?
LK: I was told it stands for Lyman. It means Lyman in English. My mom named me that twice cause my uncles name was Lymana...one of my uncles that passed away when he was a baby.
KT: And you were born in...
LK: I was born in Punene Maui in 1955, September 26th.
KT: You now reside?
LK: Peahi.
KT: So you in that district there but you been engaged in an area that we are asking to get information from people who know the area, so how old were you when you started working with the company you with?
LK: I just had gotten married and I was 23 years old when I started working with East Maui Irrigation in 1979 I started.
KT: 1979...so you got...you diamond age.
LK: Not yet. I still gotta go little bit more, couple more years.
KT: In your work is...can you explain what you do?
LK: My job title is Water Supervisor and the work that I do is I control the amount of water that passes across Maliko gulch from the East Maui Irrigation side of the company to the HC&S side of the company and give them the amount of water that they need to irrigate their fields, their cane fields with.
KT: And it requires you periodically to go up a place that we studying which is Waikamoi.
LK: Yes.
KT: How often do you go up there?
LK: Every other week on a Wednesday we go up to Waikamoi. There's myself and there's one more other ditch man and we take turns like he'll go up one Wednesday and the next week I'll go up that Wednesday. And we read the rainfalls and we read the reservoir totals, how much water in the reservoirs, we walk the upper flume, we drive down to the pipeline, the lower pipeline and read the rainfall there. Takes about one day to do that job.
KT: So outside of doing water readings you get an opportunity to be in the upper level of Maui. The Hawaiians in cutting the islands in a pie idea have different levels that they name and you're up in the level called Wao Akua, the place of the Gods. No more settlement up there.
LK: No, nobody lives up there.

KT: But there used to be I was told.
LK: That I don't know. I know where they built the flume the gang would live up there along the flume as they worked on it but I don't know of any people that lived up there you know separate from the company working up there.
KT: While there were building it were you already employed?
LK: They built it the year in 19...ah I don't know when the first flume was built but in 1974 to 75 EMI built the...they made the flume bigger. It was like maybe a foot wide and a foot deep and they made it to like two feet wide so it could take more water out yeah; bring more water out to the reservoirs. My brother worked on that flume when they built it but I was on a mission then and when I came home it was done already. The flume had been built that year.
KT: So even though you took a temporary two-year leave, they still...when you came back were re-employed right?
LK: Yes, right. I got re-employed in '79. I returned home in '76 and I was working for different construction company and so and so forth until there was an opening in East Maui Irrigation and I was able to get that job.
KT: During the time up there have you seen any major changes in the land, the flora being the plants or the trees?
LK: The only thing I notice up there it's real pristine cause nobody goes up there except maybe hunters on the weekends but it's real...nothing has changed really. The trees, they're getting older, they're dying so the newer trees are growing up but that's all.
KT: What kind of trees?
LK: The ohi'a. Ohi'a trees.
KT: Any koa?
LK: No. No koa that high. The lower level, when you go down to the pipe, the lower pipeline you can see koa along that road but when you get way up to that higher level it's just the ohi□a trees and hapu'u and stuff like that.
KT: Any ferns?
LK: There's ferns yeah, and that's the only things I've noticed and the birds, you know the little birds singing.
KT: So have you learned anything about the Hawaiian birds personally have you to identify them?
LK: Well I try and look for um but can never, you can hear um but you can never see um. They so fast, as soon as you try look for um they flying away. One day I walked the flume, I was walking in and I went all the way to the end and there was a man at the end of the flume so I asked him what was he doing, he was looking for birds. He when walk all the way from the first gate all the way into there, that's I don't know maybe five miles so I was like oh my gosh this guy he just like look, he said he looking for that special bird it's called the Maui bill, the Maui bill or something like that, he wanted to see that bird. I don't know if he saw it or if he didn't but I don't know...I can see some of um but they just flying and they're afraid of people. They don't want people to look at them I guess.
KT: Well they smart.
LK: Yeah they smart.
KT: Because people will wipe them out.

LK: Yes I think so. But no it basically looks the same. Maybe you see a little bit of this invasive kahili ginger along the flume you see a little, like a little patch grow here then you walk a little more oh little patch but other than that it looks the same as when I walked it 30 years ago. But that thing is getting pretty bad up. It's not much around the flume but when you coming from the ranch, when you coming through the state land before you get to the EMI land, pretty bad. There's other invasive species too but not so much. That I think it's called, it's that little purple flower you see that up there too along, it's along the flume, but not so much, yeah.
KT: They all spread around by seeds and stuff yeah?
LK: Yeah maybe people too you know that...maybe it's on their clothing or something when they walk in or the animals yeah. Yeah hard to keep out all these other plants they all like live over here.
KT: So I asked you about yourself but can you talk about your dad and his work up, up where you go? Anything different from you?
LK: No not really. My dad did, well the job I do is what my dad used to do when he worked for East Maui Irrigation and he never spoke of any like special stories about Waikamoi or anything to me anyway he never told me that. It was just a job to him I guess, I don't know. Maybe it was something he didn't talk about maybe but not to me anyway.
KT: I regret that I didn't sit and talk story with him more. He really had a lot of stories.
LK: Yeah oh he had great knowledge of the mountain. He knew all the different things, the plants and all that.
KT: So none of your kids had the opportunity to follow your footsteps by getting that kind of work.
LK: Yeah no, no. The company passed a new rule alright, I don't know who passed the rule but they don't hire family anymore so. I take my children with me sometimes when I go up there, you know they don't have school or they don't have work yeah I take um with me. Just so they can see what the mountain looks like yeah. We can see all over Maui from up there.
KT: So how do you folks enter to go mauka? I thought you had to come up here?
LK: Yeah you go to the top of Olinda road, to the very top and that's the ranch gate and you go through there, get access through there.
KT: Did you ever learn of the different types of ferns that grow?
LK: Well my dad used to pick the certain type of fern, I don't know the name but he'd use that, the boy scouts would be making fire in the like they'd do contest who can start the fire first. That kind of fern, that hapu fern was good for fire starter. But it was a small fern, it's not the big hapu, it's a little small one, he'd pick that for them, for the boy scouts. Then the other fern, the hapu is the good one and then there's the bad one, they call the hairy one, the black hair one and that one's not good.
KT: Not good in...
LK: Yeah it's like in Hawaiian like everything there's a good one and a bad one. So the good one is the smooth fern, that's the one everybody want the smooth one. And then the black one is the one look like it's real rough, real hairy. It's not real nice looking like the smooth one.
KT: Close to where they want to expand or put the railway up at the flume, will it cause destruction to some of our plant life there?

LK: I not too sure how they gonna, I was up there last month and they were surveying so I'm guessing they're just gonna use the same, original route that the flume is on now. And if they do I don't think it's gonna endanger any plants cause the plants grow on the outside of the access yeah where the flume is on. Where the flume is there's no really plants growing cause we try trim it back so that it doesn't you know cover the flume up yeah. Plants grow on the, like maybe the plants grow 10 to 15 feet up way from the flume. They not close to the flume where the plants growing. Where the flume is is just grass and...I don't know what the name of those, it's like little fern. Not big hapus but little fern. Looks like little Christmas trees, those things grow along and then what do you call that...uluhe, the uluhe grows down...
KT: Uluhe
LK: Uluhe yeah growing down trying, they just looking for sun but you gotta keep trimming them otherwise it's gonna cover up the flume and the flume going rot and the thing is the flume is all rotten already. It's like thirty years old the boards yeah and they just so thin that you can, if you just poke your finger you can just almost like poke a hole through the flume. So it's just leak leak leak leak everywhere leak.
LK: Yeah certain parts of the flume are kinda high maybe 30, 25 feet off the ground and there is a little wooden handrail that they, it's secured to the flume so you can, in case you lose your balance yeah you can hold on but some parts of the flume kina high.
KT: Somebody must have put in a proposal to get that fixed for safety.
LK: For safety yeah.
KT: So what animals have you seen up there?
LK: Seen?
KT: experienced up there?
LK: Well...
KT: You see the birds.
LK: We see the birds. Sometimes you see pigs, wild pigs along the flume. You can see the droppings that the owls leave. The owls will eat the little rats and you can see like the owl dropping on the flume. You never see the owls though or any big birds but maybe if you went later in the day or earlier in the morning but the times we go we don't see um. But that's about all I guess there might be some mongooses and rats and stuff but we don't see them either.
KT: You don't get to see those huh.
LK: Yeah. You see the pigs. That's the biggest big animal we see up there. Ooh yeah.
KT: Ever experience seeing a Hawaiian hawk?
LK: No, no I haven't ever seen that.
LK: I might have heard them but I...sometimes the canopy of the trees is you know too dense. You can hear noises but when you look up...cannot focus I mean there's too much stuff up there. It's hard to focus in on the sound, where the sound coming from yeah.
KT: But from what I told you, you think it's a good thing about them try to use some safety measures up there at the flume?
LK: Yeah I can see the reasoning for it cause the heights yeah, if you fell off you'd be seriously injured if you fell off the flume. So it's just um...if they do it in a nice way I guess, if they don't really get too big with it. I mean I don't think they can get any kind of

big machinery in there cause it's just too, yeah it's really hard to get even...I don't think you can even get a little tractor in there cause it's just cliffs. It's real bad, it's really hard.
KT: So that's a good dialog right there, you explaining that. To me, with not seeing it, tells me it's good for the safety of the men.
LK: Yeah yeah. It's not real...not all the flume is high. Maybe only 25% is that kina high flume. The rest is all like, it's above the ground but it's maybe 4-5 feet that's all. It's nothing real high, it's only...it's called poakamoa. Puohokamoa is the middle of the flume, maybe half way in, that's the highest spot. And then after Puohokamoa is the little gulches like that, little gulches. And when it goes across the gulch it's high. And then it comes to the high spot at the ridge you know with the gulch and then the ridge and another gulch and ridge down. So there's like one, two, three maybe three or four another little higher spot.
KT: The level of height is to get the water...
LK: Yeah to keep the water flowing from high down to low. So it's gravity flow so they don't have to use any kind of pumps to pump it yeah. That's why it's high cause otherwise they'd have to go down the gulch, come back up and then...if it had enough height to come back up the other side, might not make it.
KT: So the last question I have is, from what I've discussed with you, you think this is a good thing for the working people up there for safety...
LK: For safety? Yeah I think so Keli'i. Yeah cause if you fall off I don't know if they going have helicopter but that's a long walk before you get out. somebody going have to carry you. Up there you gotta be careful cause it's, it's real isolated, you secluded in there. So and when we go up we just by ourselves, there's nobody with us.
KT: No more phone?
LK: The phone work but certain places no work up there too.
KT: And you been doing that for all these years.
LK: Yeah almost 20, 26 years I been doing my father's job. Then my dad had knee surgery, he went to surgery, after the surgery he thought he was going come back work the doctor told him he couldn't come back work he was very upset, very upset. So anyway I took his, I was doing his job for him and then after that they made me permanent because he had to go disability.
KT: So he was able to at least walk
LK: Yeah yeah yeah.
KT: Well thank you so much.
LK: You're welcome.

End recording

Interview with Norman M. Saito

April 9, 2011

By Reccie Keawe

KT: Your full name?

NS: Saito, Norman Saito.

KT: No middle name?

NS: M.

KT: What does that mean?

NS: Well, how old are you?

KT: Sixty-eight.

NS: Sixty-eight? That's all?

KT: *(In Japanese)* And you?

NS: Next week I'm going to be eighty-four.

KT: Miracle.

KT: Okay, so let me direct you to your occupation?

NS: I used to be engineer with the water department.

KT: OK, so as part of your responsibility what connect your work with the upcountry flume?

NS: Well, that was part of the department, ah? And, like us, it was small outfits. So, that was involved in everything!

KT: So, who was the mayor at that time?

NS: Eddie Tam.

KT: Wow! And, after he passed you moved on too?

NS: Yeah, I was gone after that. But, my boss was Yoshihara Suji. That's who my boss was.

KT: Do you remember the plants you saw?

NS: Mostly *'uluhi.* That's about all, the *'uluhi* and *'ohi'a.*

KT: But, not now!

NS: I don't know.

KT: Many of the people who love Hawaiian plants are saying that the *'uluhi* are all dying away now.

NS: Maybe too dry, I don't know. But, that's all we had, *'uluhi.* You can stand fifty feet from the trail and you get lost.

KT: You know what fern is that?

HT: 'Uluhi?

NS: Da kine—it grows like a vine.

HT: Ah!

KT: That's very important to Hawaiian culture because the pigs used to jump off, they hunting and they jump—

NS: So they can run under, but—

KT: Yeah.

NS: You cannot run under all kinds; rough, ah?

KT: Yeah.

NS: So, when you walk sometimes small guys like us can walk on top *(KT laughs)*. You got a big, fat guy and make a hole then everybody is going to fall in the hole. That's what it was.

KT: That's funny.

NS: But, this flume—I don't know...when it was made. But, if you go up Waikamoi them—

KT: Right?

NS: ...somebody scribble the date right at, you know, the *lua* one, the small one, the scribble nineteen-twenty—I thought was after my niece, or I thought was 1929. But, it makes sense that the flume was made to seal the dam.

KT: Uh-huh.

NS: So, it must have come afterwards. And, the County—when I was working County, the engineer's office, I thought I saw the old plans, you know. But, if that's the case, and if they'd kept it, it must be in the water department. But, I don't think they've kept it because they throw away a *lot* of stuffs.

KT: Yeah.

NS: But, that's how I know that the flume must be about where they go.

KT: So how—as part of the water works, how often did you go up there?

NS: Oh, quite often because they had the projects up there. At one time we used to go up there every day. We were working on that fifteen million gallon storage. In fact, I worked selling that, too.

NS: But, yeah, I got one map that I can show you. *(Opens map)* See, this is lower, then—and this is end of the flume.

KT: Okay.

NS: It's on high pull on the stream. So, this is built on stilts.

KT: Right. So, it's getting all bust up now, that's why—

NS: Oh yeah, it's almost a hundred years, and only redwood, yeah?

KT: Yeah, and they're losing all the water, so they're concern.

NS: But, to tell you, the flume could carry only one million gallons a day...

KT: Ah.

NS: ...one million gallons a day.

KT: 'Cause the pipe, it was only about that big, ah?

NS: The flume is only about this wide, and about this deep. The gauge at the end shows maybe three, but it was the other streams right at the beginning that used to fill 'em up. From Haipuaena was only one million.

KT: So, some of this research that people want to see is you're using the name place Haipuaena, what were that—was this part of the waterway that goes down to the Ko'olau, Waikamoi stream all the way down to the ocean?

NS: No, this is before Waikamoi. Waikamoi and Haipuaena are different when you reach Hana Highway. That's too different.

KT: Oh.

NS: But, Haipuaena stream can give as much as fifteen million gallons a day when it floods. But, the flume can take only one. So, now what are these guys going to do? Are they going to try and catch the other fourteen, or are they just going to try the one million?

KT: Well, what the concern is that, you know, they want to refurbish that flume, but do they take machines in to build the cement type structures?

NS: They try not to...

KT: Right!

NS: ...but, I think you have to.

KT: That's the concern.

NS: Yeah, but, when you do it you can do it the right way and you can get damage more doing the wrong way. But, it can be done, because after you go through the machine, if you're careful within six months, the whole thing grows back. I like to cut trail up there. You go six months later you got to cut again.

KT: The person who walked the flumes with my other partners, Bob Hobdy, was hired to go and look at the plants and animals, and only that one day he walked, he counted—he identified sixty-six Hawaiian plants.

NS: Yeah, but, did he go outside of that area and find the same thing?

KT: Well, they were concerned—the concern is if a machine is going to come up there, and then they're going to raid 'em up and stuff.

NS: That's what I said. If you come find yourself into a smaller area the thing will grow back in no time, but, if you make a big, wide area then you're going to get trouble.

KT: Mm-hmm.

NS: So, it all depends on how you write the special location for the construction!

KT: Gotcha.

NS: You make it so that all have labor, you can't afford it. You put in big machines you're going to be troubled. But, even big machines cannot work in there.

KT: Yeah.

NS: Cannot! So, the design got to be the right design, and I don't think these guys are doing it the right way! Something is wrong.

KT: So, tell me what is the right way that we can document that they will consider what is the "Right way."

NS: First of all, you got to survey the route way you're going to do by planning. You've got to know exactly where you're going. And, you got to fix soil sampling. That's the main thing! If you don't take soil sampling, and you hit mud *(laughs)*, you're going to be out there all year; you're not going to do anything. You came across that trouble before. Before I can tell you—

KT: Yeah—

NS: I tell you the story about the fifteen million gallon tank, the two big ones at the beginning. It started with the water department, February of '57, and they were designing that already, so there's a meeting with the designers. My first question to them was, "Do you have enough water to fill it up?" They didn't know. So, they came back in two weeks and they said, "Oh, yeah, they get." They're getting all the water deposit. And, then we started construction in, when was that, '57, and we had the thing dug up, everything was all ready to concrete. And, this was Good Friday of 1958. I left up there about two o'clock, it was beginning to rain heavy. It was a Thursday before Good Friday. Then, Monday when I went back the whole place was filled with mud. The sides came down. Remember when you seen that slide in Keanae?

KT: Mm-hmm.

NS: When it ends up, just like soft poo, yeah?

KT: Yep.

NS: That's what it was, all filled up.

KT: And, that's what happened to a part of the flume! That' why they got to—

NS: No, I don't think so. The flume, these guys walk too much on top. So the thing—the ground is soft, the ground get that yellowish clay which is hard, and that's what you've got to depend on. So, if you put too much load, that thing cannot hold up, then the flume going down like that. That's what's happening. But, you know, you get wood rot too now.

KT: Mm-hmm.

NS: But, you've got to be able to put some kind of machine in there, but not the big kind.

KT: Yep. How big was your crew that went up there?

NS: What crew?

KT: *(Chuckles)*, you a one-man crew?

NS: Who, me?

KT: Only you?

NS: No! Me, had Macadengdeng, Jubilee, had one more guy. I forgot his name. But, they're all gone. Macadengdeng, I think, still around. He can tell you about the—what kind of ground that you're going to work on.

KT: So, when you guys were up there, you know, Hawaiians call it Wao Akua, yeah. You know, they break down where different settlements were, and that's what it was supposed to be the, "Level of the gods." Did you see any particular animals?

NS: No, only used to get birds and pigs. But, pigs, the white man brought anyways up there. Maybe the Hawaiians brought over the ones that's up the mountain, the kind that you—from the farm. They run away up there, yeah, the goats; but, pigs can run right underneath. You cannot follow. Over here no more the mother around because they're going to charge at you and get hurt.

KT: You folks—what kind of transportation, by then had four-wheel drive and stuff?

NS: Yeah, 'cause this was 1950, yeah? But, we had to go up there every day, and then almost every day drizzles. If you no work in the rain, no can work!

NS: But the thing is that if you had certain kind of plants growing in that particular area, you got to know where they get some more on the outside, too, ah, 'cause otherwise if you had it on the outside someplace else the thing can come back right away. You give 'em six months you're going to be able to walk through again.

KT: But, the *'uluhi* is the type of plant that cover everything, so—

NS: Yeah.

KT: If the other plants not strong it's not gonna *puka* through.

NS: If they had to, it'll be dead already.

KT: Yeah.

NS: No more sun. Yeah, this small man that used to come walk with us, he walked on the fern. Like you, maybe, can, but when he come our way, he no can *(both laughs)*. Yeah! But, I don't know what they're going to do, but the design has lots to do, you know, whether you're going to disturb, or the other stuff, or not disturb it.

KT: I think it's important information that you provided about serving, inspecting the type of soil, look at where it's going to run so that they don't run into the trouble ramp.

NS: People, they make it too complicated. Going cost so much that you no can do the work already.

KT: Yeah.

NS: Might as well give up. Even now, I figure the flume is not that important.

KT: But, that's where we get upcountry water.

NS: Yeah, the new one. The new one they're talking about, if we're going to replace just the way it is now it's not important.

HT: So, you're talking about expanding it and making it bigger?

NS: If you expand it, expand it, yes, but, if you're going to keep it the same size, no.

HT: So, it wouldn't be worth it?

NS: No. Not worth it, because you're bringing only one million gallons up there. Waikamoi is the only stream that can fill up the reservoir now. That one million gallons a day is a cleanup. Try wait, ah. Here I give you this map *(chairs moving).* Yeah, this is Waikamoi. You cover this right here. This is Haipuaena right here. You see how small? And, the two is smaller yet, only one million! This can bring in fifteen; the stream flows at fifteen maximum. So, if you're going to bring in more than one, all right! But, if not, what's one million compare to two-hundred million, yeah? See, when this thing floods it's not just two-hundred million comes down, and that's a lot in the tank.

KT: Two-hundred million?

HT: So, one more time, Waikamoi is the stream that would flow two-hundred million?

NS: It's the one that fills up all the way up there. But, it's the steady water that's important, you know, everyday you got so much.

HT: So, on an average what would you say, every day? Haipuaena—

NS: Less than a million.

HT: Less than a million?

NS: I've seen that there's only fifty thousand, ten thousand.

HT: When you would go up every day?

NS: Summertime, you got to check more often, ah. We had one guy up there checking every day, every week working day. What's his name? Miahia? He used to live by the Kealaloa Rd. going up, the one that goes to the dairy.

HT: So, I'm interested now, you said Haipuaena? On an average they bring in fifteen? Five-hundred-thousand?

NS: No, one the maximum.

HT: But, the flow—

NS: of the stream? When it floods it's about fifteen or sixteen.

HT: So, on a daily basis you said the average was about five-hundred-thousand gallons?

NS: No, it goes up and down. But, dry summertime, maybe only about fifty-thousand.

HT: Fifty-thousand? What about summertime in Waikamoi?

NS: Just as bad.

HT: Yeah.

NS: So, thing is it's about half a mile or three-quarter mile apart. Sometimes it rains heavy on the other side and not this side, but sometimes it rains heavy this side and not the other side. But, they all stop at that Halemauu trail. You see up here is the Halemauu trail, ah, up here. Where the mark? So this one here, this is the, what is it?

HT: This one here is the Honomanu.

NS: Honomanu, see? And, this is Honomanu over here, Haipuaena, I showed you. And, this is Waikamoi, so

HT: Haipuaena is this right here, right?

NS: But, that one starts from right here, ah?

HT: Yeah, it's only short. Well, small yeah.

NS: You see this Waikamoi? It goes all the way up.

HT: All the way up to Halemauu?

NS: Yeah, this is Halemauu, there.

KT: Did anybody tell you what the meaning of Waikamoi is during the times you worked?

NS: Something—I don't know, had the different interpretation. *Moi* is king, yeah?

KT: *Mo'i*, but *moi,* many people are telling me, "The water of the taro," the *moi* taro. So, get plenty taro up there?

NS: Nothing. Too high! Too cold! Well, one thing, you've got to be able to adapt yourself to live in this modern age.

KT: Yeah. Wow. So, you said it, but to summarize, to finalize, if you had your—if you were the one that was planning for this, whatever's going to happen, would you say, "Forget it?"

NS: If they tell me that you got to bring in more water, and then if it works well, I would go ahead. But, hard worker—where you could handle light load and finish the job.

HT: Those are a lot of demands. It's good.

NS: Yeah. But, the ditch system that they put up is a really terrific job. You know, when you see the water come down, no more this kind, ah? It all flows.

KT: You're comparing it to when you guys were a little bit doing it? You're saying now they make it so that it runs really good?

NS: No! Those guys, they are still going good.

HT: From where they first put it in—the ditch?

NS: They did some mistakes, that's why they had to make new tunnels, but, they figure the old hand labor...

KT: Yeah.

KT: Yeah. Son, you want to ask Mr. Saito any other questions? I think what we needed to get from him, we got?

APPENDIX K.

Department of Planning Approval of Temporary Construction Staging Area

ALAN M. ARAKAWA
Mayor

WILLIAM R. SPENCE
Director

MICHELE CHOUTEAU McLEAN
Deputy Director

COUNTY OF MAUI

DEPARTMENT OF PLANNING

April 24, 2012

David Taylor, P.E., Director
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793-2155

Dear Mr. Taylor:

SUBJECT: WAIKAMOI FLUME REPLACEMENT PROJECT: EXEMPTION TO CONSTRUCTION BASEYARD POLICY, TMK (2) 2-4-016:001

Thank you for your letter dated March 14, 2012.

We have reviewed your request and will allow the temporary construction baseyard on one acre of land for approximately 24 months. This is to accommodate the extensive scope of this large project. We understand that the area is remote and some of the equipment will need to be flown in via helicopter.

If you have any questions, please contact Carolyn Cortez, Staff Planner, at carolyn.cortez@co.maui.hi.us or by phone at 270-7813.

Sincerely,

WILLIAM SPENCE
Planning Director

xc: Carolyn Cortez; Staff Planner (via email)
Jay Arakawa, Zoning Inspector Supervisor (via email)
TMK (2) 2-4-016:001 (KIVA Related Documents)
12/General File
WRS:AHS:FAC:CEC:ckk
K:\WP_DOCS\PLANNING\LTR\2012\1497_WaikamoiFlumeReplacementDWS\Response.doc