ALAN M. ARAKAWA
Mayor

DAVID TAYLOR, P.E.
Director

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Deputy Director

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

FILE COPY

JUL 23 2013

June 27, 2013

Genevieve Salmonson, Interim Director
Office of Environmental Quality Control
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813

SUBJECT: Draft Environmental Assessment for Proposed Wailuku Production Well, Wailuku, Maui, Hawaii at TMK No.: (2)3-5-001:021 (por.), 091 (por.), and 100 (por.)

Dear Ms. Salmonson:

The County of Maui, Department of Water Supply hereby transmits the Draft Environmental Assessment (Draft EA) and anticipated a Finding of No Significant Impact prepared for the Proposed Wailuku Production Well project located at TMKs noted above, on the island of Maui. We respectfully request publication of the Draft EA in the next available Environmental Notice. Please find the enclosed items:

1. One (1) CD containing a PDF of the Draft EA and a Word Version of the OEQC Publication Form
2. Two (2) hardcopies of the Draft EA
3. One (1) hardcopy of the OEQC Publication Form

Should you have any questions regarding the Draft EA, please call Thomas Ochwat, Project Manager, at (808) 270-7835 or Leilani Pulmano of Munekiyo & Hiraga, Inc. at (808) 244-2015.

Very truly yours,

David Taylor, P.E.
Director

DT

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

"By Water All Things Find Life"

AGENCY ACTIONS
SECTION 343-5(B), HRS
PUBLICATION FORM (FEBRUARY 2013 REVISION)

Project Name Proposed Wailuku Production Well
Island: Maui
District: Wailuku
TMK: (2)3-5-001:021 (por.), 091 (por.), and 100 (por.)
Permits: Hawaii Administrative Rules, Chapter 343 Compliance, CWRM Pump Installation Permit, Construction Permits and Project District Phase III Approval

Proposing/Determination Agency: County of Maui
(*Address, Contact Person, Telephone*) Department of Water Supply
200 South High Street, 5th Floor
Wailuku, Hawaii 96793
Contact: Thomas Ochwat, (808) 270-7816

Accepting Authority: County of Maui
(for EIS submittals only) Department of Water Supply
200 South High Street, 5th Floor
Wailuku, Hawaii 96793
Contact: David Taylor, (808) 270-7816

Consultant: Munekiyo & Hiraga, Inc.
(*Address, Contact Person, Telephone*) 305 High Street, Suite 104
Wailuku, Hawaii 96793
Contact: Leilani Pulmano, Program Manager, (808) 244-2015

Status (check one only):

X DEA-AFNSI — Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day comment period ensues upon publication in the periodic bulletin.

__FEA-FONSI — Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

__FEA-EISPN — Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day consultation period ensues upon publication in the periodic bulletin.

__Act 172-12 EISPN — Submit the proposing agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov). NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.

__DEIS — The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.

__FEIS — The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

__ Section 11-200-23 Determination — The accepting authority simultaneously transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the proposing agency. No comment period ensues upon publication in the periodic bulletin.

__Section 11-200-27 Determination — The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.

__Withdrawal (explain)

Summary (Provide proposed action and purpose/need in less than 200 words. Please keep the summary brief and on this one page):

The Maui County, Department of Water Supply (DWS) plans to construct improvements to the existing Wailuku Well to convert the facility from an exploratory well to a production well. Wailuku Well (Well No. 5230-04) was initially drilled as an exploratory well to determine if the site is an appropriate water source. Testing at the exploratory well indicated that the well is capable of producing 1,400 gallons per minute (gpm) with low drawdown, and as such, the well will be an excellent, dependable source of potable water.

The Wailuku Well is located within the Kehalani Mauka development above Old Wailuku Town on a portion of an undeveloped parcel identified by Tax Map Key (2)3-5-001:100. The well site lies approximately 1,000 feet to the south of the intersection of Main Street, Alu Road, and Iao Valley Road, and is about 200 feet to the northwest of the end of the Kehalani Mauka Parkway. A new transmission line, which will cross Parcel 100 and TMK (2)3-5-001:091 (por.), will connect the Wailuku Well to the Iao Tank Storage Facility on Alu Road located on TMK (2)3-5-001:021 (por.). Minor modifications to the existing Iao Tank Site Well on Parcel 21 will be implemented as part of the proposed project to accommodate inflows from the Wailuku Well.

Improvements required to convert the exploratory well into a production facility include the construction and installation of a submersible deepwell vertical turbine pump, piping, electrical controls, a control building, and a 920-foot long transmission line from the pumping station to the Iao Tank Storage facility.

Draft Environmental Assessment

PROPOSED WAILUKU WELL PRODUCTION FACILITY, WAILUKU, MAUI, HAWAII

TMK (2)3-5-001:021 (por.), 091 (por.) and 100(por.)

(DWS Job No. 09-12)

Prepared for the Approving Agency:

County of Maui,
Department of Water Supply

July 2013

MUNEKIYO & HIRAGA, INC.

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List of Acronyms

AFNSI	Anticipated Finding of No Significant Impact
AIS	Archaeological Inventory Survey
ALISH	Agricultural Lands of Importance to the State of Hawaii
BMP	Best Management Practice
CIA	Cultural Impact Assessment
CWRM	Commission on Water Resource Management
CZM	Coastal Zone Management
DLIR	Department of Labor and Industrial Relations
DLNR	Department of Land and Natural Resources
DOE	Department of Education
DWS	Department of Water Supply
DWSRF	Drinking Water State Revolving Fund
EA	Environmental Assessment
FONSI	Findings of No Significant Impact
GPM	Gallons Per Minute
HAR	Hawaii Administrative Rules
HDOH	State of Hawaii, Department of Health
HRS	Hawaii Revised Statutes
kWH	Kilo-watt Hours
LCA	Land Commission Award
LSB	Land Study Bureau
MG	Million Gallons
MGD	Million Gallons per Day
MIP	Maui Island Plan
MSL	Mean Sea Level
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OEQC	Office of Environmental Quality Control
PDR	Preliminary Drainage Report
RGB	Rural Growth Boundaries
SDWB	Safe Drinking Water Branch, Department of Health
SHPD	State Historic Preservation Division
SIP	State Implementation Plan
SMA	Special Management Area
STB	Small Town Boundaries
TMK	Tax Map Key
UGB	Urban Growth Boundary
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

WDUP	Water Use and Development Plan
WKWWRF	Wailuku Kahului Wastewater Reclamation Facility
WUP	Water Use Permit
WvB	Wailuku Silty Clay, 3-7 percent slopes (soil type)

Executive Summary

Project Name:	Proposed Wailuku Well Production Facility
Type of Document:	Draft Environmental Assessment
Legal Authority:	Chapter 343, Hawaii Revised Statutes
Agency Determination:	Anticipated Finding of No Significant Impact (AFNSI)
Applicable Environmental Assessment Review "Trigger":	Use of State and County Funds Use of County Lands
Location:	Island of Maui Wailuku TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.)
Applicant:	County of Maui Department of Water Supply 200 South High Street, 5th Floor Wailuku, Hawaii 96793 Contact: Thomas Ochwat Phone: (808) 270-7816
Approving Agency:	County of Maui Department of Water Supply 200 South High Street, 5th Floor Wailuku, Hawaii 96793 Contact: David Taylor Phone: (808) 270-7816
Consultant:	Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793 Contact: Leilani Pulmano Phone: (808) 244-2015
Project Summary:	The Maui County, Department of Water Supply (DWS) plans to construct improvements to the existing Wailuku Well to convert the facility from an exploratory well to a production well. Wailuku Well (Well No. 5230-04) was initially drilled as an exploratory well to determine if the site is an appropriate water source. Testing at the

exploratory well indicated that the well is capable of producing 1,400 gallons per minute (gpm) with low drawdown, and as such, the well will be an excellent, dependable source of potable water. Furthermore, laboratory testing was completed and verified that the water meets drinking water standards. As such, DWS proposes to convert the exploratory well into a water source production well to serve the Central Maui Water System. The Wailuku Well production facility is being developed as a replacement water source in anticipation of the closure of Wailuku Shaft 33 (Well No. 5330-05) and as part of DWS's continuing efforts to create distance between the pumping operations within the Iao Aquifer System to prevent water quality reduction associated with closely spaced and concentrated pumping at a few locations.

The Wailuku Well is located within the Kehalani Mauka development above Old Wailuku Town on a portion of an undeveloped parcel identified by Tax Map Key (2)3-5-001:100 (Parcel 100). The well site lies approximately 1,000 feet to the south of the intersection of Main Street, Alu Road, and Iao Valley Road, and is about 200 feet to the northwest of the end of the Kehalani Mauka Parkway. A new transmission line, which will cross Parcel 100 and TMK (2)3-5-001:091 (por.) (Parcel 91), will connect the Wailuku Well to the Iao Tank Storage Facility on Alu Road located on TMK (2)3-5-001:021 (por.) (Parcel 21). Minor modifications to the existing Iao Well piping on Parcel 21 will be implemented as part of the proposed project to accommodate inflows from the Wailuku Well.

Improvements required to convert the exploratory well into a production well include the construction and installation of a submersible deepwell vertical turbine pump, piping, electrical controls, a control building, and a 920-foot long transmission line from the pumping station to the Iao Tank Storage Facility. The pump station will occupy a 12,000-square foot chain link fenced area accessed by a new driveway off of Kehalani Mauka Parkway. Modifications to the existing chlorination system at the adjacent Iao Well will be made to accommodate inflows from the Wailuku Well.

The Wailuku Well production facility will be funded by the State of Hawaii and County of Maui. The use of public funds and lands is a trigger for the preparation of an Environmental Assessment (EA) pursuant to Chapter 343, Hawaii Revised Statutes (HRS) and Section 11-200, Hawaii Administrative Rules (HAR). It should be noted that a separate EA was prepared for the exploratory well prior to the construction of the Wailuku Well as an exploratory well and a

Finding of No Significant Impact was published in the August 8, 2011 Office of Environmental Quality Control (OEQC) Environmental Notice.

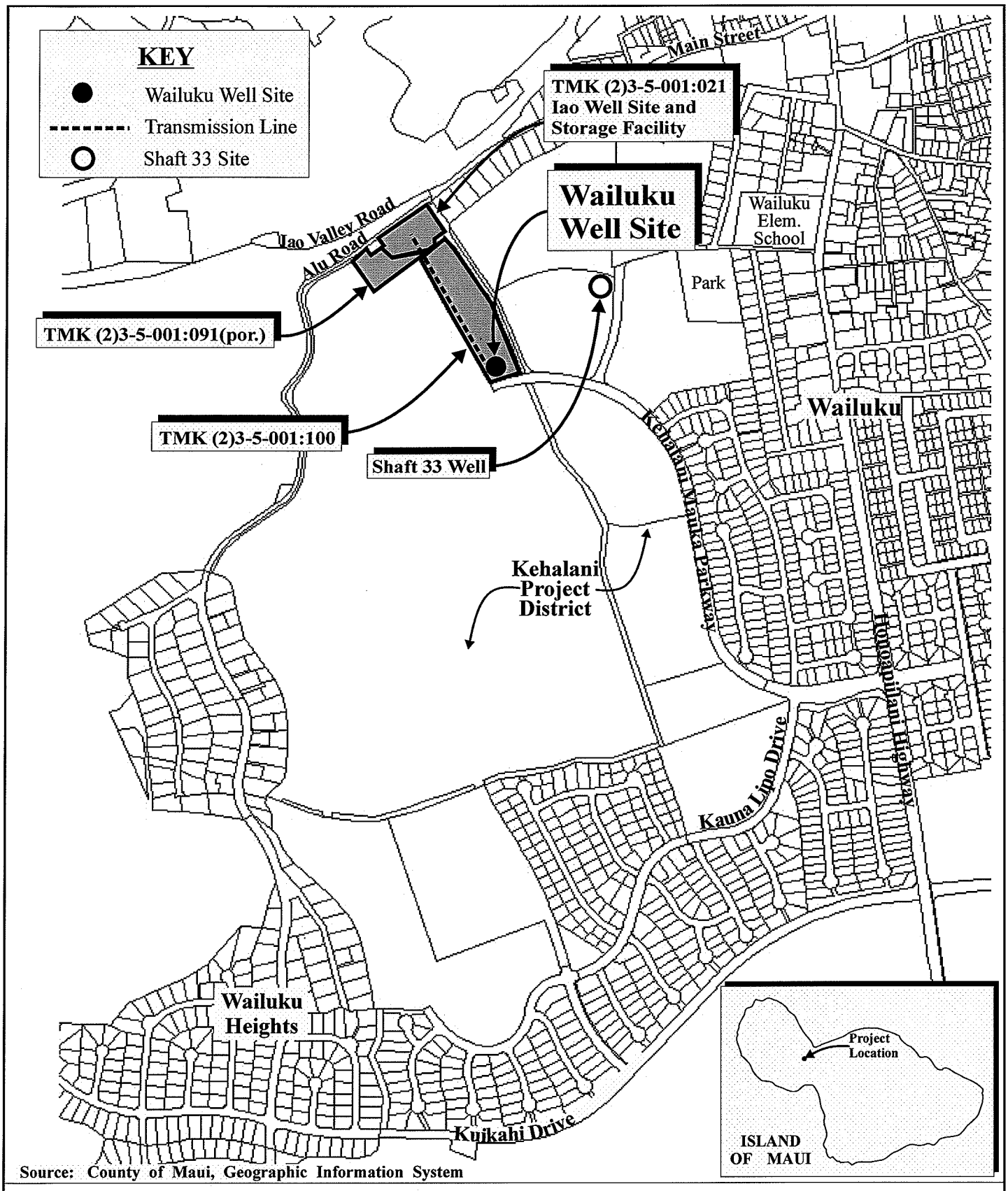
I. PROJECT OVERVIEW

I. PROJECT OVERVIEW

A. PROPERTY LOCATION, EXISTING USE, AND LAND OWNERSHIP

The Maui County Department of Water Supply (DWS) plans to construct improvements at the existing Wailuku Well to convert the exploratory well to a production well to serve the Central Maui Water System. The existing Wailuku Well is located within the Kehalani Mauka development above Old Wailuku Town on a portion of an undeveloped parcel. See **Figure 1**. The well site lies approximately 1,000 feet to the south of the intersection of Main Street, Alu Road, and Iao Valley Road, and is about 200 feet to the northwest of the end of the Kehalani Mauka Parkway. The well site is located on a portion of the newly designated Tax Map Key (2)3-5-001:100 (Parcel 100). The previous designation was Tax Map Key (2)3-5-001:067. A new transmission line, which will connect the Wailuku Well to the existing Iao Tank Storage Facility on Alu Road located on TMK (2)3-5-001:021 (por.) (Parcel 021), will cross Parcel 100 and TMK (2)3-5-001:091 (por.) (Parcel 091). Minor modifications to the existing Iao Well piping on Parcel 021 will be implemented as part of the proposed project to accommodate inflows from the Wailuku Well. For the purposes of this Environmental Assessment, the term "pump station site" will refer to the 12,000-square foot portion of Parcel 100 that contains the well and associated infrastructure including the pump and motor control building. The term "project site" will be used to collectively refer to the Wailuku Well pump station on Parcel 100, the transmission line corridor, and areas of the Iao Well that will be modified.

The pump station site is located within an undeveloped parcel that is planned for a future park. Existing single-family residential development borders the future park site to the south and east. The Kehalani Project District master plan calls for future multi-family development to border the park site to the north and west. Phasing of the proposed multi-family development has not yet been determined. The Iao Tank Storage Facility and Iao Well on Parcel 021 are existing County of Maui facilities that contain a 3.0 million gallon (MG) storage tank, the Iao Well, a motor control and chlorination system building, and other DWS infrastructure.



Source: County of Maui, Geographic Information System

Figure 1

Proposed Wailuku Well Production Facility

Regional Location Map

0 0.05 0.1 0.2 Mile

MUNEKIYO & HIRAGA, INC.

Prepared for: County of Maui, Department of Water Supply

RFE\WailukuPRODWell\REGIONAL

The Wailuku Well (Well No. 5230-04) was initially drilled in May 2012 as an exploratory well to determine if the site was an appropriate water source. The Wailuku Well is 582 feet deep, with a bottom elevation of -102 feet, above mean sea level (msl). The well casing diameter is 18 inches. Testing at the exploratory well was carried out in 2013 and indicated that the well is capable of producing 1,400 gallons per minute (gpm) with low drawdown (which indicates the amount of water that can be pumped), and as such, the well will be an excellent, dependable source of potable water. Furthermore, laboratory testing was completed and verified that the water meets drinking water standards (see **Appendix "A"** and **Appendix "B"**).

RCFC Kehalani, LLC currently owns Parcel 100 and Parcel 091. DWS will acquire about 12,000 square feet of land on Parcel 100 for the pump station site. An easement will be acquired in favor of DWS for the 920-foot long transmission line within Parcel 100 and Parcel 091. The Iao Well and Iao Tank Storage Facility property, Parcel 021, is owned by the County of Maui.

B. PROJECT NEED

The Wailuku Well production well is being proposed as one (1) of four (4) replacement wells DWS has constructed or will construct in anticipation of the closure of Wailuku Shaft 33 (Well No. 5330-05). Shaft 33 began operation in 1948 to provide irrigation for Wailuku Sugar Company's sugar cane operations. Actual pumpage at Shaft 33 peaked at 11.7 million gallons per day (MGD) in 1971 and as permitted by the State Commission on Water Resource Management (CWRM), DWS currently pumps an average of 5 MGD of groundwater from Shaft 33 through an agreement with the landowner, RCFC Kehalani, LLC. Due to impending closure of Shaft 33, DWS has two (2) replacement wells and is planning to develop two (2) additional replacement wells, which includes the proposed project, Wailuku Well production facility. The two (2) replacement wells that have been constructed are available for use and in service at reduced capacity. The fourth well is also planned for the Wailuku area and is currently in its design stages to become an exploratory well. The total capacity anticipated for the two (2) completed wells currently under construction and two (2) planned wells is 5.2 MGD. See **Table 1**.

Table 1. Replacement Wells for Shaft 33

Well	Status	Yield (MGD)
Iao Well	In Service	1.3
Waikapu Well	In Service	1.3
Wailuku Well (proposed project)	Exploratory Well Completed	1.3
Future Well	Planned	1.3
TOTAL		**5.2**

The Preliminary Design Report for the proposed Wailuku Exploratory Well details the need for the project (see **Appendix "C"**).

The CWRM estimated a sustainable yield of 20 MGD for the Iao Aquifer System. According to CWRM, the total water use permit allocation for Iao Aquifer is 19.095 MGD. However, in 2003, the CWRM designated the Iao Aquifer System as a groundwater management area and limited ground water withdrawal from the aquifer to 90 percent of its sustainable yield or 18 MGD. In addition to Shaft 33, seven (7) other wells pump from the Iao Aquifer. These wells yield 15.5 MGD, on a 12-month moving average. When Shaft 33 is retired and the four (4) replacement wells are put in place, the total groundwater withdrawal from the Iao Aquifer is anticipated to be 15.7 MGD, which is still less than the 18 MGD limit established by CWRM.

The current spacing of existing wells within the Iao Aquifer System and their depths may be detrimental to the sustainability of the aquifer. There is a concentration of wells on the north side of Iao Stream, with these sources withdrawing approximately 70 percent of the groundwater from the aquifer. Pumping on the south side of Iao Stream is concentrated at Shaft 33.

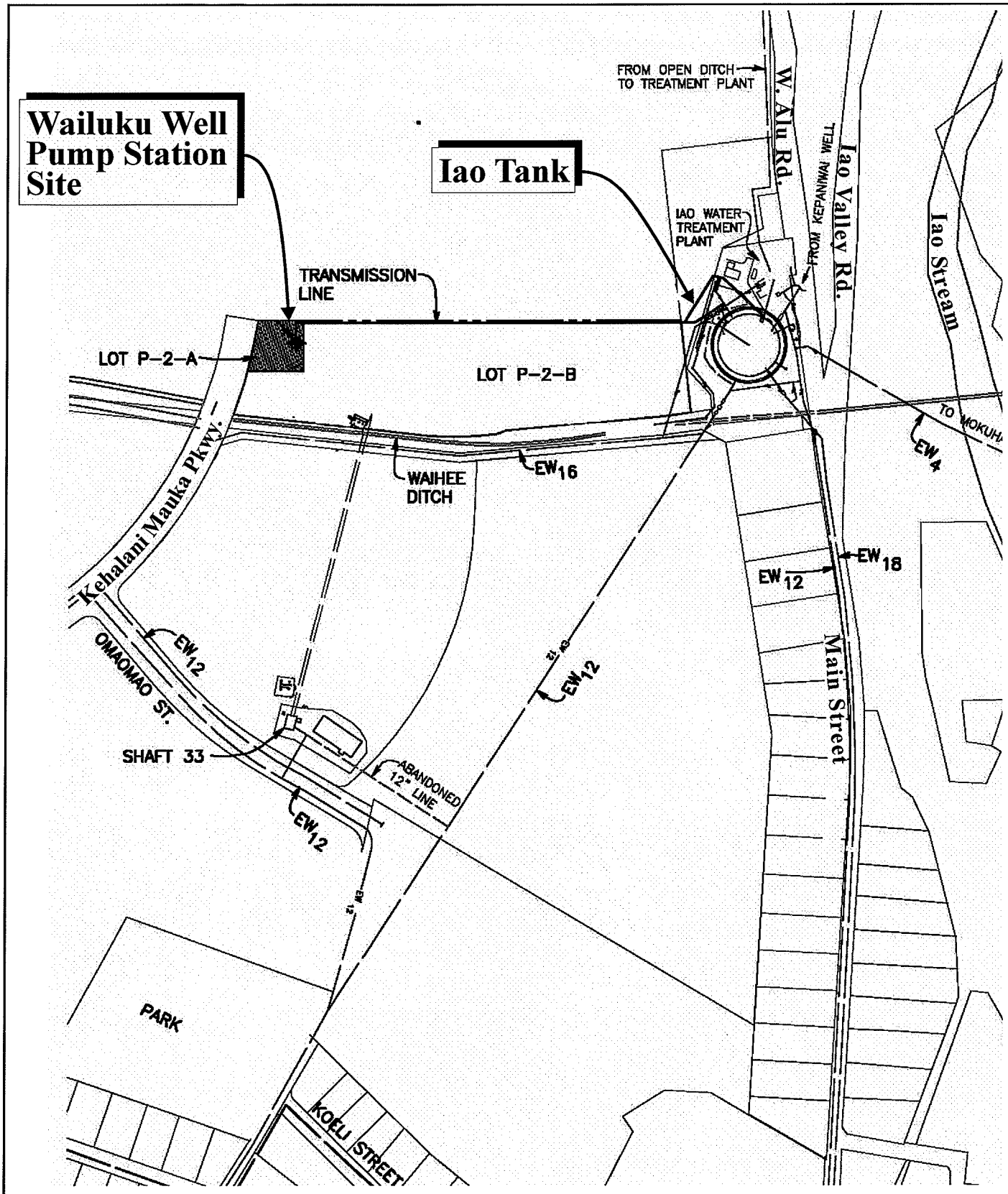
The proposed Wailuku Well is consistent with DWS's efforts to create distance between the pumping operations within the Iao Aquifer System to prevent reduction of water quality due to concentrated pumping at a few locations. The development of the Wailuku Well, along with the three (3) other replacement wells, will not concentrate pumping at one (1) location as is presently the case at Shaft 33. According to a recent study, *Ground-Water Availability in the Wailuku Area, Maui, Hawaii,* prepared by Stephen B. Gingerich, redistributing withdrawal from the Iao Aquifer would be beneficial to maintaining its sustainability (refer to **Appendix "C"**).

Testing at the Wailuku Well was conducted by DWS in April of 2013. The tests at the exploratory well determined that the well will be a dependable source of potable water for the Central Maui Water System with a capability of producing 1,400 gpm with low drawdown. The slight chloride increase that was detected during testing will either stabilize or decrease once Shaft 33 is taken offline. The rise in chlorides was due to Shaft 33 continuously pumping almost 5 MGD approximately 220 feet from the site of the exploratory well during testing of the Wailuku Well. However, when all the replacement wells are drilled and tested, dispersing the withdrawal of groundwater from the Iao Aquifer over a larger area will optimize the water system as a resource and protect it from upconing or intrusion of saline water (refer to **Appendix "A"**).

C. PROPOSED ACTION

DWS proposes to construct improvements at the existing Wailuku Well to convert it from an exploratory well to a water source production well. The Wailuku Production Well will serve the Central Maui Water System and will replace an existing water source - Shaft 33. The proposed Wailuku Well is not a new water source. Improvements required to convert the exploratory well into a production well include the construction and installation of a submersible deepwell vertical turbine pump, piping, electrical controls, a control building, and a 920-foot 16-inch ductile transmission line from the pumping station to the Iao Tank Storage facility located on Alu Road, which has a capacity of 3.0 million gallons. The pump station will occupy a 12,000-square foot chain link fenced area accessed by a new driveway off of Kehalani Mauka Parkway. A chlorination system will not be provided at the Wailuku Well. Instead, the existing chlorination system at the nearby Iao Well on Parcel 021 will be modified to accommodate water conveyed from the Wailuku Well. It is noted that the Wailuku Well was drilled, cased, and tested as part of the construction of the exploratory well; drilling of a new well is not proposed as part of this project. This project takes the drilled exploratory well and provides the infrastructure required to provide a permanent source of water to the DWS system. See **Figure 2** and **Figure 3**. Construction plans for the proposed project are presented in **Appendix "D"**.

Site improvements at the pump station site include a paved driveway, a 50-foot by 50-foot paved service yard, security fencing, domestic water service, electrical distribution circuits, and drainage improvements. See **Appendix "E"**.



Source: Ronald M. Fukumoto Engineering, Inc.

Figure 2

Proposed Wailuku Well Production Facility

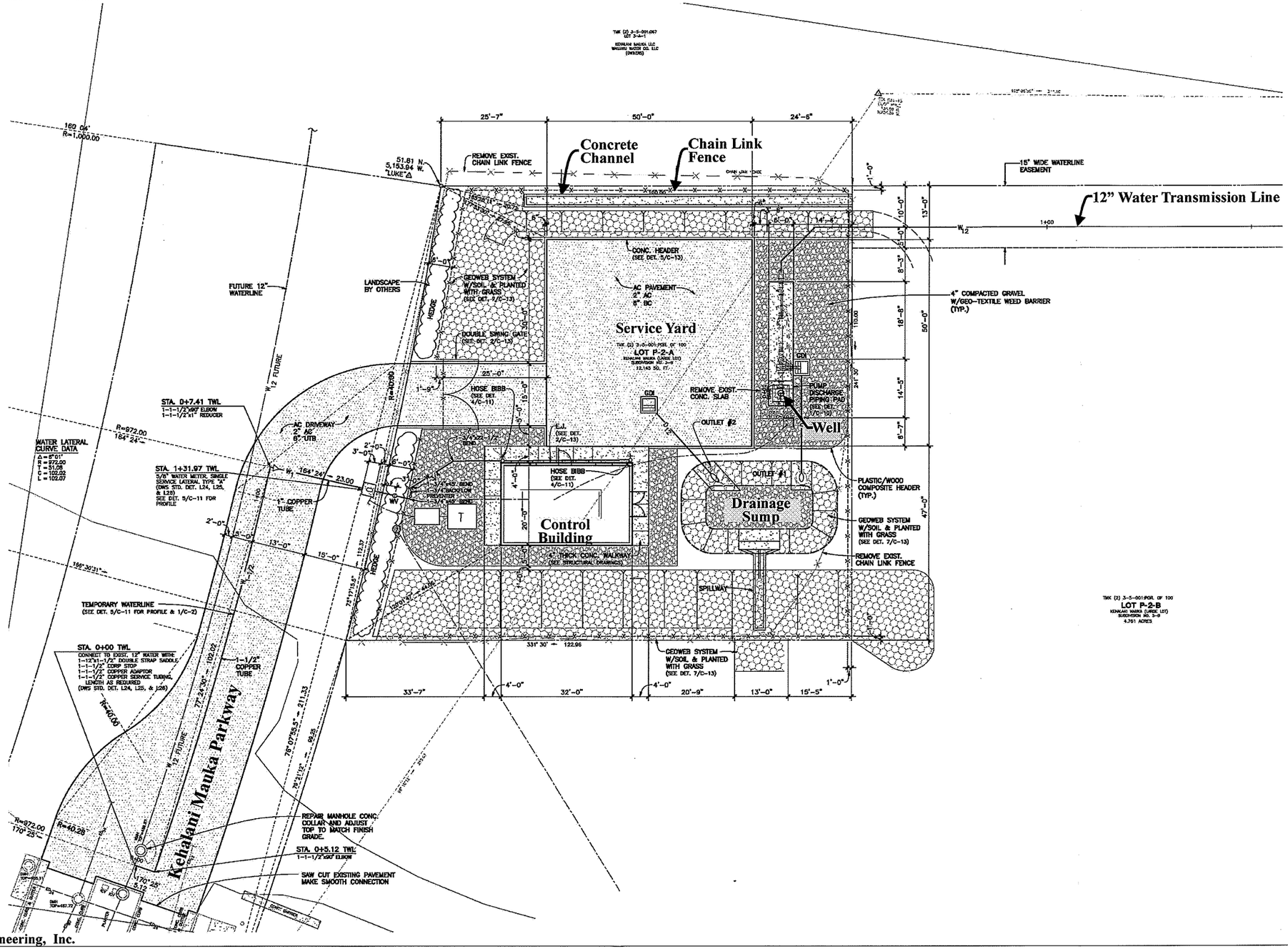
Site Plan

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Prepared for: County of Maui, Department of Water Supply

RFE\WailukuPRODWell\siteplan



Source: Ronald M. Fukumoto Engineering, Inc.

Figure 3

Proposed Wailuku Well Production Facility

Pump Station Site Plan

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

RFE/WailukuPRODWell/PumpStnSitePlan

As previously mentioned, the Wailuku Production Well is one (1) of four (4) wells that will replace the Shaft 33 water source. Upon completion of the Wailuku Well, three (3) of the four (4) replacement wells will be completed.

D. PROJECT COSTS AND IMPLEMENTATION

The cost of the proposed project is estimated to be $2.2 million. Construction of the production well is anticipated to take approximately 240 calendar days to complete.

Annual operations and maintenance costs for the project are estimated to be $0.5 million. This project may be funded by Federal funds through the State of Hawaii's Drinking Water State Revolving Fund (DWSRF), which would constitute a Federal action, and will require the project to meet all NEPA and Hawaii DWSRF program requirements.

E. CHAPTER 343, HAWAII REVISED STATUTES (HRS) REQUIREMENTS

The Wailuku Well production facility will be funded by the County of Maui and State of Hawaii. The use of public funds and lands triggers compliance with the Hawaii Revised Statutes (HRS), Chapter 343 requirements. Therefore, this Environmental Assessment (EA) is being prepared pursuant to Title 11, Chapter 200, Hawaii Administrative Rules (HAR), Environmental Impact Statement Rules to evaluate the proposed project's technical characteristics, environmental and socio-economic impacts, and alternatives, as well as to advance findings relative to the significance of the project's potential impacts and proposed mitigation measures. The Approving Agency for the EA is the Maui County, DWS. It should be noted that an EA was prepared for the Wailuku Exploratory Well prior to its construction and a Finding of No Significant Impact was published in the August 8, 2011 Office of Environmental Quality Control (OEQC) Environmental Notice. The EA for the Wailuku Exploratory Well was limited to the improvements related to the exploratory well and testing. Additional improvements required for the production well and assessment of impacts related to the use of the Wailuku Well as a permanent replacement water source were not addressed in the 2011 EA because water quality and water flow rate tests were required to determine that the site was a suitable water source. The exploratory testing conducted in 2013 determined that the Wailuku Well is an appropriate water source, this EA is being prepared for the Wailuku Well as a production facility.

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 existing Wailuku Well is located west of Old Wailuku Town within the Kehalani Mauka development. Kehalani Mauka is part of the larger Kehalani master-planned community, a 550-acre development that will have 2,400 homes when completed. With the exception of the existing Wailuku Well, Parcel 100 and surrounding area is currently vacant and undeveloped. The Wailuku Well pump station site is located within a future 5-acre park, which will be completed as adjacent developments are built. Existing single-family development borders the future park site on the south and east. The Kehalani Project District Master Plan calls for future multi-family development for areas north and west of the park and well site. These developments are part of the last phase of Kehalani and may be as far as ten (10) years until completion. Refer to **Figure 1**.

The Iao Tank Storage Facility and Iao Well are located on Parcel 021. The existing County of Maui facilities contain a 3.0 million gallon (MG) storage tank, the Iao Well, a control building, and other DWS infrastructure.

Parcel 091 is currently vacant and undeveloped.

Wailuku Town is located further north and east of the project site, beyond the Kehalani Mauka development. Wailuku serves as the County seat and the primary location of many State and Federal offices. Wailuku Town is also characterized by a mix of commercial uses, including offices, shops, and restaurants.

b. Potential Impacts and Mitigation Measures

The proposed Wailuku Well pump station site will be confined to an area of approximately 12,000 square feet within the Kehalani Mauka development. Although the pump station site is located within a future residential development, its specific siting within a future park provides a buffer between the well and residential homes. Furthermore, the construction of the proposed improvements to convert the Wailuku Well into a production facility is expected to be completed prior to the construction of the surrounding multi-family development and park within Kehalani Mauka.

The proposed transmission line connecting the Wailuku Well to the Iao Tank Storage Facility will be placed underground and will not adversely impact surrounding land uses. The modifications proposed for the existing Iao Well are limited to improvements to the chlorination system and is not anticipated to adversely impact the infrastructure at the site.

The proposed project is intended to replace Shaft 33, an existing water source that is also located within the Kehalani Mauka development, and provide potable water into the DWS Central Maui Water System. Due to the replacement nature of the proposed project, the limited project site area, and well location within a future park, the Wailuku Well production facility is not anticipated to have adverse impacts to existing land uses in the vicinity.

2. Climate

a. Existing Conditions

Like most areas of Hawaii, the climate in Wailuku is relatively uniform year-round. Characteristic of Maui's climate, the project site experiences mild and uniform temperatures, moderate humidity and relatively consistent northeasterly tradewinds. This stability is attributed to Maui's tropical latitude, relative to the Pacific anticyclone and storm tracts, and the surrounding ocean currents. Variations in climate among the different regions in Maui are largely due to local terrain.

Historically, in the region, daily temperatures range from an average low of 67 degrees Fahrenheit (measured at Kahului Airport) to an average high of

84 degrees Fahrenheit. The warmest month is August while the coolest month is February (County of Maui, Office of Economic Development, 2011).

Rainfall in the region is seasonal, with most precipitation occurring between October and March. Annual rainfall data for Central Maui shows an average of 18.49 inches (County of Maui, Office of Economic Development, 2011).

The winds in the region are predominantly tradewinds from the north-northeast. In general, tradewinds blow stronger in the afternoon. The tradewinds blow onshore toward the warmer land mass during the day; during the evening, the tradewinds blow offshore toward the relatively warmer ocean.

b. Potential Impacts and Mitigation Measures

The proposed project is limited to the conversion of the existing exploratory well into a production well. Improvements will be confined to the existing 12,000-square foot area exploratory well site, a 920-foot transmission line to the Iao Tank Storage facility, and minor modifications to the Iao Well piping or chlorination system. The Wailuku Production Well is a replacement water source that is being proposed in anticipation of the closure of the nearby Shaft 33. While the proposed project involves the development of a new replacement potable water source, it will not result in a significant net increase in the amount of pumpage from the Iao Aquifer System. Significant adverse impacts to climatic conditions are not anticipated as a result of the proposed project.

3. Agricultural Lands

a. Existing Conditions

In 1977, the State of Hawaii, Department of Agriculture developed a classification system to identify Agricultural Lands of Importance to the State of Hawaii (ALISH), based primarily, though not exclusively, on soil characteristics of the underlying land. The three (3) classes of ALISH lands are "Prime", "Unique", and "Other Important" agricultural land, with the remaining non-classified lands termed "Unclassified". When utilized with

modern farming methods, "Prime" agricultural lands have soil quality, growing season, and moisture supply needed to produce sustained crop yields economically; while "Unique" agricultural lands contain a combination of soil quality, growing season, and moisture supply to produce sustained yields of a specific crop. "Other Important" agricultural lands include those important agricultural lands that have not been rated as "Prime" or "Unique".

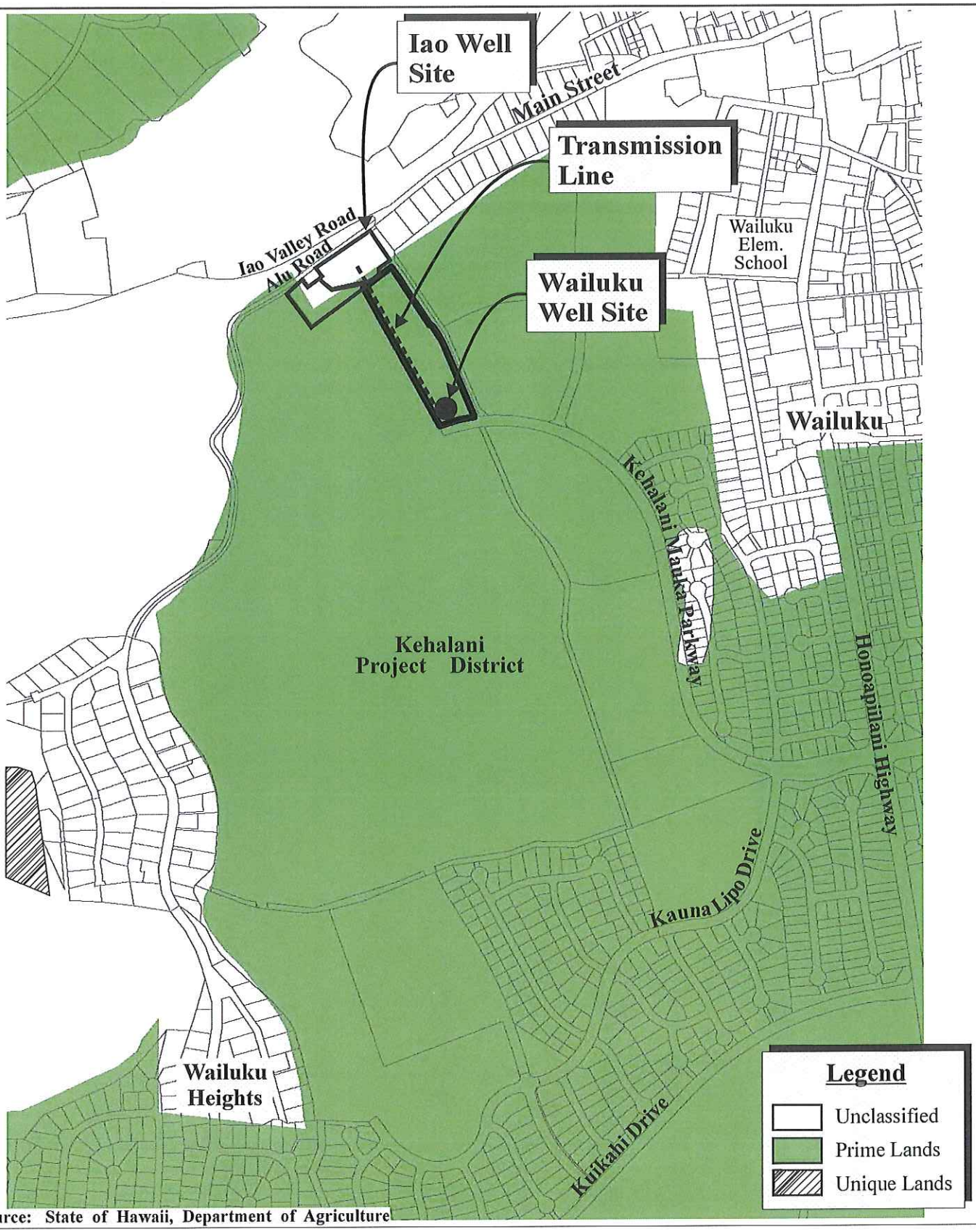
The Wailuku Well pump station site and transmission line corridor, as reflected by the ALISH map, are located on lands designated as "Prime" agricultural lands. The Iao Well facility is located on lands that are "Unclassified" by the ALISH map. See **Figure 4**.

Additionally, the University of Hawaii, Land Study Bureau (LSB) developed the Overall Productivity Rating, which classified soils according to five (5) levels, with "A" representing the class of highest productivity soils and "E" representing the lowest. A portion of the Iao Well site is classified as LSB "E", the lowest classification for productivity. The proposed action in this location would be installation of the underground transmission line and modifications to the existing chlorination system. See **Figure 5**.

The project site and surrounding areas were cultivated with sugar cane from the mid-1800s through the 1990s. When sugar production ended in the 1990s, the area was converted to cattle grazing. Grazing activity ended approximately nine (9) years ago. In 1991, this area was urbanized from agricultural to Project District 3 (Wailuku) as the Kehalani Master Planned Development. Since that time, the Wailuku Well project site and surrounding areas have been vacant and undeveloped.

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

Although the pump station site is designated as "Prime" agricultural, it has not been in active agricultural production since the 1990s. The entire Kehalani Mauka area is now classified "Urban" by the State Land Use Commission and is slated for residential development as part of the Kehalani Mauka project. The Wailuku Well will be converted from an exploratory well to a production well. In addition, the Iao Tank is an existing facility. Given the discontinued agricultural use at the site and proposed urban development plans for the area, along with the limited action required to



Source: State of Hawaii, Department of Agriculture

Figure 4

Proposed Wailuku Well Production Facility

Agricultural Land of Importance to the State of Hawaii

0 0.05 0.1 0.2 Mile

MUNEKIYO & HIRAGA, INC.

Prepared for: County of Maui, Department of Water Supply

RFE\WaikapuPRODWell\ALISH

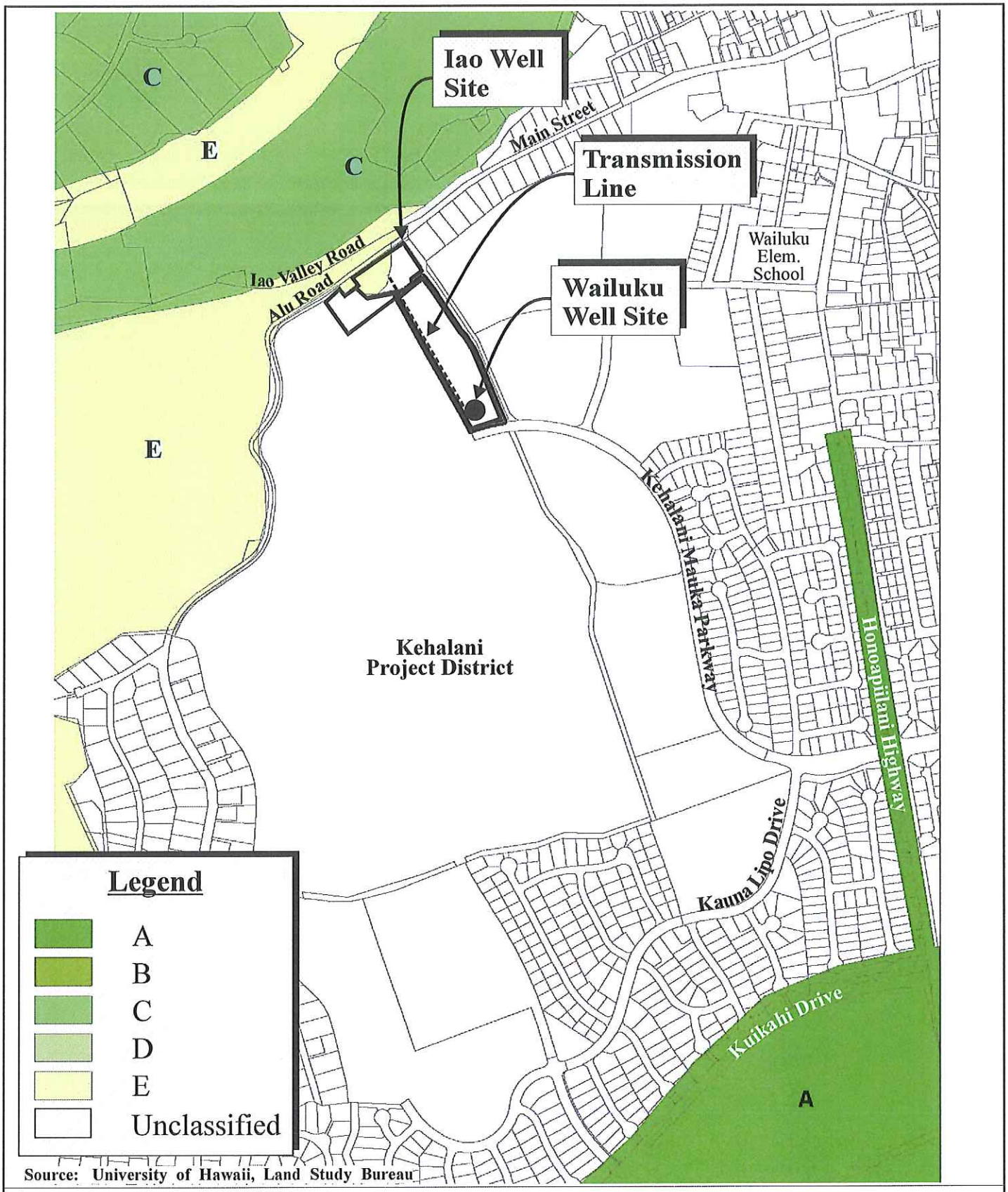


Figure 5

Proposed Wailuku Well Production Facility

Land Study Bureau Productivity Rating

0 0.075 Miles
0.0375 0.15

MUNEKIYO & HIRAGA, INC.

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

RFE\WailukuPRODWell\LandStudyBureau

convert the facility to a production well, adverse impacts to agricultural productivity are not anticipated as a result of the proposed project.

4. Topography and Soils Characteristics

a. Existing Conditions

The project site is about 480 feet above mean sea level, generally sloping down from west to east with a surface slope of about eight (8) percent. Refer to **Appendix "A"**.

The project site consists of soils within the Waiakoa-Keahua-Molokai association, which is found on low uplands and is characterized by moderately deep and deep, nearly level to moderately steep, well-drained soils that have a moderately fine textured subsoil (USDA, 1972). See **Figure 6**. Underlying the project site is Wailuku Silty Clay, 3 to 7 percent slopes (WvB). See **Figure 7**.

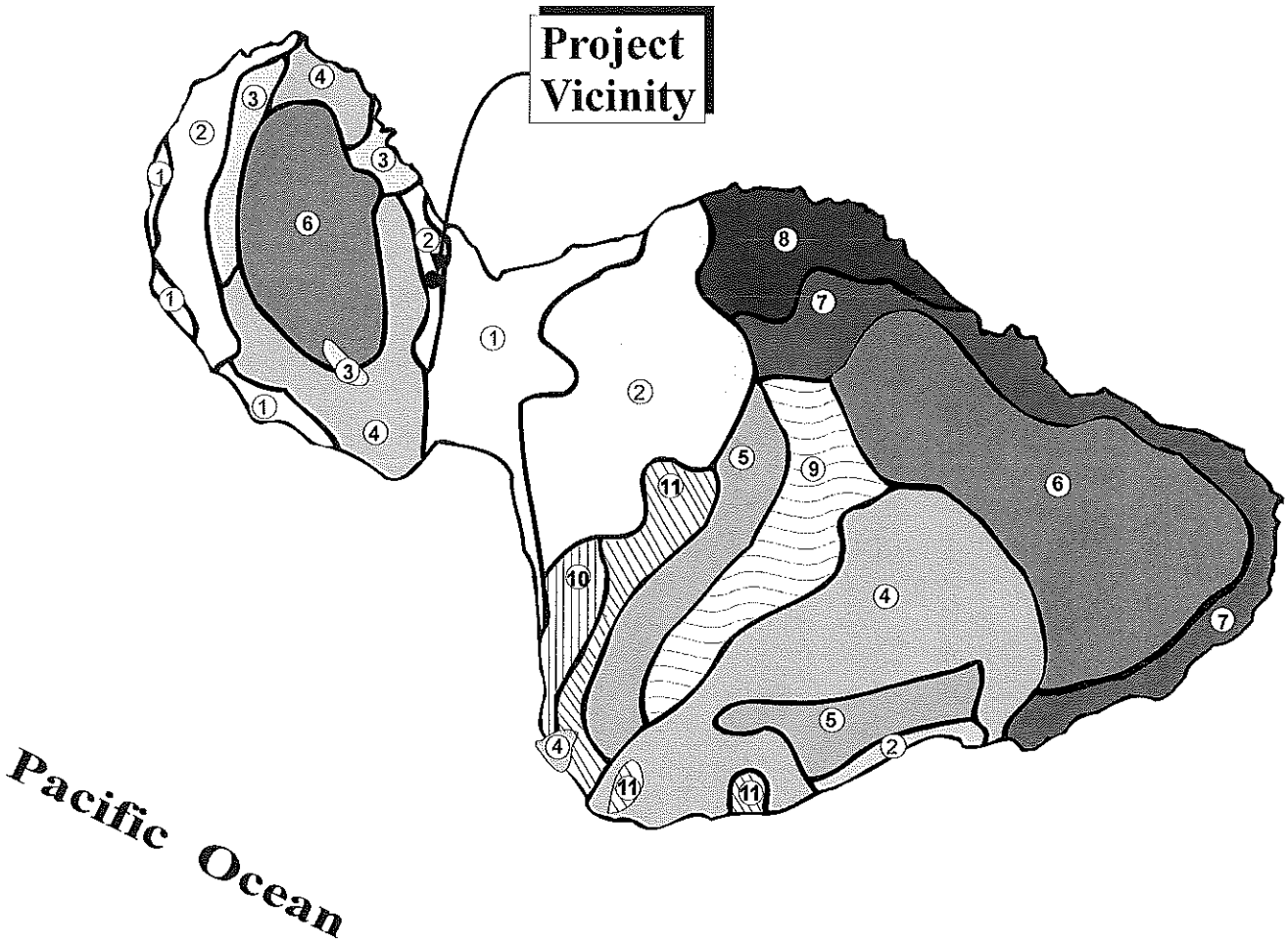
Wailuku Silty Clay, 3 to 7 percent slopes (WvB) is a dark reddish-brown silty clay that is about 12 inches thick. Permeability is moderate, runoff is slow and the erosion hazard is slight (USDA, 1972).

b. Potential Impacts and Mitigation Measures

The existing Wailuku Well has been drilled to be approximately 582 feet deep, with a bottom elevation of -102 feet msl. The proposed project involves improvements to the well site to convert the Wailuku Well into a production facility. Site improvements include a paved driveway, a 50-foot by 50-foot paved service yard, security fencing, domestic water service, electrical distribution circuits, a control building to house the motor control center, and drainage improvements. Drainage improvements include the construction of a ditch for directing and carrying runoff from undeveloped lands above the pump station site towards a grassed swale which will take the runoff around the site and towards the Waihee Ditch; as well as drain inlets, drain pipes, outlet structures, a spillway structure, and a drainage sump for capturing and collecting runoff from the paved service yard. Improvements for the transmission pipeline consist of accommodating 920 feet of 16-inch ductile iron pipe between the pumping station and the Iao Tank sites. As part of final construction design, geo-technical studies will be

LEGEND

- (1) Pulchu-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

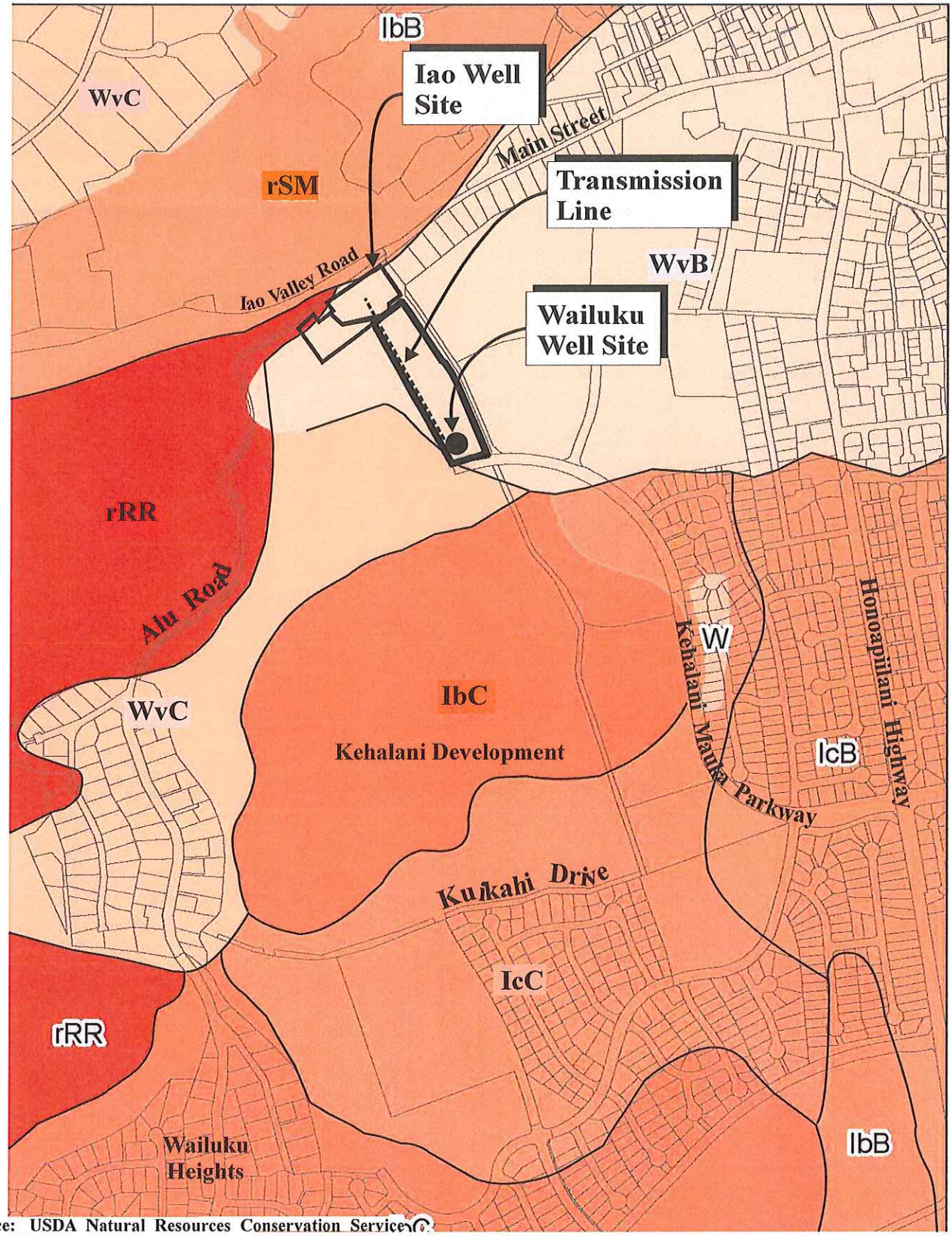
Proposed Wailuku Well Production Facility
Soil Association Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

RFE/WailukuPRODWell/Soils



Source: USDA Natural Resources Conservation Service

Figure 7

Proposed Wailuku Well Production Facility

Soil Classification Map

Approx. 0 0.05 0.1 0.2 Mile

Prepared for: County of Maui, Department of Water Supply

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carried out to ensure provisions are included in the design to address site specific foundation design requirements. During construction, Best Management Practices (BMP) erosion control will be implemented. BMPs include minimizing construction time, retaining existing ground cover as long as possible, temporary berms, silt fences, and other measures. See **Exhibit "C"**, Construction Erosion Control Notes.

Adverse impacts to underlying soil conditions and topography are not anticipated to result from the proposed project (refer to **Appendix "E"**).

5. Flood and Tsunami Hazards

a. Existing Conditions

The project site is located near the eastern base of the West Maui Mountains. As indicated by the Flood Insurance Rate Map for the County of Maui, the project site is located within Zone X. Zone X is the flood insurance rate zone that corresponds to areas of minimal flooding or areas determined to be outside the 0.2 percent annual chance flood plain. See **Figure 8**.

The project site is located inland and outside the tsunami inundation zone.

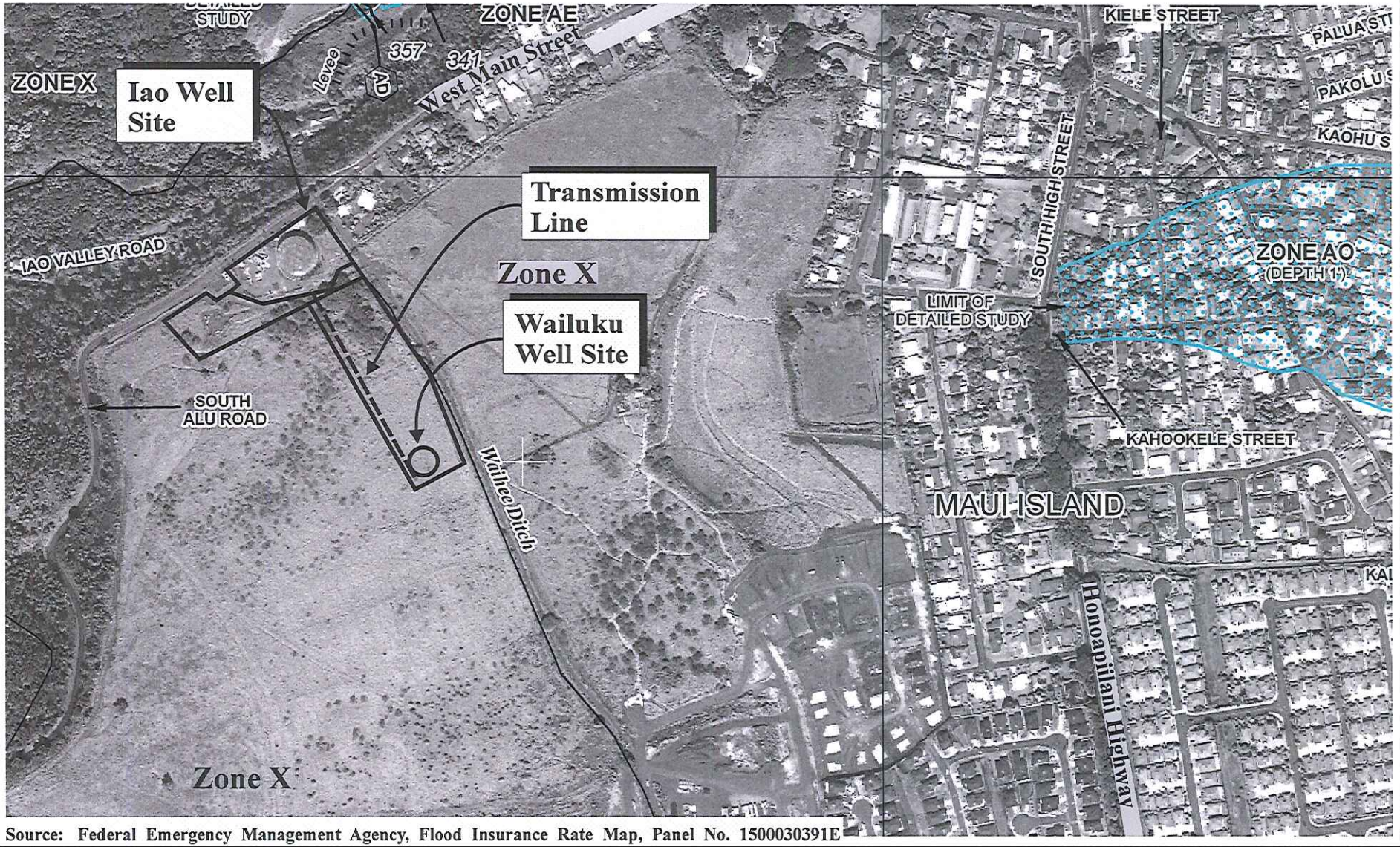
b. Potential Impacts and Mitigation Measures

Given the location of the project site within Flood Zone X and outside of the tsunami inundation zone, there are no anticipated adverse effects to the proposed project from flooding or tsunami related events.

6. Streams and Wetlands

a. Existing Conditions

There are no streams or wetlands within the project site. Iao Stream is located approximately 1,800 feet north of the pump station site. The stream is north of Iao Valley Road and generally runs west to east. This stream is listed by the State of Hawaii, Department of Health as impaired water, indicating that the water quality within the stream may not meet State of Hawaii water quality criteria for streams. Iao Stream is one (1) of the four (4) streams in the Wailuku District that comprises Na Wai Eha. The three (3)



Source: Federal Emergency Management Agency, Flood Insurance Rate Map, Panel No. 1500030391E

Figure 8

Proposed Wailuku Well Production Facility

Flood Insurance Rate Map

0 250 125 500 Feet

MUNEKIYO & HIRAGA, INC.

Prepared for: County of Maui, Department of Water Supply

RFE/WailukuPRODWell/FIRM

other streams are Waikapu, Waiehu, and Waihee. In March 2008, Na Wai Eha was designated as a surface water management area, the first such designation in the state. Any person who is making or wanting to make a withdrawal, diversion, impoundment, or consumptive use of surface water in the area is now required to apply for a Surface Water Use Permit (WUP) from the Commission on Water Resource Management (CWRM). However, a WUP is not required for domestic consumption of surface water by individuals, for users of any Maui Department of Water Supply water system, and for the use of rain catchment systems to gather water. DWS does not anticipate a need for a WUP for the proposed production facility.

The closest wetland is the Kanaha Pond Wildlife Sanctuary located approximately 3.5 miles northwest of the project site.

Waihee Ditch, an irrigation canal built in the early 1900s, is located approximately 200 feet to the east of the pump station site. The irrigation canal flows in a southerly direction and ends at a reservoir in Maalaea. If the reservoir overflows, it discharges into Pohakea Gulch, which terminates in Kealia Pond, a wetland in Kihei.

b. Potential Impacts and Mitigation Measures

As indicated, there are no streams or wetlands on the project site. Exploratory testing at the Wailuku Well indicated that the well will be a dependable source of potable water for the Central Maui Water System with a capability of producing 1,400 GPM with low drawdown. No adverse impacts to Iao Stream are anticipated to result from the proposed Wailuku Well production facility. Adverse impacts to Waihee Ditch are also not anticipated as a result of the project. The Wailuku Well pump station site is located on the western portion of Parcel 100, further away from Waihee Ditch.

7. Flora and Fauna

a. Existing Conditions

The project site lies on former agricultural lands that slope gently down to the east from the West Maui Mountains. Original vegetation in the area

consisted of a dense low saturated native forest and shrubland. However, the area was cleared for sugar cane cultivation in the mid 1800s and the land was plowed, planted, burned, and harvested in continuous cycles for over 100 years. When sugar production ended in the 1990s, the area was converted to cattle grazing. These agricultural practices, along with recent fires, have resulted in an environment that is nearly lacking native plants and animal species.

A biological survey of the pump station site and transmission line corridor was conducted by Robert Hobdy (see **Appendix "F"**). The vegetation within the pump station site and along the transmission line corridor is a nearly monotypic stand of Guinea grass (*Megathyrsus maximus*) which can grow in dense stands to eight (8) feet deep. Other species of significance included Castor bean (*Ricinus communis*), glycine (*Neonotonia wightii*), opiuma (*Pithecellobium dulce*) and false mallow (*Malvastrum coromandelianum*). Of the 51 plant species recorded during the survey, just one (1) was a common dry land native plant, the uhaloa (*Waltheria indica*), which is widespread in Hawaii and many other Pacific Islands. The remaining species were pasture plants or agricultural weeds.

The wildlife within and around the pump station site and transmission line corridor is composed almost entirely of non-native species. Of a total of two (2) mammals, five (5) birds, one (1) reptile, five (5) insects, and one (1) mollusk, only one (1) indigenous dragonfly, the green darner (*Anax junius*) was recorded. This dragonfly is widespread in Hawaii and also occurs on the American mainland.

A special effort was made to look for the native Hawaiian hoary bat by making an evening survey of the area. However, evidence of the bats' presence was not found.

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

Under the existing site conditions, there are no federally listed endangered or threatened species of flora or fauna within the pump station site or transmission line corridor, largely due to former agricultural activity. The biological survey also did not identify any special wildlife habitats. As a result, the proposed project is not anticipated to have any significant negative

impacts on botanical or wildlife resources in the area and the biological survey concludes that no recommendations for mitigation are deemed necessary.

While no protected seabirds were found on the property, the *uau* and *ao*, are known to fly over the area at dawn and dusk to their burrows high in the mountains between March and November each year. The young birds are easily confused by bright lights; therefore, any significant outdoor lighting such as street lights or flood lights that are incorporated into the project design will be shielded to direct the light downward so that it is not visible from above.

8. Archaeological Resources

a. Existing Conditions

An Archaeological Field Inspection was conducted for the proposed project site in August 2012 by Scientific Consultants Services, Inc. See **Appendix "G"**. The Field Inspection consisted of a 100 percent pedestrian survey to determine the presence or absence of architecture, midden deposits, and/or artifact deposits on the surface of the area, as well as assess the potential for the presence of subsurface cultural deposits. The ground surface and subterranean reaches of the study area have been heavily disturbed over time as a result of intensive industrial sugar cane plantation cultivation, as well as recent construction storage activities. No historic sites, features, midden scatters, or artifacts were documented and the survey was negative for both surface materials and areas thought to potentially contain subsurface cultural materials.

b. Potential Impacts and Mitigation Measures

No surface or subsurface cultural remains were identified during the field inspection. Repeated instances of modern era clearing, grubbing, and agricultural activities at the project site have extensively disturbed the area, making the likelihood of encountering any remaining surface features almost non-existent. The Archaeological Field Inspection concluded that the proposed project would not have an adverse impact on any significant historic properties and no further archaeological work is needed for the parcel. The

Archaeological Field Survey was submitted to the State Historic Preservation Division (SHPD) for review and approval.

Should any archaeological resources or human burials be encountered during ground-altering activities, all work in the vicinity of the find will cease, and SHPD will be notified.

9. Cultural Resources

a. Existing Conditions

A Cultural Impact Assessment (CIA) for the proposed project, dated June 2013, was prepared by Scientific Consultant Services, Inc. See **Appendix "H"**. The purpose of the CIA is to identify any traditional or contemporary native Hawaiian or other cultural practices, resources, sites, and beliefs associated with the project site and surrounding lands. The CIA was prepared in part by archival and documentary research, including review of Mahele (land division of 1848), as well as communication with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs.

Within the Hawaiian cultural context, the project site is located within Wailuku *ahupuaa*, which translated means "water [of] destruction," referring to the battle of Ke Pani Wai, between Kamehameha I and Kalanikupule.

The Wailuku area is one of the *Na Wai Eha,* or "the four waters," known for the occupancy of chiefly individuals, with many chiefs and much of the area's population residing near or within portions of Iao Valley and lower Wailuku. The Wailuku District and Wailuku *ahupuaa* are frequently mentioned in historical texts and oral-tradition accounts as being politically, ceremonially, and geographically important areas during traditional times. The area was likely settled between c. A.D. 1100 and A.D. 1200. Scattered amongst the agricultural and habitation sites were other places of cultural significance. The Wailuku District was a center of political power often at war with its rival in Hana.

During the Great Mahele of 1848, the Wailuku District was declared Crown Land. Approximately 180 Land Commission Awards (LCA) were granted

in Wailuku *ahupuaa* and 100 were granted in the neighboring Waikapu *ahupuaa*. While a handful of foreigners gained control of large parcels of land that would later be used for commercial sugar cane production, the majority of LCAs were awarded to Native Hawaiians, suggesting that the area was densely populated in the mid-19th century. The project site falls under LCA 387, which was awarded to the American Board of Commissioners for Foreign Missions.

Land use in and around the project area in the mid-19th and early 20th centuries was largely devoted to commercial sugar cane and pineapple production. Sugar plantations and mills have been located in the Wailuku and Waikapu area since the 1860s. The Hopoi Sugar Camp, which shows up on maps dated to 1922, was located just south of the project area near the Hopoi Reservoir.

b. Potential Impacts and Mitigation Measures

The CIA concludes that the exercise of native Hawaiian rights, or any other ethnic group, related to gathering, access or other customary activities will not be adversely affected by the proposed project.

10. Air Quality

a. Existing Conditions

The project site, in general, does not experience adverse air quality conditions. There are no point sources of airborne emissions within close proximity to the project site. Point sources in the surrounding Central Maui region include the Maalaea Power Plant, Puunene Sugar Mill, and rock quarry at Puunene, all of which are well over two (2) miles from the project site. Non-point sources of pollution in the vicinity of the project site include: vehicular exhaust from Honoapiilani Highway and other nearby roadways; dust generated by construction activities in the Kehalani Mauka development; and/or burning activities from sugar cane harvesting and cultivation operations conducted in the central valley area. Emissions from these sources, however, are quickly dispersed by prevailing tradewinds.

b. Potential Impacts and Mitigation Measures

During construction, airborne particulates as a result of construction-related activities may temporarily affect the ambient air quality within the immediate vicinity of the project site. The project will comply with regulations established in Hawaii Administrative Rules, Chapter 11.60.1, "Air Pollution Control" and Section 11-60.1-33, "Fugitive Dust". Mitigative measures will include utilization of water wagons and sprinklers to control dust, as well as other appropriate Best Management Practices to ensure that fugitive dust from the project area is minimized. By effectively employing these mitigative measures, construction-related activities are not anticipated to pose a significant impact to the air quality in the surrounding area.

From a long-term perspective, adverse impacts to air quality are not anticipated. Open areas within the Wailuku Well pump station site will be landscaped with grass or covered with gravel to control dust at the site.

11. Noise

a. Existing Conditions

The predominant source of noise in the vicinity of the project site stems from traffic traveling along Kehalani Mauka Parkway and other residential roadways in the Kehalani development. The lands abutting the north and west of the pump station site are former agricultural lands that are currently vacant and undeveloped. Single-family homes located to the south and east of the project site are not major noise-generators.

b. Potential Impacts and Mitigation Measures

Ambient noise conditions may be temporarily affected by construction-related activities. Heavy construction machinery and equipment are anticipated to be the dominant noise-generating sources during the construction period. Mitigation measures for construction-related activities will include using proper equipment and conducting regular vehicle maintenance, both of which are anticipated to reduce noise levels. Equipment mufflers or other noise attenuating equipment may also be employed as required. Noisy construction activities will be restricted to hours between 7:00 a.m. and 4:30 p.m., Monday through Friday, excluding

holidays. The project will comply with Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control" and obtain a noise permit, as applicable. By effectively employing these measures, potential noise-related impacts from construction-related activities will be mitigated to an acceptable level. Ambient noise impacts associated with the project will be limited to a 240-calendar day time frame during which the construction of the project will be completed. It is noted that construction of the proposed project is anticipated to be completed prior to the development of the future park on Parcel 100 and residential areas immediately surrounding the pump station site.

Additionally, the proposed project includes the installation of a submersible motor at the bottom of the well. As such, no long-term noise impacts are anticipated as a result of project implementation.

12. Scenic and Open Space Resources

a. Existing Conditions

Scenic resources in the vicinity of the project site include the West Maui Mountains to the west and the Central Maui isthmus and Haleakala to the east. Open space resources in the region include the slopes of the West Maui Mountains and Haleakala.

b. Potential Impacts and Mitigation Measures

The proposed project will not affect views from Wailuku, Honoapiilani Highway, or Iao Valley Road. New construction of components includes the control building, which will measure approximately 14 feet in height, and a 30-foot high antenna pole. All other project actions are upgrades to existing facilities to convert the existing facility to a production well. As such, the proposed project will not negatively affect scenic resources. Further, with the proposed pump station site occupying about 12,000 square feet, the project will not adversely affect open space resources.

13. Beach and Mountain Access

a. Existing Conditions

The project site is located approximately 2.5 miles from the nearest beach and approximately a quarter of a mile from the foot of the West Maui mountains. A Cultural Impact Assessment was completed for the proposed project by Scientific Consultant Services, Inc. and concluded that the exercise of native Hawaiian rights, or any other ethnic group, related to gathering, access, or other customary activities would not be adversely affected by the proposed project. Refer to **Appendix "E"**.

b. Potential Impacts and Mitigation Measures

There are no traditional access corridors identified by the Cultural Impact Assessment within the project site and due to the distances and spatial relationships to the nearest beach and mountain, there are no anticipated adverse impacts to beach and mountain access from the proposed project.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Population

a. Existing Conditions

The population of the County of Maui has exhibited relatively strong growth over the past decade. In 2010, there were 154,834 residents in the County, a 21 percent increase in the resident population since 2000. The Wailuku-Kahului region is the most populous region in the County and has grown at a faster rate than the County as a whole. In 2010, there were approximately 54,400 residents living in the Wailuku-Kahului region, a 31 percent increase over the last decade (U.S. Census Bureau, 2000 and 2010). Population in the County of Maui is projected to grow to 199,550 residents by 2030 while the Wailuku-Kahului region is anticipated to have approximately 71,200 residents (County of Maui, Department of Planning, 2006).

b. Potential Impacts and Mitigation Measures

The proposed Wailuku Well production facility will provide potable water to the DWS's Central Maui Water System which services Central Maui, South Maui, and Paia areas. However, as the Wailuku Well is a replacement water source that is being developed in anticipation of the closure of Shaft 33, no significant adverse impacts to population are anticipated to result from project implementation.

2. Economy

a. Existing Conditions

The Wailuku region is Maui County's center of governmental activity. Along with neighboring Kahului, the region encompasses a broad range of commercial, service, and public sector activities. In addition, the region is surrounded by approximately 32,000 acres of sugar cane. This vast expanse of agricultural land, managed by Hawaiian Commercial & Sugar Company (HC&S), is a key contributor to the local economy.

Not-seasonally-adjusted unemployment rates for both Maui County and the Island of Maui in April 2013, were 4.8 percent and 4.8 percent, respectively. These rates both decreased from the April 2012 unemployment rates of 6.2 percent and 6.1 percent, respectively (DLIR, May 2013). The recent economic recession has affected Maui County's major industries of tourism, construction and real estate due to, among other factors, reduction in discretionary income and tightening of credit. However, as previously noted, employment has improved since 2012, signaling an improving local economy.

b. Potential Impacts and Mitigation Measures

In the short term, the proposed project will provide construction-related revenue and employment. Accordingly, the project will have a beneficial impact on the local economy during the construction phase. The estimated construction cost of the project is $2.2 million.

In the long term, the Wailuku Well production facility is not anticipated to adversely impact Maui County's economy. The well will be a replacement

water source serving the Central Maui Water system and does not represent a new potable water source.

C. PUBLIC SERVICES

1. Police and Fire Protection

a. Existing Conditions

Police protection for the Wailuku and Waikapu region is provided by the Maui County Police Department headquartered on Mahalani Street, approximately 1.5 miles north of the project site. The region is served by the Department's Central Maui station, which is divided in three (3) sectors. Each sector is divided into three (3) beats, each patrolled by a single officer.

Fire prevention, suppression, and protection services for the Waiehu, Waihee, and Wailuku regions are provided by the County Department of Fire and Public Safety's Wailuku station, located on Kinipopo Street in Wailuku Town, approximately 0.9 mile northeast of the project site. The region is also served by the Department's Kahului Station, located on Dairy Road, approximately 3.5 miles east of the project site.

b. Potential Impacts and Mitigation Measures

The proposed project will not adversely affect the service area limits or personnel requirements for police and fire protection. The proposed Wailuku Well production facility is not anticipated to impact service request calls for police and fire personnel. The pump station site will be enclosed by a six-foot high screened chain link fence for security.

2. Medical Services

a. Existing Conditions

The island's major medical facility is Maui Memorial Medical Center, located approximately 3.0 miles north of the project site, midway between Wailuku and Kahului. Acute, general, and emergency care services are provided at the 231-bed facility. Other private medical service providers in

the Central Maui region, which have regular hours, include Maui Medical Group and Kaiser Permanente.

b. Potential Impacts and Mitigation Measures

As a non-habitable project, the proposed Wailuku Well production facility will not affect requirements for medical services. As with police and fire protection services, service area limits for medical emergency responders will also not be adversely affected by the proposed project.

3. Solid Waste

a. Existing Conditions

Single-family residential solid waste collection service is provided by the County of Maui. Residential solid waste collected by County crews is disposed at the County's Central Maui Landfill, located four (4) miles southeast of the Kahului Airport. Commercial waste from private collection companies is also disposed at the Central Maui Landfill. A privately operated green waste recycling facility is located at the Central Maui Landfill.

Maui Demolition and Construction Landfill, a privately owned facility, accepts solid waste and concrete from demolition and construction activities. This facility is located at Maalaea, south of the project site, near Honoapiilani Highway's junction with North Kihei Road and Kuihelani Highway.

b. Potential Impacts and Mitigation Measures

Construction waste which may be generated from implementation of the project will be recycled or disposed of at the appropriate construction waste disposal location. With these solid waste management measures, the contribution of construction waste to the landfills will be minimized. The proposed action is not anticipated to adversely affect capacity parameters of the County's solid waste system. After project construction, the proposed Wailuku Well production facility will generate no solid waste.

4. Recreational Resources

a. Existing Conditions

The Wailuku Well pump station site is located at the site of a future park. In addition, the County's Wailuku Elementary School Park is located less than a quarter of a mile from the site, providing baseball/softball fields, basketball courts, a volleyball court, and a playground.

b. Potential Impacts and Mitigation Measures

The proposed project will not create a need for additional recreational facilities. Therefore, the proposed project is not anticipated to adversely impact existing public recreational facilities.

Because the proposed pump station site will be located within a future park site, security and public safety measures have been incorporated into the design. As mentioned previously, the pump station site will be completely surrounded by a six-foot high screened chain link fence. It should be noted that construction of the project is expected to be complete prior to the park's development.

5. Schools

a. Existing Conditions

The Wailuku-Kahului region is served by the State Department of Education's (DOE) public school system and by several privately operated schools. Public schools operated by DOE in the Kahului area include Lihikai, Kahului, and Pomaikai Elementary Schools (Grades K-5); Maui Waena Intermediate School (Grades 6-8); and Maui High School (Grades 9-12). Existing DOE public schools in the Wailuku area include Wailuku Elementary School (Grades K-5); Iao Intermediate School (Grades 6-8); and Baldwin High School (Grades 9-12). The University of Hawaii-Maui College, located north of the project site in Kahului, serves as the island's primary higher education institution. A new public elementary school, the Puu Kukui Elementary School, is currently under construction within the Kehalani Mauka development and is anticipated to open for the 2013-2014 school year.

b. Potential Impacts and Mitigation Measures

Inasmuch as the Wailuku Well production facility is a non-residential project that will serve as a replacement water source for the soon-to-be-closed Shaft 33, it will not impact school enrollments or facility requirements.

D. INFRASTRUCTURE

1. Roadways

a. Existing Conditions

The Wailuku Well pump station site is within an undeveloped parcel approximately 200 feet from the end of the improved section of Kehalani Mauka Parkway. Access to the pump station site will be provided by a driveway from the end of the improved Kehalani Mauka Parkway. The Iao Well facility is accessed by an existing driveway off of Alu Road near its intersection with Iao Valley Road.

Kehalani Mauka Parkway is a two-lane roadway that serves as the primary collector road throughout the Kehalani Mauka development west of Honoapiilani Highway. Kehalani Mauka Parkway currently ends south of the proposed well site. However, as future development of the Kehalani Mauka subdivision continues, the roadway will be extended, forming a loop that begins and ends near the intersection of Kehalani Parkway and Honoapiilani Highway.

Access to Kehalani Mauka Parkway is provided by Honoapiilani Highway, a north-south, two-way, two-lane, undivided State-owned arterial road. Honoapiilani Highway begins as the continuation of South High Street near Kahookele Street, and continues southward through Waikapu, Maalaea, and wraps around the "Pali" towards West Maui. The intersection of Honoapiilani Highway and Kehalani Parkway is signalized, with left-turn and right-turn lanes from Honoapiilani Highway onto Kehalani Parkway.

Alu Road is a two-lane roadway that originates at the junction with Iao Valley Road and Main Street. Alu Road provides access through the Wailuku Heights residential neighborhood while Iao Valley Road continues west into

Iao Valley. Main Street is a two-lane east-west roadway that runs through Wailuku Town. Refer to **Figure 1**.

b. Potential Impacts and Mitigation Measures

There will be a short-term increase in traffic in the vicinity of the Wailuku Well pump station site and Iao Well associated with construction workers and equipment entering and leaving the project site. DWS estimates that approximately four (4) construction vehicles will be onsite daily during the construction period. Parking for construction employees will be located on the project site to minimize additional traffic impacts. Limited construction access use will be confined to the 240-day construction period. Construction of the proposed project is not anticipated to adversely impact pedestrian or vehicular movement and no road, lane, or sidewalk closures are expected during the course of the project.

Once the Wailuku Well production facility is in operation, one (1) DWS employee would visit the pump station site everyday. Based on this anticipated level of maintenance and monitoring, significant long-term impacts to traffic conditions in the vicinity of the pump station site are not anticipated. The modification of the chlorination system at the Iao Well would not require additional DWS personnel at the facility during project operation.

2. Water

a. Existing Conditions

Water to the Wailuku-Kahului region is provided by the Maui County, DWS Central Maui System which also serves the South Maui and Paia areas. The main sources of water for this system include the Iao and Waihee aquifers, the Iao Tunnel, and the Iao-Waikapu Ditch.

The project site is located within the Iao Aquifer System, which has a sustainable yield of 20 million gallons per day (MGD). In 2003, the CWRM designated the Iao Aquifer System as a groundwater management area and limited groundwater withdrawal from the aquifer to 90 percent of its sustainable yield. The current total water use permit allocation for the Iao

Aquifer is 19.095 MGD. The current withdrawal from the Iao Aquifer System is approximately 15.5 MGD on a 12-month moving average basis.

Shaft 33, the existing well located to the northeast of the project area, was constructed in 1946 and put into operation in 1948 to provide irrigation water for Wailuku Sugar Company's sugar cane operations. Through an agreement with Kehalani Mauka LLC, the previous landowner, the DWS has pumped groundwater from Shaft 33 for a number of years. DWS uses one (1) of the three (3) wells at the site equipped with a 3,900 GPM pump and pumps an average of nearly 5 MGD. Water pumped from Shaft 33 provides water to the Central Maui Water System.

The CWRM monitors water quality within the Iao Aquifer System through two (2) deep monitor wells. The Waiehu Deep Monitor Well (State Well No. 5430-05) is located north of Iao Stream, and the Iao Deep Monitor Well (State Well No. 5230-02) is located south of Iao Stream and south of Shaft 33. These wells penetrate the freshwater lens, the zone of mixture (transition zone), and the underlying salt water. The CWRM owns the wells and monitors the elevations of the top of the transition zone and the lens mid-point on a regular schedule. The Waiehu Deep Monitor Well is located near some of Maui DWS's major pumping centers (the Mokuhau Wells, the Waihee Wells, and the Waiehu Wells), and has monitored the rise in the top of the transition zone (defined as two (2) percent seawater concentration) and lens mid-point (defined as 50 percent seawater concentration) since 1985. The changes seen in the lens were the result of pumping these sources and the proximity of the monitor well to the pumping sources. CWRM has monitored the same parameters in the Iao Deep Monitor Well since 2006.

Pumping south of Iao Stream is mainly from Shaft 33. There are three (3) wells, ten feet apart, drilled below the pump room of the shaft. Only one well is currently used. The portal of the shaft is at elevation 400± feet above mean sea level (feet, msl). The floor of the pump room is at 31± feet, msl. The wells are drilled to a depth of 310 feet below the pump room floor. Over the pumping history of the last ten years, the chlorides have risen from about 45 mg/L in year 2000 to about 65 mg/L in year 2010, however, upconing or intrusion of saltwater in Shaft 33 has not occurred as indicated by data drawn from the Iao Deep Monitor Well. The Iao Deep Monitor Well has shown a

decline in water levels since 2006, but the mid-point of the Ghyben-Herzberg lens has remained stable over that period, hovering about -950 feet, msl, while the top of the transition zone ranges in elevation around -630 feet msl to -680 feet, msl over the period of record.[1] Therefore, pumpage from Shaft 33 has not adversely affected the structure of the Ghyben-Herzberg lens south of Iao Stream as measured in the Iao Deep Monitor Well.

b. Potential Impacts and Mitigation Measures

The proposed Wailuku Well production facility is one (1) of four (4) wells intended to replace Shaft 33. Two (2) DWS well development projects - the Waikapu Well and Iao Well - in the Iao Aquifer System have been completed and two (2) additional wells, including the proposed Wailuku Well, are planned in response to the anticipated closure of Shaft 33. Refer to **Table 1**. As discussed previously, the Wailuku Well production facility, along with the additional replacement wells, is consistent with the DWS's ongoing efforts to create distance between pumping operations within the aquifer to protect water quality.

The proposed project constitutes a replacement water source rather than a new water source. The Water Use and Development Plan (WUDP), Central DWS District Plan Update was adopted by the County Council in December 2010. The WUDP discusses the proposed replacement of Wailuku Shaft 33 with several replacement wells. The withdrawal from the proposed production well, when combined with the pumpage from the three (3) other replacement wells and other existing wells within the Iao Aquifer system will not exceed the total water use permit allocation of 18.45 MGD. When Shaft 33 is retired and the four (4) replacement wells are put in place, the total groundwater withdrawal from the Iao Aquifer is anticipated to be 15.7 MGD. As such, the project is not anticipated to have negative impacts to the Iao Aquifer system.

Replacing the existing Shaft 33 with new wells drilled to shallower depths (in compliance with CWRM Well Standards which states that the bottom of the

[1] The Ghyben-Herzberg ratio describes the interface between the saltwater and freshwater lens in coastal aquifers. When freshwater is withdrawn at a faster rate than it can be replenished, saltwater from the ocean intrudes into the acquifer, resulting in a rise in the interface and an increase in chlorides in the wells.

well will be no deeper than ¼ of the thickness of the freshwater lens), and each well pumping less than the existing Shaft 33, will help in "spreading out the pumpage" within the Iao Aquifer System, which ultimately optimizes the development of freshwater south of Iao Stream.

Pumpage from basal groundwater wells will not adversely affect streams in the Iao area. Water levels in the basal Ghyben-Herzberg aquifer are hundreds of feet below the invert elevation of streambeds. The alluvial/colluvial cover of overlying sediment downstream high-level dike-fed springs provide a low permeability barrier that does not allow for interaction.

Flow rate and water quality testing was done at the Wailuku Well to verify that the well will be a viable source of potable water. The results of the testing confirm that the well will be a dependable source of potable water for the Central Maui Water System with a capability of producing 1,400 gpm with low drawdown. A slight increase in chloride was detected during testing due to Shaft 33 continuously pumping almost 5 MGD approximately 220 feet from the site of the well. However, when all four (4) of the replacement wells for Shaft 33 are drilled and tested, dispersing the pumping and withdrawal of groundwater from the Iao Aquifer over a larger area will greatly optimize the water system as a resource and protect it from upconing or intrusion of saline water.

Laboratory test results have verified that the water meets all safe drinking water standards (refer to **Appendix "B"**).

3. Wastewater

a. Existing Conditions

Wastewater from the Wailuku-Kahului region is treated at the Wailuku-Kahului Wastewater Reclamation Facility (WKWWRF). The WKWWRF also receives flow from Kuau, Paia, Skill Village, and Spreckelsville. Currently, the WKWWRF has a design capacity of 7.9 MGD and average dry weather flow of 4.4 MGD. Effluent disposal from the WKWWRF is via eight (8) gravity injection wells. Principal solids from the WKWWRF are treated, processed and digested, dewatered and then composted at the Central

Maui Landfill. There are 15 major wastewater pump stations which are part of the WKWWRF system.

There are no existing County sewer system facilities at the project site.

b. Potential Impacts and Mitigation Measures

The proposed project is limited in scope to the Wailuku Well production facility and related improvements. The facility will not generate wastewater flows and will not impact regional wastewater treatment facilities.

4. Drainage

a. Existing Conditions

The proposed pump station site slopes from west to east with a surface slope of about eight percent. There are no drainageways at the site and storm runoff generally sheet flows into adjacent downstream properties eventually entering the Waihee Ditch, or the drainage system within the roadway of Kehalani Mauka Parkway.

b. Potential Impacts and Mitigation Measures

To mitigate runoff from upstream undeveloped properties running through the pump station site, a number of drainage improvements have been proposed. These include the construction of a ditch for directing and carrying runoff from the undeveloped lands above the pump station site towards a grassed swale which will take the runoff around the site and towards the Waihee Ditch; as well as drain inlets, drain pipes, outlet structures, a spillway structure, and a drainage sump for capturing and collecting runoff from the paved service yard. Refer to **Appendix "E"**.

Drainage improvements are not necessary for the underground transmission line or the existing Iao Well site.

The proposed project will not present any adverse effects on drainage patterns or runoff volume.

5. Electricity and Telephone Systems

a. Existing Conditions

There are underground electrical and telephone lines located along Kehalani Mauka Parkway. There are no electrical or telephone utilities currently serving the pump station site. On average, the production facility is anticipated to use approximately 12,000 kilo-watt hours (kWH) per month. In comparison, Shaft 33 uses on average approximately 450,000 kWH per month.

b. Potential Impacts and Mitigation Measures

A component of the project involves installing electrical distribution circuits to provide power for the operation of the deep well submersible pump and other components of the pump station site. Electrical power will be provided via overhead utility lines. The proposed project constitutes a replacement well which operates using a more efficient pump than that which is currently utilized at Shaft 33, and as such, the proposed project is not anticipated to create an increase in electrical energy use or long-term emissions.

E. CUMULATIVE AND SECONDARY IMPACTS

Cumulative impacts are defined by Title 11, Chapter 200, Hawaii Administrative Rules (HAR), Environmental Impact Statement Rules 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."*

A "secondary impact" or "indirect effect" from the proposed action are defined by Title 11, Chapter 200, HAR as

> *"effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable."*

As mentioned previously, the proposed project is one (1) of four (4) water wells planned to replace the existing Shaft 33. Two (2) replacement wells, the Waikapu Well and the Iao

Well have been completed. Upon completion, the four (4) replacement wells will replace groundwater pumping that is currently concentrated at Shaft 33. The dispersal of pumping throughout the Iao Aquifer System will positively impact the quality of water pumped and maintain a sustainable aquifer. The proposed Wailuku Well along with the three (3) other replacement wells are not anticipated to cumulatively have a negative impact on the physical environment. Refer to **Appendix "C"**.

The project, as a replacement water source, is not anticipated to have a significant adverse impact on the physical environment and is not anticipated to result in significant adverse secondary impacts.

III. RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

III. RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

A. STATE LAND USE DISTRICTS

Pursuant to Chapter 205, Hawaii Revised Statutes (HRS), all lands in the State have been placed into one (1) of four (4) land use districts by the State Land Use Commission. These land use districts have been designated "Urban", "Rural", "Agricultural", and "Conservation". The Wailuku Well pump station site (Parcel 100) is classified "Urban" and wells are a permitted use within the "Urban" district. See **Figure 9**. Parcel 091, which the transmission line will cross, and a portion of Parcel 021, which houses the existing Iao Well and Iao Tank Storage Facility, are located within the "Urban" district and permitted in the "Urban" district. The remainder of Parcel 021 is classified as "Agricultural" by the State Land Use Commission.

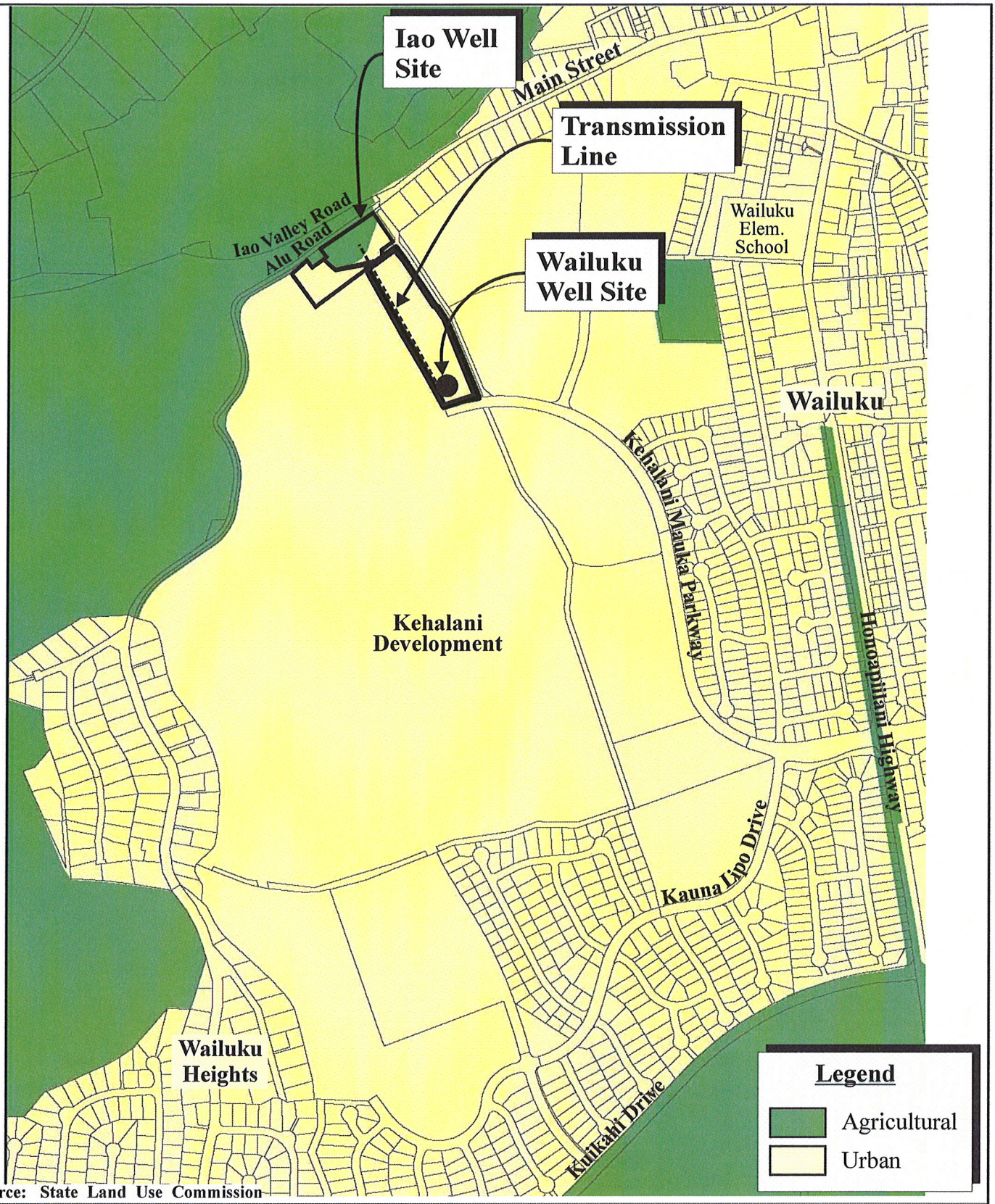
B. CHAPTER 226, HRS, HAWAII STATE PLAN

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 goals of the Hawaii State Plan:

- A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations.

1. Objectives and Policies of the Hawaii State Plan

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



Source: State Land Use Commission

Figure 9

Proposed Wailuku Well Production Facility

State Land Use District Map

Approx. 0 0.1 Mile
0.05 0.2

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

226-11(b)(1), HRS: Exercise an overall conservation ethic in 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)(8), HRS: Pursue compatible relationships among activities, facilities, and natural resources.

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

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

226-13(b)(3), HRS: Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.

Chapter 226-14, HRS, Objectives and Policies for the 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.

Chapter 226-16, HRS, Objectives and Policies for the Facility Systems - Water.

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.

2. Priority Guidelines of the Hawaii State Plan

The proposed project coincides with the following priority guideline of the Hawaii State Plan.

Chapter 226-103, HRS, Economic Priority Guidelines:

226-103(e)(4), HRS: Explore alternative funding sources and approaches to support future water development programs and water system improvements.

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.*

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, while the Maui Island Plan, which delineates areas for future urban and rural growth as part of a Directed Growth Strategy, was adopted as Ordinance No. 4004 on December 28, 2012.

The following sections identify pertinent objectives, policies, implementing actions and related provisions set forth in the Countywide Policy Plan and the Maui Island Plan. It is recognized that both documents are comprehensive in nature and address a number of functional planning areas which apply to all programs, plans, and projects. However, for purposes of addressing General Plan compliance requirements, policy considerations which

are deemed most relevant in terms of compatibility and consistency are addressed in this report section.

1. Countywide Policy Plan

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 Wailuku Well production facility, the following goals, objectives, policies and implementing actions are illustrative of the compliance with the Countywide Policy Plan.

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.

Policy:

- Ensure that adequate supplies of water are available prior to approval of subdivision or construction documents.
- Develop and fund improved water-delivery systems.
- 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.
- Seek reliable long-term sources of water to serve developments that achieve consistency with the appropriate Community Plans.

Objective:

Improve the planning and management of infrastructure systems.

Policies:

- Provide a reliable and sufficient level of funding to enhance and maintain infrastructure system.
- Maintain inventories of infrastructure capacity, and project future infrastructure needs.
- Ensure that infrastructure is built concurrent with or prior to development.

2. Maui Island Plan

The MIP is applicable to the island of Maui only, providing more specific policy-based strategies for population, land use, transportation, public and community facilities, water and sewage systems, visitor destinations, urban design, and other matters related to future growth.

As provided by Chapter 2.80B, the MIP shall include the following components:

1. *An island-wide land use strategy, including a managed and directed growth plan*

2. *A water element assessing supply, demand and quality parameters*

3. *A nearshore ecosystem element assessing nearshore waters and requirements for preservation and restoration*

4. *An implementation program which addresses the County's 20-year capital improvement requirements, financial program for implementation, and action implementation schedule*

5. *Milestone indicators designed to measure implementation progress of the MIP*

It is noted that the Ordinance No. 4004 does not address the component relating to the implementation program. Chapter 2.80B of the Maui County Code, relating to the General Plan, was amended by Ordinance No. 3979, effective October 5, 2012, to provide that the implementation program component be adopted no later than one (1) year following the effective date of Ordinance No. 4004. As such, the implementation program component of the MIP will require adoption prior to December 28, 2013.

The MIP addresses a number of planning categories with detailed policy analysis and recommendations which are framed in terms of goals, objectives, policies and implementing actions. These planning categories address the following areas:

1. *Population*

2. *Heritage Resources*

3. *Natural Hazards*

4. *Economic Development*

5. *Housing*

6. *Infrastructure and Public Facilities*

7. *Land Use*

Additionally, an essential element of the MIP is its directed growth plan which provides a management framework for future growth in a manner that is fiscally, environmentally, and culturally prudent. Among the directed growth management

tools developed through the MIP process are maps delineating urban growth boundaries (UGB), small town boundaries (STB) and rural growth boundaries (RGB). The respective boundaries identify areas appropriate for future growth and their corresponding intent with respect to development character.

The proposed Wailuku Well production facility is located within the UGB. In this regard, it is consistent with the directed growth strategy defined via growth maps adopted in the MIP.

In addition, the proposed Wailuku Well production facility has been reviewed with respect to pertinent goals, objectives, policies and implementing actions of the MIP. A summary of these policy statements are provided below:

INFRASTRUCTURE AND PUBLIC FACILITIES - WATER

Goal: **6.3** Maui will have an environmentally sustainable, reliable, safe, and efficient water system.

Objective: **6.3.1** More comprehensive approach to water resources planning to effectively protect, recharge, and manage water resources including watersheds, groundwater, streams, and aquifers.

Policies: **6.3.1.a** Ensure that DWS actions reflect its public trust responsibilities toward water.

6.3.1.e Where desirable, retain and expand public ownership and management of watersheds and fresh-water systems.

Objective: **6.3.2** Increase the efficiency and capacity of the water systems in striving to meet the needs and balance the island's water needs.

Policies: **6.3.2.a** Ensure the efficiency of all water system elements including well and stream intakes, water catchment, transmission lines, reservoirs, and all other system infrastructure.

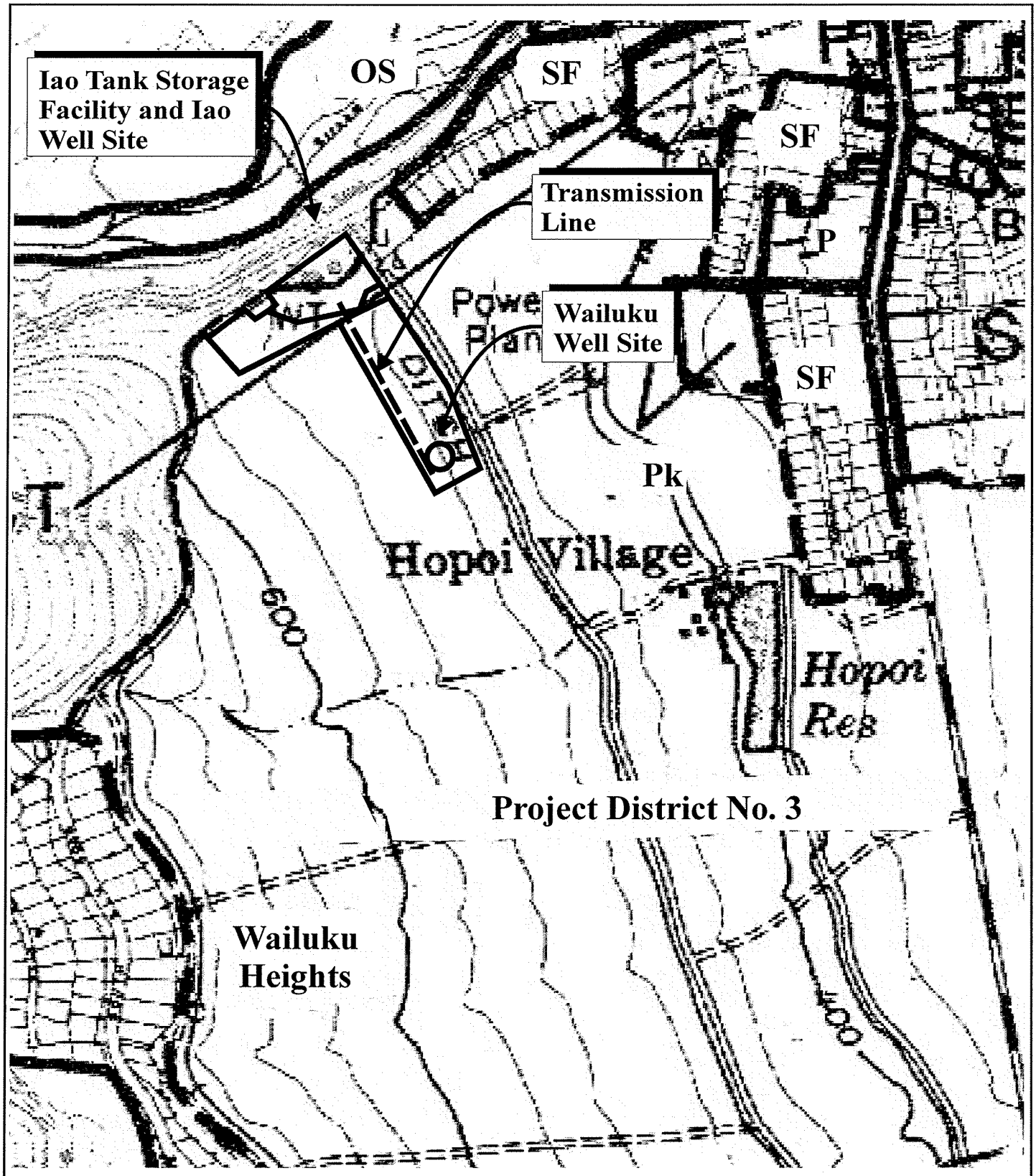
In summary, the proposed Wailuku Well production facility project is consistent with the above-noted themes and principles of the Countywide Policy Plan and the Maui Island Plan.

D. WAILUKU-KAHULUI COMMUNITY PLAN

The project site is located within the Wailuku-Kahului Community Plan region, one (1) of nine (9) community plan regions established in the County of Maui. Planning for each region is guided by the respective community plan, which is designed to implement the Maui County General Plan. Each community plan contains recommendations and standards which guide the sequencing, patterns and characteristics of future development in the region.

The Wailuku-Kahului Community Plan was adopted by the County of Maui and took effect in 2002. Land use guidelines are set forth by the Wailuku-Kahului Community Plan Land Use Map. The pump station site and transmission line corridor are designated "Project District 3" by the Wailuku-Kahului Community Plan Map. See **Figure 10**. The guidelines for Project District 3 calls for:

> *...units of all types, including single family detached, attached and various forms of multi-family units including townhouses and garden apartments. Alternatives to promote affordable housing such as experimental and demonstration housing shall be considered in the residential development.*
>
> *A neighborhood commercial center of at least 20 acres should be provided with convenient access for residences of the project district and adjacent residential areas. Public amenities should include a continuous system of parks and open space areas which would include pedestrian ways and green-belts with buffer zones along the highway.*
>
> *Public use areas should be reserved within the Project District to accommodate a school, park use and any other public facilities that may be required should the need arise in the future.*
>
> *The immediate construction of the Waiale Road extension, from Honoapiilani Highway to its intersection with the Mahalani Road extension, will facilitate access between Kahului and Wailuku.*
>
> *Recommended guidelines for spatial allocations within the project district are:*



Source: County of Maui, Planning Department

Figure 10 Proposed Wailuku Well Production Facility

Wailuku-Kahului Community Plan Map

NOT TO SCALE

Prepared for: County of Maui, Department of Water Supply

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School (elementary)	*10 acres*
Park	*20 acres*
Community center	*5 acres*
Open space, and drainage	*94 acres*
Neighborhood commercial center	*20 acres*
Residential use	*396 acres*
Residential units based on an average density of 5.1 units per acre	*2,000 units*

The Iao Tank Storage Facility and Iao Well are located within lands designated as "Agriculture" by the Wailuku-Kahului Community Plan.

The proposed project is an allowed use within the Wailuku-Kahului Community Plan. In addition, the proposed action is consistent with the following goals, objectives, and policies of the Wailuku-Kahului Community Plan.

GOVERNMENT

Goal:

Government that demonstrates the highest standards of fairness; responsiveness to the needs of the community; fiscal integrity; effectiveness in planning and implementation of programs and projects; a fair and equitable approach to taxation and regulation; and efficient, results-oriented management.

Objectives and Policies:

- Ensure that adequate infrastructure is or will be available to accommodate planned development.

INFRASTRUCTURE

Goal:

Timely and environmentally sound planning, development and maintenance of infrastructure systems which serve to protect and preserve the safety and health of the region's residents, commuters and visitors through the provision of clean water,

effective waste disposal and drainage systems, and efficient transportation systems which meet the needs of the community.

Objectives and Policies:

- Coordinate water system improvement plans with growth areas to ensure adequate supply and a program to replace deteriorating portions of the distribution system. Future growth should be phased to be in concert with the service capacity of the water system.

- Improve the quality of domestic water.

- Protect water resources in the region from contamination, including protecting ground water recharge areas, and wellhead protection areas within a 1.25-mile radius from the wells.

- Coordinate the construction of all water and public roadway and utility improvements to minimize construction impacts and inconveniences to the public.

E. COUNTY ZONING

The Wailuku Well pump station site (Parcel 100) and Parcel 091, which the transmission line will cross, are located within the "Wailuku-Kahului Project District 3 (Wailuku)", according to Maui County zoning. The purpose of this project district is to "*provide for a flexible and creative approach to development which considers physical, environmental, social, and economic factors in a comprehensive manner*". And, the intent of this project district is to "*establish a residential community along with an integrated open space and recreation system, future school sites, and community shopping facilities to serve the expanding Wailuku-Kahului population*". The pump station site is located in the Residential Subdistrict within the Project District (PD-WK/3). The portion of the transmission line crossing over Parcel 091 is also within the Residential Subdistrict. The pump station site and transmission line are permitted uses within the Residential Subdistrict. A Project District Phase III application has already been submitted and approved by the County of Maui Planning Department on December 1, 2011 for the proposed project (PH3 2011/0003).

The Iao Well facility, Parcel 021, is zoned "Agricultural" by Maui County Zoning. Minor utility facilities, which include "water wells, tanks, and distribution equipment", are permitted uses within the Agricultural district.

F. COASTAL ZONE MANAGEMENT OBJECTIVES AND POLICIES

Pursuant to Chapter 205-A, Hawaii Revised Statutes, projects should be evaluated with respect to Coastal Zone Management (CZM) objectives, policies and guidelines. The project site is approximately 2.5 miles away from the coastline and will not involve work within the County of Maui's Special Management Area (SMA). However, the applicability of coastal zone management considerations has been reviewed and assessed.

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 use 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, county planning commissions; and crediting such dedication against the requirements of Section 46-6, HRS.

Response: The project site is located inland, approximately 2.5 miles from the coastline. Based on the project actions, there are no anticipated impacts on coastal recreational opportunities or existing public access to the shoreline.

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: A Cultural Impact Assessment (CIA) was prepared for the project site. As discussed previously, the CIA did not identify any cultural activities within the project area and concluded that the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by the proposed project. Refer to **Appendix "H"**.

An Archaeological Field Inspection of the project site also did not identify any

historic surface features or architecture. As such, the proposed production well is not anticipated to have an adverse impact on significant historic properties. Refer to **Appendix "G"**.

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 which are not coastal dependent to locate in inland areas.

Response: The project site does not lie within a coastal scenic view corridor nor along the shoreline. The infrastructure development at the Wailuku Well production facility will primarily entail low-profile improvements. These improvements consist of a 30-foot high antenna pole, and the control building measuring approximately 14 feet in height. The control building sits at an elevation below the upland residential area and Alu Road. For these reasons, no adverse impacts on scenic or open space resources are anticipated.

4. **Coastal Ecosystems**

Objective:

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

Policies:

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

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

(C) 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

(D) Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

Response: The proposed project is located inland, and approximately 2.5 miles from the coastline. Based on the location of the project and its scope, there are no anticipated adverse impacts on coastal ecosystems.

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 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 generate short-term construction-related employment and spending which will benefit the local economy. The proposed action does not contradict the objectives and policies for economic uses. Furthermore, the proposed project is part of the County's efforts to maintain and improve potable water service to businesses and residents in the area.

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;

(D) Prevent coastal flooding from inland projects; and

(E) Develop a coastal point and nonpoint source pollution control program.

Response: The project site falls within Zone X, an area of minimal flooding, as indicated by the Flood Insurance Rate Map for the County of Maui. Refer to **Figure 8** and **Exhibit "D"**. Best Management Practices (BMPs) will be implemented during the construction phase to mitigate potential erosion and stormwater impacts. BMPs include the dust control by water wagons and use of temporary berms and cut-off ditches. Upon completion of construction, a permanent drainage system will be installed that includes drain inlets, pipes, and sump for managing stormwater runoff.

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: The HRS Chapter 343 EA involves review by governmental agencies and provide for public involvement opportunities to comment on the project. Applicable State and County requirements will be adhered to in the design and construction of the project. Further, opportunities for review of the proposed action are offered through the regulatory review process for construction and development permits.

8. Public Participation

Objective:

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

Policies:

(A) Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;

(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-related issues, developments, and government activities; and

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

Response: The project will meet County public awareness, education and participation objectives. Opportunities for agency and public review will be provided as part of the notification review and comment process required for the EA.

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 and to 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 inland, approximately 2.5 miles from the shoreline. There are no anticipated adverse impacts on beach resources.

10. Marine Resources

Objective:

Implement the State's ocean resources management plan.

Policies:

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

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

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

(D) 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;

(E) 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

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

Response: As previously stated, the project site is located inland, 2.5 miles away from the ocean and is therefore, not anticipated to have any adverse impact on marine or coastal resources.

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

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 is not located on or near the shoreline. Nevertheless, project lighting will be shielded to direct light downward.

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 and assessment of the environmental cross-cutters as well as the documentation received for the proposed Wailuku Well production facility project.

Table 2. 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)	An Archaeological Field Inspection was prepared in August 2012. The Draft EA will be provided to SHPD for review and comment. The Archaeological Field Inspection will be provided to SHPD for approval.	Refer to Archaeological Field Inspection in **Appendix "G"**.
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-10) of EA document 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)	A biological survey for the proposed project found no federally listed endangered or threatened species of flora or fauna and did not identify any critical habitats. The USFWS was consulted during the early consultation process for the Draft EA. No comments were received. The Draft EA will be provided to the USFWS for review and comment.	Refer to **Appendix "F"** for the biological survey.
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 project. The Draft EA will be provided to 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)	Not applicable. The project site does not contain any wetlands. The U.S. Army Corps of Engineers was consulted during the early consultation process for the Draft EA. The Draft EA will be provided to the U.S. Army Corps of Engineers for review and comment.	Not applicable.
Farmland Protection Policy Act	Obtain review if project area contains prime farmland	Natural Resources Conservation Service (NRCS)	The pump station site is designated as "Prime" agricultural lands by the Agricultural Lands of Importance to the State of Hawaii (ALISH) map. The pump station site and surrounding areas were cultivated with sugar cane from the mid-1800s to the 1990s. However, this area is currently vacant and undeveloped. It is designated "Urban" by the State Land Use Commission and is part of the Kehalani master planned community.	Refer to Chapter II (Section A-3) of this EA document for a discussion of agricultural resources.
Fish and Wildlife Coordination Act	Obtain review for all projects	USFWS	No comments from USFWS were received in the early consultation process during the preparation of the Draft EA. Nonetheless, the Draft EA will be provided to USFWS for review and comment.	Refer to **Appendix "F"**.
National Historic Preservation Act	Obtain review for all projects	SHPD	An Archaeological Field Inspection was prepared in August 2012. The Draft EA will be provided to SHPD for review and comment. The Archaeological Field Inspection will be provided to SHPD for approval.	Refer to the Archaeological Field Inspection in **Appendix "G"**.

Environmental Authority	Procedure	Responsible Agency	Response	Project Documentation
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-6 and Section D-2) of this EA document for a discussion of water quality.
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	The project site is located approximately 2.5 miles inland of the nearest coastline. The proposed project will not affect essential fish habitats.	Not applicable.

IV. UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

IV. UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

In the short term, the proposed Wailuku Well production facility project will result in unavoidable construction-related impacts, including noise impacts generated by construction equipment and activities. In addition, there may be temporary air quality impacts associated with dust generated from site work and exhaust emissions from construction equipment and vehicles. These noise and air quality impacts will be temporary in nature, occurring only during the 240-day construction and testing period, and will be mitigated to the extent practicable through implementation of Best Management Practices (BMPs).

The proposed project commits a small area of land, about 12,000 square feet, for the construction of the Wailuku Well pump station. Other resources which will be committed in the implementation of the proposed action include material and fuel resources. The project will result in short-term beneficial impacts related to temporary construction employment and spending. In the long term, the proposed action ensures sustainability of the Iao Aquifer.

V. ALTERNATIVES TO THE PROPOSED ACTION

V. ALTERNATIVES TO THE PROPOSED ACTION

Alternatives to the preferred alternative, which is the proposed action, include the "no action", "restoration of Shaft 33 alternative," and "alternative site location". These alternatives are addressed below.

A. NO ACTION ALTERNATIVE

The spacing of existing wells within the Iao Aquifer System and their depths may be detrimental to the sustainability of the aquifer. There is a concentration of wells on the north side of Iao Stream, with these sources withdrawing approximately 70 percent of the groundwater from the aquifer. Pumping on the south side of Iao Stream is concentrated at Shaft 33. According to a recent study, *Ground-Water Availability in the Wailuku Area, Maui, Hawaii,* prepared by Stephen B. Gingerich, redistributing withdrawal from the Iao Aquifer would be beneficial (refer to **Appendix "C"**). The proposed Wailuku Well production facility is one (1) of four (4) wells that would replace Shaft 33 and de-concentrate pumping.

A no action alternative would involve DWS's abandonment of the existing Wailuku Exploratory Well and the loss of a proven water source for the Central Maui Water System. This alternative would result in the underutilization of previously expended County funds that have already been invested in developing and testing of the Wailuku Exploratory Well. In addition, the no action alternative would not disperse the pumping from a single location at Shaft 33 and could result in water quality degradation of the Iao Aquifer.

B. RESTORATION OF SHAFT 33 ALTERNATIVE

The DWS has pumped groundwater from Shaft 33 for a number of years. However, the County's use of Shaft 33 was intended to be an interim measure until development of other new wells were completed. Shaft 33 was built in 1946 and is in need of repair and maintenance. Because of its design, the well is difficult to access for repairs and maintenance. Further, Shaft 33 is not owned by the County DWS, but privately owned.

To incorporate Shaft 33 as a permanent water source, DWS would need to obtain ownership of the land. In addition, restoration of the system to acceptable DWS standards would require reconfiguration of the entire system due to the existing design of Shaft 33. As a result of these factors, the use of Shaft 33 as a permanent DWS water source is not a practical alternative based on cost and time to implement and meeting DWS objectives of dispersing pumping throughout the Aquifer.

C. ALTERNATIVE SITE LOCATION ALTERNATIVE

The Preferred Alternative (the proposed action) supports DWS's efforts to disperse pumping throughout the Iao Aquifer System to prevent water quality degradation associated with concentrated pumping. The location of the Wailuku Well was selected based on a consideration of numerous factors, including site topography, proximity to existing DWS facilities such as the Iao Well, and the relationship to other wells within the Iao Aquifer System. The exploratory pump testing at the Wailuku Exploratory Well indicated that the well is capable of producing 1,400 gallons per minute (gpm) with low drawdown, and the well will be an excellent, dependable source of potable water. Laboratory testing was completed and verified that the water meets drinking water standards. Given the foregoing factors, an alternate site location is not desirable.

VI. SIGNIFICANCE CRITERIA ASSESSMENT

VI. SIGNIFICANCE CRITERIA ASSESSMENT

The proposed project involves the conversion of the Wailuku Exploratory Well to a production well. The Wailuku Well is one (1) of four (4) proposed wells to replace the existing Shaft 33.

Since the proposed action will involve the use of State and County funds, compliance with Chapter 343, Hawaii Revised Statutes (HRS), and Chapter 200 (Title 11), Hawaii Administrative Rules, Environmental Impact Statement Rules is necessary. Every aspect of the proposed action, expected primary and secondary consequences, and the cumulative as well as the short-term and long-term effects of the action have been evaluated in accordance with the Significance Criteria of Section 11-200-12 of the Administrative Rules. Discussion of project conformance to the Significance Criteria is as follows:

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

   The historic agricultural practices at the project site and in the surrounding areas have resulted in an environment that is nearly totally lacking in native plants and animal species. There are no endangered or threatened flora or fauna on the site, nor are there any archaeological, historic or cultural resources that may be affected by the proposed project. No impacts to streams or wetlands are anticipated to result from the proposed action.

   As discussed previously, a Cultural Impact Assessment (CIA) prepared for the project did not identify any on-going cultural activities within the project area and concluded that the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by the proposed project. Refer to **Appendix "H"**.

   The Archaeological Field Inspection did not identify surface cultural or historic features or architecture. The proposed production well is not anticipated to have an adverse impact on any historic properties. Refer to **Appendix "G"**.

   In regards to the Iao Aquifer, the proposed project will replace Shaft 33, thereby dispersing pumping within the Iao Aquifer and protecting the potable water source.

This dispersement of well locations will prevent degradation of water quality due to concentrated pumping at Shaft 33.

Based on the discussion provided above, the proposed project is not anticipated to involve an irrevocable commitment to loss or destruction of any natural or cultural resource.

2. **Curtails the range of beneficial uses of the environment.**

There are no adverse impacts to climate, topography, or soils anticipated to result from the proposed project. There are also no known rare, threatened, or endangered species of flora, fauna, or avifauna nor critical habitat located within the project site.

The proposed Wailuku Well production facility involves lands designated for urban uses. While the project site was historically used for sugar cane cultivation, active cultivation ended in the 1990s. The project commits a small area of land amounting to about 12,000 square feet that has already been developed for the Wailuku Exploratory Well. Based on the foregoing facts, the proposed project protects the Iao Aquifer and will not curtail the beneficial use of the site.

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 does not conflict with the State's Environmental Policy and Guidelines as set forth in Chapter 344, Hawaii Revised Statutes (HRS).

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

The proposed project will directly benefit the local economy by providing construction and construction-related employment. Therefore, the proposed project will have a positive short-term effect on economic and social welfare. From a long-term perspective, the Wailuku Well production facility will improve the Central Maui Water System by dispersing pumping within the Iao Aquifer. The CIA did not identify any ongoing cultural practices occurring within the project site. Adverse impacts to cultural practices are not anticipated.

5. **Substantially affects public health.**

During the 240-calendar day construction and testing period, appropriate best management practices will be implemented to mitigate potential air quality and noise impacts. Refer to **Exhibit "D"**. Following construction, long-term adverse public health impacts resulting from the proposed project are not anticipated. The proposed Wailuku Well production facility will spread out the pumping within the Iao Aquifer to prevent a degradation of water quality due to concentrated pumping at a few locations.

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

The proposed project is not anticipated to result in significant adverse secondary impacts. No significant population changes are anticipated as a result of the proposed project as the Wailuku Well production facility is a replacement water source for Shaft 33. There are no anticipated adverse effects on public services, such as police, fire, medical, educational, or solid waste collection, as service limits and service capacities will not be affected. The proposed project is anticipated to benefit long-term water quality of the Iao Aquifer by dispersing pump locations.

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

Construction activities will create temporary short-term nuisances related to noise and dust. Appropriate dust control and noise mitigation measures will be implemented by the contractor to ensure that fugitive dust and noise generated in connection with construction is minimized. Refer to **Exhibit "D"**.

As previously discussed in Chapter II of this EA document, adverse impacts to natural resources, cultural resources, and the natural environment are not anticipated. The proposed project is anticipated to be beneficial in protecting and sustaining the Iao Aquifer.

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

The proposed project is one (1) of four (4) water wells planned to replace the existing Shaft 33. Creating distance between pumping operations throughout the Iao Aquifer System will positively impact the quality of water pumped and the sustainability of

the aquifer. The proposed Wailuku Well production facility, along with the three (3) other replacement wells are anticipated to cumulatively have a positive impact on the physical environment.

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

Rare, threatened or endangered species of flora, fauna, avifauna or their habitats are not expected to be affected by the proposed project, due to the fact that there are no rare, threatened, or endangered species or their habitats found on or in the vicinity of the project site.

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

Construction activities will result in short-term air quality and noise impacts. Best Management Practices (BMPs) for dust control measures, such as regular watering will be implemented to minimize construction-related air quality impacts. Short-term noise impacts will occur primarily from construction equipment. Equipment mufflers or other noise attenuating equipment, as well as proper equipment and vehicle maintenance and other BMPs are anticipated to mitigate noise from construction activities. Erosion control measures, including the installation of berms and cut off swales will reduce the amount of silt and stormwater runoff flowing into downstream properties. Refer to **Exhibit "D"**.

The proposed project includes the installation of a submersible motor at the bottom of the well, however, no long-term noise impacts are anticipated as a result of project implementation.

Based on the discussion provided above, the proposed project is not anticipated to detrimentally affect air or water quality or ambient noise levels.

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 proposed project is not located within any environmentally sensitive areas and, as such, there are no anticipated adverse effects as a result of the proposed project.

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

The proposed project is not anticipated to adversely affect scenic view corridors. The infrastructure development at the Wailuku Well production facility will primarily entail low-profile improvements. Construction of new components includes the control building, which will measure approximately 14 feet in height, and a 30-foot high antenna pole. The control building and antenna sit at an elevation below the upland residential area and Alu Road.

13. **Requires substantial energy consumption.**

The deep well submersible pump that will be installed to pump water from the well as well as other components of the pump station site improvements will require electrical energy to operate. The construction of electrical distribution circuits is included as a component of the proposed project to connect the pump station site with electrical utility lines. However, the proposed project is not anticipated to represent a substantial level of energy consumption. The proposed project will utilize a more efficient pump than that which is currently utilized at Shaft 33, and as such, the proposed project will not result in an increase in electrical energy use or long-term emissions.

Based on the aforementioned findings, a Findings of No Significant Impact (FONSI) is anticipated for the proposed Wailuku Production Well project.

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. Hawaii Administrative Rules, Chapter 343 Compliance

2. CWRM Pump Installation Permit

County of Maui

1. Construction Permits (i.e., grading permit), as applicable

2. Project District Phase III Approval, as applicable

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

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The following agencies were consulted during preparation of the Draft Environmental Assessment (EA). Agency comments and responses to substantive comments are presented herein.

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One Main Plaza
2200 Main Street, Suite 100
Wailuku, Hawaii 96793

32. Jo Anne Johnson Winer, Director
County of Maui
Department of Transportation
200 South High Street
Wailuku, Hawaii 96793

33. Councilmember Mike Victorino
Maui County Council
200 South High Street
Wailuku, Hawaii 96793

34. Dan Takahata
Manager – Engineering
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawaii 96733

35. **Hawaiian Telcom**
60 South Church Street
Wailuku, Hawaii 96793

36. Jacob W. Verkerke, Chair
Glenn M. Adolpho, Development Monitoring Committee Chair
Waikapu Community Association
P.O. Box 3046
Wailuku, Hawaii 96793

37. **Waikapu Gardens Homeowners Association**
67 East Waiko Road
Wailuku, Hawaii 96793

38. **Wailuku Community Association**
40 Hoauna Street
Wailuku, Hawaii 96793

39. Jocelyn Perreira, Executive Director
Wailuku Main Street Association
P.O. Box 1130
Wailuku, Hawaii 96793

40. Joseph G. Blackburn II
Waiolani Community Association
P.O. Box 1067
Wailuku, Hawaii 96793

41. Rick Papa, President
Attention: Tiana Raymondo
Kehalani Association
P.O. Box 1530
Wailuku, Hawaii 96793

JAN 1 0 2013

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

REPLY TO
ATTENTION OF:

January 3, 2013

Regulatory Branch

File No. POH-2012-00222

Munekiyo & Hiraga, Inc.
Attention: Ms. Tessa Munekiyo Ng
305 High Street, Suite 104
Wailuku, HI 96793

NO PERMIT REQUIRED

Dear Ms. Ng:

We have received your August 31, 2012 letter requesting Department of the Army (DA) review comments for the proposed Wailuku well production facility and associated improvements located at portions of TMKs 235001021, 235001091 and 235001100 in Wailuku, Maui Isle, Hawaii. We have reviewed your proposal pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404). We have determined that a DA permit is not required for your proposed work as described in your letter and drawings.

Section 10 requires that a DA permit be obtained for certain structures or work in or affecting navigable waters of the United States (U.S.), prior to conducting the work (33 U.S.C. 403). Although the Pacific Ocean is considered a navigable water, we have determined that a Section 10 permit is not required for your proposed work because the work will occur *mauka* of the High Tide Line of the ocean and apart from tidally influenced water resources. Section 404 requires that a DA permit be obtained for the discharge of dredged and/or fill material into waters of the U.S., including wetlands and navigable waters of the U.S, prior to conducting the work (33 U.S.C. 1344). A Section 404 permit is not required for your proposed work because it appears the work will not result in the discharge of dredge and/or fill material in waters of the U.S., including wetlands and the on-site Waihee Ditch. Although a permit is not required, we recommend use of Best Management Practices to ensure discharges do not inadvertently occur or to prevent construction debris from entering any aquatic resource.

Thank you for giving us the opportunity to review this proposal and for your cooperation with our regulatory program. Please be advised you can 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.

Should you have any questions, please contact Ms. Joy Anamizu at (808) 835-4308, by facsimile at (808) 835-4126, or by Email at Joy.N.Anamizu@usacae.army.mil . Please refer to File No. **POH-2012-00222** in all future communications with this office regarding this or other projects at this location.

Sincerely,

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

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 3, 2013

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

SUBJECT: Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii

Dear Mr. Young:

Thank you for your letter, dated January 3, 2013, providing early consultation comments on the subject project (File No. POH-2012-00222). On behalf of the applicant, County of Maui, Department of Water Supply (DWS), we offer the following information in response to the comments provided.

1. We acknowledge that a Department of Army (DA) Permit is not required for the proposed project pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act.

2. Best Management Practices will be implemented during the construction of the project to prevent debris from entering aquatic resources.

MAUI
305 High St., Suite 104 Wailuku, Hawaii 96793
PH: (808)244-2015 FAX: (808)244-8729
OAHU
735 Bishop St., Suite 238 Honolulu, Hawaii 96813 | PH: (808)983-1233
WWW.MHPLANNING.COM

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft EA for the proposed project. Should you have any questions, please feel free to contact me at (808) 244-2015.

Very truly yours,

Leilani Pulmano
Program Manager

LP:tn
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
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SEP 11 2012

NEIL ABERCROMBIE
GOVERNOR

Dean H. Seki
Comptroller

Maria E. Zielinski
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

SEP 10 2012

(P)1202.2

Ms. Tessa Munekiyo Ng, AICP
Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Ng:

Subject: Proposed Wailuku Well Production Facility and Associated Improvements
TMK: (2) 3-5-001:021 (por) 091, (por) and 100 (por)
Wailuku, Maui, Hawaii

Thank you for the opportunity to provide comments for the subject project. The project does not impact any of the Department of Accounting and General Services' existing facilities in this area and we have no comments to offer at this time.

If you have any questions, please call me at 586-0400 or have your staff call Mr. Alva Nakamura of the Public Works Division at 586-0488.

Sincerely,

DEAN H. SEKI
Comptroller

c: Mr. David Victor, DAGS-Maui
Mr. Tom Ochwat, P.E., County of Maui, Department of Water Supply
Mr. Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 5, 2013

Dean Seki, Comptroller
Department of Accounting and General Services
State of Hawaii
P.O. Box 119
Honolulu, Hawaii 96810-0119

SUBJECT: Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii

Dear Mr. Seki:

Thank you for your letter, dated September 10, 2012, providing early consultation comments on the subject project. The County of Maui, Department of Water Supply (DWS) understands that the proposed project does not impact any of the Department of Accounting and General Services' existing facilities in the area.

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft Environmental Assessment for the proposed project.

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

Sincerely,

LP

Leilani Pulmano
Program Manager

LP:tn
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
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SEP 12 2012

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

LORRIN W. PANG, M.D., M.P.H.
DISTRICT HEALTH OFFICER

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, HAWAII 96793

September 11, 2012

Ms. Tessa Munekiyo Ng, AICP
Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Ng:

Subject: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements, Wailuku, Maui, Hawaii
TMK: (2) 3-5-001:021 (por.), 091 (por.), and 100 (por.)

Thank you for the opportunity to review this project. We have the following comments to offer:

1. National Pollutant Discharge Elimination System (NPDES) permit coverage maybe required for this project. The Clean Water Branch should be contacted at 808 586-4309.

2. The noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules (HAR), Chapter 11-46, "Community Noise Control." A noise permit may be required and should be obtained before the commencement of work. The Indoor & Radiological Health Branch should be contacted at 808 586-4700.

3. The proposed well project will have an impact within the 1000 foot radius of the existing dwellings served by the cesspool and septic tank system. Dwellings might have to upgrade to aerobic units if they apply for building permit modifications. If you have any questions, please call Roland Tejano, Environmental Engineer, at 808 984-8232.

It is strongly recommended that the Standard Comments found at the Department's website: http://hawaii.gov/health/environmental/env-planning/landuse/landuse.html be reviewed, and any comments specifically applicable to this project should be adhered to.

Should you have any questions, please call me at 808 984-8230 or E-mail me at patricia.kitkowski@doh.hawaii.gov.

Sincerely,

Patti Kitkowski

Patti Kitkowski
District Environmental Health Program Chief

c EPO

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MIGH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 3, 2013

Patti Kitkowski
Department of Health
Maui District Health Office
State of Hawaii
54 High Street
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii

Dear Ms. Kitkowski:

Thank you for your letter, dated September 11, 2012, providing early consultation comments on the subject project. On behalf of the applicant, County of Maui, Department of Water Supply (DWS), we offer the following information in response to the comments provided.

1. A National Pollutant Discharge Elimination (NPDES) permit is not anticipated to be required for the proposed project as the proposed construction area will be less than one (1) acre. Nonetheless, coordination will be carried out with the Department of Health Clean Water Branch prior to project implementation to assess the applicability and requirements of the permit.
2. We understand that the project is subject to Chapter 11-46, Hawaii Administrative Rules, "Community Noise Control". As applicable, requirements for a noise permit will be coordinated with the Indoor and Radiological Health Branch prior to commencement of work.
3. We acknowledge that existing dwellings within 1,000 feet of the project served by cesspool and septic tank systems may have to upgrade to aerobic units if they apply for building permit modifications. The closest existing dwelling served by a cesspool or septic tank system is approximately 2,200 feet from the well.
4. We have reviewed the standard comments on your department's website. We are enclosing a list of applicable comments as well as the applicant's response to each. See **Exhibit "A"**.

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WWW.MHPLANNING.COM

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft Environmental Assessment for the proposed project. Should you have any questions, please feel free to contact me at 244-2015.

Sincerely,

Leilani Pulmano
Program Manager

LP:tn
Enclosure
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
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EXHIBIT "A"

REVIEW OF STANDARD COMMENTS RELATING TO STATE ENVIRONMENTAL HEALTH PROGRAMS

Hazard Evaluation and Emergency Response Office

- *A Phase I Environmental Site Assessment (ESA) should be conducted for developments or redevelopments. If the investigation shows that a release of petroleum, hazardous substance, pollutants or contaminants occurred at the site, the site should be properly characterized through an approved Hawaii State Department of Health (DOH)/Hazard Evaluation and Emergency Response Office (HEER) soil and or groundwater sampling plan. If the site is found to be contaminated, then all removal and remedial actions to clean up hazardous substance or oil releases by past and present owners/tenants must comply with chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.*

Response:

In 2002, Clayton Group Services, Inc. conducted a Phase I Environmental Site Assessment (Phase I ESA) that included about 719 acres of land in Wailuku, Maui. The Phase I ESA area included the current Kehalani Development and the proposed Wailuku Well Production Facility site. Since the area was used for sugarcane production for at least 150 years, it was considered a "recognized environmental condition" (REC) because of evidence of historical application of agricultural chemicals. A baseline surface soil investigation was recommended to assess the presence or absence of agricultural chemicals.

In 2010, Bureau Veritas North America, Inc. (Bureau Veritas) conducted an environmental investigation of the Kehalani Development in Wailuku, Maui. The purpose of the investigation was to assess potential environmental impacts resulting from past agricultural use of the site. For reporting purposes, the area was divided into two sites: one for proposed residential use with an area of about 210.5 acres and the other for proposed non-residential use with an area of about 38.5 acres. The Wailuku Well Production Facility site, a portion of Lot P-2, is part of the non-residential site. Details are contained in the report, *Multi-Increment Sampling Investigation Report, 210.5 Acres of Proposed Residential Use and 38.5 Acres of Proposed Non-Residential Use, Kehalani Development, Wailuku, Maui, Hawaii*, dated February 1, 2011.

In February and March 2010, Bureau Veritas collected soil samples and sent the soil samples to a testing laboratory for analysis of arsenic, 22 organochlorine

pesticides, and dioxin. The following are the test results of the soil samples from Lot P-2:

- Arsenic – not detected
- Organochlorine Pesticides – not detected
- Dioxin – toxicity equivalent (TEQ) of 47.8 nanograms per kilogram (ng/kg)

The dioxin TEQ of 47.8 ng/kg is less than the 2010 State of Hawaii Department of Health (HDOH) Dioxin Soil Action Level of 240 ng/kg. The dioxin TEQ of 47.8 ng/kg also falls within Soil Category B (Minimally Impacted) with a TEQ range of 20 ng/kg to 240 ng/kg of the HDOH Dioxin Soil Management Category.

Based on these results, Bureau Veritas concluded that the surface soil, to a depth of 18 inches, in the non-residential site has not been significantly impacted by historical agricultural land uses and that the surface soil at the site is suitable for unrestricted land use. Additionally, Bureau Veritas recommended no further investigation of the non-residential site.

- *All lands formerly in the production of sugarcane should be characterized for arsenic contamination, If arsenic is detected above the US EPA Region (preliminary remediation goal (PRG) for non-cancer effects, then a removal and or remedial plan must be submitted to the Hazard Evaluation and Emergency Response (HEER) Office of the State Department of Health for approval. The plan must comply with Chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.*

Response:

As noted above, in February and March 2010, Bureau Veritas collected soil samples from Lot P-2, which includes the Wailuku Well Production Facility site. Arsenic was not detected in the soil samples.

Clean Air Branch

- *A significant potential for fugitive dust emissions exists during all phases of construction and operations. Proposed activities that occur in proximity to existing residences, businesses, public areas or thoroughfares, exacerbate potential dust problems. It is recommended that a dust control management plan be developed which identifies and addresses all activities that have a potential to generate fugitive dust. The plan, which does not require DOH approval, would help with recognizing and minimizing the dust problems from the proposed project.*

Activities must comply with the provisions of Hawaii Administrative Rules, § 11-60-1-33 on Fugitive Dust. In addition, for cases involving mixed land use, we strongly recommend that buffer zones be established, wherever possible, in order to alleviate potential nuisance problems.

The contractor should provide adequate measures to control the fugitive dust from the road areas and during the various phases of construction. Examples of measures that can be implemented to control dust include, but are not limited to, the following:

a) *Planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact;*
b) *Providing an adequate water source at the site prior to start-up of construction activities;*
c) *Landscaping and providing rapid covering of bare areas, including slopes, starting from the initial grading phase;*
d) *Minimizing dust from shoulders and access roads;*
e) *Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and*
f) *Controlling dust from debris being hauled away from the project site.*

Response:

Best Management Practices will be implemented to minimize the potential for dust-related impacts from the construction of the proposed project. Project-related activities will comply with applicable provisions of Section 11-60-1.33, HAR.

Clean Water Branch

- *Any project and its potential impacts to State waters must meet the State's: 1) Antidegradation policy, 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; 2) Designated uses, as determined by the classification of the receiving State waters; and 3) water quality criteria (Hawaii Administrative Rules (HAR), Chapter 11-54).*

Response:

The proposed project will comply with the State's antidegradation, designated uses, and water quality criteria.

- *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:

  The Army Corps of Engineers concluded that the construction of the Wailuku Well Production Facility did not require a Department of the Army permit.

- *National Pollutant Discharge Elimination System (NPDES) permits are required 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, NPDES general permit coverage may be applied for by submitting a Notice of Intent (NOI) form: 1) storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi); 2) storm water associated with construction activities, including excavation, grading, clearing, demolition, uprooting of vegetation, equipment staging, and storage areas that result in the disturbance of equal to or greater than one (1) acre of total land area*; 3) treated effluent from leaking underground storage tank remedial activities; 4) once through cooling water less than one (1) million gallons per day; 5) hydrotesting water; 6) dewatering effluent; 7) treated effluent from petroleum bulk stations and terminals; 8) treated effluent from well drilling activities; 9) treated effluent from recycled water distribution systems; 10) storm water and certain non-storm water from a small municipal separate storm sewer system; and 11) circulation water from decorative ponds or tanks.*
  **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.*

  Response:

  An NPDES permit is not anticipated to be required for the proposed project. The proposed construction area will be less than one (1) acre in size. Nonetheless, the applicant will discuss permit requirements for the proposed project with the Department of Health Clean Water Branch.

- *A separate NOI form for each type of discharge must be submitted 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.

Response:

The applicant acknowledges that a separate NOI form must be submitted for each type of discharge, if applicable, at least 30 calendar days prior to the start of discharge activity.

- *For types of wastewater discharges not listed above or wastewater discharging into Class 1 or Class AA waters, you may need to obtain an NPDES individual permit. Class 1 waters include, but is not limited to, all State waters in natural reserves, preserves, sanctuaries, and refuges established by the Department of Land and Natural Resources (DLNR) under Hawaii Revised Statutes (HRS), Chapter 195, or similar reserves for the protection of aquatic life established under HRS, Chapter 195.*

Response:

No discharges into Class 1 or Class AA waters are anticipated.

- *An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge or start of construction activities. 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.*

Response:

The applicant acknowledges that an NPDES individual permit application, if applicable, must be submitted at least 180 calendar days before the commencement of discharge or construction activities.

- *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:

The applicant acknowledges that a copy of the NOI or NPDES permit application, if applicable, must be submitted to the SHPD.

- *Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards.*

Response:

The applicant acknowledges that all discharges related to project construction and operation 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.*

Response:

The applicant acknowledges that compliance with water quality and permitting requirements are subject to Chapter 11-54 and 11-55, HAR.

Safe Drinking Water Branch

- *Federal and state regulations define a public water system as a system that serves 25 or more individuals at least 60 days per year or has at least 15 service connections. All public water system owners and operators are required to comply with Hawaii Administrative Rules, Title 11, Chapter 20, titled Rules Relating to Potable Water Systems.*

Response:

The Wailuku Well Production Facility will service the DWS Central Maui Water System. The DWS will comply with Hawaii Administrative Rules, Title 11, Chapter 20, "Rules Relating to Potable Water Systems".

- *All new public water systems are required to demonstrate and meet minimum capacity requirements prior to their establishment. This requirement involves demonstration that the system will have satisfactory technical, managerial and financial capacity to enable the system to comply with safe drinking water standards and requirements.*

Response:

The proposed project is a new facility in an existing public water system. The Wailuku Well Production Facility will serve the existing Central Maui Water System in accordance with safe drinking water requirements.

- *Projects that propose development of new sources of potable water serving or proposed to serve a public water system must comply with the terms of Section 11-20-29 of Chapter 20. This section requires that all new public water system sources be approved by the Director of Health prior to its use. Such approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements set in Section 11-20-29.*

Response:

The DWS understands that new public water system sources must be approved by the Director of Health prior to its use.

- *The engineering report must identify all potential sources of contamination and evaluate alternative control measures which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source. In addition, water quality analyses for all regulated contaminants, performed by a laboratory certified by the State Laboratories Division of the state of Hawaii, must be submitted as part of the report to demonstrate compliance with all drinking water standards. Additional parameters may be required by the Director for this submittal or additional tests required upon his or her review of the information submitted.*

Response:

The DWS acknowledges that potential sources of water contamination and associated mitigating measures must be identified. Water quality test results have been performed and will be submitted to the Safe Drinking Water Branch, Department of Health. Results reflect that the water quality meets drinking water standards.

- *All sources of public water systems must undergo a source water assessment which will delineate a source water protection area. This process is preliminary to the creation of a source water protection plan for that source and activities which will take place to protect the source of drinking water.*

Response:

A source water assessment is being prepared and will be submitted to the Safe Drinking Water Branch.

- *Projects proposing to develop new public water systems or proposing substantial modifications to existing public water systems must receive approval by the Director of Health prior to construction of the proposed system or modification. These projects include treatment, storage and distribution systems of public water systems. The approval authority for projects owned and operated by a County Board or Department of Water or Water Supply has been delegated to them.*

Response:

The DWS understands that modifications to an existing public water system must be approved by the Director of Health prior to its use.

- *All public water systems must be operated by certified distribution system and water treatment plant operators as defined by Hawaii Administrative Rules, Title 11, Chapter 11-25 titled; Rules Pertaining to Certification of Public Water System Operators.*

Response:

The proposed project will service the Central Maui Water System, operated by the DWS, which is certified distribution system and water treatment plant operator.

- *All projects which propose the use of dual water systems or the use of a non-potable water system in proximity to an existing potable water system to meet irrigation or other needs must be carefully designed and operated to prevent the cross-connection of these systems and prevent the possibility of backflow of water from the non-potable system to the potable system. The two systems must be clearly labeled and physically separated by air gaps or reduced pressure principle backflow prevention devices to avoid contaminating the potable water supply. In addition backflow devices must be tested periodically to assure their proper operation. Further, all non-potable spigots and irrigated areas should be clearly labeled with warning signs to prevent the inadvertent consumption on non-potable water. Compliance with Hawaii Administrative Rules, Title 11, Chapter 11-21 titled; Cross-Connection and Backflow Control is also required.*

Response:

The proposed project does not propose the use of dual water systems or the use of a non-potable water system in proximity to an existing water system.

- *All projects which propose the establishment of a potentially contaminating activity (as identified in the Hawai`i Source Water Assessment Plan) within the source water protection area of an existing source of water for a public water supply should address this potential and activities that will be implemented to prevent or reduce the potential for contamination of the drinking water source.*

Response:

The proposed project does not propose the establishment of a potentially contaminating activity within the source water protection area of an existing public water source.

Solid and Hazardous Waste Branch

- *The state regulations for hazardous waste are in Chapters 11-260 to 11- 280, Hawaii Administrative Rules (HAR). These rules apply to the identification, handling, transportation, storage and disposal of regulated hazardous waste. Generators, transporters and treatment, storage and disposal facilities of hazardous waste must adhere to these requirements or be subject to fines and penalties.*

Response:

The proposed project will comply with applicable requirements of HAR, Chapters 11-260 to 11-280.

- *Generators of solid waste are required to ensure that their wastes are properly delivered to permitted solid waste management facilities. Managers of construction and demolition projects should require their waste contractors to submit disposal receipts and invoices to ensure proper disposal of wastes.*

Response:

Construction waste for the project will be properly disposed of at an approved construction waste disposal facility. Following project construction, the proposed Wailuku Well Production Facility will generate minimal solid waste, if any.

- *HRS Chapter 342G encourages the reduction of waste generation, reuse of discarded materials, and the recycling of solid waste. Businesses, property*

managers and developers, and government entities are highly encouraged to develop solid waste management plans to ensure proper handling of wastes. Solid waste management plans should also seek to maximize waste diversion and minimize disposal. Such plans should include designated areas to promote the collection of reusable and recyclable materials.

Response:

The proposed Wailuku Well Production Facility will generate minimal solid waste, if any.

Noise, Radiation, and Indoor Air Quality Branch

- *Project activities shall comply with Chapter 11-39 (Air Conditioning and Ventilating), Chapter 11-45 (Radiation Control) and 11-46 (Community Noise Control) of the Administrative Rules of the Department of Health.*

Response:

The proposed project will comply with applicable requirements of HAR, Chapter 11-46, community noise control. HAR, Chapter 11-39 (Air Conditioning and Ventilating) and Chapter 11-45 (Radiation Control) do not apply to the proposed project.

SEP 24 2012

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:

12-159
Wailuku Well

September 17, 2012

Ms. Tessa Munekiyo Ng, Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Munekiyo:

SUBJECT: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements at TMK: (2) 3-5-001: 021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your letter, dated **August 31, 2012.** Thank you for allowing us to review and comment on the subject document. The document was routed to the various branches of the Environmental Health Administration. We have no comments at this time, but reserve the right to future comments. We strongly recommend that you review all of the Standard Comments on our website: www.hawaii.gov/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this application should be adhered to.

The United States Environmental Protection Agency (EPA) provides a wealth of information on their website including strategies to help protect our natural environment and build sustainable communities at: http://water.epa.gov/infrastructure/sustain/ . The DOH encourages State and county planning departments, developers, planners, engineers and other interested parties to apply these strategies and environment principles whenever they plan or review new developments or redevelopments projects. We also ask you to share this information with others to increase community awareness on healthy, sustainable community design. If there are any questions about these comments please contact me.

Sincerely,

Laura Leialoha Phillips McIntyre, AICP
Environmental Planning Office Manager
Environmental Health Administration
Department of Heath
919 Ala Moana Blvd., Ste. 312
Honolulu, Hawaii 96814
Phone: 586-4337
Fax: 586-4370
laura.mcintyre@doh.hawaii.gov

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 5, 2013

Laura McIntyre, AICP
Environmental Planning Office
Department of Health
919 Ala Moana Boulevard, Suite 312
Honolulu, Hawaii 96814

SUBJECT: Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii (File: 12-159)

Dear Ms. McIntyre:

Thank you for your letter, dated September 17, 2012, providing early consultation comments on the subject project. On behalf of the applicant, County of Maui, Department of Water Supply (DWS), we offer the following information in response to the comment provided.

1. We have reviewed the standard comments on your department's website. We are enclosing a list of applicable comments as well as the applicant's response to each. See **Exhibit "A"**.

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft Environmental Assessment for the proposed project. Should you have any questions, please feel free to contact me at (808) 244-2015.

Sincerely,

LP

Leilani Pulmano
Program Manager

LP:tn
Enclosure
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
K:\DATA\RFE\WailukuPRODWell\ECL ResponseLtrs\DOH EPO.res.doc

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EXHIBIT "A"

REVIEW OF STANDARD COMMENTS RELATING TO STATE ENVIRONMENTAL HEALTH PROGRAMS

Hazard Evaluation and Emergency Response Office

- *A Phase I Environmental Site Assessment (ESA) should be conducted for developments or redevelopments. If the investigation shows that a release of petroleum, hazardous substance, pollutants or contaminants occurred at the site, the site should be properly characterized through an approved Hawaii State Department of Health (DOH)/Hazard Evaluation and Emergency Response Office (HEER) soil and or groundwater sampling plan. If the site is found to be contaminated, then all removal and remedial actions to clean up hazardous substance or oil releases by past and present owners/tenants must comply with chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.*

Response:

In 2002, Clayton Group Services, Inc. conducted a Phase I Environmental Site Assessment (Phase I ESA) that included about 719 acres of land in Wailuku, Maui. The Phase I ESA area included the current Kehalani Development and the proposed Wailuku Well Production Facility site. Since the area was used for sugarcane production for at least 150 years, it was considered a "recognized environmental condition" (REC) because of evidence of historical application of agricultural chemicals. A baseline surface soil investigation was recommended to assess the presence or absence of agricultural chemicals.

In 2010, Bureau Veritas North America, Inc. (Bureau Veritas) conducted an environmental investigation of the Kehalani Development in Wailuku, Maui. The purpose of the investigation was to assess potential environmental impacts resulting from past agricultural use of the site. For reporting purposes, the area was divided into two sites: one for proposed residential use with an area of about 210.5 acres and the other for proposed non-residential use with an area of about 38.5 acres. The Wailuku Well Production Facility site, a portion of Lot P-2, is part of the non-residential site. Details are contained in the report, *Multi-Increment Sampling Investigation Report, 210.5 Acres of Proposed Residential Use and 38.5 Acres of Proposed Non-Residential Use, Kehalani Development, Wailuku, Maui, Hawaii*, dated February 1, 2011.

In February and March 2010, Bureau Veritas collected soil samples and sent the soil samples to a testing laboratory for analysis of arsenic, 22 organochlorine pesticides, and dioxin. The following are the test results of the soil samples from

Lot P-2:

- Arsenic – not detected
- Organochlorine Pesticides – not detected
- Dioxin – toxicity equivalent (TEQ) of 47.8 nanograms per kilogram (ng/kg)

The dioxin TEQ of 47.8 ng/kg is less than the 2010 State of Hawaii Department of Health (HDOH) Dioxin Soil Action Level of 240 ng/kg. The dioxin TEQ of 47.8 ng/kg also falls within Soil Category B (Minimally Impacted) with a TEQ range of 20 ng/kg to 240 ng/kg of the HDOH Dioxin Soil Management Category.

Based on these results, Bureau Veritas concluded that the surface soil, to a depth of 18 inches, in the non-residential site has not been significantly impacted by historical agricultural land uses and that the surface soil at the site is suitable for unrestricted land use. Additionally, Bureau Veritas recommended no further investigation of the non-residential site.

- *All lands formerly in the production of sugarcane should be characterized for arsenic contamination, If arsenic is detected above the US EPA Region (preliminary remediation goal (PRG) for non-cancer effects, then a removal and or remedial plan must be submitted to the Hazard Evaluation and Emergency Response (HEER) Office of the State Department of Health for approval. The plan must comply with Chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.*

Response:

As noted above, in February and March 2010, Bureau Veritas collected soil samples from Lot P-2, which includes the Wailuku Well Production Facility site. Arsenic was not detected in the soil samples.

Clean Air Branch

- *A significant potential for fugitive dust emissions exists during all phases of construction and operations. Proposed activities that occur in proximity to existing residences, businesses, public areas or thoroughfares, exacerbate potential dust problems. It is recommended that a dust control management plan be developed which identifies and addresses all activities that have a potential to generate fugitive dust. The plan, which does not require DOH approval, would help with recognizing and minimizing the dust problems from the proposed project.*

Activities must comply with the provisions of Hawaii Administrative Rules, § 11-60-1-33 on Fugitive Dust. In addition, for cases involving mixed land use, we strongly recommend that buffer zones be established, wherever possible, in order to alleviate potential nuisance problems.

The contractor should provide adequate measures to control the fugitive dust from the road areas and during the various phases of construction. Examples of measures that can be implemented to control dust include, but are not limited to, the following:

a) *Planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact;*
b) *Providing an adequate water source at the site prior to start-up of construction activities;*
c) *Landscaping and providing rapid covering of bare areas, including slopes, starting from the initial grading phase;*
d) *Minimizing dust from shoulders and access roads;*
e) *Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and*
f) *Controlling dust from debris being hauled away from the project site.*

Response:

Best Management Practices will be implemented to minimize the potential for dust-related impacts from the construction of the proposed project. Project-related activities will comply with applicable provisions of Section 11-60-1.33, HAR.

Clean Water Branch

- *Any project and its potential impacts to State waters must meet the State's: 1) Antidegradation policy, 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; 2) Designated uses, as determined by the classification of the receiving State waters; and 3) water quality criteria (Hawaii Administrative Rules (HAR), Chapter 11-54).*

Response:

The proposed project will comply with the State's antidegradation, designated uses, and water quality criteria.

- *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:

  The Army Corps of Engineers concluded that the construction of the Wailuku Well Production Facility did not require a Department of the Army permit.

- *National Pollutant Discharge Elimination System (NPDES) permits are required 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, NPDES general permit coverage may be applied for by submitting a Notice of Intent (NOI) form: 1) storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi); 2) storm water associated with construction activities, including excavation, grading, clearing, demolition, uprooting of vegetation, equipment staging, and storage areas that result in the disturbance of equal to or greater than one (1) acre of total land area*; 3) treated effluent from leaking underground storage tank remedial activities; 4) once through cooling water less than one (1) million gallons per day; 5) hydrotesting water; 6) dewatering effluent; 7) treated effluent from petroleum bulk stations and terminals; 8) treated effluent from well drilling activities; 9) treated effluent from recycled water distribution systems; 10) storm water and certain non-storm water from a small municipal separate storm sewer system; and 11) circulation water from decorative ponds or tanks.*
  **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.*

  Response:

  An NPDES permit is not anticipated to be required for the proposed project. The proposed construction area will be less than one (1) acre in size. Nonetheless, the applicant will discuss permit requirements for the proposed project with the Department of Health Clean Water Branch.

- *A separate NOI form for each type of discharge must be submitted 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.

Response:

The applicant acknowledges that a separate NOI form must be submitted for each type of discharge, if applicable, at least 30 calendar days prior to the start of discharge activity.

- *For types of wastewater discharges not listed above or wastewater discharging into Class 1 or Class AA waters, you may need to obtain an NPDES individual permit. Class 1 waters include, but is not limited to, all State waters in natural reserves, preserves, sanctuaries, and refuges established by the Department of Land and Natural Resources (DLNR) under Hawaii Revised Statutes (HRS), Chapter 195, or similar reserves for the protection of aquatic life established under HRS, Chapter 195.*

Response:

No discharges into Class 1 or Class AA waters are anticipated.

- *An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge or start of construction activities. 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.*

Response:

The applicant acknowledges that an NPDES individual permit application, if applicable, must be submitted at least 180 calendar days before the commencement of discharge or construction activities.

- *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:

The applicant acknowledges that a copy of the NOI or NPDES permit application, if applicable, must be submitted to the SHPD.

- *Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards.*

Response:

The applicant acknowledges that all discharges related to project construction and operation 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.*

Response:

The applicant acknowledges that compliance with water quality and permitting requirements are subject to Chapter 11-54 and 11-55, HAR.

Safe Drinking Water Branch

- *Federal and state regulations define a public water system as a system that serves 25 or more individuals at least 60 days per year or has at least 15 service connections. All public water system owners and operators are required to comply with Hawaii Administrative Rules, Title 11, Chapter 20, titled Rules Relating to Potable Water Systems.*

Response:

The Wailuku Well Production Facility will service the DWS Central Maui Water System. The DWS will comply with Hawaii Administrative Rules, Title 11, Chapter 20, "Rules Relating to Potable Water Systems".

- *All new public water systems are required to demonstrate and meet minimum capacity requirements prior to their establishment. This requirement involves demonstration that the system will have satisfactory technical, managerial and financial capacity to enable the system to comply with safe drinking water standards and requirements.*

Response:

The proposed project is a new facility in an existing public water system. The Wailuku Well Production Facility will serve the existing Central Maui Water System in accordance with safe drinking water requirements.

- *Projects that propose development of new sources of potable water serving or proposed to serve a public water system must comply with the terms of Section 11-20-29 of Chapter 20. This section requires that all new public water system sources be approved by the Director of Health prior to its use. Such approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements set in Section 11-20-29.*

Response:

The DWS understands that new public water system sources must be approved by the Director of Health prior to its use.

- *The engineering report must identify all potential sources of contamination and evaluate alternative control measures which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source. In addition, water quality analyses for all regulated contaminants, performed by a laboratory certified by the State Laboratories Division of the state of Hawaii, must be submitted as part of the report to demonstrate compliance with all drinking water standards. Additional parameters may be required by the Director for this submittal or additional tests required upon his or her review of the information submitted.*

Response:

The DWS acknowledges that potential sources of water contamination and associated mitigating measures must be identified. Water quality test results have been performed and will be submitted to the Safe Drinking Water Branch, Department of Health. Results reflect that the water quality meets drinking water standards.

- *All sources of public water systems must undergo a source water assessment which will delineate a source water protection area. This process is preliminary to the creation of a source water protection plan for that source and activities which will take place to protect the source of drinking water.*

Response:

A source water assessment is being prepared and will be submitted to the Safe Drinking Water Branch.

- *Projects proposing to develop new public water systems or proposing substantial modifications to existing public water systems must receive approval by the Director of Health prior to construction of the proposed system or modification. These projects include treatment, storage and distribution systems of public water systems. The approval authority for projects owned and operated by a County Board or Department of Water or Water Supply has been delegated to them.*

Response:

The DWS understands that modifications to an existing public water system must be approved by the Director of Health prior to its use.

- *All public water systems must be operated by certified distribution system and water treatment plant operators as defined by Hawaii Administrative Rules, Title 11, Chapter 11-25 titled; Rules Pertaining to Certification of Public Water System Operators.*

Response:

The proposed project will service the Central Maui Water System, operated by the DWS, which is certified distribution system and water treatment plant operator.

- *All projects which propose the use of dual water systems or the use of a non-potable water system in proximity to an existing potable water system to meet irrigation or other needs must be carefully designed and operated to prevent the cross-connection of these systems and prevent the possibility of backflow of water from the non-potable system to the potable system. The two systems must be clearly labeled and physically separated by air gaps or reduced pressure principle backflow prevention devices to avoid contaminating the potable water supply. In addition backflow devices must be tested periodically to assure their proper operation. Further, all non-potable spigots and irrigated areas should be clearly labeled with warning signs to prevent the inadvertent consumption on non-potable water. Compliance with Hawaii Administrative Rules, Title 11, Chapter 11-21 titled; Cross-Connection and Backflow Control is also required.*

Response:

The proposed project does not propose the use of dual water systems or the use of a non-potable water system in proximity to an existing water system.

- *All projects which propose the establishment of a potentially contaminating activity (as identified in the Hawai`i Source Water Assessment Plan) within the source water protection area of an existing source of water for a public water supply should address this potential and activities that will be implemented to prevent or reduce the potential for contamination of the drinking water source.*

Response:

The proposed project does not propose the establishment of a potentially contaminating activity within the source water protection area of an existing public water source.

Solid and Hazardous Waste Branch

- *The state regulations for hazardous waste are in Chapters 11-260 to 11- 280, Hawaii Administrative Rules (HAR). These rules apply to the identification, handling, transportation, storage and disposal of regulated hazardous waste. Generators, transporters and treatment, storage and disposal facilities of hazardous waste must adhere to these requirements or be subject to fines and penalties.*

Response:

The proposed project will comply with applicable requirements of HAR, Chapters 11-260 to 11-280.

- *Generators of solid waste are required to ensure that their wastes are properly delivered to permitted solid waste management facilities. Managers of construction and demolition projects should require their waste contractors to submit disposal receipts and invoices to ensure proper disposal of wastes.*

Response:

Construction waste for the project will be properly disposed of at an approved construction waste disposal facility. Following project construction, the proposed Wailuku Well Production Facility will generate minimal solid waste, if any.

- *HRS Chapter 342G encourages the reduction of waste generation, reuse of discarded materials, and the recycling of solid waste. Businesses, property*

managers and developers, and government entities are highly encouraged to develop solid waste management plans to ensure proper handling of wastes. Solid waste management plans should also seek to maximize waste diversion and minimize disposal. Such plans should include designated areas to promote the collection of reusable and recyclable materials.

Response:

The proposed Wailuku Well Production Facility will generate minimal solid waste, if any.

Noise, Radiation, and Indoor Air Quality Branch

- *Project activities shall comply with Chapter 11-39 (Air Conditioning and Ventilating), Chapter 11-45 (Radiation Control) and 11-46 (Community Noise Control) of the Administrative Rules of the Department of Health.*

Response:

The proposed project will comply with applicable requirements of HAR, Chapter 11-46, community noise control. HAR, Chapter 11-39 (Air Conditioning and Ventilating) and Chapter 11-45 (Radiation Control) do not apply to the proposed project.

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SEP 20 2012

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
SAFE DRINKING WATER BRANCH
919 ALA MOANA BLVD., ROOM 308
HONOLULU, HI 96814-4920

In reply, please refer to:
File: SDWB
Wailuku Well1.Doc

September 18, 2012

Tessa Munekiyo Ng, AICP
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Ng:

SUBJECT: EARLY CONSULTATION REQUEST FOR PROPOSED WAILUKU WELL PRODUCTION FACILITY AND ASSOCIATED IMPROVEMENTS AT TMK: (2) 3-5-001:021 (POR.), 091 (POR.) AND 100 (POR.) WAILUKU, MAUI, HAWAII

We are in receipt of the above referenced document and offer the following comments:

In the draft environmental assessment, please provide the following information:

1. A statement of project needs and benefits, including a discussion of the drinking water quality benefits of the project and/or the public health/water quality problems to be corrected.

2. A description of the proposed project and the public water system of which it is a part of.

3. An evaluation of the alternatives considered to address the project needs.

4. A description of the selected alternative and the relevant design criteria used.

5. Cost information on the estimated total capital costs and annual operation and maintenance costs for the project. The following statement should be included in the cost information section of the environmental assessment: *This project may be funded by federal funds through the state of Hawaii's Drinking Water State Revolving Fund (DWSRF), which would constitute a federal action, and will require the project to meet all NEPA and Hawaii DWSRF program requirements.*

6. An evaluation of the impact of the project on the water supply (if applicable).

Please refer to the enclosed documents for the specific criteria and crosscutters that are expected to be addressed in the environmental assessment. Written documentation of consultation with the applicable state or federal agency for each environmental crosscutter is required to be included in the environmental assessment. The documentation shall also include the specific crosscutter being addressed.

For additional information please visit the DWSRF website at http://hawaii.gov/health/environmental/water/sdwb/dwsrf/dwsrf.html or contact Mr. Alain Carey of the Engineering Section at (808) 586-4258.

Sincerely,

JOANNA L. SETO, P.E., CHIEF
Safe Drinking Water Branch

AC:cb

Enclosure

DWSRF Environmental Crosscutters

Environmental Authorities	Procedure	Responsible Agency
Archaeological and Historical Preservation Act of 1974, Pub. L. 86-523, as amended	Obtain review for all projects	State Historic Preservation Office
Clean Air Act, Pub. L. 84-159, as amended	Coordinate to assure project conforms with state implementation plan (SIP)	State Department of Health, Clean Air Branch
Coastal Barrier Resources Act, Pub. L. 92-348	Obtain review if project is located on a coastal barrier island	State Coastal Zone Management Agency
Coastal Zone Management Act, Pub. L. 92-583, as amended	Obtain review if project is located in coastal zone	State Coastal Zone Management Agency
Endangered Species Act, Pub. L. 93-205, as amended	Obtain review by U.S. Fish and Wildlife Service for all projects	U.S. Fish and Wildlife Service
Environmental Justice, Executive Order (EO) 12898	Are low income and minority groups affected?	U.S. Environmental Protection Agency
Floodplain Management, Executive Order 11988 as amended by EO 12148	Obtain review if project is located in or affects 100-year flood plain	Federal Emergency Management Agency
Protection of Wetlands, Executive Order 11990	Obtain review if project area contains wetlands	U.S. Army Corps of Engineers
Farmland Protection Policy Act, Pub. L. 97-98	Obtain review if project area contains prime farmland	Natural Resources Conservation Service- State Conservationist
Fish and Wildlife Coordination Act, Pub. L. 85-624, as amended	Obtain review for all projects	U.S. Fish and Wildlife Service
National Historic Preservation Act of 1966, PL 89-665, as amended	Obtain review for all projects	State Historic Preservation Office
Safe Drinking Water Act, Pub. L. 93-523, as amended	Obtain review if project could affect sole source aquifer	State Department of Health, Safe Drinking Water Branch
Wild and Scenic Rivers Act, Pub. L. 90-542, as amended	Obtain review if project is located in area with Wild and Scenic Rivers	National Park Service
Essential Fish Habitat consultation process under the Magnuson-Stevens Fishery Conservation and Management Act	Obtain review if it will affect essential fish habitat	National Marine Fisheries Service (NMFS)

(Rev. Jul 25/07)

SAFE DRINKING WATER BRANCH
HAWAII DEPARTMENT OF HEALTH

ENVIRONMENTAL ASSESSMENT
CHECKLIST AND CERTIFICATION

PROJECT NAME: _____

PROJECT NUMBER: _____ _____
(Applicant) (State)

	YES	NO
ENVIR. ASSESSMENT SUBMITTED:	-----	-----
PRIOR DECISION DOC'T SUBMITTED:	-----	-----

_____

_____

A. OEQC CRITERIA ADDRESSED:

(1) ID of applicant:	-----	-----
(2) ID of approv agency:	-----	-----
(3) Agencies consulted:	-----	-----
(4) Descrip. of proj. char:	-----	-----
(5) Descrip. of envir:	-----	-----
(6) Impacts and alternatives:	-----	-----
(7) Mitigation measures:	-----	-----
(8) Determination:	-----	-----
(9) Findings and reasons:	-----	-----

B. SERP CRITERIA ADDRESSED:

1. Population projections current:	-----	-----
2. "No-action" alternative:	-----	-----

3. Impacts analysis addresses:

a. prim & sec impacts:	-----	-----
b. social parameters:	-----	-----
c. cumulative impacts:	-----	-----
d. other projects:	-----	-----
e. sensitive issues:	-----	-----

C. CROSS CUTTERS ADDRESSED:

1. Arch & Hist Pres Act:	-----	-----
2. Clean Air Act:	-----	-----
3. Coastal Zone Mang. Act:	-----	-----
4. Endangered Spec Act:	-----	-----
5. Environmental Justice Act:	-----	-----
6. Farmland Prot Act:	-----	-----
7. Fish & Wildlife Act:	-----	-----
8. Floodplain Mang EO:	-----	-----
9. Nat Hist Pres Act:	-----	-----
10. Prot of Wetlands EO	-----	-----
11. Safe Drink Water Act:	-----	-----
12. Wild & Scenic Rivers Act:	-----	-----
13. Essential Fish Habitat Act:	-----	-----

CERTIFICATION: (County certifies that it has conducted a current assessment of the environmental impacts of the proposed project, and has disclosed, in the Environmental Assessment Documents referred to in this checklist, all known significant environmental impacts of the proposed project.)

Signature	Title	Date

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 3, 2013

Joanna L. Seto, P.E., Chief
Safe Drinking Water Branch
Department of Health
State of Hawaii
919 Ala Moana Boulevard, Room 308
Honolulu, Hawaii 96814-4920

SUBJECT: Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii (File: SDWB Wailuku Well 1.Doc)

Dear Ms. Seto:

Thank you for your letter, dated September 18, 2012, providing early consultation comments on the subject project. On behalf of the applicant, County of Maui, Department of Water Supply (DWS), we offer the following information in response to the comments provided.

1. The draft environmental assessment (EA) will provide the information addressing the six (6) items noted in your letter.

2. We thank you for the information regarding the specific criteria and crosscutters that are expected to be addressed in the EA. The Draft EA will provide written documentation of consultation with the applicable State or Federal agency for each environmental crosscutter.

3. The Engineering Report for new potable water source for the Wailuku Well is being prepared and will be submitted to the Safe Drinking Water Branch.

MAUI
305 High St., Suite 104 Wailuku, Hawaii 96793
PH: (808)244-2015 FAX: (808)244-8729
OAHU
735 Bishop St., Suite 238 Honolulu, Hawaii 96813 | PH: (808)983-1233
WWW.MHPLANNING.COM

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft EA for the proposed project. Should you have any questions, please feel free to contact me at (808) 244-2015.

Sincerely,

Leilani Pulmano
Program Manager

LP:tn
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
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SEP 24 2012

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
ENVIRONMENTAL MANAGEMENT DIVISION
SOLID AND HAZARDOUS WASTE BRANCH
919 ALA MOANA BOULEVARD, #212
HONOLULU, HAWAII 96814

In reply, please refer to:
EMD/SHWB

September 21, 2012 S0918LO

Ms. Tessa Munekiyo Ng, Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Munekiyo:

SUBJECT: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements
Wailuku, Maui
TMK: (2)3-5-001:021 (por.), 091 (por.) and 100 (por.)

Thank you for giving us the opportunity to review and provide comments on the subject document. The document has been reviewed by the Office of Solid Waste Management, Solid Waste Section, Hazardous Waste Section, and Underground Storage Tank Section of the Solid and Hazardous Waste Branch.

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

Please contact Mr. Lane Otsu of the Office of Solid Waste Management with any questions at (808) 586-4226.

Sincerely,

STEVEN Y.K. CHANG, P.E., CHIEF
Solid and Hazardous Waste Branch

SEP 21 2012

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
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

September 19, 2011

Munekiyo & Higara, Inc.
Attention: Tessa Munekiyo Ng, Senior Associate
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Munekiyo Ng:

SUBJECT: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements

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 comments.

At this time, the DLNR has no comments to offer on the subject matter. If you have any questions, please feel free to call Lydia Morikawa at 587-0410. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

cc: Central Files

SEP 25 2012

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
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

September 24, 2012

Munekiyo & Higara, Inc.
Attention: Tessa Munekiyo Ng, Senior Associate
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Munekiyo Ng:

SUBJECT: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements

Thank you for the opportunity to review and comment on the subject matter. In addition to the comments previously sent you on September 19, 2012, enclosed are comments from the (a) the Division of Forestry and Wildlife, (b) the Engineering Division and (c) the Division of State Parks on the subject matter. Should you have any questions, please feel free to call Lydia Morikawa at 587-0410. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
cc: Central Files

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
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

September 12, 2012

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division
_X_ Div. of Forestry & Wildlife
_X_ Div. of State Parks
_X_ Commission on Water Resource Management
___Office of Conservation & Coastal Lands
_X_ Land Division – Maui District
_X_ Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements
LOCATION: Wailuku, Island of Maui TMK: (2) 3-5-001:021 (por), 091 (por.) & 100(por.)
APPLICANT: County of Maui, Department of Water Supply (DWS)

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by September 19, 2012.

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 Lydia Morikawa at 587-0410. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(✓) Comments are attached.

Signed:
Print Name: Carty S. Chang, Chief Engineer
Date: 9/18/12

cc: Central Files

42

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/ Russell Y. Tsuji
Ref.: Early Consultation for Proposed Wailuku Well Production Facility and Associated Improvements, Wailuku
Maui.003

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 Zone X. The National Flood Insurance Program (NFIP) does not regulate developments within Zone 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 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. Mario Siu Li at (808) 768-8098 or Ms. Ardis Shaw-Kim at (808) 768-8296 of the City and County of Honolulu, Department of Planning and Permitting.

( ) Mr. Frank DeMarco at (808) 961-8042 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 project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.

( ) 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.

(X) Additional Comments: We never made a commitment to contribute funds toward the development of Wailuku Well from an exploratory well to a production well. There are also no funds currently available for us to contribute.

( ) Other: _____

Should you have any questions, please call Mr. Dennis Imada of the Planning Branch at 587-0257.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 9/16/12

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
12 SEP 14 P4:06

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
LAND DIVISION
2012 SEP 19 P 3:02
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

September 12, 2012

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division
_X_ Div. of Forestry & Wildlife
_X_ Div. of State Parks
_X_ Commission on Water Resource Management
___Office of Conservation & Coastal Lands
_X_ Land Division – Maui District
_X_ Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements
LOCATION: Wailuku, Island of Maui TMK: (2) 3-5-001:021 (por), 091 (por.) & 100(por.)
APPLICANT: County of Maui, Department of Water Supply (DWS)

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by September 19, 2012.

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 Lydia Morikawa at 587-0410. Thank you.

Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed: _____
Print Name: Roger W. Imoto
Date: 9/19/12

cc: Central Files

55344

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
STATE PARKS

'12 SEP 14 A10 :35

DEPT OF LAND & NATURAL RESOURCES

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 12, 2012

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_Engineering Division
_X_Div. of Forestry & Wildlife
_X_Div. of State Parks
_X_Commission on Water Resource Management
___Office of Conservation & Coastal Lands
_X_Land Division – Maui District
_X_Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements
LOCATION: Wailuku, Island of Maui TMK: (2) 3-5-001:021 (por), 091 (por.) & 100(por.)
APPLICANT: County of Maui, Department of Water Supply (DWS)

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by September 19, 2012.

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 Lydia Morikawa at 587-0410. Thank you.

Attachments

(✓) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed:
Print Name: David S. Quinn
Date: 9/20/12

cc: Central Files

OCT 0 3 2012

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
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

October 1, 2012

Munekiyo & Hiraga, Inc.
Attention: Tessa Munekiyo Ng, Senior Associate
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Munekiyo Ng:

SUBJECT: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements

Thank you for the opportunity to review and comment on the subject matter. In addition to the comments previously sent you on September 19 and 24, 2012, enclosed are comments from the Commission on Water Resources Management on the subject matter. Should you have any questions, please feel free to call Lydia Morikawa at 587-0410. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
cc: Central Files

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON

WILLIAM D. BALFOUR, JR.
SUMNER ERDMAN
CRYSTAL A. J. FUDDY, A.C.S.W., M.P.H.
NEAL S. FUJIWARA
JONATHAN STARR
TED YAMAMURA

WILLIAM M. TAM
DEPUTY DIRECTOR

RECEIVED
LAND DIVISION
2012 SEP 28 P 2:57
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

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

September 28, 2012

REF: 5230-04.prod.dr

TO: Russell Tsuji, Administrator
Land Division

FROM: William M. Tam, Deputy Director
Commission on Water Resource Management

SUBJECT: Wailuku Exploratory Well to Production (Well No. 5230-04)

FILE NO.: N/A
TMK NO.: (2) 3-5-001:021

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 http://hawaii.gov/dlnr/cwrm/resources_permits.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. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.

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

☐ 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(s) 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 (are) 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:

1. Well construction has been permitted. A pump installation permit and a water use permit will be required. Before either permit may be approved, the applicant must provide acceptable pump tests. The well completion reports must be submitted and accepted by the Commission. The well construction and pump installation must be properly completed and certified before any water may be used. In addition, the Maui Department of Water Supply must apply to the Commission to assign existing pumpage from other municipal wells for existing water use to this well.

2. The underlying aquifer is being pumped to its maximum sustainable yield. No new water uses have been approved.

If there are any questions, please contact Charley Ice at 587-0218.

c: Munekiyo & Hiraga, Inc.
Maui Department of Water Supply

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 3, 2013

Russell Y. Tsuji, Land Administrator
Department of Land and Natural Resources
Land Division
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii

Dear Mr. Tsuji:

Thank you for your letters, dated September 19, 2012, September 24, 2012, and October 1, 2012, providing early consultation comments on the subject project. On behalf of the applicant, County of Maui, Department of Water Supply (DWS), we offer the following information in response to the comments provided.

Engineering Division

1. We acknowledge that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone X and that the National Flood Insurance Program does not regulate development within Flood Zone X.
2. We understand that the Department of Land and Natural Resources (DLNR) has not made a commitment to contribute funds to the development of the Wailuku Well from an exploratory well to a production well and that there are no funds currently available for the DLNR to contribute. Please note that the County has encumbered funds for the proposed project.

Division of Forestry and Wildlife

3. We acknowledge that the Division of Forestry and Wildlife does not have comments on the proposed project.

MAUI
305 High St., Suite 104 Wailuku, Hawaii 96793
PH: (808)244-2015 FAX: (808)244-8729
OAHU
735 Bishop St., Suite 238 Honolulu, Hawaii 96813 | PH: (808)983-1233
WWW.MHPLANNING.COM

Division of State Parks

4. We acknowledge that the Division of State Parks does not have comments on the proposed project.

Commission on Water Resource Management

5. The Water Use and Development Plan (WUDP), Central DWS District Plan Update was adopted by the County Council in December 2010. The WUDP discusses the proposed replacement of Wailuku Shaft 33 with several replacement wells.
6. Thank you for the information regarding water efficient fixtures. The completed project will use a minimal amount of water to operate the facility. Onsite water fixtures consist of two (2) exterior hose bibs for occasional washdown of equipment and a drip irrigation system for irrigating landscape plantings. There are no plumbing fixtures in the control building.
7. We note your comment regarding the use of alternative water sources, whenever practicable. The proposed project is for the conversion of an exploratory well into a production well. The Wailuku Well production facility is a replacement water source for the Central Maui Water System that is being developed in anticipation of the impending closure of Shaft 33. It is noted that extensive water conservation and recycled wastewater use are final strategies in the WUDP, Central DWS District Plan Update.
8. We understand that well construction has been permitted for the Wailuku Exploratory Well and a pump installation permit and a water use permit will be required for the Wailuku Well Production Facility. The DWS will provide pump tests and well completion reports to the Commission on Water Resource Management (CWRM). The DWS understands that well construction and pump installation must be properly completed and certified before any water may be used. Furthermore, the Department understands that it must apply to the CWRM to assign existing pumpage from other municipal wells, such as Shaft 33, for existing water use to the Wailuku Well Production Facility.
9. Existing data indicates the existing wells in the Iao Aquifer yield 15.5 mgd on a 12-month moving average. As the Iao Aquifer is designated as a groundwater management area, withdrawal is limited to 18 mgd. The Wailuku Well Production Facility is one (1) of four (4) replacement wells that are being developed in anticipation of the closure of Shaft 33. The Wailuku Well is a replacement water source and will not result in new pumpage from the Iao Aquifer. As such, the well yields in the aquifer are anticipated to remain the same.

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft Environmental Assessment for the proposed project. Should you have any questions, please feel free to contact me at (808) 244-2015.

Sincerely,

Leilani Pulmano
Program Manager

LP:tn
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
K:\DATA\RFE\WailukuPRODWell\ECL ResponseLtrs\DLNR.res.doc

SEP 27 2012

NEIL ABERCROMBIE
GOVERNOR

GLENN M. OKIMOTO
DIRECTOR

Deputy Directors
JADE T. BUTAY
FORD N. FUCHIGAMI
RANDY GRUNE
JADINE URASAKI

IN REPLY REFER TO:

STP 8.0972

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

September 20, 2012

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

Dear Ms. Ng:

Subject: Wailuku Well Production Facility and Associated Improvements
Early Consultation for Draft Environmental Assessment
TMK: (2) 3-5-001:021(por.), 091(por.), 100(por.)

Thank you for requesting the State Department of Transportation's (DOT) review of the subject project.

DOT understands the Maui County Department of Water Supply (DWS) proposes to construct improvements at the existing Wailuku Well to convert the facility from an exploratory well to a production well.

Given the location and the nature of the project, DOT does not anticipate any significant adverse impacts to the State transportation facilities.

DOT appreciates the opportunity to provide comments. If there are any other questions, please contact Mr. Garrett Smith of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Very truly yours,

GLENN M. OKIMOTO, Ph.D.
Director of Transportation

c: Ronald M. Fukumoto, Ronald M. Fukumoto Engineering Inc.
Tom Ochowat, County of Maui, Department of Water Supply

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 5, 2013

Glenn Okimoto, Ph.D, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

SUBJECT: Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii

Dear Mr. Okimoto:

Thank you for your letter, dated September 20, 2012, providing early consultation comments on the subject project. On behalf of the applicant, County of Maui, Department of Water Supply (DWS), we acknowledge that the Department of Transportation does not anticipate any significant adverse impacts to the State transportation facilities as a result of the proposed project.

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft Environmental Assessment for the proposed project. Should you have any questions, please feel free to contact me at (808) 244-2015.

Sincerely,

Leilani Pulmano
Program Manager

LP:tn
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
K:\DATA\RFE\WailukuPRODWell\ECL ResponseLtrs\SDOT.res.doc

MAUI
305 High St., Suite 104 Wailuku, Hawaii 96793
PH: (808)244-2015 FAX: (808)244-8729
OAHU
735 Bishop St., Suite 238 Honolulu, Hawaii 96813 | PH: (808)983-1233
WWW.MHPLANNING.COM

ALAN M. ARAKAWA
MAYOR

SEP 25 2012
JEFFREY A. MURRAY
CHIEF

ROBERT M. SHIMADA
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE AND PUBLIC SAFETY
FIRE PREVENTION BUREAU

313 MANEA PLACE • WAILUKU, HAWAII 96793
(808) 244-9161 • FAX (808) 244-1363

September 21, 2012

Munekiyo & Hiraga, Inc.
Attention: Tessa Munekiyo Ng, Senior Associate
305 Hight Street, Suite 104
Wailuku, HI 96793

Re: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements.
Wailuku, Maui, HI
TMK: (2) 3-5-001: 021, 091 (por.), and 100 (por.)

Dear Tessa:

Thank for the allowing the Department of Fire and Public Safety the opportunity to comment on the above subject. At this time, our office has no specific comments in regards to this subject. Our office does reserve the right to comment, during the building permit process, on any building permits submitted as part of this project.

If there are any questions or comments, please feel free to contact me at 244-9161 ext. 23.

Sincerely,

Paul Haake
Captain, Fire Prevention Bureau
Department of Fire and Public Safety, Maui County

SEP 17 2012

DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
HOUSING DIVISION
COUNTY OF MAUI

ALAN M. ARAKAWA
Mayor
JO-ANN T. RIDAO
Director
JAN SHISHIDO
Deputy Director

35 LUNALILO STREET, SUITE 102 • WAILUKU, HAWAII 96793 • PHONE (808) 270-7351 • FAX (808) 270-6284

September 11, 2012

Ms. Tessa Munekiyo Ng
Senior Associate
Munekiyo & Higara, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Ng:

Subject: **Early Consultation for Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2) 3-5-001:021 (por.), 091 (por.) and 100 (por.), Wailuku, Maui, Hawaii**

The Department has reviewed the request for Early Consultation for the above subject project. Based on our review, we have determined that the subject project is not subject to Chapter 2.96, Maui County Code. At the present time, the Department has no additional comments to offer.

Please call Mr. Veranio Tongson Jr. of our Housing Division at (808) 270-1741 if you have any questions.

Sincerely,

CLYDE ALMEIDA
Assistant Housing Administrator

cc: Director of Housing and Human Concerns

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 5, 2013

Clyde Almeida, Assistant Housing Administrator
Department of Housing and Human Concerns
Housing Division
County of Maui
35 Lunalilo Street, Suite 102
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii

Dear Almeida:

Thank you for your letter, dated September 11, 2012, providing early consultation comments on the subject project. On behalf of the applicant, County of Maui, Department of Water Supply (DWS), we acknowledge that the proposed project is not subject to Chapter 2.96, Maui County Code.

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft Environmental Assessment for the proposed project. Should you have any questions, please feel free to contact me at 244-2015.

Sincerely,

Leilani Pulmano
Program Manager

LP:tn
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
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ALAN M. ARAKAWA
Mayor

GLENN T. CORREA
Director

PATRICK T. MATSUI
Deputy Director

(808) 270-7230
FAX (808) 270-7934

SEP 19 2012

DEPARTMENT OF PARKS & RECREATION

700 Hali'a Nakoa Street, Unit 2, Wailuku, Hawaii 96793

September 14, 2012

Munekiyo & Hiraga, Inc.
Attn: Tessa Munekiyo Ng
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Ng:

SUBJECT: Early Consultation Request for Draft Environmental Assessment (EA) for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK: (2) 3-5-001:021(por.), 091 (por.) and 100 (por.), Wailuku, Maui, Hawaii

Thank you for the opportunity to review and comment on the subject project. The Department of Parks & Recreation has no comment at this time, and looks forward to reviewing the Environmental Assessment when it is available.

Please feel free to contact me or Robert Halvorson, Chief of Planning and Development, at 270-7931, should you have any questions.

Sincerely,

GLENN T. CORREA
Director of Parks & Recreation

c: Robert Halvorson, Chief of Planning and Development

GTC:RH:ca

ALAN M. ARAKAWA
Mayor

WILLIAM R. SPENCE
Director

MICHELE CHOUTEAU McLEAN
Deputy Director

SEP 19 2012

COUNTY OF MAUI

DEPARTMENT OF PLANNING

September 18, 2012

Tessa Munekiyo Ng, Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Ng:

SUBJECT: REQUEST FOR COMMENTS (RFC) FOR PROPOSED WAILUKU WELL PRODUCTION FACILITY AND ASSOCIATED IMPROVEMENTS, AT WAILUKU, ISLAND OF MAUI, HAWAII; TMK(S): (2) 3-5-001:021 (POR.) AND 100 (POR.) (RFC 2012/0141)

The Department of Planning has reviewed the proposed action and has no comment to offer at this time.

Thank you for your cooperation. If additional clarification is required, please contact Staff Planner Paul Fasi at paul.fasi@mauicounty.gov or at (808) 270-7814.

Sincerely,

CLAYTON I. YOSHIDA, AICP
Planning Program Administrator

for WILLIAM SPENCE
Planning Director

xc: Paul F. Fasi, Staff Planner (PDF)
Project File
General File

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ALAN M. ARAKAWA
Mayor

DAVID C. GOODE
Director

ROWENA M. DAGDAG-ANDAYA
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

OCT 01 2012

RALPH NAGAMINE, 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

September 18, 2012

Ms. Tessa Munekiyo Ng, AICP
Senior Associate
MUNEKIYO & HIRAGA, INC.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Ms. Ng:

SUBJECT: EARLY CONSULTATION REQUEST FOR PROPOSED WAILUKU WELL PRODUCTION FACILITY AND ASSOCIATED IMPROVEMENTS; TMK: (2) 3-5-001:021 (POR.), 091 (POR.), and 100 (POR.)

We reviewed the early consultation request and offer the following comments:

1. We request notification of any off site discharge of water that may impact County drainage ways or roadways, preferably in advance of such discharge.

2. Will there be a future closure plan for the Wailuku Shaft 33 well for the safety of the adjoining residential community?

3. Please address where the overflow runoff will travel once the onsite drainage sump reaches capacity. It appears the overflow runoff will travel overland and enter the Waihee Ditch.

4. Please consider setting the entry gate further into the property so vehicles entering/exiting the site can avoid sticking out into traffic, or parking over the sidewalk.

5. There were no inspections conducted for Building Permit No. B2010-0060 issued on January 14, 2010 for a control building.

Please call Rowena M. Dagdag-Andaya at (808) 270-7845 if you have any questions regarding this letter.

Sincerely,

DAVID C. GOODE
Director of Public Works

DCG:RMDA:ls
xc: Highways Division
Engineering Division
S:\LUCA\CZM\prop_wailuku_well_produc_facility_ec_35001021_091_100_pors_ls.wpd

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 3, 2013

David Goode, Director
Department of Public Works
County of Maui
200 South High Street, Room No. 434
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii

Dear Mr. Goode:

Thank you for your letter, dated September 18, 2012, providing early consultation comments on the subject project. On behalf of the applicant, County of Maui, Department of Water Supply (DWS), we offer the following information in response to the comments provided.

1. The DWS will notify the Department of Public Works of any off-site discharge of water that may impact County drainage ways or roadways.
2. The proposed Wailuku Well Production Facility is one (1) of four (4) replacement wells that will replace the Wailuku Shaft 33. DWS is working with RCFC Kehalani, LLC on a closure plan for Shaft 33. Once Shaft 33 is decommissioned, RCFC Kehalani, LLC will be responsible for its property closure, as the owner of Shaft 33.
3. The proposed project includes a drainage sump production facility site. The drainage sump will collect and mitigate the increase in storm water runoff generated by the project site. A concrete rubble masonry spillway will channel drainage sump overflow into the future park that will occupy the remainder of TMK (2)3-5-001:100.
4. The location of the entry gate was determined to allow access to the Maui Electric Company (MECO) transformer pad. Moving the entry gate further into the site creates a restricted space between the fence and the building and prevents access to the transformer pad. With the entry gate in the current location, MECO has access to their equipment. The current gate location allows for maintenance and DWS staff vehicles to be out of the roadway while opening and closing the entry gate. From an operational standpoint the amount of time

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that a vehicle will be blocking the sidewalk will be minimal.

5. Thank you for the information regarding Building Permit 2010-0060. This building permit was issued for the Iao Well. DWS project engineer has provided special inspection reports to the Department of Public Works, Development Services Administration for this building permit.

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft Environmental Assessment for the proposed project. Should you have any questions, please feel free to contact me at 244-2015.

Sincerely,

Leilani Pulmano
Program Manager

LP:tn
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
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ALAN M. ARAKAWA
Mayor

SEP 21 2012

JO ANNE JOHNSON-WINER
Director
MARC I. TAKAMORI
Deputy Director
Telephone (808) 270-7511

DEPARTMENT OF TRANSPORTATION

COUNTY OF MAUI
200 South High Street
Wailuku, Hawaii, USA 96793-2155

September 6, 2012

Ms. Tessa Munekiyo Ng
Munekiyo & Hiraga Inc.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Subject: Proposed Wailuku Well Production Facility and Improvements

Dear Ms. Ng,

Thank you for the opportunity to comment on this project. We have no comments to make at this time.

Please feel free to contact me if you have any questions.

Sincerely,

Jo Anne Johnson Winer

JoAnne Johnson Winer
Director

Maui Electric Company, Ltd.•210 West Kamehameha Avenue•P. O. Box 398•Kahului, Maui, HI 96733-0698•(808) 871-8461

October 9, 2012

Munekiyo & Hiraga, Inc
Attention: Ms. Tessa Munekiyo Ng, Senior Associate
305 High Street, Suite 104
Wailuku, Hawaii 96793

Subject: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements
Tax Map Key: (2) 3-5-001:021 (por.), 091 (por.), and 100 (por.)
Wailuku, Maui, Hawaii

Dear Ms. Ng,

Thank you for allowing us to comment on the Early Consulation Request for the subject project.

In reviewing our records and the information received, Maui Electric Company (MECO) would like to highly encourage the customer's electrical consultant to submit electrical drawings to us as soon as practical to address and coordinate any possible relocations of our facilities. Since this project's anticipated electrical demand may have a substantial impact to our system, we encourage the customer's electrical consultant to submit the electrical demand requirements and project time schedule as soon as practical so that service can be provided on a timely basis. MECO may need to complete system upgrades to accommodate the anticipated electrical load.

Should you have any questions or concerns, please feel free to contact Kelcie Kawamura at 872-3246.

Sincerely,

R. Okazaki

Ray Okazaki
Supervisor, Engineering

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
PRESIDENT

KARLYNN FUKUDA
EXECUTIVE VICE PRESIDENT

GWEN OHASHI HIRAGA
SENIOR VICE PRESIDENT

MITSURU "MICH" HIRANO
SENIOR VICE PRESIDENT

MARK ALEXANDER ROY
VICE PRESIDENT

July 5, 2013

Ray Okazaki, Supervisor
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawaii 96732

SUBJECT Draft Environmental Assessment for the Proposed Wailuku Well Production Facility and Associated Improvements at TMK (2)3-5-001:021 (por.), 091 (por.), and 100 (por.), Wailuku, Maui, Hawaii

Dear Mr. Okazaki:

Thank you for your letter, dated October 9, 2012, providing early consultation comments on the subject project. On behalf of the applicant, County of Maui, Department of Water Supply (DWS), we offer the following information in response to the comment provided.

The DWS and its engineers will coordinate with the Maui Electric Company, Ltd. (MECO) and submit the electrical demand requirements and project time schedule for review.

We appreciate the input provided by your department. A copy of your comment letter will be included in the Draft Environmental Assessment for the proposed project. Should you have any questions, please feel free to contact me at 244-2015.

Sincerely,

Leilani Pulmano
Program Manager

LP:tn
cc: Tom Ochwat, County of Maui, Department of Water Supply
Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
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SEP 13 2012

Hawaiian Telcom

Network Engineering and Planning
OSP Engineering - Maui
60 South Church St.
Wailuku, HI 96793
Phone 808 242-5102
Fax 808 242-8899

September 11, 2012

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

Attention: Tessa Munekiyo Ng, AICP

Subject: Early Consultation Request for Proposed Wailuku Well Production Facility and Associated Improvements, Wailuku, Maui

Dear Tessa,

Thank you for allowing us to review and comment on the subject project. Your plans have been received and put on file.

Hawaiian Telcom, Inc. has no comment, nor do we require any additional information at this time.

Should you require further assistance, please call me at 242-5107.

Sincerely,

Tom Hutchison
OSP Engineer

cc: Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc.
Tom Ochwat, P.E., COM, DWS

BICS File No. 1101-001 (3080)

IX. REFERENCES

IX. REFERENCES

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APPENDIX A.

Wailuku Exploratory Well Summary of Drilling and Well Testing

Wailuku Exploratory Well
State Well No. 5230-04
Summary of Drilling and Well Testing
April 8-April 12, 2013

Prepared For:

Ronald M. Fukumoto Engineering, Inc.
1721 Wili Pa Loop, Suite 203
Wailuku, Hawaii 96793

Prepared By:

Mink and Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96825

April 2013

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FIGURES

TABLES

APPENDICES

Introduction

The Maui Department of Water Supply's new Wailuku Exploratory Well (State Well No. 5230-04) is located at ground elevation of 480± feet above sea level (ft., msl). The surveyed benchmark elevation on top of the southwest corner of the well pad is 480.85 ft., msl. The NAD83 coordinates were determined for the well using a Garmin 60Cx GPS unit are latitude 20° 52' 50.7"N and longitude 156° 30' 30.9"W with an error factor of ±15 ft. Alpha, Inc. under the direction of Dominic Crosariol, P. E., completed the well in November 2012. Figure 1 is a map showing the location of the well.

With the installation of a line-shaft test pump, the well was readied for the step-drawdown and constant rate test that began on November 26, 2012. When the step-drawdown test was performed, the pump engine had difficulty maintaining steady (and targeted) test rates of 700, 1,000, 1,400 gallons per minute (gpm). In fact, the highest rate was never attained. After a recovery period, where the static water level recovered to initial conditions, the 96-hour constant rate test began on November 26 and shut down after only a few hours of pumping. This was due to the failure of the engine to sustain a constant flow rate. The following report is a summary of the second step-drawdown test and the constant rate test that occurred on April 8, 2013 (step-drawdown test) and ended on April 12, 2013 (constant rate test). Figure 2 shows the configuration of the test pump set-up.

A geologic log was compiled from the drill cuttings. The geologic log is attached in Appendix 1. The log shows that the upper 200± feet of the well penetrate colluvial and alluvial sediments. These sediments were deposited by gravity and water, respectively, on the flanks of the West Maui shield volcano. The log shows that from a depth of 225 feet (255 feet above sea level [ft., msl]) the well penetrates the shield-building lavas of the Wailuku Basalt (Stearns and Macdonald, 1942; Clague and Langenheim 1987). These lavas tend to be thin-bedded and highly permeable.

However, during the drilling of the pilot hole, two large voids, possibly lava tubes or cinder pockets, were encountered near the bottom of the design depth of the well (-100 ft., msl). The upper void is from elevation -84 ft., msl to -93 ft., msl. The lower void is from -96 ft., msl to -102 ft., msl. Geological features such as voids and/or lava tubes greatly increase the performance of a well by decreasing drawdown from pumping. Accordingly, the well design was modified by drilling 6 ft. deeper with an 18-inch hammer bit. A 6-foot cement plug was placed to set the casing shoe at -102 ft., msl, as an anchor to the 108 ft. of perforated casing.

During the testing period, Wailuku Shaft 33 was pumping continuously at a rate of 3,450 gpm (Tom Ochwat, Maui DWS, personal communication, April 22, 2013). The underground pump room is about 220 ft. north northeast of the Wailuku Exploratory Well (Ronald Fukumoto, Ronald M. Fukumoto Engineering, Inc., personal communication, April 22, 2013). Assuming steady pumping, the static water levels encountered prior to the step-drawdown constant rate tests were depressed due to the influence of the drawdown cone at the new well site. The combined pumpage within this small area was almost 7 million gallons per day (mgd) over the 96-hour test.

A summary of the construction details of the well and tabulation of pump test results will be submitted by the driller to the Commission on Water Resource Management (CWRM) in the required well completion report. However, below is a summary of the pertinent well data:

- Driller: Alpha, Inc. (Dominic Crosariol, P.E.)
- Ground elevation: 480± ft., msl
- Benchmark elevation: 480.85 ft., msl
- Measuring point elevation: 482.17 ft., msl (top of sounding tube)
- Depth of well from ground: 582± ft.
- Bottom elevation: -102 ft., msl
- Hole diameter: 24 inches (radius 1 ft.)
- Casing diameter: 18 inches ID
- Solid casing length: 471 ft.
- Perforated casing length: 108 ft.

- Depth to water from measuring point: 473.75 ft.
- Static water level elevation: 8.53 ft., msl (April 8, 2013)

Summary of Step-Drawdown Test Results

As mentioned above, a step-drawdown test was performed on November 26, 2012, but the results were inconclusive due to the inability of the pump to maintain a constant rate during each step. However, even at the highest rate, the drawdown was less than 2 ft.

A second step-drawdown test was conducted on April 8, 2013 using Alpha, Inc.'s line-shaft test pump. Three pumping rates (Q_{ave}) of 772 gpm, 1,030 gpm, and 1,570 gpm were run. Each rate lasted one hour while drawdown, water temperature, and water samples were collected. Drawdown stabilized within 10 minutes from the beginning of each rate. After the completion of the step-drawdown test, the well was allowed to recover 90 minutes to within 99 percent of static conditions. The static depth to water measurement used for the constant rate test was 473.72 ft. (8.45 ft., msl) before the start of the 4-day 96-hour constant rate test.

Prior to the step-drawdown test, the static measured water level was 8.53 ft., msl. The drawdowns measured in the well during the test are in relation to this water level. Table 1 below summarizes the measured parameters during the step-drawdown test. The complete record of measurements taken during the step-drawdown test by Alpha, Inc. is shown in Appendix 2.

Table 1

Ave. Pumping Rate (gpm)	Stable Drawdown (ft.)	Field Chloride[1] (mg/L)	Sp. Conductance[2] (µS/cm)	Temperature[3] (°F)
772	1.11	70	354	71.3
1,030	1.63	70	353	70.8
1,570	2.69	70	356	71.6

[1]Hach kit analysis
[2]Average specific conductance
[3]Average temperature

In addition to the field chloride sampling, Maui DWS collected a sample at the beginning of the step-drawdown test and another sample at the end of each rate. These samples were analyzed at their laboratory using EPA's SM4500CL-D method (see Appendix 3). The four analyzed samples had chloride concentrations increasing from 56.8 mg/L to 57.6 mg/L. These are much lower than the Hach test kit chlorides. In fact, all DWS analyzed samples were consistently lower than the field sample analyses.

. As stated above, the well penetrates highly permeable basaltic lava flows of the Wailuku Basalt. These highly permeable lavas are reflected in the well's efficiency and low drawdowns. Figure 3 is a plot of the step-drawdown results of drawdown versus pumping rate. The equation for the straight line is shown. If the equation of the line is cast in the form of combining drawdown (s) as laminar flow, Q, with turbulent flow, Q^2, then the equation is:

$$s = BQ + C\,Q^2$$

To solve for B and C using simultaneous equations by using the first rate (772 gpm or 148,610 ft^3/d) and the last rate (1,570 gpm or 302,225 ft^3/d) yields are:

$$1.11 = B(148{,}610) + C(148{,}610)^2$$

$$2.69 = B(302{,}225) + C(302{,}225)^2$$

So that the drawdown equation becomes:

$$s = 6.084\text{E-}06\,Q + 9.318\text{E-}12\,Q^2$$

Therefore, if the pumping rate is 1,570 gpm or 302,225ft^3/d, the calculated drawdowns due to laminar and turbulent flow are 1.84 ft. and 0.85 ft., respectively. Total drawdown is 2.69 ft. From the laminar (aquifer loss) and turbulent (well loss) flow contributions, 89.9 percent of the drawdown is due to aquifer loss from the highly permeable aquifer, and only 10.1 percent is well loss due to turbulent flow at the well bore. Since turbulent flow is inversely proportional to well efficiency, the Wailuku Exploratory Well is very efficient. In addition, the high pumping rate combined with low drawdown, is indicative of a very permeable aquifer.

The step-drawdown data can be used to calculate the hydraulic conductivity (K) of the aquifer in the vicinity of the well. K, in feet per day (ft/d), is a measure of an aquifer's permeability. High yield basal basaltic aquifers typically have K values greater than 1,000 ft/d. An equation presented in Underwood and others (equation 1, 1995) can be used in a partially penetrating well using the adjusted drawdown data from the step-drawdown test:

$$K = \frac{Q\ln(1.6L/r_w)}{2\pi L s_w}$$

Where: Q is the pumping rate in ft^3/d ($302{,}225 ft^3/d$);
ln is the natural logarithm (base e = 2.7180);
L is the length of the open interval (102 ft);
π is pi, equal to 3.1415;
r_w is the radius of the well in ft. (1 ft.);
s_w is drawdown in pumped well adjusted for well loss (1.84 ft).

Substituting the above values into the equation, a K of 1,306 ft/d is calculated. The equation assumes a well that partially penetrates a much thicker aquifer. A factor of 1.6 times the bottom elevation of the well defines the influence of the well on the aquifer affected, but the actual freshwater thickness of the aquifer is much greater.

The total amount of water pumped during the step-drawdown test was 202,300 gallons. At the end of the step-drawdown test recovery to within 99 percent of static conditions occurred within 90 minutes.

Summary of the 96-Hour Constant Rate Test

The 96-hour constant rate test began at 1:30 pm on April 8 and ended at 1:33 pm on April 12, 2013. The static water level prior to the test was 8.45 ft., msl. Again, all subsequent drawdown measurements are compared to this water level. The pumping rate was set for 1,400± gpm. At the end of the test, 8,031,900 gallons were pumped. The

average pumping rate over the 96 hours was 1,394 gpm or 99 percent of the target rate of 1,400 gpm.

Drawdown data were collected every 30 seconds for the first five minutes, every minute for the first 10 minutes. From 10 minutes to 20 minutes measurements were taken every two minutes. A measurement was taken at 25 minutes, and then every 10 minutes until 100 minutes of elapsed time was reached. After 100 minutes a measurement was taken every hour until 4 pm of April 9, and then every two hours until the end of the test. Field Hach test kit chlorides, specific conductance, and temperature measurements were taken every four hours. Maui DWS chloride samples were taken every 4 hours. AECOS Laboratories, Inc. collected the State DOH mandated EPA samples on April 10, 2013

Table 2 summarizes the measured parameters collected in the field during the 96-hour test. The data were collected by Alpha, Inc. personnel. The field measurements provided by Alpha, Inc. are in Appendix 2.

Table 2

Date	Average Drawdown (ft.)	Average sp. conductance (µS/cm)	Average Field Chloride (mg/L)	Average Temperature (°F)
4/8/13	2.16	351	70	70.2
4/9/13	2.48	355	70	70.5
4/10/13	2.51	354	70	70.3
4/11/13	2.52	353	70	70.5
4/12/13	2.58	352	67.5	70.5

As shown in Table 2, drawdown increased slightly over time. Figure 4 shows how drawdown changed during the duration of the test. Minor variations shown in Appendix 2 are due primarily to atmospheric pressure changes and possibly to ocean tides, but could also be due to slight fluctuation in pumping at Wailuku Shaft 33. The specific conductance remained stable as did temperature. Figure 5 shows changes in the Maui DWS analyzed chloride concentration over time (data from Appendix 3).

However, Figure 6 shows the pattern of chloride change. There is minimum chloride (valley) and then a peak, and back to a valley, though the chlorides increase. The pattern seems to indicate that well interference causes a rise in the chloride concentration. Total increase in chloride concentration during the test was 3.6 mg/L, as shown in Figures 5 and 6.

Wailuku Shaft 33 pumps from one well that has a bottom elevation of -280 ft., msl (information provided by Maui DWS, Commission on Water Resource Management well files). A water sample collected on April 10, 2013 and analyzed by Maui DWS resulted in a chloride value of 78.2 mg/L. Samples collected at the Wailuku Exploratory Well on April 10 ranged between 59.4 and 60.6 mg/L chloride. The bottom elevation of the new well is about 178 ft. shallower than Wailuku Shaft 33.

In addition to the analysis of the aquifer hydraulic conductivity from data collected during the step-drawdown test, the time and drawdown data collected from the constant rate test can be analyzed for aquifer transmissivity and hydraulic conductivity. Appendix 4 shows the analysis by the Cooper and Jacob method of using time and drawdown measurements from Appendix 2. Since the effective "thickness" of the aquifer used in the step-drawdown analysis is 1.6 times the bottom elevation of the well, the same was used in the Cooper and Jacob analysis. The hydraulic conductivity, K, is calculated at 1,400 ft/d and the transmissivity (K times the aquifer thickness) is 246,000 ft^2/d. This K value corresponds well with the 1,306 ft/d obtained from the step-drawdown data. If the thickness of the aquifer is defined by the Ghyben-Herzberg principle, as the mid-point of the transition zone (roughly 40 times the true static water level), and as stated above, then the aquifer's freshwater thickness is greater. However, knowing what the true static water level in the aquifer in the vicinity of the Wailuku Exploratory well is difficult because total pumpage within the Iao Aquifer System creates an aquifer-wide drawdown.

Conclusions

The results from testing show that the Wailuku Exploratory Well is an excellent well and will be a dependable source of potable water for Maui DWS. The well is capable of producing 1,400 gpm with low drawdown. The slight chloride increase seen during the test will either stabilize or decrease once Wailuku Shaft 33 is taken off-line. As stated earlier, the rise in the chlorides was due to Wailuku Shaft 33 continuously pumping almost 5 mgd about 220 ft. from the exploratory well. When all of the Wailuku Shaft replacement wells are drilled and tested, spreading out the withdrawal of groundwater over a larger area will greatly optimize the Iao Aquifer System as a resource and protect it from upconing of more saline water.

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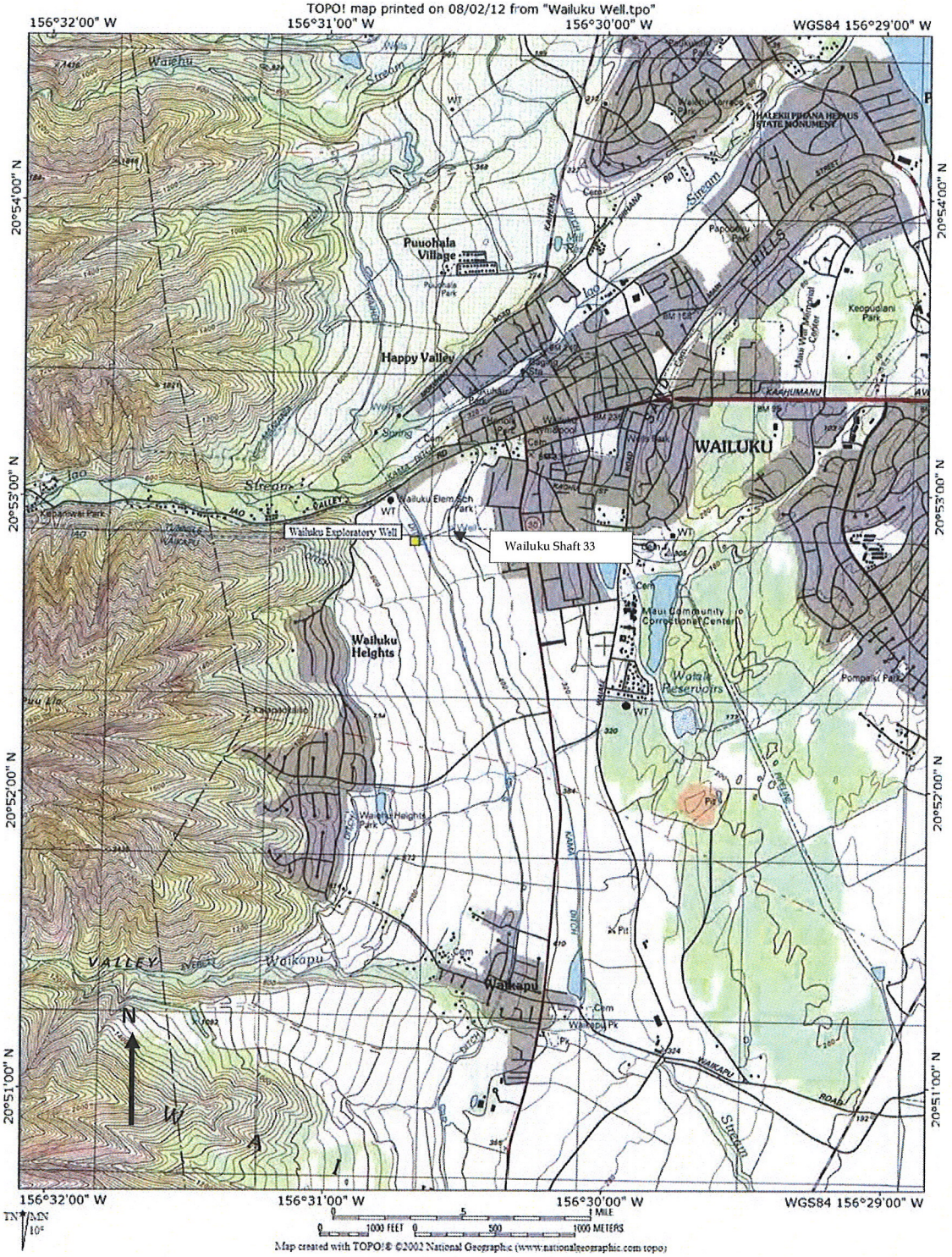


Figure 1: Location Map

Figure 2: Pictures showing the sound-proofing baffle around diesel engine, piping, and right-angle drive with water level sounder and measuring tube.

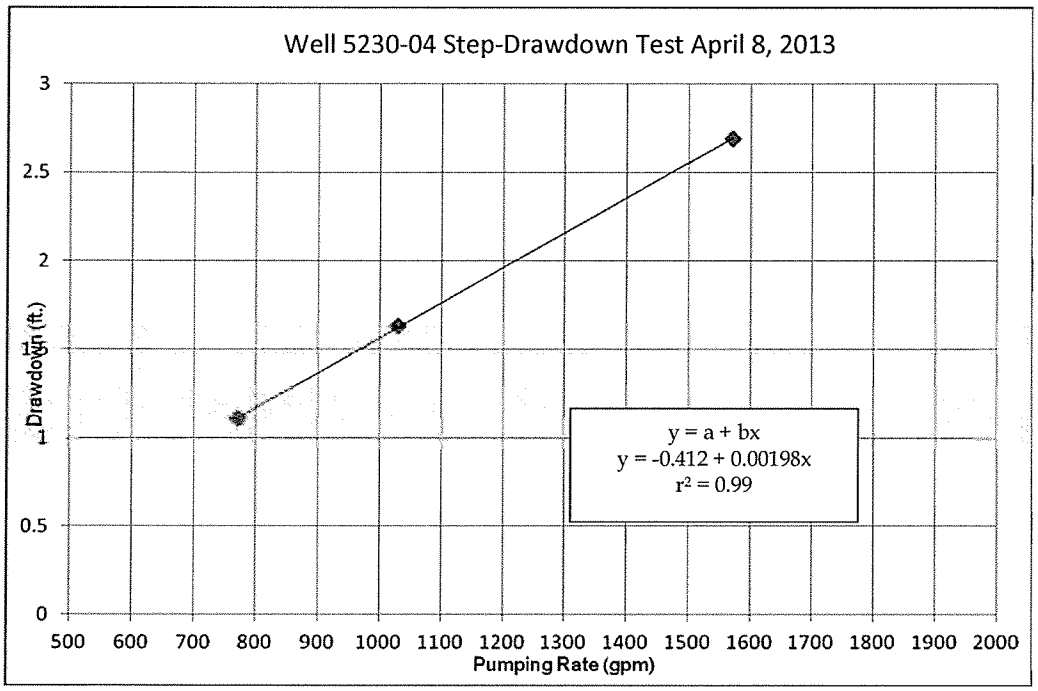


Figure 3: Graph of drawdown versus pumping rate.

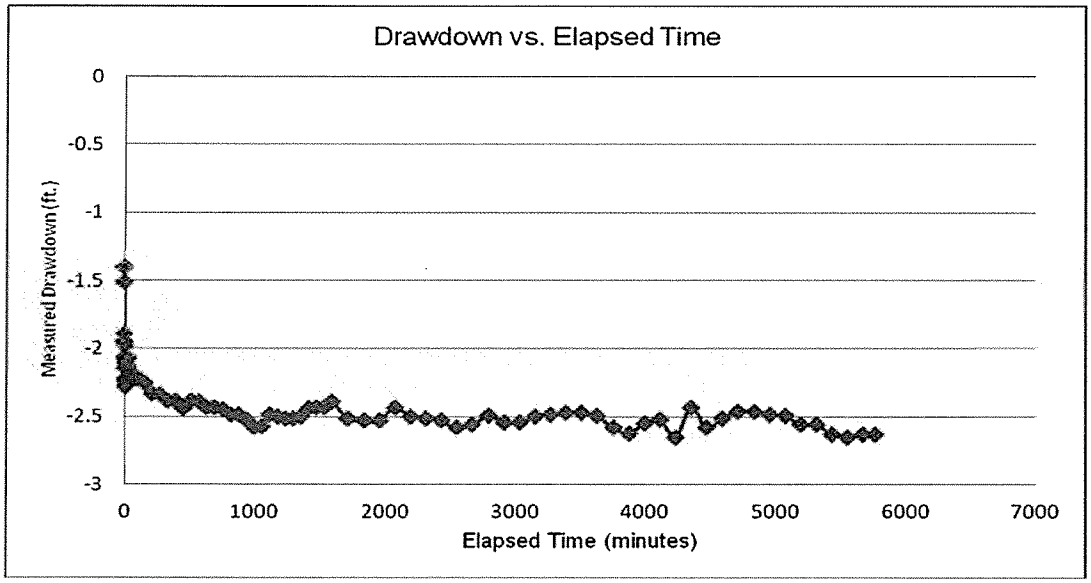


Figure 4: Changes in drawdown during test

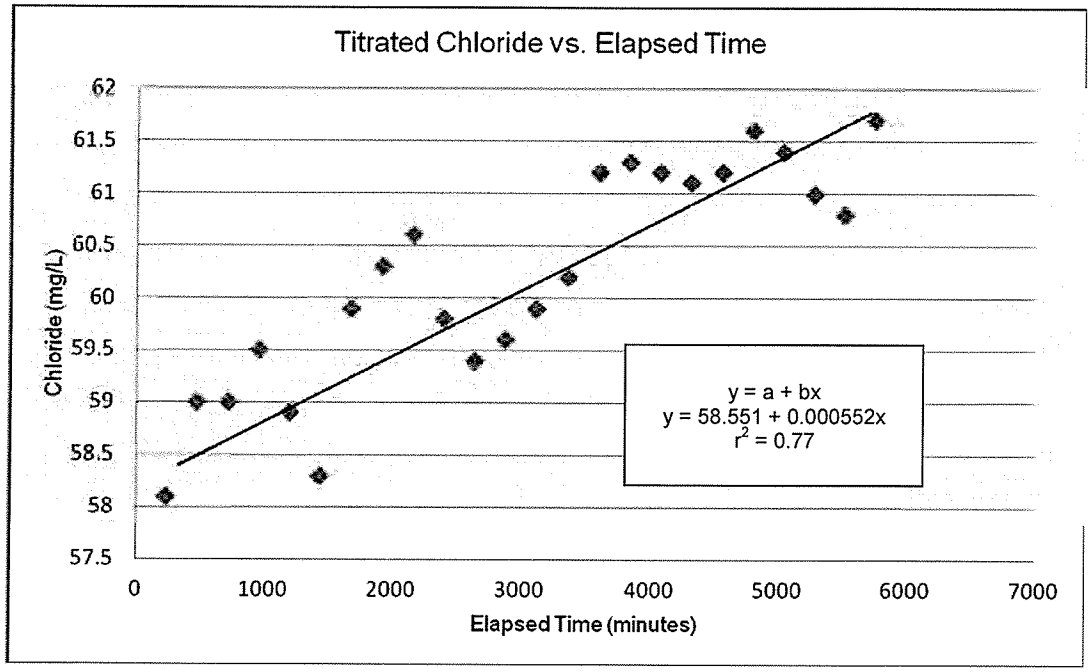


Figure 5: Changes in chloride during constant rate test

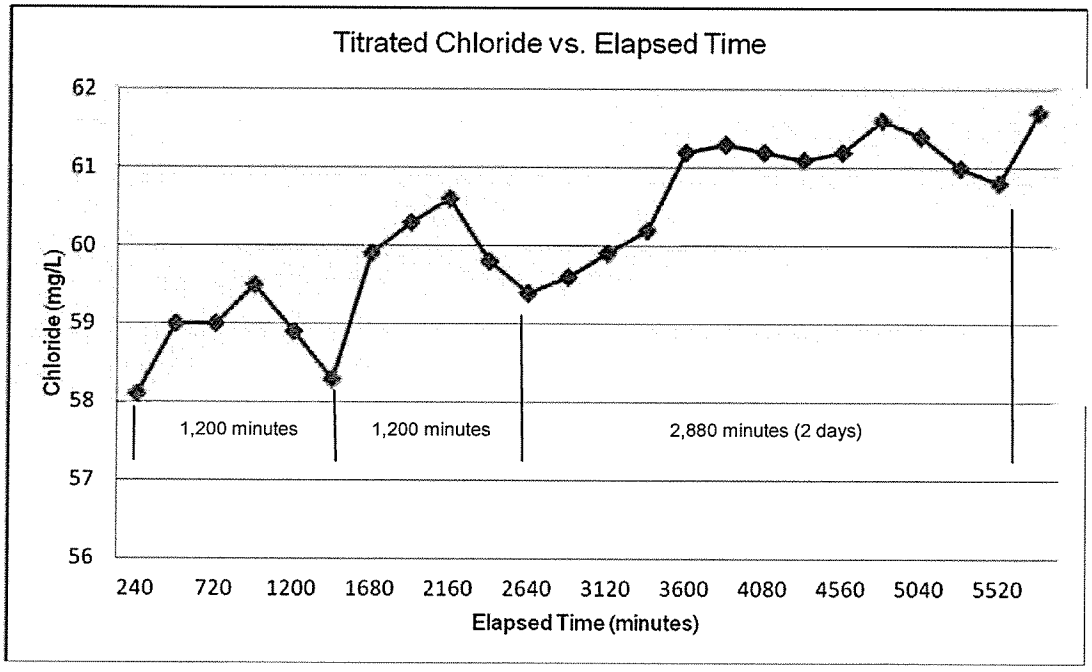


Figure 6: Pattern of chloride change during constant rate test

Appendix 1

Geologic Log

Wailuku Exploratory Well (5234-04)
Geologic Log
By Glenn Bauer, Mink & Yuen, Inc.

Ground Elevation is: 480 ± ft., msl
NAD83 Lat/Long: 20°52'50.7" 156°30'40.9" (Garmin 60Cx GPS)

Depth Interval (ft.)			Elevation (ft., msl)		Description
0	to	60	480 to	420	Dark brown gritty plastic clay
60	to	80	420 to	400	Mixture of very weathered colluvial pebble-size cuttings, some with round vesicles, some coated in Mn, some are dense, non-
80	to	100	400 to	380	Same as above, however a greater proportion of dense non-vescular cuttings
100	to	120	380 to	360	Gray weathered pebble-size cuttings of colluvial material
120	to	165	360 to	315	Same as above, though denser and darker gray. Minor plagioclase phenocrysts present
165	to	200	315 to	280	No sample collected
200	to	225	280 to	255	Same as depth interval 120-165
225	to	250	255 to	230	Dense dark gray cuttings (Wailuku Basalt?)
250	to	275	230 to	205	No sample collected
275	to	300	205 to	180	Slightly weathered gray aphyric aa
300	to	325	180 to	155	No sample collected
325	to	350	155 to	130	Dense dark gray aa containing minor plagioclase feldspar
350	to	375	130 to	105	No sample collected
375	to	400	105 to	80	Slightly weathered grayaphyric pahoehoe transitional to aa
400	to	483	80 to	-3	No sample collected
483	to	508	-3 to	-28	Slightly feldspar-phyric pahoehoe (plagioclase ~10-15%), with minor olivine phenocrysts
508	to	533	-28 to	-53	Same as above, no olivine, some cuttings are scoriaceous
533	to	558	-53 to	-78	Same as above, some cuttings are dense
558	to	583	-78 to	-103	Mixture of feldspar-phyric scoriaceous and dense cuttings and aphyric scoriaceous and dense cuttings

Appendix 2

Field Measurements

09-12 Wailuku Exploratory Well Step Test (Data from Alpha Inc.)

8.53 FEET ABOVE SEA LEVEL BM 480.85 1.32 bottom side of tube

TEST TOTALIZER START READ 1335800 482.17 top of tube

TEST TOTALIZER END READ 01538100

		4/8/2013					
		8:15AM	473.64				
		8:30	473.64				
		8:45	473.64				
		9:00 AM	473.64				
			TEST TOTALIZER START READ				
		RATE 700/GPM	01335800				
ACTUAL ELAPSED TIME			DEPTH TO WATER	PUMPING RATE	EC	CL	TEMP	DRAWDOWN
		:30	474.87	700 GPM				-1.23
		1:00	474.75					-1.11
		2:00	474.55					-0.91
		2:30	474.50					-0.86
		3:30	474.48					-0.84
		4:30	474.55					-0.91
		5:15	474.56					-0.92
		6:15	474.59					-0.95
		7:15	474.60					-0.96
		8:15	474.72					-1.08
		9:15	474.70					-1.06
SAMPLE 1		10:15:00 AM	474.67		356		71.6	-1.03
		12:00	474.65					-1.01
		14:00	474.70					-1.06
		16:00	474.68					-1.04
		18:00	474.74					-1.1
		20:00	474.67			15 DROPS	75PPM	-1.03
		22:00	474.74					-1.1
		24:00	474.67					-1.03
		27:00	474.74					-1.1
		30:00	474.75					-1.11
		35:00	474.75					-1.11
		36:00			354		71.2	
		40:00	474.75					-1.11
		45:00	474.74					-1.1
SAMPLE 2		50:00	474.75		353		71.2	-1.11
		54:00				14 DROPS	70PPM	
		55:00	474.75					-1.11
		60:00	474.75					-1.11

10:00AM

RATE 1000/GPM (average 1030)

ACTUAL ELAPSED TIME		DEPTH TO WATER	PUMPING RATE	EC	CL	TEMP	DRAWDOWN
	1:00	475.30	1000 GPM				-1.66
	2:00	475.25					-1.61
	3:00	475.20					-1.56
	4:00	475.25					-1.61
	4:45	475.25					-1.61
	5:00	475.25					-1.61
	6:00	475.25					-1.61
	7:00	475.24					-1.6
	8:00	475.25					-1.61
	9:00	475.26					-1.62
	10:00	475.27					-1.63
	12:00	475.26		355		71.6	-1.62
	14:00	475.25					-1.61
	16:00	475.22					-1.58
	18:00	475.23					-1.59
	20:00	475.24					-1.6
	25:00	475.24			14 DROPS 70PPM		-1.6
	27:00			352		70.8	
	30:00	475.25					-1.61
	35:00	475.25					-1.61
	40:00	475.25					-1.61
	45:00	475.25					-1.61
SAMPLE 3	50:00	475.25		353		70.7	-1.61
	51:00				15 DROPS 75PPM		
	55:00	475.25					-1.61
	60:00	475.25					-1.61

1:30PM

RATE 1400/GPM (actual 1570/gpm) TEST

ACTUAL ELAPSED TIME	DEPTH TO WATER	PUMPING RATE	EC	CI	TEMP	DRAWDOWN
:30	476.30	1400 GPM				-2.66
1:00	476.24					-2.6
2:00	476.23					-2.59
3:00	476.26					-2.62
4:00	476.24					-2.6
5:00	476.25					-2.61
6:00	476.25					-2.61
7:00	476.26					-2.62
8:00	476.26					-2.62
10:00	476.27					-2.63
12:00	476.27		356		72.1	-2.63
14:00	476.27					-2.63
15:00				14 DROPS 70PPM		
16:00	476.27					-2.63
18:00	476.28					-2.64
20:00	476.28					-2.64

	25:00	476.31				-2.67
	30:00	476.29				-2.65
	35:00	476.31				-2.67
	37:00		356		70.8	
	40:00	476.29				-2.65
	45:00	476.33				-2.69
SAMPLE 4	50:00	476.33				-2.69
	53:00		356		71.9	
	55:00	476.32		14 DROPS 70PPM		-2.68
	60:00	476.32				-2.68

TEST TOTALIZER END READ 01538100

RECOVERY

ACTUAL ELAPSED TIME	DEPTH TO WATER	RECOVERY
1:00	473.05	0.59
2:00	473.55	0.09
2:30	473.52	0.12
3:00	473.63	0.01
4:00	473.57	0.07
5:00	473.58	0.06
6:00	473.91	-0.27
7:00	473.90	-0.26
8:00	473.85	-0.21
9:00	473.87	-0.23
10:00	473.87	-0.23
12:00	473.87	-0.23
14:00	473.87	-0.23
16:00	473.87	-0.23
18:00	473.87	-0.23
20:00	473.85	-0.21
25:00	473.83	-0.19
30:00	473.81	-0.17
35:00	473.80	-0.16
40:00	473.80	-0.16
45:00	473.78	-0.14
50:00	473.77	-0.13
55:00	473.77	-0.13
60:00	473.75	-0.11
70:00	473.74	-0.1
80:00	473.72	-0.08
90:00	473.72	-0.08

09-12 Wailuku Exploratory Well Constant Rate Test (Data from Alpha, Inc.)

4/8/2013
1:30PM DTW = 473.72 STATIC

ACTUAL ELAPSED TIME	DEPTH TO WATER	PUMPING RATE	DRAWDOWN
:30	475.23	1400 GPM	-1.51
1:00	475.12		-1.4
1:30	475.61		-1.89
2:00	475.67		-1.95
2:30	475.7		-1.98
3:00	475.94		-2.22
3:30	475.95		-2.23
4:00	475.96		-2.24
4:30	476.00		-2.28
5:00	475.81		-2.09
6:00	475.87		-2.15
7:00	475.78		-2.06
8:00	475.78		-2.06
9:00	475.79		-2.07
10:00	475.86		-2.14
12:00	475.84		-2.12
14:00	475.84		-2.12
16:00	475.87		-2.15
18:00	475.84		-2.12
20:00	475.87		-2.15
25:00	475.79		-2.07
30:00	475.89		-2.17
40:00	475.89		-2.17
50:00	475.94		-2.22
60:00	475.94		-2.22
70:00	475.94		-2.22
80:00	475.94		-2.22
90:00	475.94		-2.22
100:00	475.94		-2.22

4/8/13

	ACTUAL TIME	DEPTH TO WATER	PUMPING RATE	EC	CL	TEMP	DRAWDOWN
	3:20PM	475.94	1400 GPM				-2.22
	4:00	475.97					-2.25
	5:00	476.05					-2.33
SAMPLE #1	5:30						
	5:32			351		70.7	
	5:34				14 DROPS 70PPM		
	6:00	476.06					-2.34
	7:00	476.10					-2.38
	8:00	476.10					-2.38
	9:00	476.16					-2.44
SAMPLE #2	9:30						
	9:32			351		69.6	

	9:34				14 DROPS 70PPM	
	10:00	476.10				-2.38
	11:00	476.11				-2.39
TUES 4/9/13	12:00AM	476.15				-2.43
	1:00	476.15				-2.43
SAMPLE #3	1:30					
	1:32			354	69.6	
	1:34				14 DROPS 70PPM	
	2:00	476.17				-2.45
	3:00	476.20				-2.48
	4:00	476.20				-2.48
	5:00	476.24				-2.52
SAMPLE #4	5:30					
	5:32			354	69.4	
	5:35				14 DROPS 70PPM	
	6:00	476.30				-2.58
	7:00	476.29				-2.57
	8:00	476.20				-2.48
	9:00	476.22				-2.5
SAMPLE #5	9:30					
	9:32			356	71	
	9:35				14 DROPS 70PPM	
	10:00	476.23				-2.51
	11:00	476.23				-2.51
	12:00PM	476.22				-2.5
	1:00	476.16				-2.44
SAMPLE #6	1:30		TOTALIZER 03546500			
	1:32			357	72.8	
	1:36				14 DROPS 70PPM	
	2:00	476.15				-2.43
	3:00	476.15				-2.43
	4:00	476.11				-2.39
SAMPLE #7	5:30					
	5:32			354	69.3	
	5:33				14 DROPS 70PPM	
	6:00	476.23				-2.51
	8:00	476.25				-2.53
SAMPLE #8	9:30					
	9:32			353	69.9	
	9:35				14 DROPS 70PPM	
	10:00	476.25				-2.53
WED 4/10/13	12:00AM	476.15				-2.43
SAMPLE #9	1:30					
	1:33			355	69.6	
	1:36				14 DROPS 70PPM	
	2:00	476.22				-2.5
	4:00	476.23				-2.51
SAMPLE #10	5:30					
	5:32			354	69.3	
	5:35				14 DROPS 70PPM	
	6:00	476.25				-2.53
	8:00	476.30				-2.58
SAMPLE #11	9:30					

	9:33			355	71.4	
	9:35				14 DROPS 70PPM	
	10:00	476.28				-2.56
	12:00PM	476.21				-2.49
SAMPLE #12	1:30		TOTALIZER 05555500			
	1:32			356	72.4	
	1:36				14 DROPS 70PPM	
	2:00	476.26				-2.54
	4:00	476.26				-2.54
SAMPLE #13	5:30					
	5:35			349	70.3	
	5:38				14 DROPS 70PPM	
	6:00	476.22				-2.5
	8:00	476.20				-2.48
SAMPLE #14	9:30					
	9:32			354	69.8	
	9:35				14 DROPS 70PPM	
	10:00	476.19				-2.47
THURS 4/11/13	12:00AM	476.19				-2.47
SAMPLE #15	1:30					
	1:32			353	69.8	
	1:34				14 DROPS 70PPM	
	2:00	476.21				-2.49
	4:00	476.30				-2.58
SAMPLE #16	5:30					
	5:34			354	69.4	
	5:36				14 DROPS 70PPM	
	6:00	476.34				-2.62
	8:00	476.27				-2.55
SAMPLE #17	9:30					
	9:33			352	70.7	
	9:37				15 DROPS 75PPM	
	10:00	476.24				-2.52
	12:00PM	476.37				-2.65
SAMPLE #18	1:30		TOTALIZER 07561900			
	1:34			354	72.5	
	1:36				14 DROPS 70PPM	
	2:00	476.15				-2.43
	4:00	476.30				-2.58
SAMPLE #19	5:30					
	5:33			352	70.8	
	5:37				13 DROPS 65PPM	
	6:00	476.23				-2.51
	8:00	476.18				-2.46
SAMPLE #20	9:30					
	9:33			351	69.7	
	9:35				14 DROPS 70PPM	
	10:00	476.18				-2.46
FRI 4/12/13	12:00AM	476.20				-2.48
SAMPLE #21	1:30					
	1:32			351	69.5	
	1:35				13 DROPS 65PPM	
	2:00	476.21				-2.49
	4:00	476.28				-2.56

SAMPLE #22	5:30				
	5:33		353	70.5	
	5:35			13 DROPS 65PPM	
	6:00	476.28			-2.56
	8:00	476.35			-2.63
SAMPLE #23	9:30				
	9:32		351	71.4	
	9:35			14 DROPS 70PPM	
	10:00	476.37			-2.65
	12:00	476.35			-2.63
	1:26		351	70.7	
	1:28			14 DROPS 70PPM	
SAMPLE #24	1:30	476.35			-2.63
	1:33	SHUTDOWN			RECOVERY
	1:33	473.54			0.18
	1:34	473.77			-0.05
	1:35	474.07			-0.35
	1:35	474.40			-0.68
	1:36	474.33			-0.61
	1:38	474.32			-0.6
	1:38	474.26			-0.54
	1:40	474.28			-0.56
	1:48	474.26			-0.54

Appendix 3

Maui DWS Analyzed Chloride Samples

614 Palapala Drive
Kahului, Hawaii 96732
Phone: (808) 270 - 7550

Laboratory Hits Report #201311

County of Maui Department of Water Supply-Engineering Division
Attention: Tom Ochwat
200 S High Street
Wailuku HI 96793

Sample #	Sample ID	Sampled on	Analyzed	Method	Analyte	Results	Units
2013040804	Wailuku Exploratory Well	04-08-13 0910	04-11-13	SM4500Cl- D	Chloride	56.8	mg/L
2013040805	Wailuku Exploratory Well	04-08-13 0950	04-11-13	SM4500Cl- D	Chloride	56.9	mg/L
2013040806	Wailuku Exploratory Well	04-08-13 1050	04-11-13	SM4500Cl- D	Chloride	56.9	mg/L
2013040807	Wailuku Exploratory Well	04-08-13 1130	04-11-13	SM4500Cl- D	Chloride	57.6	mg/L
2013040902	Wailuku Exploratory Well	04-08-13 1730	04-11-13	SM4500Cl- D	Chloride	58.1	mg/L
2013040903	Wailuku Exploratory Well	04-08-13 2130	04-11-13	SM4500Cl- D	Chloride	59	mg/L
2013040904	Wailuku Exploratory Well	04-09-13 0130	04-11-13	SM4500Cl- D	Chloride	59.0	mg/L
2013040905	Wailuku Exploratory Well	04-09-13 0530	04-11-13	SM4500Cl- D	Chloride	59.5	mg/L
2013040906	Wailuku Exploratory Well	04-09-13 0930	04-11-13	SM4500Cl- D	Chloride	58.9	mg/L
2013040907	Wailuku Exploratory Well	04-09-13 1330	04-11-13	SM4500Cl- D	Chloride	58.3	mg/L
2013041025	Wailuku Exploratory Well	04-09-13 1730	04-11-13	SM4500Cl- D	Chloride	59.9	mg/L
2013041026	Wailuku Exploratory Well	04-09-13 2130	04-11-13	SM4500Cl- D	Chloride	60.3	mg/L
2013041027	Wailuku Exploratory Well	04-10-13 0130	04-11-13	SM4500Cl- D	Chloride	60.6	mg/L
2013041028	Wailuku Exploratory Well	04-10-13 0530	04-11-13	SM4500Cl- D	Chloride	59.8	mg/L
2013041029	Wailuku Exploratory Well	04-10-13 0930	04-11-13	SM4500Cl- D	Chloride	59.4	mg/L
2013041030	Wailuku Exploratory Well	04-10-13 1330	04-11-13	SM4500Cl- D	Chloride	59.6	mg/L

Step-drawdown test data outlined in box

SUMMARY OF POSITIVE DATA ONLY.

Department of Water Supply
"By Water All Things Find Life"
614 Palapala Drive
Kahului, Hawaii 96732
Phone: (808) 270 - 7550

Laboratory Hits Report #201312

County of Maui Department of Water Supply-Engineering Division
Attention: Tom Ochwat
200 S High Street
Wailuku HI 96793

Sample #	Sample ID	Sampled on	Analyzed	Method	Analyte	Results	Units
Samples received 04-11-13 1500							
2013041112	Wailuku Exploratory Well	04-10-13 1730	04-18-13	SM4500Cl- D	Chloride	59.9	mg/L
2013041113	Wailuku Exploratory Well	04-10-13 2130	04-18-13	SM4500Cl- D	Chloride	60.2	mg/L
2013041114	Wailuku Exploratory Well	04-11-13 0130	04-18-13	SM4500Cl- D	Chloride	61.2	mg/L
2013041115	Wailuku Exploratory Well	04-11-13 0530	04-18-13	SM4500Cl- D	Chloride	61.3	mg/L
2013041116	Wailuku Exploratory Well	04-11-13 0930	04-18-13	SM4500Cl- D	Chloride	61.2	mg/L
2013041117	Wailuku Exploratory Well	04-11-13 1330	04-18-13	SM4500Cl- D	Chloride	61.1	mg/L
Samples received 04-12-13 1410							
2013041202	Wailuku Exploratory Well	04-11-13 1730	04-18-13	SM4500Cl- D	Chloride	61.2	mg/L
2013041203	Wailuku Exploratory Well	04-11-13 2130	04-18-13	SM4500Cl- D	Chloride	61.6	mg/L
2013041204	Wailuku Exploratory Well	04-12-13 0130	04-18-13	SM4500Cl- D	Chloride	61.4	mg/L
2013041205	Wailuku Exploratory Well	04-12-13 0530	04-18-13	SM4500Cl- D	Chloride	61.0	mg/L
2013041206	Wailuku Exploratory Well	04-12-13 0930	04-18-13	SM4500Cl- D	Chloride	60.8	mg/L
2013041207	Wailuku Exploratory Well	04-12-13 1330	04-18-13	SM4500Cl- D	Chloride	61.7	mg/L

SUMMARY OF POSITIVE DATA ONLY.

Appendix 4

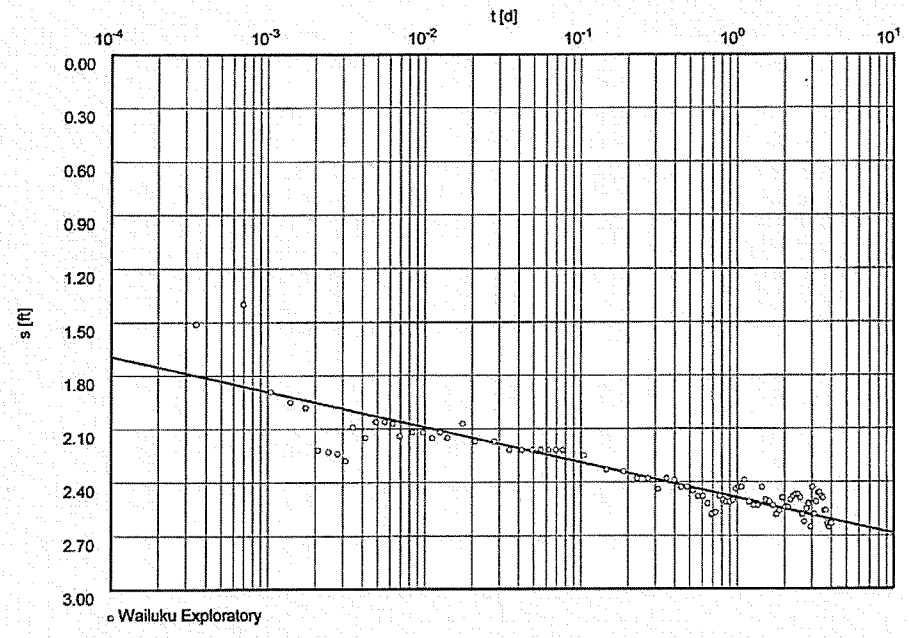
Constant Rate Test Cooper & Jacob

Transmissivity and Hydraulic Conductivity

Calculations

Waterloo Hydrogeologic 160 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Time-Drawdown-method after COOPER & JACOB Confined aquifer	Date: 20.04.2013	Page 1
		Project: Wailuku Exploratory Well	
		Evaluated by: Glenn Bauer	

Pumping Test No. Constant Rate Test	Test conducted on: April 8-12, 2013
State Well No.: 5230-04	
Discharge 1394.00 U.S.gal/min	



Transmissivity [ft²/d]: 2.46×10^{5}

Hydraulic conductivity [ft/d]: 1.40×10^{3}

Aquifer thickness [ft]: 176.00

Storativity: 1.74×10^{-7}

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Time-Drawdown-method after COOPER & JACOB Confined aquifer	Date: 20.04.2013	Page 2
		Project: Wailuku Exploratory Well	
		Evaluated by: Glenn Bauer	

Pumping Test No. Constant Rate Test	Test conducted on: April 8-12, 2013
State Well No. 5230-04	Wailuku Exploratory Well
Discharge 1394.00 U.S.gal/min	Distance from the pumping well 1.00 ft
Static water level: 473.72 ft below datum	

	Pumping test duration [d]	Water level [ft]	Drawdown [ft]	
1	0.00035	475.23	1.51	
2	0.00069	475.12	1.40	
3	0.00104	475.61	1.89	
4	0.00139	475.67	1.95	
5	0.00174	475.70	1.98	
6	0.00208	475.94	2.22	
7	0.00243	475.95	2.23	
8	0.00278	475.96	2.24	
9	0.00312	476.00	2.28	
10	0.00347	475.81	2.09	
11	0.00417	475.87	2.15	
12	0.00486	475.78	2.06	
13	0.00556	475.78	2.06	
14	0.00625	475.79	2.07	
15	0.00694	475.86	2.14	
16	0.00833	475.84	2.12	
17	0.00972	475.84	2.12	
18	0.01111	475.87	2.15	
19	0.01250	475.84	2.12	
20	0.01389	475.87	2.15	
21	0.01736	475.79	2.07	
22	0.02083	475.89	2.17	
23	0.02778	475.89	2.17	
24	0.03472	475.94	2.22	
25	0.04167	475.94	2.22	
26	0.04861	475.94	2.22	
27	0.05556	475.94	2.22	
28	0.06250	475.94	2.22	
29	0.06944	475.94	2.22	
30	0.07639	475.94	2.22	
31	0.10417	475.97	2.25	
32	0.14583	476.05	2.33	
33	0.18750	476.06	2.34	
34	0.22917	476.10	2.38	
35	0.27083	476.10	2.38	
36	0.31250	476.16	2.44	
37	0.35417	476.10	2.38	
38	0.39583	476.11	2.39	
39	0.43750	476.15	2.43	
40	0.47917	476.15	2.43	
41	0.52083	476.17	2.45	
42	0.56250	476.20	2.48	
43	0.60417	476.20	2.48	
44	0.64583	476.24	2.52	
45	0.68750	476.30	2.58	
46	0.72917	476.29	2.57	
47	0.77083	476.20	2.48	
48	0.81250	476.22	2.50	
49	0.85417	476.23	2.51	
50	0.89583	476.23	2.51	

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)748-1798	Pumping test analysis Time-Drawdown-method after COOPER & JACOB Confined aquifer	Date: 20.04.2013	Page 3
		Project: Wailuku Exploratory Well	
		Evaluated by: Glenn Bauer	

Pumping Test No. Constant Rate Test	Test conducted on: April 8-12, 2013
State Well No. 5230-04	Wailuku Exploratory Well
Discharge 1394.00 U.S.gal/min	Distance from the pumping well 1.00 ft

Static water level: 473.72 ft below datum

	Pumping test duration [d]	Water level [ft]	Drawdown [ft]	
51	0.93750	476.22	2.50	
52	0.97917	476.16	2.44	
53	1.02083	476.15	2.43	
54	1.06250	476.15	2.43	
55	1.10417	476.11	2.39	
56	1.18750	476.23	2.51	
57	1.27083	476.25	2.53	
58	1.35417	476.25	2.53	
59	1.43750	476.15	2.43	
60	1.52083	476.22	2.50	
61	1.60417	476.23	2.51	
62	1.68750	476.25	2.53	
63	1.77083	476.30	2.58	
64	1.85417	476.28	2.56	
65	1.93750	476.21	2.49	
66	2.02083	476.26	2.54	
67	2.10417	476.26	2.54	
68	2.18750	476.22	2.50	
69	2.27083	476.20	2.48	
70	2.35417	476.19	2.47	
71	2.43750	476.19	2.47	
72	2.52083	476.21	2.49	
73	2.60417	476.30	2.58	
74	2.68750	476.34	2.62	
75	2.77083	476.27	2.55	
76	2.85417	476.24	2.52	
77	2.93750	476.37	2.65	
78	3.02083	476.15	2.43	
79	3.10417	476.30	2.58	
80	3.18750	476.23	2.51	
81	3.27083	476.18	2.46	
82	3.35417	476.18	2.46	
83	3.43750	476.20	2.48	
84	3.52083	476.21	2.49	
85	3.60417	476.28	2.56	
86	3.68750	476.28	2.56	
87	3.77083	476.35	2.63	
88	3.85417	476.37	2.65	
89	3.93750	476.35	2.63	
90	4.00000	476.35	2.63	

APPENDIX B.

Summary of Water Quality Test Results

SUMMARY OF LABORATORY TEST RESULTS								
No.	**Category**	**Contaminant**	**Max. Contam. Level (MCL)**	**Unit**	**Test Date**	**Re-sults**	**Unit**	**Re-marks**
1	Microbiological	Total Coliform Bacteria	For 40 or more samples per month: No more than 5.0% of the samples positive For less than 40 samples per month: no more than 1 sample per month positive	(none)	4/10/13	Nega-tive	(none)	OK
2	Microbiological	Fecal Coliform or E. coli Bacteria	Acute violation when: total coliform positive routine is flowed by a fecal coliform of E. coli positive repeat or a fecal coliform or E. Coli positive routine is followed by a total coliform positive repeat	(none)	4/10/13	Nega tive	(none)	OK
3	Inorganic Chemicals	Arsenic	0.01	mg/l	4/16/13	Not De-tected (ND)	mg/l	OK
4	Inorganic Chemicals	Asbestos	7	million fibers per liter longer than 10 Mm	4/22/13	ND	million fibers per liter longer than 10 Mm	OK
5	Inorganic Chemicals	Barium	2	mg/l	4/16/13	0.0053	mg/l	OK
6	Inorganic Chemicals	Cadmium	0.005	mg/l	4/16/13	ND	mg/l	OK
7	Inorganic Chemicals	Chromium	0.1	mg/l	4/16/13	0.0019	mg/l	OK
8	Inorganic Chemicals	Copper (Action Level)	1.3	mg/l	4/16/13	ND	mg/l	OK
9	Inorganic Chemicals	Lead (Action Level)	0.015	mg/l	4/16/13	ND	mg/l	OK
10	Inorganic Chemicals	Mercury	0.002	mg/l	4/17/13	ND	mg/l	OK
11	Inorganic Chemicals	Nickel	(None)	mg/l	4/16/13	ND	mg/l	OK
12	Inorganic Chemicals	Nitrate (as Nitrogen)	10	mg/l	4/11/13	1.24	mg/l	OK

SUMMARY OF LABORATORY TEST RESULTS								
No.	**Category**	**Contaminant**	**Max. Contam. Level (MCL)**	**Unit**	**Test Date**	**Re-sults**	**Unit**	**Re-marks**
13	Inorganic Chemicals	Nitrite (as Nitrogen)	1	mg/l	4/11/13	ND	mg/l	OK
14	Inorganic Chemicals	Total Nitrate & Nitrite (as Nitrogen)	10	mg/l	4/11/13	1.24	mg/l	OK
15	Inorganic Chemicals	Selenium	0.05	mg/l	4/16/13	ND	mg/l	OK
16	Inorganic Chemicals	Fluoride	4.0	mg/l	4/23/13	0.078	mg/l	OK
17	Inorganic Chemicals	Antimony	0.006	mg/l	4/16/13	ND	mg/l	OK
18	Inorganic Chemicals	Beryllium	0.004	mg/l	4/16/13	ND	mg/l	OK
19	Inorganic Chemicals	Cyanide (as free Cyanide)	0.2	mg/l	4/18/13	ND	mg/l	OK
20	Inorganic Chemicals	Thallium	0.002	mg/l	4/16/13	ND	mg/l	OK
21	Disinfection ByProducts (only Subpart H & P systems with population > 10,000 until 1/1/04)	Total trihalome - thanes (sum of chloroform, bromoform, bromodichloro-methane, dibro-mochlorome-thane)	0.080	mg/l	Not Tested (NT)		mg/l	
22	Disinfection ByProducts (only Subpart H & P systems with population > 10,000 until 1/1/04)	Total Haloacetic Acids (sum of mono-, di-, trichloroacetic acids and mono- and dibromoa-cetic acids	0.060	mg/l	NT		mg/l	
23	Disinfection ByProducts (only Subpart H & P systems with population > 10,000 until 1/1/04)	Chlorite (usually formed under ClO_2 use)	1.0	mg/l	NT		mg/l	
24	Disinfection ByProducts (only Subpart H & P systems with population > 10,000 until 1/1/04)	Bromate (brominated waters using ozone)	0.010	mg/l	NT		mg/l	
25	Radionuclides	Combined Radium 226 and Radium 228	5	pCi/l	5/18/13	ND	pCi/l	OK
26	Radionuclides	Gross alpha	15	pCi/l	4/19/13	ND	pCi/l	OK

SUMMARY OF LABORATORY TEST RESULTS								
No.	**Category**	**Contaminant**	**Max. Contam. Level (MCL)**	**Unit**	**Test Date**	**Re-sults**	**Unit**	**Re-marks**
27	Radionuclides	Gross beta	50 (screening level)	pCi/l	4/19/13	ND	pCi/l	OK
28	Radionuclides	Uranium	30	µg/l	4/16/13	ND	µg/l	OK
29	Organic Chemicals Volatile Organic Chemicals	Benzene	0.005	mg/l	4/16/13	ND	mg/l	OK
30	Organic Chemicals Volatile Organic Chemicals	Carbon Tetrachloride	0.005	mg/l	4/16/13	ND	mg/l	OK
31	Organic Chemicals Volatile Organic Chemicals	Chlorobenzene	(None)	mg/l	4/16/13	ND	mg/l	OK
32	Organic Chemicals Volatile Organic Chemicals	o-Dichlorobenzene	0.6	mg/l	4/16/13	ND	mg/l	OK
33	Organic Chemicals Volatile Organic Chemicals	para-Dichlorobenzene	0.075	mg/l	4/16/13	ND	mg/l	OK
34	Organic Chemicals Volatile Organic Chemicals	1,2-Dichloroethane	0.005	mg/l	4/16/13	ND	mg/l	OK
35	Organic Chemicals Volatile Organic Chemicals	1,1-Dichloroethylene	0.007	mg/l	4/16/13	ND	mg/l	OK
36	Organic Chemicals Volatile Organic Chemicals	cis-1,2-Dichloroethylene	0.07	mg/l	4/16/13	ND	mg/l	OK
37	Organic Chemicals Volatile Organic Chemicals	trans-1,2-Dichloroethylene	0.1	mg/l	4/16/13	ND	mg/l	OK
38	Organic Chemicals Volatile Organic Chemicals	DCP (1,2-Dichloropropane)	0.005	mg/l	4/16/13	ND	mg/l	OK
39	Organic Chemicals Volatile Organic Chemicals	Ethylbenzene	0.7	mg/l	4/16/13	ND	mg/l	OK
40	Organic Chemicals Volatile Organic Chemicals	Styrene	0.1	mg/l	4/16/13	ND	mg/l	OK
41	Organic Chemicals Volatile Organic Chemicals	Tetrachloroethy-lene	0.005	mg/l	4/16/13	ND	mg/l	OK
42	Organic Chemicals Volatile Organic Chemicals	Toluene	1	mg/l	4/16/13	ND	mg/l	OK
43	Organic Chemicals Volatile Organic Chemicals	1,1,1-Trichloroethane	0.2	mg/l	4/16/13	ND	mg/l	OK

SUMMARY OF LABORATORY TEST RESULTS								
No.	**Category**	**Contaminant**	**Max. Contam. Level (MCL)**	**Unit**	**Test Date**	**Re-sults**	**Unit**	**Re-marks**
44	Organic Chemicals Volatile Organic Chemicals	Trichloroethylene	0.005	mg/l	4/16/13	ND	mg/l	OK
45	Organic Chemicals Volatile Organic Chemicals	TCP (1,2,3-Trichloroprop-ane)	0.0006	mg/l	4/16/13	ND	mg/l	OK
46	Organic Chemicals Volatile Organic Chemicals	Vinyl Chloride	0.002	mg/l	4/16/13	ND	mg/l	OK
47	Organic Chemicals Volatile Organic Chemicals	Xylenes (total)	10	mg/l	4/16/13	ND	mg/l	OK
48	Organic Chemicals Volatile Organic Chemicals	Dichloromethane	0.005	mg/l	4/16/13	ND	mg/l	OK
49	Organic Chemicals Volatile Organic Chemicals	1,2,4-Trichlorobezene	0.07	mg/l	4/16/13	ND	mg/l	OK
50	Organic Chemicals Volatile Organic Chemicals	1,1,2-Trichloroethane	0.005	mg/l	4/16/13	ND	mg/l	OK
51	Organic Chemicals Synthetic Organic Chemicals	Alachlor	0.002	mg/l	4/16/13	ND	mg/l	OK
52	Organic Chemicals Synthetic Organic Chemicals	Aldicarb	0.003	mg/l	4/18/13	ND	mg/l	OK
53	Organic Chemicals Synthetic Organic Chemicals	Aldicarb Sulfone	0.002	mg/l	4/18/13	ND	mg/l	OK
54	Organic Chemicals Synthetic Organic Chemicals	Aldicarb Sulfoxide	0.004	mg/l	4/18/13	ND	mg/l	OK
55	Organic Chemicals Synthetic Organic Chemicals	Atrazine	0.003	mg/l	5/2/13	ND	mg/l	OK
56	Organic Chemicals Synthetic Organic Chemicals	Carbofuran	0.04	mg/l	4/18/13	ND	mg/l	OK
57	Organic Chemicals Synthetic Organic Chemicals	Chlordane	0.002	mg/l	4/16/13	ND	mg/l	OK
58	Organic Chemicals Synthetic Organic Chemicals	DBCP (Dibro-mochloropro-pane)	0.00004	mg/l	4/17/13	ND	mg/l	OK
59	Organic Chemicals Synthetic Organic Chemicals	2,4-D	0.07	mg/l	4/17/13	ND	mg/l	OK
60	Organic Chemicals Synthetic Organic Chemicals	EDB (Ethylene Dibromide)	0.00004	mg/l	4/17/13	ND	mg/l	OK

SUMMARY OF LABORATORY TEST RESULTS								
No.	**Category**	**Contaminant**	**Max. Contam. Level (MCL)**	**Unit**	**Test Date**	**Re-sults**	**Unit**	**Re-marks**
61	Organic Chemicals Synthetic Organic Chemicals	Heptachlor	0.0004	mg/l	4/16/13	ND	mg/l	OK
62	Organic Chemicals Synthetic Organic Chemicals	Heptachlor Epoxide	0.0002	mg/l	4/16/13	ND	mg/l	OK
63	Organic Chemicals Synthetic Organic Chemicals	Lindane	0.0002	mg/l	4/16/13	ND	mg/l	OK
64	Organic Chemicals Synthetic Organic Chemicals	Methoxychlor	0.04	mg/l	4/16/13	ND	mg/l	OK
65	Organic Chemicals Synthetic Organic Chemicals	Polychlorinated Biphenyls (PCBs)	0.005	mg/l	4/16/13	ND	mg/l	OK
66	Organic Chemicals Synthetic Organic Chemicals	Pentachloro-phenol	0.001	mg/l	4/17/13	ND	mg/l	OK
67	Organic Chemicals Synthetic Organic Chemicals	Toxaphene	0.003	mg/l	4/16/13	ND	mg/l	OK
68	Organic Chemicals Synthetic Organic Chemicals	2,4,5-TP (Silvex)	0.05	mg/l	4/17/13	ND	mg/l	OK
69	Organic Chemicals Synthetic Organic Chemicals	Benzo(a)pyrene	0.0002	mg/l	5/2/13	ND	mg/l	OK
70	Organic Chemicals Synthetic Organic Chemicals	Dalapon	0.2	mg/l	4/17/13	ND	mg/l	OK
71	Organic Chemicals Synthetic Organic Chemicals	Di(2-ethylhexyl) adipate	0.4	mg/l	5/2/13	ND	mg/l	OK
72	Organic Chemicals Synthetic Organic Chemicals	Di(2-ethylhexyl) phthalate	0.006	mg/l	5/2/13	ND	mg/l	OK
73	Organic Chemicals Synthetic Organic Chemicals	Dinoseb	0.007	mg/l	4/17/13	ND	mg/l	OK
74	Organic Chemicals Synthetic Organic Chemicals	Diquat	0.02	mg/l	4/16/13	ND	mg/l	OK
75	Organic Chemicals Synthetic Organic Chemicals	Endothall	0.1	mg/l	4/19/13	ND	mg/l	OK
76	Organic Chemicals Synthetic Organic Chemicals	Endrin	0.002	mg/l	4/16/13	ND	mg/l	OK
77	Organic Chemicals Synthetic Organic Chemicals	Glyphosate	0.7	mg/l	4/16/13	ND	mg/l	OK

SUMMARY OF LABORATORY TEST RESULTS								
No.	**Category**	**Contaminant**	**Max. Contam. Level (MCL)**	**Unit**	**Test Date**	**Re-sults**	**Unit**	**Re-marks**
78	Organic Chemicals Synthetic Organic Chemicals	Hexachloro-benzene	0.001	mg/l	4/23/13	ND	mg/l	OK
79	Organic Chemicals Synthetic Organic Chemicals	Hexachlorocyc-lopentadiene	0.05	mg/l	5/2/13	ND	mg/l	OK
80	Organic Chemicals Synthetic Organic Chemicals	Oxamyl (Vydate)	0.2	mg/l	4/18/13	ND	mg/l	OK
81	Organic Chemicals Synthetic Organic Chemicals	Picloram	0.5	mg/l	4/17/13	ND	mg/l	OK
82	Organic Chemicals Synthetic Organic Chemicals	Simazine	0.004	mg/l	5/2/13	ND	mg/l	OK
83	Organic Chemicals Synthetic Organic Chemicals	2,3,7,8-TCDD (Dioxin)	3 X 10 -8	mg/l	4/24/13	ND	mg/l	OK
84	Water Quality Parameters	Alkalinity	Not Applicable (N/A)	mg/l	4/16/13	74	mg/l	
85	Water Quality Parameters	Calcium	N/A	mg/l	4/16/13	23	mg/l	
86	Water Quality Parameters	Chlorine Resi-dual	N/A		NT			
87	Water Quality Parameters	Conductivity	N/A		4/16/13	390	um-ho/cm	
88	Water Quality Parameters	pH (field meas-urement)	6.5-8.5		4/10/13	6.71		
89	Water Quality Parameters	Temperature (field measure-ment)	N/A	degrees F	4/10/13	71.8	degrees F	
90	Water Quality Parameters	Turbidity	5	NTU	4/11/13	0.54	NTU	OK

AECOS, Inc.

45-939 Kamehameha Hwy., Room 104 • Kaneohe, HI 96744
Telephone: (808) 234-7770 • Fax: (808) 234-7775

CLIENT: Mink & Yuen, Inc.
1670 Kalakaua Ave. Suite 605
Honolulu HI 96826
ATTENTION: George Yuen ☎943-1822

FILE No.:	457
REPORT DATE:	05/29/13
PAGE:	1 of 4

AECOS REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: Potable well water
DATE SAMPLED: 04/10/13

AECOS LOG No.: 29062
DATE RECEIVED: 04/10/13
Sampled by: C. Linebaugh

SAMPLE ID ⇨ / ANALYTE ⇩	Wailuku Exploratory Well	Method Number	Reporting Limit	Analysis Date Analyst ID
Temperature (°C)	22.1	SM2550B	0.1	field
pH	6.71	SM4500H+	0.01	field
Turbidity (NTU)	0.54	EPA 180.1 Rev 2.0	0.01	04/11/13 ml
Nitrate (mg/L)	1.24	EPA 353.2	0.0500	04/11/13 TA
Nitrite (mg/L)	<0.0500	EPA 353.2	0.0500	04/11/13 TA
Chloride (mg/L)	62	EPA 300.0	2	04/15/13 EEA
Alkalinity (mg CaCO3/L)	74	SM2320B	2	04/16/13 EEA
Conductivity (µmho/cm)	390	SM2510B	2	04/16/13 EEA
Fluoride (mg/L)	0.078	SM4500 F-C	0.05	04/23/13 EEA
Cyanide (mg/L)	<0.025	SM4500 CN-F	0.025	04/18/13 EEA
Calcium (mg/L)	23	200.7	1	04/15-16/13 EEA
Antimony (µg/L)	<1	200.8	1	04/15-16/13 EEA
Arsenic (µg/L)	<1	200.8	1	04/15-16/13 EEA
Barium (µg/L)	5.3	200.8	2	04/15-16/13 EEA
Beryllium (µg/L)	<1	200.8	1	04/15-16/13 EEA
Cadmium (µg/L)	<0.5	200.8	0.5	04/15-16/13 EEA
Chromium (µg/L)	1.9	200.8	1	04/15-16/13 EEA
Copper (µg/L)	<2	200.8	2	04/15-16/13 EEA
Lead (µg/L)	<0.5	200.8	0.5	04/15-16/13 EEA
Mercury (µg/L)	<0.2	245.1	0.2	04/16-17/13 EEA
Nickel (µg/L)	<5	200.8	5	04/15-16/13 EEA
Selenium (µg/L)	<5	200.8	5	04/15-16/13 EEA
Thallium (µg/L)	<1	200.8	1	04/15-16/13 EEA

J. Mello, Laboratory Director

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FILE No.:	457
REPORT DATE:	05/29/13
PAGE:	2 of 4

AECOS REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: Potable well water
DATE SAMPLED: 04/10/13
***AECOS* LOG No.:** 29062
DATE RECEIVED: 04/10/13

SAMPLE ID ⇨ / ANALYTE ⇩	Wailuku Exploratory Well	Method Number	Reporting Limit	Analysis Date Analyst ID
Glyphosate (µg/L)	<6	547	6	04/16/13 EEA
Endothall (µg/L)	<5	548.1	5	04/16-19/13 EEA
2,3,7,8-TCDD 1613 (Dioxin) pg/L	<5	1613B	5	04/19-24/13 EEA
DBCP (Dibromo-chloropropane) (µg/L)	<0.01	EPA 504.1	0.01	04/17/13 EEA
EDB (Etheylene Dibromide / 1,2-Dibromoethane) (µg/L)	<0.01	EPA 504.1	0.01	04/17/13 EEA
Diquat (µg/L)	<0.4	EPA 549.2	0.4	04/12-16/13 EEA
Organochlorine Pesticides/PCBs (µg/L)	ND	EPA 505	Refer to EEA report	04/15-16/13 EEA
Chlorophenoxy Herbicides (µg/L)	ND	EPA 515.4	Refer to EEA report	04/16-17/13 EEA
Volatile Organic Compounds (µg/L)	ND	EPA 524.2	Refer to EEA report	04/16/13 EEA
Semivolatile Organic Compounds (µg/L)	ND	EPA 525.2	Refer to EEA report	04/23/13-05/02/13 EEA
Aldicarbs (µg/L)	ND	EPA 531.2	0.5	04/18/13 EEA
Asbestos (MFL)	<0.2	EPA 100.2	0.2	04/12-22/13 EEA

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FILE No.:	457
REPORT DATE:	05/29/13
PAGE:	3 of 4

AECOS REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: Potable well water
DATE SAMPLED: 04/10/13
***AECOS* LOG No.:** 29062
DATE RECEIVED: 04/10/13

SAMPLE ID ⇨ / ANALYTE ⇩	Wailuku Exploratory Well	Method Number	Reporting Limit	Analysis Date Analyst ID
Gross Alpha (pCi/L)	<3	EPA 900.0	3	04/15-19/13 EEA
Gross Beta (pCi/L)	<3	EPA 900.0	3	04/15-19/13 EEA
Uranium (µg/L)	<1	EPA 200.8	1	04/15-16/13 EEA
Uranium (pCi/L)	<0.7	EPA 200.8	0.7	04/17/13 EEA
Radium 228 (pCi/L)	<1	RA 228 – GA	1	04/25/13-05/18/13 EEA
Radium 226 (pCi/L)	<1	RA 226 - GA	1	04/25/13-05/18/13 EEA

Test America Work Order Number: HWD0045
MWH Laboratories Report Number: 431199

CLIENT:	Mink & Yuen, Inc. 1670 Kalakaua Ave. Suite 605 Honolulu HI 96826
ATTENTION:	George Yuen ☎943-1822

FILE No.:	457
REPORT DATE:	05/29/13
PAGE:	4 of 4

AECOS REPORT OF MICROBIOLOGICAL RESULTS

SAMPLE TYPE: Well water (new source) **AECOS LOG No.:** 29062

DATE SAMPLED: 04/10/13 **METHOD** Idexx Colisure (SM9223B)

DATE/TIME RECEIVED: 04/10/13 @2018 **SAMPLER:** C. Linebaugh

TEMPERATURE CONTROL: 5.5 °C **MATRIX:** drinking water

CHLORINE RESIDUAL: ---

Analysis Date 04/10/13 @2025 **Analyst:** C. Linebaugh

ANALYTE (UNITS)		Total Coliforms (Present / Absent)	E Coli (Present / Absent)	
SAMPLE ID ⇩	TIME SAMPLED ⇩			
Wailuku Exploratory Well	1357	Absent	Absent	

AECOS, Inc.

45-939 Kamehameha Highway Suite 104
Kaneohe, Oahu, HI 96744
Tel: (808) 234-7770 Fax: 234-7775

Wailuku Exploratory Well

CHAIN OF CUSTODY FORM

NEW SOURCE - Page 1 of 2

PROJECT FILE No.: Wailuku Exp Well [redacted]

LOG NUMBER: 029062

CLIENT: Mink + Yuen
ADDRESS:

CONTACT: George Yuen
PHONE No.: ☎
Purchase Order No.:

☐ RUSH
☐ SEE REVERSE

SPECIAL INSTRUCTIONS

	☑	SAMPLE ID	SAMPLED DATE	TIME	SAMPLE TYPE	CONTAINER(S)		REQUESTED ANALYSES	PRESERVATION
1		WEW	4-10-13	1340	Potable water	1	1L poly	Diquat	None/chill
2				1358	Potable water	3	40ml glass	EDB/DBCP (EPA 504)	None/chill
3				1402	Potable water	3(+2)	40ml glass	VOASDWA (EPA 524-VOCs) *(+ TRIP BLANKS)*	HCl/chill
4				1341	Potable water	2	1L glass	EPA 525	HCl/chill
5				1404	Potable water	2	40ml glass	EPA 531.2	KH2Citrate/chill
6				1406	Potable water	2	125ml glass	EPA 515.4	Sulfite/chill
7				1418	Potable water	4	40ml glass	EPA 505	Thio/chill
8				1345	Potable water	1	250ml glass	Endothal	None/chill
9				1415	Potable water	1	125ml glass	Glyphosate	None/chill
10				1343	Potable water	2	1L glass	Dioxin EPA 1613 (D1613EDD)	None/chill

CLIENTS PROVIDING SAMPLES TO THE LABORATORY SHOULD COMPLETE AS MUCH OF THE ABOVE FORM AS POSSIBLE. NOTE: NAME AND DATED SIGNATURE OF PERSON COLLECTING THE SAMPLE MUST BE ENTERED BELOW ↓. INFORMATION REQUESTED IN SHADED BOXES ABOVE TO BE FILLED IN BY THE LABORATORY.

SAMPLED BY: DATE 4-10-13 20	RECEIVED BY: DATE 20	RECEIVED FOR LABORATORY: DATE 4-10-13 20
PRINT NAME: Chad Lindsay 2018	SIGNATURE: TIME	SIGNATURE: TIME 2018
RELINQUISHED: DATE 20	RELINQUISHED: DATE 20	RELINQUISHED: DATE 20
SIGNATURE: TIME	SIGNATURE OR INITIALS: TIME	SIGNATURE OR INITIALS: TIME
COMMENTS:	PRECAUTIONS:	DISPOSAL:

USE (BLACK) INK

RETURN SAMPLE TO CLIENT ☐

AECOS, Inc.

45-939 Kamehameha Highway Suite 104
Kaneohe, Oahu, HI 96744
Tel: (808) 234-7770 Fax: 234-7775

CHAIN OF CUSTODY FORM

NEW SOURCE – April 2008 – Page 2 of 2

PROJECT FILE No. Wailuku Exp. Well [redacted]

LOG NUMBER 25262

CLIENT: Mink + Yuen

ADDRESS:

CONTACT:

PHONE No.: ☎

Purchase Order No.:

☐ RUSH
☐ SEE REVERSE

SPECIAL INSTRUCTIONS

	☑	SAMPLE ID	DATE SAMPLED	TIME	SAMPLE TYPE	CONTAINER(S)		REQUESTED ANALYSES	PRESERVATION
1		WEU	4-10-17	1351	Potable water	1	250ml poly	Cyanide ✓	NaOH/AA/chill
2				1350	Potable water	1	500ml poly	Metals(Sb, As, Ba, Be, Ca, Cd, Cr, Cu, Pb, Hg, Ni, Se, Tl,Ur) ✓	HNO3/chill
3				1354	Potable water	1	~~125ml~~ 500 poly	Fluoride, Conductivity, Chloride ✓	None/chill
4				1352	Potable water	1	250ml poly	Alkalinity ✓	None/chill
5				1345	Potable water	1	1L poly	Asbestos ✓	None/Chill
6				1354	Potable water	1	~~500ml~~ 125 poly	Nitrate, Nitrite	None/chill
7				1347	Potable water	1 3	~~250~~ ml poly 1L poly	RAD (Gross Alpha & Beta) ✓ + 500 ml	none/chill HNO3/chill
8				1348	Potable Water	1	500ml poly	Total Alpha Radium ✓	HNO3/Chill
9				1357	Potable Water	2	~~250~~ ml poly Idexx	Total Coliforms, *E. Coli* ✓	Sodium thio/chill
10				1355	Potable Water	~~2~~ 1	250 ml poly 500ml poly	Turbidity, Field Temp., Field pH ✓	None/Chill

CLIENTS PROVIDING SAMPLES TO THE LABORATORY SHOULD COMPLETE AS MUCH OF THE ABOVE FORM AS POSSIBLE. NOTE: NAME AND DATED SIGNATURE OF PERSON COLLECTING THE SAMPLE MUST BE ENTERED BELOW ↓. INFORMATION REQUESTED IN SHADED BOXES ABOVE TO BE FILLED IN BY THE LABORATORY.

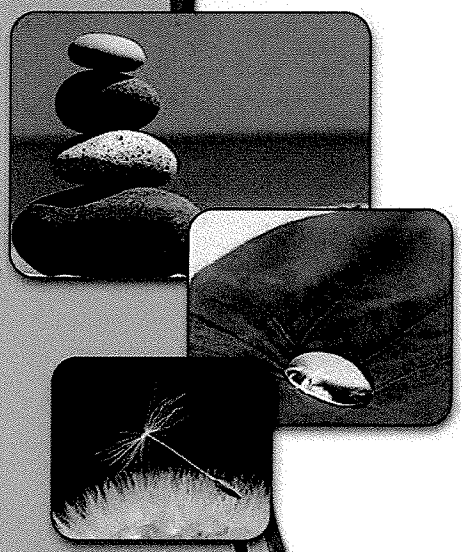
SAMPLED BY: DATE 4-10-17	RECEIVED BY: DATE	RECEIVED FOR LABORATORY: DATE 4-10-17
PRINT NAME Chad Lindsay 20 2018	SIGNATURE 20 TIME	SIGNATURE TIME 2015
RELINQUISHED: DATE	RELINQUISHED: DATE	RELINQUISHED: DATE
SIGNATURE 20 TIME	SIGNATURE OR INITIALS 20 TIME	SIGNATURE OR INITIALS 20 TIME

COMMENTS:

PRECAUTIONS:

DISPOSAL:

USE (BLACK) INK



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Honolulu
99-193 Aiea Heights Drive, Suite 121
Aiea, HI 96701
Tel: 808-486-5227

TestAmerica Job ID: HWD0045
Client Project/Site: [none]
Client Project Description: DW Nitrate

For:
Aecos
45-939 Kamehameha Highway, Suite 104
Kaneohe, HI 96744

Attn: Snookie Mello

Kristie Reilly

Authorized for release by:
4/22/2013 2:17:31 PM

Kristie Reilly
Project Manager
Kristie.Brachmann@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Aecos
Project/Site: [none]

TestAmerica Job ID: HWD0045

Job ID: HWD0045

Laboratory: TestAmerica Honolulu

Narrative

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory unless otherwise stated in the report. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. TestAmerica Analytical Testing Corporation certifies that the analytical results contained herein apply only to the specific sample(s) analyzed.

The Chain(s) of Custody are included and are an integral part of this report. This entire report was reviewed and approved for release.

If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-(808)486-5227

LABORATORY REPORT

At sample receipt, the cooler/sample was 5.4 degrees C.
NELAC states that samples which require thermal preservation shall be considered acceptable if the arrival temperature is within 2 degrees C of the required temperature or the method specified range. For samples with a temperature requirement of 4 degrees C, an arrival temperature from 0 degrees C to 6 degrees C meets specifications. Samples that are delivered to the laboratory on the same day that they are collected may not meet these criteria. In these cases, the samples are considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice.

The reported results were obtained in compliance with the 2003 NELAC standards unless otherwise noted.

Sample Summary

Client: Aecos
Project/Site: [none]

TestAmerica Job ID: HWD0045

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
HWD0045-01	WELL	Drinking Water	04/10/13 13:54	04/11/13 12:38

Detection Summary

Client: Aecos
Project/Site: [none]

TestAmerica Job ID: HWD0045

Client Sample ID: WELL — **Lab Sample ID: HWD0045-01**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nitrate as N	1.24		0.0500		mg/L as N	1.00		EPA 353.2	Total

This Detection Summary does not include radiochemical test results.

Client: Aecos
Project/Site: [none]

TestAmerica Job ID: HWD0045

Client Sample ID: WELL
Date Collected: 04/10/13 13:54
Date Received: 04/11/13 12:38

Lab Sample ID: HWD0045-01
Matrix: Drinking Water

Method: EPA 353.2 - General Chemistry Parameters

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.24**		0.0500		mg/L as N		04/11/13 15:39	04/11/13 15:39	1.00
Nitrite as N	ND		0.0500		mg/L as N		04/11/13 15:39	04/11/13 15:39	1.00

Client: Aecos
Project/Site: [none]

TestAmerica Job ID: HWD0045

Method: EPA 353.2 - General Chemistry Parameters

Lab Sample ID: 13D0017-BLK1
Matrix: Water - NonPotable
Analysis Batch: 13D0017

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 13D0017_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.0500		mg/L as N		04/11/13 15:31	04/11/13 15:31	1.00
Nitrite as N	ND		0.0500		mg/L as N		04/11/13 15:31	04/11/13 15:31	1.00

Lab Sample ID: 13D0017-BS1
Matrix: Water - NonPotable
Analysis Batch: 13D0017

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 13D0017_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrite as N	1.00	0.981		mg/L as N		98	80 - 120

Lab Sample ID: 13D0017-MS1
Matrix: Water - NonPotable
Analysis Batch: 13D0017

Client Sample ID: WELL
Prep Type: Total
Prep Batch: 13D0017_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrite as N	0.0190		1.00	1.06		mg/L as N		104	80 - 120

Lab Sample ID: 13D0017-MSD1
Matrix: Water - NonPotable
Analysis Batch: 13D0017

Client Sample ID: WELL
Prep Type: Total
Prep Batch: 13D0017_P

Analyte	Sample Result	Sample Qualifier	Spike Added	ıtrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrite as N	0.0190		1.00	1.04		mg/L as N		103	80 - 120	1	20

QC Association Summary

Client: Aecos
Project/Site: [none]

TestAmerica Job ID: HWD0045

WetChem

Analysis Batch: 13D0017

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
13D0017-BLK1	Method Blank	Total	Water - NonPotable	EPA 353.2	13D0017_P
13D0017-BS1	Lab Control Sample	Total	Water - NonPotable	EPA 353.2	13D0017_P
13D0017-MS1	WELL	Total	Water - NonPotable	EPA 353.2	13D0017_P
13D0017-MSD1	WELL	Total	Water - NonPotable	EPA 353.2	13D0017_P
HWD0045-01	WELL	Total	Drinking Water	EPA 353.2	13D0017_P

Prep Batch: 13D0017_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
13D0017-BLK1	Method Blank	Total	Water - NonPotable	Default Prep GenChem	
13D0017-BS1	Lab Control Sample	Total	Water - NonPotable	Default Prep GenChem	
13D0017-MS1	WELL	Total	Water - NonPotable	Default Prep GenChem	
13D0017-MSD1	WELL	Total	Water - NonPotable	Default Prep GenChem	
HWD0045-01	WELL	Total	Drinking Water	Default Prep GenChem	

Lab Chronicle

Client: Aecos
Project/Site: [none]

TestAmerica Job ID: HWD0045

Client Sample ID: WELL
Date Collected: 04/10/13 13:54
Date Received: 04/11/13 12:38

Lab Sample ID: HWD0045-01
Matrix: Drinking Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Analysis	EPA 353.2		1.00	13D0017	04/11/13 15:39	NK	TAL HON
Total	Prep	Default Prep GenChem		1.00	13D0017_P	04/11/13 15:39	NK	TAL HON
Total	Analysis	EPA 353.2		1.00	13D0017	04/11/13 15:39	NK	TAL HON
Total	Prep	Default Prep GenChem		1.00	13D0017_P	04/11/13 15:39	NK	TAL HON

Laboratory References:

TAL HON = TestAmerica Honolulu, 99-193 Aiea Heights Drive, Suite 121, Aiea, HI 96701, TEL 808-486-5227

Certification Summary

Client: Aecos
Project/Site: [none]

TestAmerica Job ID: HWD0045

Laboratory: TestAmerica Honolulu

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Florida	NELAP	4	E87907	05-30-13
Hawaii	State Program	9	N/A	06-28-13
USDA	Federal		HON-S-206	01-31-15

Method Summary

Client: Aecos
Project/Site: [none]

TestAmerica Job ID: HWD0045

Method	Method Description	Protocol	Laboratory
EPA 353.2	General Chemistry Parameters		TAL HON

Protocol References:

Laboratory References:

TAL HON = TestAmerica Honolulu, 99-193 Aiea Heights Drive, Suite 121, Aiea, HI 96701, TEL 808-486-5227

AECOS, Inc.

45-939 Kamehameha Highway Suite 104
Kaneohe, Oahu, HI 96744
Tel: (808) 234-7770 Fax: 234-7775

SUB-- CHAIN OF CUSTODY FORM

PROJECT FILE No. NWD0045

LOG NUMBER [29062]

CLIENT: AECOS INC.

ADDRESS:

CONTACT: SNOOKIE MELLO

PHONE No.: ☎ (808)234-7770

Purchase Order No.:

☐ RUSH
☐ SEE REVERSE

SPECIAL INSTRUCTIONS

NWD0045

	☑	SAMPLE ID	SAMPLED DATE	SAMPLED TIME	SAMPLE TYPE	CONTAINER(S)		REQUESTED ANALYSES	PRESERVATION
1		WELL	4-10-13	1354	Potable	1	125ml Poly	Nitrate, Nitrite (reported separately)	None
2									
3									
4									
5									
6									
7									
8									
9									
10									

CLIENTS PROVIDING SAMPLES TO THE LABORATORY SHOULD COMPLETE AS MUCH OF THE ABOVE FORM AS POSSIBLE. NOTE: NAME AND DATED SIGNATURE OF PERSON COLLECTING THE SAMPLE MUST BE ENTERED BELOW ↓. INFORMATION REQUESTED IN SHADED BOXES ABOVE TO BE FILLED IN BY THE LABORATORY.

SAMPLED BY: CL (PRINT NAME)	DATE 4-10 20 13	
RELINQUISHED: CL (SIGNATURE)	DATE 4/10 20 13 TIME 2018	
RECEIVED BY: CL - AECOS (SIGNATURE)	DATE 4-10 20 13 TIME 2018	
RELINQUISHED: (SIGNATURE OR INITIALS)	DATE 4/11 20 13 TIME 1238	
RECEIVED FOR LABORATORY: (SIGNATURE)	DATE 4/11/13 20__ TIME 1238	
RELINQUISHED: cooler wet ice 5.4C Intact (SIGNATURE OR INITIALS)	DATE 20__ TIME	

COMMENTS:

USE (BLACK) INK

PRECAUTIONS:

DISPOSAL:

RETURN SAMPLE TO CLIENT ☐

4/22/2013

TestAmerica

Rush TAT Confirmation (Initial/Date) _____

Sample Receipt Checklist

Client Name: AECOS Date/ Time Received: 4/11/13 1238

Received By: Nina Kim

Matrices: Aq Carrier: Hand Airbill# :

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Chain of Custody present?	Yes ☑	No ☐	☐
Chain of Custody Signed when relinquished and received?	Yes ☑	No ☐	
Chain of Custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sample containers on ice?	Yes ☑	No ☐	Type: Wet
Sufficient sample volume for indicated test?	Yes ☐	No ☑	May be short for QC
All samples received within holding time?	Yes ☑	No ☐	
Water - VOA Vials have Zero Headspace?	Yes ☐	No ☐	No VOA vials present: ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Checked: ☑
pH Adjusted?	Yes ☐	No ☐	Final pH:
Encores / MI-VOC / 5035 Vials Present?	Yes ☐	No ☑	Location:
Sample Filtration Needed?	Yes ☐	No ☑	Filtered in Field: ☐
Dry Weight Corrected Results?	Yes ☐	No ☑	Take Action: ☐
DODQSM / QAPP Project?	Yes ☐	No ☑	Type:

Temperature Blank Present? Yes ☐ No ☑

Sample Container Temperature: 5.4 °C

Comments/ Sampling Handling Notes:

eurofins | Eaton Analytical
formerly MWH Laboratories

750 Royal Oaks Drive, Suite 100
Monrovia, California 91016-3629
Tel: (626) 386-1100
Fax: (626) 386-1101
1 800 566 LABS (1 800 566 5227)

Laboratory Report

for

AECOS, Inc.
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744
Attention: Snookie DeMello
Fax: 808-234-7775

Date of Issue
05/29/2013

EUROFINS EATON ANALYTICAL

DST: David S Tripp
Project Manager

NELAP ACCREDITED TNI LABORATORY
01114CA

Report: 431199
Project: SUBCONTRACT
Group: New Source Well

Laboratory certifies that the test results meet all **TNI NELAP** requirements unless noted in the Comments section or the Case Narrative. Following the cover page are Hits Reports, Comments, QC Summary, QC Report and Regulatory Forms. This report shall not be reproduced except in full, without the written approval of the laboratory.

eurofins | Eaton Analytical
formerly MWH Laboratories

STATE CERTIFICATION LIST

State	Certification Number	State	Certification Number
Alabama	41060	**Mississippi**	Certified
Alaska	CA00006	**Montana**	Cert 0035
Arizona	AZ0778	**Nevada**	CA00006-2012-1
Arkansas	Certified	**New Hampshire**	2959-11
California – NELAP	01114CA	**New Jersey**	CA 008
California – ELAP	1422	**New Mexico**	Certified
Colorado	Certified	**New York**	11320
Connecticut	PH-0107	**North Carolina**	06701
Delaware	CA 006	**North Dakota**	R-009
Florida	E871024	**Oregon**	CA 200003-011
Georgia	947	**Pennsylvania**	68-565
Guam	12-006r	**Rhode Island**	LAO00326
Hawaii	Certified	**South Carolina**	87016001
Idaho	Certified	**South Dakota**	Certified
Illinois	200033	**Tennessee**	TN02839
Indiana	C-CA-01	**Texas**	T104704230-12-4
Kansas	E-10268	**Utah**	Mont-1
Kentucky	90107	**Vermont**	VT0114
Louisiana	LA130008	**Virginia**	00210
Maine	CA0006	**Washington**	C383
Maryland	224	**West Virginia**	9943 C
Commonwealth of Northern Marianas Is.	MP0004	**Wisconsin**	998316660
Massachusetts	M-CA006	**Wyoming**	8TMS-L
Michigan	9906	**EPA Region 5**	Certified

eurofins | Eaton Analytical
formerly MWH Laboratories

Acknowledgement of Samples Received

Addr: **AECOS, Inc.**
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Attn: Snookie DeMello
Phone: 808-234-7770

Client ID: AECOS
Folder #: 431199
Project: SUBCONTRACT
Sample Group: New Source Well

Project Manager: David S Tripp
Phone: (626) 386-1158
PO #: 29062

The following samples were received from you on **April 12, 2013**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical.

Sample #	Sample ID	Sample Date
201304130035	WELL	04/10/2013 1340

@2378-TCDD_Dioxin	@504MOD	@525PAC
@DIQUAT	@ML505	@ML515.4
@ML531.2	@RA226 GA	@RA228 GA
@RAD	@VOASDWA	Alkalinity in CaCO3 units
Antimony Total ICAP/MS	Arsenic Total ICAP/MS	Asbestos by TEM - >10 microns
Asbestos Ozonation	Barium Total ICAP/MS	Beryllium Total ICAP/MS
Cadmium Total ICAP/MS	Calcium Total ICAP	Chloride
Chromium Total ICAP/MS	Copper Total ICAP/MS	Cyanide
Endothall	Fluoride	Glyphosate
Lead Total ICAP/MS	Mercury	Nickel Total ICAP/MS
Selenium Total ICAP/MS	Specific Conductance	Thallium Total ICAP/MS
Uranium by ICPMS as pCi/L	Uranium ICAP/MS	

Sample #	Sample ID	Sample Date
201304130036	Travel Blank - HOLD	04/10/2013 0800

@VOASDWA TB

Test Description

@2378-TCDD_Dioxin -- 2,3,7,8-TCDD_Dioxin

@504MOD -- EPA Method 504.1

@525PAC -- Semivolatiles by GCMS

@DIQUAT -- Diquat and Paraquat

@ML505 -- Organochlorine Pesticides/PCBs

@ML515.4 -- Chlorophenoxy Herbicides

@ML531.2 -- Aldicarbs

@RA226 GA -- Radium 226

@RA228 GA -- Radium 228

@RAD -- Gross Alpha/Beta Radiation

@VOASDWA -- Volatile Organics by GCMS

@VOASDWA TB -- Volatile Organics by GCMS

431199

AECOS, Inc.

45-939 Kamehameha Highway Suite 104
Kaneohe, Oahu, HI 96744
Tel: (808) 234-7770 Fax: 234-7775

SUB -CHAIN OF CUSTODY FORM

NEW SOURCE – April 2008

PROJECT FILE No.

LOG NUMBER [29062]

CLIENT: AECOS

ADDRESS:

CONTACT:

PHONE No.: ☎

Purchase Order No.:

☐ RUSH
☐ SEE REVERSE

SPECIAL INSTRUCTIONS

	☑ SAMPLED	SAMPLE ID	DATE	TIME	SAMPLE TYPE	CONTAINER(S)		REQUESTED ANALYSES	PRESERVATION
1		WELL	4/10/13	1356	Potable water	1	125ml poly	Cyanide	NaOH/AA/chill
2				1356	Potable water	1	500ml poly	Metals (Sb, As, Ba, Be, Ca, Cd, Cr, Cu, Pb, Hg, Ni, Se, Tl) Uranium	HNO3 / chill
3				1354	Potable water	1	~~125~~ 500 poly 1ml	Fluoride, Chloride, Conductivity	None / chill
4				1345	Potable water	1	1L poly	Asbestos	None / Chill
5					~~Potable Water~~	~~1~~	~~500 ml poly~~	~~Chloride~~ Chloride 4/12/13 1145	
6				1347	Potable water	1 3	125 ml poly 1L poly	RAD (Gross Alpha & Beta)	none/ chill HNO3/chill
7				1348	Potable water	1	500 poly 1mL	Total Alpha Radium ~~(MUST BE 1 FULL LITER!)~~	HNO3 / Chill
8				1352	Potable Water	1	250ml poly	Alkalinity	chill
9									
10									

CLIENTS PROVIDING SAMPLES TO THE LABORATORY SHOULD COMPLETE AS MUCH OF THE ABOVE FORM AS POSSIBLE. NOTE: NAME AND DATED SIGNATURE OF PERSON COLLECTING THE SAMPLE MUST BE ENTERED BELOW ↓. INFORMATION REQUESTED IN SHADED BOXES ABOVE TO BE FILLED IN BY THE LABORATORY.

SAMPLED BY: CL (PRINT NAME) DATE 4/10/13

RELINQUISHED: CL (SIGNATURE) DATE 4/10/13 TIME 2018

RECEIVED BY: AECOS-CL (SIGNATURE) DATE 4/10/13 TIME 2018

RELINQUISHED: (SIGNATURE OR INITIALS) DATE 4-11/13 TIME 1155

RECEIVED FOR LABORATORY: (SIGNATURE) DATE 4/12/13 TIME 1145

RELINQUISHED: (SIGNATURE OR INITIALS) DATE 20__ TIME

COMMENTS:

PRECAUTIONS:

DISPOSAL: 5.1.c

USE (BLACK) INK

RETURN SAMPLE TO CLIENT ☐

AECOS, Inc.

45-939 Kamehameha Highway Suite 104
Kaneohe, Oahu, HI 96744
Tel: (808) 234-7770 Fax: 234-7775

SUB-CHAIN OF CUSTODY FORM

NEW SOURCE – May 2010 - Page 1 of 2

PROJECT FILE No.:

LOG NUMBER: [29062]

CLIENT: AECOS
ADDRESS:

CONTACT:
PHONE No.: ☎
Purchase Order No.:

☐ RUSH
☐ SEE REVERSE
SPECIAL INSTRUCTIONS

	☑ SAMPLED	SAMPLE ID	DATE	TIME	SAMPLE TYPE	CONTAINER(S)		REQUESTED ANALYSES	PRESERVATION
1		WELL	4/10/13	1340	Potable water	1	1L poly	Diquat	None/chill
2				1358	Potable water	3	40ml glass	EDB/DBCP (EPA 504)	None/chill
3				1402	Potable water	3(+2)	40ml glass	VOASDWA (EPA 524-VOCs) *(+ TRIP BLANKS)*	HCL / chill
4				1341	Potable water	2	1L glass	EPA 525	HCL / chill
5				1404	Potable water	2	40ml glass	EPA 531.2	KH2Citrate, thio / chill
6				1406	Potable water	2	125ml glass	EPA 515.4	Sulfite / chill
7				1418	Potable water	4	40ml glass	EPA 505	Thio / chill
8				1349	Potable water	1	250ml glass	Endothal	None/chill
9				1415	Potable water	1	125ml glass	Glyphosate	None/chill
10				1343	Potable water	2	1L glass	Dioxin EPA 1613 (D1613EDD)	None/chill

CLIENTS PROVIDING SAMPLES TO THE LABORATORY SHOULD COMPLETE AS MUCH OF THE ABOVE FORM AS POSSIBLE. NOTE: NAME AND DATED SIGNATURE OF PERSON COLLECTING THE SAMPLE MUST BE ENTERED BELOW ↓. INFORMATION REQUESTED IN SHADED BOXES ABOVE TO BE FILLED IN BY THE LABORATORY.

SAMPLED BY: DATE 4/10/13
CL
PRINT NAME TIME 1356

RELINQUISHED: DATE 4/10/13
CL
SIGNATURE TIME 2018

RECEIVED BY: DATE 4/10/13
AECOS
SIGNATURE TIME 2018

RELINQUISHED: DATE 4-11-13
SIGNATURE OR INITIALS TIME 1155

RECEIVED FOR LABORATORY: DATE 4-12-20 13
SIGNATURE TIME 1145

RELINQUISHED: DATE
SIGNATURE OR INITIALS TIME

COMMENTS:

PRECAUTIONS:

DISPOSAL:

5.1°C

USE (BLACK) INK

RETURN SAMPLE TO CLIENT ☐

MWH
LABORATORIES
A Division of MWH Americas, Inc
750 Royal Oaks Drive Suite 100
Monrovia, CA 91016 (626) 386-1100 FAX (626) 386-1124

Kit Order for AECOS, Inc.

David S Tripp is Your MWH Labs Project Manager

Sampler: please return this paper with your samples

Kit #: 51728
Created By: ADT
Order Date: 06/04/2012
STG: Bottle Orders

Client ID: AECOS
Project Code: SUBCONTRACT Bottle Orders
Group Name: New Source Well
PO#/JOB#:

Ship By:
05/25/2012

Ship Sample Kits to
AECOS, Inc.
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Attn: Ann Mello
Phone: 808-234-7770
Fax: 808-234-7775

Send Report to
AECOS, Inc.
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Attn: Snookie DeMello
Phone: 808-234-7770
Fax: 808-234-7775

Billing Address
AECOS, Inc.
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Attn: Ann Mello
Phone: 808-234-7770
Fax: 808-234-7775

# of Samples	Tests	Bottles - Qty for each sample, type & preservative if any	UN DOT #
1	@2378-TCDD_Dioxin	✓ 2 1L amber glass D1613_NO_PRESERVATIVE	
1	@504MOD	✓ 3 40ml amber glass vial no preservative	
1	@525PAC	✓ 2 1L amber glass 2ml of 6N HCl	UN1789
1	@DIQUAT	✓ 1 1L amber poly no preservative	
1	@ML505	✓ 4 40ml amber glass vial 1drop thio (8%)	
1	@ML515.4	✓ 2 125ml amber glass 7mg SULFITE xls	
1	@ML531.2	✓ 2 40ml amber glass vial 0.38g KH2Citrate+1drop 8% thio	
1	@RA226 GA, @RA228 GA	✓ 3 1L poly 4ml HNO3 (18%)	UN2031
1	@RAD	✓ 1 500ml poly 2ml 18%HNO3+125ml poly/no pres	UN2031
1	@VOASDWA	✓ 3 40ml amber glass vial 4drops 6N HCL (36%)	UN1789
1	@VOASDWA TB	✓ 2 40ml amber glass vial 4drops of 1:1 HCL + H2O	UN1789
1	Alkalinity in CaCO3 units	✓ 1 250ml poly no preservative	
1	Antimony Total ICAP/MS, Arsenic Total ICAP/MS, Barium Total ICAP/MS, Beryllium Total ICAP/MS, Cadmium Total ICAP/MS, Calcium Total ICAP, Chromium Total ICAP/MS, Copper Total ICAP/MS, Lead Total ICAP/MS, Mercury, Nickel Total ICAP/MS, Selenium Total ICAP/MS, Thallium Total ICAP/MS, Uranium by ICPMS as pCi/L, Uranium ICAP/MS	1 500ml acid poly 2ml HNO3 (18%) ✓	UN2031
1	Asbestos by TEM - >10 microns, Asbestos Ozonation	✓ 1 1L poly sonicated no preservative	
1	Chloride, Fluoride, ~~Nitrate as Nitrogen by IC, Nitrite Nitrogen by~~ IC, Speci Conductance	1 ~~125~~ 500ml poly no preservative ✓	
1	Cyanide	✓ 1 250 ml poly 2 ml NaOH (30%)+6 scoops AA	
1	Endothall	✓ 1 250ml amber glass no preservative	
1	Glyphosate	✓ 1 125ml amber glass no preservative	

Code Status Date Shipped Via Tracking # # of Coolers Prepared By

# of Samples Tests	Bottles - Qty for each sample, type & preservative if any	UN DOT #

Comments

SHIPPING: Please send with sampling instructions and extra ice packs for Hawaii.

Code	Status	Date Shipped	Via	Tracking #	# of Coolers	Prepared By

AECOS, Inc.
45-939 Kamehameha Highway Suite 104
Kaneohe, Oahu, HI 96744
Tel: (808) 234-7770 Fax: 234-7775

Subcontractor: Eurofins /MWH

Requested By: ~~Jessica Withrow~~ Ann

Date Requested: 4-11-13

Send results to: amello@aecos.com

Turnaround Time Requested : normal TAT

Log No.	# of samples	# of bottles	Sample Type	Analysis requested	Date collected	Sample Prep / preservation
29062	1	33	well H_2O potable new source	see sub CoC	4-10-13	see CoC
29035	1	2	RO efflicent	Ammonia, Hardness	4-6-13	H_2SO_4, HNO_3

PLEASE RETURN AECOS COOLERS with replacement bottles: YES (NO) belongs to MWH.

OTHER SPECIAL NOTES/INSTRUCTIONS:

29035 - Sampled at Wake Island, so Wake time!

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formerly MWH Laboratories

750 Royal Oaks Drive, Suite 100
Monrovia, California 91016-3629
Tel: (626) 386-1100
Fax: (626) 386-1101
1 800 566 LABS (1 800 566 5227)

Laboratory Hits
Report: 431199

AECOS, Inc.
Snookie DeMello
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Samples Received on:
04/12/2013

Analyzed	Analyte	Sample ID	Result	Federal MCL	Units	MRL
	201304130035	**WELL**				
04/16/2013 14:32	Alkalinity in CaCO3 units		74		mg/L	2
04/16/2013 14:47	Barium Total ICAP/MS		5.3	2000	ug/L	2
04/16/2013 18:37	Calcium Total ICAP		23		mg/L	1
04/15/2013 22:14	Chloride		62	250	mg/L	2
04/16/2013 14:47	Chromium Total ICAP/MS		1.9	100	ug/L	1
04/23/2013 21:23	Fluoride		0.078	4	mg/L	0.05
04/16/2013 14:32	Specific Conductance, 25 C		390		umho/cm	2

SUMMARY OF POSITIVE DATA ONLY

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Laboratory Data
Report: 431199

AECOS, Inc.
Snookie DeMello
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Samples Received on:
04/12/2013

Prepared	Analyzed	QC Ref #	Method	Analyte	Result	Units	MRL	Dilution
WELL (201304130035)						**Sampled on 04/10/2013 1340**		
			EPA 200.8 - ICPMS Metals					
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Antimony Total ICAP/MS	ND	ug/L	1	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Arsenic Total ICAP/MS	ND	ug/L	1	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Barium Total ICAP/MS	5.3	ug/L	2	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Beryllium Total ICAP/MS	ND	ug/L	1	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Cadmium Total ICAP/MS	ND	ug/L	0.5	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Chromium Total ICAP/MS	1.9	ug/L	1	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Copper Total ICAP/MS	ND	ug/L	2	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Lead Total ICAP/MS	ND	ug/L	0.5	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Nickel Total ICAP/MS	ND	ug/L	5	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Selenium Total ICAP/MS	ND	ug/L	5	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Thallium Total ICAP/MS	ND	ug/L	1	1
4/15/2013	04/16/2013	14:47 702945	(EPA 200.8)	Uranium ICAP/MS	ND	ug/L	1	1
			EPA 200.7 - ICP Metals					
4/15/2013	04/16/2013	18:37 702839	(EPA 200.7)	Calcium Total ICAP	23	mg/L	1	1
			EPA 245.1 - Mercury Total					
4/16/2013	04/17/2013	18:09 703111	(EPA 245.1)	Mercury	ND	ug/L	0.2	1
			EPA 100.2 - Asbestos by TEM - >10 microns					
4/12/2013	04/22/2013	00:00 703773	(EPA 100.2)	Asbestos by TEM - >10 microns	ND	MFL	0.2	1
			EPA 100.2 - Asbestos Ozonation					
	04/15/2013	00:00 702633	(EPA 100.2)	Asbestos Ozonation	NA	Date		1
			EPA 200.8 - Uranium by ICPMS as pCi/L					
	04/17/2013	10:36	(EPA 200.8)	Uranium by ICPMS as pCi/L	ND	pCi/L	0.7	1
			EPA 505 - Organochlorine Pesticides/PCBs					
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	Alachlor (Alanex)	ND	ug/L	0.1	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	Aldrin	ND	ug/L	0.01	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	Chlordane	ND	ug/L	0.1	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	Dieldrin	ND	ug/L	0.01	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	Endrin	ND	ug/L	0.01	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	Heptachlor	ND	ug/L	0.01	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	Heptachlor Epoxide	ND	ug/L	0.01	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	Lindane (gamma-BHC)	ND	ug/L	0.01	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	Methoxychlor	ND	ug/L	0.05	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	PCB 1016 Aroclor	ND	ug/L	0.08	1
4/15/2013	04/16/2013	02:21 702822	(EPA 505)	PCB 1221 Aroclor	ND	ug/L	0.1	1

Rounding on totals after summation.
(c) - indicates calculated results

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Laboratory Data
Report: 431199

AECOS, Inc.
Snookie DeMello
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Samples Received on:
04/12/2013

Prepared	Analyzed	QC Ref #	Method	Analyte	Result	Units	MRL	Dilution
4/15/2013	04/16/2013 02:21	702822	(EPA 505)	PCB 1232 Aroclor	ND	ug/L	0.1	1
4/15/2013	04/16/2013 02:21	702822	(EPA 505)	PCB 1242 Aroclor	ND	ug/L	0.1	1
4/15/2013	04/16/2013 02:21	702822	(EPA 505)	PCB 1248 Aroclor	ND	ug/L	0.1	1
4/15/2013	04/16/2013 02:21	702822	(EPA 505)	PCB 1254 Aroclor	ND	ug/L	0.1	1
4/15/2013	04/16/2013 02:21	702822	(EPA 505)	PCB 1260 Aroclor	ND	ug/L	0.1	1
4/15/2013	04/16/2013 02:21	702822	(EPA 505)	Total PCBs	ND	ug/L	0.1	1
4/15/2013	04/16/2013 02:21	702822	(EPA 505)	Toxaphene	ND	ug/L	0.5	1
4/15/2013	04/16/2013 02:21	702822	(EPA 505)	Tetrachlorometaxylene	96	%		1
		EPA 515.4 - Chlorophenoxy Herbicides						
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	2,4,5-T	ND	ug/L	0.2	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	2,4,5-TP (Silvex)	ND	ug/L	0.2	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	2,4-D	ND	ug/L	0.1	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	2,4-DB	ND	ug/L	2	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	3,5-Dichlorobenzoic acid	ND	ug/L	0.5	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	Acifluorfen	ND	ug/L	0.2	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	Bentazon	ND	ug/L	0.5	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	Dalapon	ND	ug/L	1	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	Dicamba	ND	ug/L	0.1	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	Dichlorprop	ND	ug/L	0.5	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	Dinoseb	ND	ug/L	0.2	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	Pentachlorophenol	ND	ug/L	0.04	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	Picloram	ND	ug/L	0.1	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	Tot DCPA Mono&Diacid Degradate	ND	ug/L	0.1	1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	2,4-Dichlorophenyl acetic acid	93	%		1
4/16/2013	04/17/2013 11:13	702850	(EPA 515.4)	4,4-Dibromooctafluorobiphenyl	106	%		1
		EPA 504.1 - EPA Method 504.1						
4/17/2013	04/17/2013 17:49	703127	(EPA 504.1)	1,2,3-Trichloropropane (TCP)	ND	ug/L	0.04	1
4/17/2013	04/17/2013 17:49	703127	(EPA 504.1)	Dibromochloropropane (DBCP)	ND	ug/L	0.01	1
4/17/2013	04/17/2013 17:49	703127	(EPA 504.1)	Ethylene Dibromide (EDB)	ND	ug/L	0.01	1
4/17/2013	04/17/2013 17:49	703127	(EPA 504.1)	1,2-Dibromopropane	82	%		1
		EPA 525.2 - Semivolatiles by GCMS						
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Atrazine	ND	ug/L	0.05	1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Benzo(a)pyrene	ND	ug/L	0.02	1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Di-(2-Ethylhexyl)adipate	ND	ug/L	0.6	1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Di(2-Ethylhexyl)phthalate	ND	ug/L	0.6	1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Heptachlor	ND	ug/L	0.03	1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Hexachlorobenzene	ND	ug/L	0.05	1

Rounding on totals after summation.
(c) - indicates calculated results

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Laboratory Data
Report: 431199

AECOS, Inc.
Snookie DeMello
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Samples Received on:
04/12/2013

Prepared	Analyzed	QC Ref #	Method	Analyte	Result	Units	MRL	Dilution
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Hexachlorocyclopentadiene	ND	ug/L	0.05	1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Molinate	ND	ug/L	0.1	1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Simazine	ND	ug/L	0.05	1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Thiobencarb (ELAP)	ND	ug/L	0.2	1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	1,3-Dimethyl-2-nitrobenzene	95	%		1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Acenaphthene-d10	96	%		1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Chrysene-d12	99	%		1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Perylene-d12	77	%		1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Phenanthrene-d10	102	%		1
4/23/2013	05/02/2013 4:13	705441	(EPA 525.2)	Triphenylphosphate	101	%		1
		EPA 548.1 - Endothall						
4/16/2013	04/19/2013 15:24	704057	(EPA 548.1)	Endothall	ND	ug/L	5	1
		EPA 1613B - 2,3,7,8-TCDD_Dioxin						
4/19/2013	04/24/2013 01:45	703984	(EPA 1613B)	2,3,7,8-TCDD	ND	pg/L	5	1
4/19/2013	04/24/2013 01:45	703984	(EPA 1613B)	C12-2,3,7,8-TCDD	87	%		1
		EPA 547 - Glyphosate						
	04/16/2013 13:39	702498	(EPA 547)	Glyphosate	ND	ug/L	6	1
		EPA 531.2 - Aldicarbs						
	04/18/2013 18:40	703365	(EPA 531.2)	3-Hydroxycarbofuran	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	Aldicarb (Temik)	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	Aldicarb sulfone	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	Aldicarb sulfoxide	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	Baygon	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	Carbaryl	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	Carbofuran (Furadan)	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	Methiocarb	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	Methomyl	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	Oxamyl (Vydate)	ND	ug/L	0.5	1
	04/18/2013 18:40	703365	(EPA 531.2)	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate	78	%		1
		EPA 549.2 - Diquat and Paraquat						
4/12/2013	04/16/2013 17:17	702780	(EPA 549.2)	Diquat	ND	ug/L	0.4	1
4/12/2013	04/16/2013 17:17	702780	(EPA 549.2)	Paraquat	ND	ug/L	2	1
		EPA 300.0 - Chloride, Sulfate by EPA 300.0						
	04/15/2013 22:14	702862	(EPA 300.0)	Chloride	62	mg/L	2	2
		EPA 900.0 - Gross Alpha/Beta Radiation						
4/15/2013	04/19/2013 12:25	704382	(EPA 900.0)	Alpha, Gross	ND	pCi/L	3	1
4/15/2013	04/19/2013 12:25	704382	(EPA 900.0)	Alpha, Min Detectable Activity	3.0	pCi/L		1

Rounding on totals after summation.
(c) - indicates calculated results

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Laboratory Data
Report: 431199

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Snookie DeMello
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Samples Received on:
04/12/2013

Prepared	Analyzed	QC Ref #	Method	Analyte	Result	Units	MRL	Dilution
4/15/2013	04/19/2013 12:25	704382	(EPA 900.0)	Alpha, Two Sigma Error	2.5	pCi/L		1
4/15/2013	04/19/2013 12:25	704382	(EPA 900.0)	Beta, Gross	ND	pCi/L	3	1
4/15/2013	04/19/2013 12:25	704382	(EPA 900.0)	Beta, Min Detectable Activity	3.0	pCi/L		1
4/15/2013	04/19/2013 12:25	704382	(EPA 900.0)	Beta, Two Sigma Error	1.2	pCi/L		1
4/15/2013	04/19/2013 12:25	704382	(EPA 900.0)	Gross Alpha + adjusted error	ND	pCi/L	3	1
	Ra-226 GA - Radium 226							
4/25/2013	05/18/2013 06:20	705241	(Ra-226 GA)	Radium 226	ND	pCi/L	1	1
4/25/2013	05/18/2013 06:20	705241	(Ra-226 GA)	Radium 226 Min Detect Activity	0.39	pCi/L		1
4/25/2013	05/18/2013 06:20	705241	(Ra-226 GA)	Radium 226 Two Sigma Error	0	pCi/L		1
	RA-228 GA - Radium 228							
4/25/2013	05/18/2013 06:20	705245	(RA-228 GA)	Radium 228	ND	pCi/L	1	1
4/25/2013	05/18/2013 06:20	705245	(RA-228 GA)	Radium 228 Min Detect Activity	0.67	pCi/L		1
4/25/2013	05/18/2013 06:20	705245	(RA-228 GA)	Radium 228 Two Sigma Error	0	pCi/L		1
	EPA 524.2 - Volatile Organics by GCMS							
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,1,1-Trichloroethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,1,2-Trichloroethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,1-Dichloroethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,1-Dichloroethylene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,1-Dichloropropene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,2,3-Trichlorobenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,2,3-Trichloropropane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,2,4-Trichlorobenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,2,4-Trimethylbenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,2-Dichloroethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,2-Dichloropropane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,3,5-Trimethylbenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,3-Dichloropropane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	2,2-Dichloropropane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	2-Butanone (MEK)	ND	ug/L	5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	4-Methyl-2-Pentanone (MIBK)	ND	ug/L	5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Benzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Bromobenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Bromochloromethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Bromodichloromethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Bromoethane	ND	ug/L	0.5	1

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Laboratory Data
Report: 431199

AECOS, Inc.
Snookie DeMello
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Samples Received on:
04/12/2013

Prepared	Analyzed	QC Ref #	Method	Analyte	Result	Units	MRL	Dilution
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Bromoform	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Bromomethane (Methyl Bromide)	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Carbon disulfide	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Carbon Tetrachloride	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Chlorobenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Chlorodibromomethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Chloroethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Chloroform (Trichloromethane)	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Chloromethane(Methyl Chloride)	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	cis-1,2-Dichloroethylene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	cis-1,3-Dichloropropene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Dibromomethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Dichlorodifluoromethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Dichloromethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Di-isopropyl ether	ND	ug/L	3	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Ethyl benzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Hexachlorobutadiene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Isopropylbenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	m,p-Xylenes	ND (LE)	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	m-Dichlorobenzene (1,3-DCB)	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Methyl Tert-butyl ether (MTBE)	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Naphthalene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	n-Butylbenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	n-Propylbenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	o-Chlorotoluene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	o-Dichlorobenzene (1,2-DCB)	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	o-Xylene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	p-Chlorotoluene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	p-Dichlorobenzene (1,4-DCB)	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	p-Isopropyltoluene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	sec-Butylbenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Styrene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	tert-amyl Methyl Ether	ND	ug/L	3	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	tert-Butyl Ethyl Ether	ND	ug/L	3	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	tert-Butylbenzene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Tetrachloroethylene (PCE)	ND	ug/L	0.5	1

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Samples Received on:
04/12/2013

Prepared	Analyzed	QC Ref #	Method	Analyte	Result	Units	MRL	Dilution
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Toluene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Total 1,3-Dichloropropene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Total THM	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Total xylenes	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	trans-1,2-Dichloroethylene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	trans-1,3-Dichloropropene	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Trichloroethylene (TCE)	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Trichlorofluoromethane	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Trichlorotrifluoroethane(Freon 113)	ND	ug/L	0.5	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Vinyl chloride (VC)	ND	ug/L	0.3	1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	1,2-Dichloroethane-d4	110	%		1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	4-Bromofluorobenzene	107	%		1
4/16/2013	04/16/2013 23:25	703074	(EPA 524.2)	Toluene-d8	78	%		1
	SM4500CN-F - Cyanide							
	04/18/2013 01:28	702620	(SM4500CN-F)	Cyanide	ND	mg/L	0.025	1
	SM 4500F-C - Fluoride							
	04/23/2013 21:23	703538	(SM 4500F-C)	Fluoride	0.078	mg/L	0.05	1
	SM 2320B - Alkalinity in CaCO3 units							
	04/16/2013 14:32	702801	(SM 2320B)	Alkalinity in CaCO3 units	74	mg/L	2	1
	SM2510B - Specific Conductance							
	04/16/2013 14:32	702950	(SM2510B)	Specific Conductance, 25 C	390	umho/cm	2	1

Travel Blank - HOLD (201304130036) **Sampled on 04/10/2013 0800**

	EPA 524.2 - Volatile Organics by GCMS							
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,1,1,2-Tetrachloroethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,1,1-Trichloroethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,1,2,2-Tetrachloroethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,1,2-Trichloroethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,1-Dichloroethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,1-Dichloroethylene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,1-Dichloropropene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,2,3-Trichlorobenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,2,3-Trichloropropane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,2,4-Trichlorobenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,2,4-Trimethylbenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,2-Dichloroethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,2-Dichloropropane	NA	ug/L	0.5	1

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Prepared	Analyzed	QC Ref #	Method	Analyte	Result	Units	MRL	Dilution
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,3,5-Trimethylbenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,3-Dichloropropane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	2,2-Dichloropropane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	2-Butanone (MEK)	NA	ug/L	5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	4-Methyl-2-Pentanone (MIBK)	NA	ug/L	5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Benzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Bromobenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Bromochloromethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Bromodichloromethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Bromoethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Bromoform	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Bromomethane (Methyl Bromide)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Carbon disulfide	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Carbon Tetrachloride	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Chlorobenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Chlorodibromomethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Chloroethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Chloroform (Trichloromethane)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Chloromethane(Methyl Chloride)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	cis-1,2-Dichloroethylene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	cis-1,3-Dichloropropene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Dibromomethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Dichlorodifluoromethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Dichloromethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Di-isopropyl ether	NA	ug/L	3	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Ethyl benzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Hexachlorobutadiene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Isopropylbenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	m,p-Xylenes	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	m-Dichlorobenzene (1,3-DCB)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Methyl Tert-butyl ether (MTBE)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Naphthalene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	n-Butylbenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	n-Propylbenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	o-Chlorotoluene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	o-Dichlorobenzene (1,2-DCB)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	o-Xylene	NA	ug/L	0.5	1

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04/12/2013

Prepared	Analyzed	QC Ref #	Method	Analyte	Result	Units	MRL	Dilution
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	p-Chlorotoluene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	p-Dichlorobenzene (1,4-DCB)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	p-Isopropyltoluene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	sec-Butylbenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Styrene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	tert-amyl Methyl Ether	NA	ug/L	3	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	tert-Butyl Ethyl Ether	NA	ug/L	3	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	tert-Butylbenzene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Tetrachloroethylene (PCE)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Toluene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Total 1,3-Dichloropropene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Total THM	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Total xylenes	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	trans-1,2-Dichloroethylene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	trans-1,3-Dichloropropene	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Trichloroethylene (TCE)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Trichlorofluoromethane	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Trichlorotrifluoroethane(Freon 113)	NA	ug/L	0.5	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Vinyl chloride (VC)	NA	ug/L	0.3	1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	1,2-Dichloroethane-d4	NA	%		1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	4-Bromofluorobenzene	NA	%		1
4/16/2013	04/17/2013 02:00	703074	(EPA 524.2)	Toluene-d8	NA	%		1

Rounding on totals after summation.
(c) - indicates calculated results

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Laboratory Comments
Report: 431199

AECOS, Inc.
Snookie DeMello
45-939 Kamehameha Hwy, Suite104
Kaneohe, HI 96744

Flags Legend:

LE - MRL Check recovery was above laboratory acceptance limits.

The Comments Report may be blank if there are no comments for this report.

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AECOS, Inc.

QC Ref # 702498 - Glyphosate
201304130035 WELL
Analysis Date: 04/16/2013
Analyzed by: PRC

QC Ref # 702620 - Cyanide
201304130035 WELL
Analysis Date: 04/18/2013
Analyzed by: MXT

QC Ref # 702633 - Asbestos Ozonation
201304130035 WELL
Analysis Date: 04/15/2013
Analyzed by: CJB

QC Ref # 702780 - Diquat and Paraquat
201304130035 WELL
Analysis Date: 04/16/2013
Analyzed by: XWO

QC Ref # 702801 - Alkalinity in CaCO3 units
201304130035 WELL
Analysis Date: 04/16/2013
Analyzed by: JMO

QC Ref # 702822 - Organochlorine Pesticides/PCBs
201304130035 WELL
Analysis Date: 04/16/2013
Analyzed by: LRL

QC Ref # 702839 - ICP Metals
201304130035 WELL
Analysis Date: 04/16/2013
Analyzed by: NINA

QC Ref # 702850 - Chlorophenoxy Herbicides
201304130035 WELL
Analysis Date: 04/17/2013
Analyzed by: KCL

QC Ref # 702862 - Chloride, Sulfate by EPA 300.0
201304130035 WELL
Analysis Date: 04/15/2013
Analyzed by: CYP

QC Ref # 702945 - ICPMS Metals
201304130035 WELL
Analysis Date: 04/16/2013
Analyzed by: SXK

QC Ref # 702950 - Specific Conductance
201304130035 WELL
Analysis Date: 04/16/2013
Analyzed by: JMO

QC Ref # 703074 - Volatile Organics by GCMS
201304130035 WELL
Analysis Date: 04/16/2013
Analyzed by: KCP
201304130036 Travel Blank - HOLD
Analyzed by: KCP

QC Ref # 703111 - Mercury Total
201304130035 WELL
Analysis Date: 04/17/2013
Analyzed by: MXT

QC Ref # 703127 - EPA Method 504.1
201304130035 WELL
Analysis Date: 04/17/2013
Analyzed by: MCP

QC Ref # 703365 - Aldicarbs
201304130035 WELL
Analysis Date: 04/18/2013
Analyzed by: XWO

QC Ref # 703538 - Fluoride
201304130035 WELL
Analysis Date: 04/23/2013
Analyzed by: MXT

QC Ref # 703773 - Asbestos by TEM - >10 microns
201304130035 WELL
Analysis Date: 04/22/2013
Analyzed by: CJB

QC Ref # 703984 - 2,3,7,8-TCDD_Dioxin
Analysis Date: 04/24/2013

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201304130035 WELL — Analyzed by: PAC

QC Ref # 704057 - Endothall — **Analysis Date: 04/19/2013**
201304130035 WELL — Analyzed by: CRW

QC Ref # 704382 - Gross Alpha/Beta Radiation — **Analysis Date: 04/19/2013**
201304130035 WELL — Analyzed by: MAL

QC Ref # 705241 - Radium 226 — **Analysis Date: 05/18/2013**
201304130035 WELL — Analyzed by: WBH

QC Ref # 705245 - Radium 228 — **Analysis Date: 05/18/2013**
201304130035 WELL — Analyzed by: WBH

QC Ref # 705441 - Semivolatiles by GCMS — **Analysis Date: 05/02/2013**
201304130035 WELL — Analyzed by: JWC

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
QC Ref# 702498 - Glyphosate by EPA 547						**Analysis Date: 04/16/2013**			
CCCH	Glyphosate		25	24.9	ug/L	100	(80-120)		
CCCM	Glyphosate		10	9.61	ug/L	96	(80-120)		
LCS1	Glyphosate		10	10.4	ug/L	104	(70-130)		
MBLK	Glyphosate			<6	ug/L				
MRL_CHK	Glyphosate		6.0	6.36	ug/L	106	(50-150)		
MS_201304120165	Glyphosate	ND	10	11.9	ug/L	119	(70-130)		
MS2_201304120466	Glyphosate	ND	10	10.4	ug/L	104	(70-130)		
MSD_201304120165	Glyphosate	ND	10	10.2	ug/L	102	(70-130)	20	15
QC Ref# 702620 - Cyanide by SM4500CN-F						**Analysis Date: 04/17/2013**			
LCS1	Cyanide		0.1	0.0951	mg/L	95	(90-110)		
LCS2	Cyanide		0.1	0.0916	mg/L	92	(90-110)	20	3.8
MBLK	Cyanide			<0.025	mg/L				
MRL_CHK	Cyanide		0.025	0.0270	mg/L	108	(50-150)		
MS_201304090070	Cyanide	ND	0.1	0.0956	mg/L	87	(80-120)		
MS_201304120399	Cyanide	ND	0.1	0.0939	mg/L	87	(80-120)		
MSD_201304090070	Cyanide	ND	0.1	0.102	mg/L	93	(80-120)	20	6.5
MSD_201304120399	Cyanide	ND	0.1	0.0937	mg/L	87	(80-120)	20	0.21
QC Ref# 702780 - Diquat and Paraquat by EPA 549.2						**Analysis Date: 04/16/2013**			
CCCH	Diquat		10	10.2	ug/L	102	(80-120)		
CCCL	Diquat		0.4	0.344	ug/L	86	(80-120)		
LCS1	Diquat		5.0	4.50	ug/L	90	(70-130)		
LCS2	Diquat		5.0	4.51	ug/L	90	(70-130)	20	0.22
MBLK	Diquat			<0.2	ug/L				
MRL_CHK	Diquat		0.4	0.320	ug/L	80	(50-150)		
MS_201304130035	Diquat	ND	5.0	4.27	ug/L	85	(70-130)		
MSD_201304130035	Diquat	ND	5.0	4.16	ug/L	83	(70-130)	20	2.6
CCCH	Paraquat		10	9.86	ug/L	99	(80-120)		
CCCL	Paraquat		2.0	1.91	ug/L	96	(80-120)		
LCS1	Paraquat		5.0	4.57	ug/L	91	(70-130)		
LCS2	Paraquat		5.0	4.47	ug/L	89	(70-130)	20	2.2
MBLK	Paraquat			<1	ug/L				
MRL_CHK	Paraquat		2.0	1.77	ug/L	89	(50-150)		
MS_201304130035	Paraquat	ND	5.0	4.16	ug/L	83	(70-130)		
MSD_201304130035	Paraquat	ND	5.0	3.92	ug/L	78	(70-130)	20	5.9
QC Ref# 702801 - Alkalinity in CaCO3 units by SM 2320B						**Analysis Date: 04/16/2013**			

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RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	Alkalinity in CaCO3 units		100	98.6	mg/L	99	(90-110)		
LCS2	Alkalinity in CaCO3 units		100	98.8	mg/L	99	(90-110)	20	0.20
MBLK	Alkalinity in CaCO3 units			<2	mg/L				
MRL_CHK	Alkalinity in CaCO3 units		2.0	2.10	mg/L	105	(50-150)		
MS_201304120072	Alkalinity in CaCO3 units	53	100	150	mg/L	97	(80-120)		
MS_201304150329	Alkalinity in CaCO3 units	52	100	143	mg/L	91	(80-120)		
MSD_201304150329	Alkalinity in CaCO3 units	52	100	142	mg/L	90	(80-120)	20	0.70
MSD_201304120072	Alkalinity in CaCO3 units	53	100	146	mg/L	93	(80-120)	20	2.7
QC Ref# 702822 - Organochlorine Pesticides/PCBs by EPA 505						**Analysis Date: 04/15/2013**			
CCCH	Alachlor (Alanex)		1.0	1.19	ug/L	119	(70-130)		
CCCH	Alachlor (Alanex)		1.0	1.16	ug/L	116	(70-130)		
CCCH	Alachlor (Alanex)		1.0	1.16	ug/L	116	(70-130)		
CCCH	Alachlor (Alanex)		1.0	1.18	ug/L	118	(70-130)		
LCS1	Alachlor (Alanex)		1.0	1.14	ug/L	114	(70-130)		
MBLK	Alachlor (Alanex)			<0.1	ug/L				
MRL_CHK	Alachlor (Alanex)		0.1	0.0612	ug/L	61	(50-150)		
MS1_201304120492	Alachlor (Alanex)	ND	0.2	0.200	ug/L	100	(65-135)		
MS2_201304120486	Alachlor (Alanex)	ND	1.0	1.11	ug/L	111	(65-135)		
CCCH	Aldrin		0.1	0.113	ug/L	113	(70-130)		
CCCH	Aldrin		0.1	0.112	ug/L	112	(70-130)		
CCCH	Aldrin		0.1	0.117	ug/L	117	(70-130)		
CCCH	Aldrin		0.1	0.117	ug/L	117	(70-130)		
LCS1	Aldrin		0.1	0.116	ug/L	116	(70-130)		
MBLK	Aldrin			<0.01	ug/L				
MRL_CHK	Aldrin		0.01	0.00850	ug/L	85	(50-150)		
MS1_201304120492	Aldrin	ND	0.02	0.0207	ug/L	103	(65-135)		
MS2_201304120486	Aldrin	ND	0.1	0.104	ug/L	104	(65-135)		
CCCH	Chlordane		0.5	0.531	ug/L	106	(70-130)		
CCCH	Chlordane		0.5	0.519	ug/L	104	(70-130)		
LCS1	Chlordane		0.5	0.512	ug/L	102	(70-130)		
MBLK	Chlordane			<0.1	ug/L				
MRL_CHK	Chlordane		0.1	0.0948	ug/L	95	(50-150)		
MS2_201304120486	Chlordane	ND	0.5	0.522	ug/L	104	(65-135)		
CCCH	Dieldrin		0.1	0.114	ug/L	114	(70-130)		
CCCH	Dieldrin		0.1	0.115	ug/L	115	(70-130)		
CCCH	Dieldrin		0.1	0.114	ug/L	114	(70-130)		
CCCH	Dieldrin		0.1	0.115	ug/L	115	(70-130)		
LCS1	Dieldrin		0.1	0.110	ug/L	110	(70-130)		

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RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	Dieldrin			<0.01	ug/L				
MRL_CHK	Dieldrin		0.01	0.00620	ug/L	62	(50-150)		
MS1_201304120492	Dieldrin	ND	0.02	0.0196	ug/L	98	(65-135)		
MS2_201304120486	Dieldrin	ND	0.1	0.107	ug/L	107	(65-135)		
CCCH	Endrin		0.1	0.114	ug/L	114	(70-130)		
CCCH	Endrin		0.1	0.115	ug/L	115	(70-130)		
CCCH	Endrin		0.1	0.114	ug/L	115	(70-130)		
CCCH	Endrin		0.1	0.114	ug/L	114	(70-130)		
LCS1	Endrin		0.1	0.113	ug/L	113	(70-130)		
MBLK	Endrin			<0.01	ug/L				
MRL_CHK	Endrin		0.01	0.00680	ug/L	68	(50-150)		
MS1_201304120492	Endrin	ND	0.02	0.0193	ug/L	97	(65-135)		
MS2_201304120486	Endrin	ND	0.1	0.107	ug/L	107	(65-135)		
CCCH	Heptachlor		0.1	0.126	ug/L	126	(70-130)		
CCCH	Heptachlor		0.1	0.121	ug/L	121	(70-130)		
CCCH	Heptachlor		0.1	0.126	ug/L	126	(70-130)		
CCCH	Heptachlor		0.1	0.120	ug/L	120	(70-130)		
LCS1	Heptachlor		0.1	0.122	ug/L	122	(70-130)		
MBLK	Heptachlor			<0.01	ug/L				
MRL_CHK	Heptachlor		0.01	0.00700	ug/L	70	(50-150)		
MS1_201304120492	Heptachlor	ND	0.02	0.0196	ug/L	98	(65-135)		
MS2_201304120486	Heptachlor	ND	0.1	0.111	ug/L	111	(65-135)		
CCCH	Heptachlor Epoxide		0.1	0.109	ug/L	109	(70-130)		
CCCH	Heptachlor Epoxide		0.1	0.116	ug/L	116	(70-130)		
CCCH	Heptachlor Epoxide		0.1	0.114	ug/L	114	(70-130)		
CCCH	Heptachlor Epoxide		0.1	0.115	ug/L	115	(70-130)		
LCS1	Heptachlor Epoxide		0.1	0.112	ug/L	113	(70-130)		
MBLK	Heptachlor Epoxide			<0.01	ug/L				
MRL_CHK	Heptachlor Epoxide		0.01	0.00690	ug/L	69	(50-150)		
MS1_201304120492	Heptachlor Epoxide	ND	0.02	0.0193	ug/L	97	(65-135)		
MS2_201304120486	Heptachlor Epoxide	ND	0.1	0.107	ug/L	107	(65-135)		
CCCH	Lindane (gamma-BHC)		0.1	0.111	ug/L	111	(70-130)		
CCCH	Lindane (gamma-BHC)		0.1	0.113	ug/L	113	(70-130)		
CCCH	Lindane (gamma-BHC)		0.1	0.112	ug/L	112	(70-130)		
CCCH	Lindane (gamma-BHC)		0.1	0.113	ug/L	113	(70-130)		
LCS1	Lindane (gamma-BHC)		0.1	0.108	ug/L	108	(70-130)		
MBLK	Lindane (gamma-BHC)			<0.01	ug/L				
MRL_CHK	Lindane (gamma-BHC)		0.01	0.00740	ug/L	74	(50-150)		

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MS1_201304120492	Lindane (gamma-BHC)	ND	0.02	0.0195	ug/L	98	(65-135)		
MS2_201304120486	Lindane (gamma-BHC)	ND	0.1	0.105	ug/L	105	(65-135)		
CCCH	Methoxychlor		0.5	0.568	ug/L	114	(70-130)		
CCCH	Methoxychlor		0.5	0.572	ug/L	114	(70-130)		
CCCH	Methoxychlor		0.5	0.578	ug/L	116	(70-130)		
CCCH	Methoxychlor		0.5	0.561	ug/L	112	(70-130)		
LCS1	Methoxychlor		0.5	0.580	ug/L	116	(70-130)		
MBLK	Methoxychlor			<0.05	ug/L				
MRL_CHK	Methoxychlor		0.05	0.0368	ug/L	74	(50-150)		
MS1_201304120492	Methoxychlor	ND	0.1	0.0988	ug/L	99	(65-135)		
MS2_201304120486	Methoxychlor	ND	0.5	0.548	ug/L	110	(65-135)		
MBLK	PCB 1016 Aroclor			<0.08	ug/L				
MBLK	PCB 1221 Aroclor			<0.1	ug/L				
MBLK	PCB 1232 Aroclor			<0.1	ug/L				
MBLK	PCB 1242 Aroclor			<0.1	ug/L				
MBLK	PCB 1248 Aroclor			<0.1	ug/L				
MBLK	PCB 1254 Aroclor			<0.1	ug/L				
MBLK	PCB 1260 Aroclor			<0.1	ug/L				
CCCH	Tetrachlorometaxylene (S)			106	%	106	(70-130)		
CCCH	Tetrachlorometaxylene (S)			105	%	105	(70-130)		
CCCH	Tetrachlorometaxylene (S)			112	%	112	(70-130)		
CCCH	Tetrachlorometaxylene (S)			112	%	112	(70-130)		
LCS1	Tetrachlorometaxylene (S)			107	%	107	(70-130)		
MBLK	Tetrachlorometaxylene (S)			88.8	%	89	(70-130)		
MRL_CHK	Tetrachlorometaxylene (S)			100	%	100	(70-130)		
MS1_201304120492	Tetrachlorometaxylene (S)			99.9	%	100	(70-130)		
MS2_201304120486	Tetrachlorometaxylene (S)			97.3	%	97	(70-130)		
MBLK	Total PCBs			<0.08	ug/L				
CCCH	Toxaphene		2.5	2.49	ug/L	100	(70-130)		
CCCH	Toxaphene		2.5	2.63	ug/L	105	(70-130)		
LCS1	Toxaphene		2.5	2.38	ug/L	95	(70-130)		
MBLK	Toxaphene			<0.5	ug/L				
MRL_CHK	Toxaphene		0.5	0.571	ug/L	114	(50-150)		
MS1_201304120492	Toxaphene	ND	2.5	2.50	ug/L	100	(65-135)		
QC Ref# 702839 - ICP Metals by EPA 200.7						**Analysis Date: 04/16/2013**			
LCS1	Calcium Total ICAP		50	47.1	mg/L	94	(85-115)		
LCS2	Calcium Total ICAP		50	47.9	mg/L	96	(85-115)	20	1.7
MBLK	Calcium Total ICAP			<0.5	mg/L				

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Calcium Total ICAP		1.0	0.983	mg/L	98	(50-150)		
MS_201304170177	Calcium Total ICAP	13	50	59.2	mg/L	92	(70-130)		
MS2_201304160188	Calcium Total ICAP	57	50	112	mg/L	111	(70-130)		
MSD_201304170177	Calcium Total ICAP	13	50	58.7	mg/L	91	(70-130)	20	0.85
MSD2_201304160188	Calcium Total ICAP	57	50	103	mg/L	93	(70-130)	20	8.4
QC Ref# 702850 - Chlorophenoxy Herbicides by EPA 515.4							**Analysis Date: 04/17/2013**		
CCCM	2,4,5-T		1.0	1.26	ug/L	126	(70-130)		
MBLK	2,4,5-T			<0.1	ug/L				
MRL_CHK	2,4,5-T		0.2	0.172	ug/L	86	(50-150)		
MS2_201304120166	2,4,5-T	ND	0.75	0.754	ug/L	100	(70-130)		
MSD2_201304120166	2,4,5-T	ND	0.75	0.709	ug/L	95	(70-130)	30	6.2
CCCM	2,4,5-TP (Silvex)		1.0	1.22	ug/L	122	(70-130)		
MBLK	2,4,5-TP (Silvex)			<0.1	ug/L				
MRL_CHK	2,4,5-TP (Silvex)		0.2	0.130	ug/L	65	(50-150)		
MS2_201304120166	2,4,5-TP (Silvex)	ND	0.75	0.786	ug/L	105	(70-130)		
MSD2_201304120166	2,4,5-TP (Silvex)	ND	0.75	0.766	ug/L	102	(70-130)	30	2.6
CCCM	2,4-D		0.5	0.522	ug/L	104	(70-130)		
MBLK	2,4-D			<0.05	ug/L				
MRL_CHK	2,4-D		0.1	0.0996	ug/L	100	(50-150)		
MS2_201304120166	2,4-D	ND	0.38	0.322	ug/L	86	(70-130)		
MSD2_201304120166	2,4-D	ND	0.38	0.292	ug/L	78	(70-130)	30	9.8
CCCM	2,4-DB		10	11.3	ug/L	113	(70-130)		
MBLK	2,4-DB			<1	ug/L				
MRL_CHK	2,4-DB		2.0	1.30	ug/L	65	(50-150)		
MS2_201304120166	2,4-DB	ND	7.5	7.28	ug/L	97	(70-130)		
MSD2_201304120166	2,4-DB	ND	7.5	7.21	ug/L	96	(70-130)	30	0.97
CCCM	2,4-Dichlorophenyl acetic acid (S)			120	%	120	(70-130)		
MBLK	2,4-Dichlorophenyl acetic acid (S)			99.9	%	100	(70-130)		
MRL_CHK	2,4-Dichlorophenyl acetic acid (S)			101	%	101	(70-130)		
MS2_201304120166	2,4-Dichlorophenyl acetic acid (S)			102	%	102	(70-130)		
MSD2_201304120166	2,4-Dichlorophenyl acetic acid (S)			102	%	102	(70-130)		
CCCM	3,5-Dichlorobenzoic acid		2.5	2.53	ug/L	101	(70-130)		
MBLK	3,5-Dichlorobenzoic acid			<0.25	ug/L				
MRL_CHK	3,5-Dichlorobenzoic acid		0.5	0.446	ug/L	89	(50-150)		
MS2_201304120166	3,5-Dichlorobenzoic acid	ND	1.9	1.89	ug/L	101	(70-130)		
MSD2_201304120166	3,5-Dichlorobenzoic acid	ND	1.9	1.89	ug/L	101	(70-130)	30	0.0
CCCM	4,4-Dibromooctafluorobiphenyl (I)			81.6	%	82	(50-150)		

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Laboratory QC
Report: 431199

AECOS, Inc.

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	4,4-Dibromooctafluorobiphenyl (I)			99.4	%	99	(50-150)		
MRL_CHK	4,4-Dibromooctafluorobiphenyl (I)			97.3	%	97	(50-150)		
MS2_201304120166	4,4-Dibromooctafluorobiphenyl (I)			97.6	%	98	(50-150)		
MSD2_201304120166	4,4-Dibromooctafluorobiphenyl (I)			96.8	%	97	(50-150)		
CCCM	Acifluorfen		1.0	1.25	ug/L	125	(70-130)		
MBLK	Acifluorfen			<0.1	ug/L				
MRL_CHK	Acifluorfen		0.2	0.120	ug/L	60	(50-150)		
MS2_201304120166	Acifluorfen	ND	0.75	0.811	ug/L	108	(70-130)		
MSD2_201304120166	Acifluorfen	ND	0.75	0.809	ug/L	108	(70-130)	30	0.25
CCCM	Bentazon		2.5	3.19	ug/L	127	(70-130)		
MBLK	Bentazon			<0.25	ug/L				
MRL_CHK	Bentazon		0.5	0.297	ug/L	59	(50-150)		
MS2_201304120166	Bentazon	ND	1.9	1.90	ug/L	102	(70-130)		
MSD2_201304120166	Bentazon	ND	1.9	1.75	ug/L	93	(70-130)	30	8.7
CCCM	Dalapon		5.0	5.19	ug/L	104	(70-130)		
MBLK	Dalapon			<0.5	ug/L				
MRL_CHK	Dalapon		1.0	0.996	ug/L	100	(50-150)		
MS2_201304120166	Dalapon	ND	3.8	2.95	ug/L	79	(70-130)		
MSD2_201304120166	Dalapon	ND	3.8	2.86	ug/L	76	(70-130)	30	3.1
CCCM	Dicamba		0.5	0.642	ug/L	128	(70-130)		
MBLK	Dicamba			<0.04	ug/L				
MRL_CHK	Dicamba		0.1	0.0583	ug/L	58	(50-150)		
MS2_201304120166	Dicamba	ND	0.38	0.322	ug/L	86	(70-130)		
MSD2_201304120166	Dicamba	ND	0.38	0.298	ug/L	80	(70-130)	30	7.7
CCCM	Dichlorprop		2.5	3.20	ug/L	128	(70-130)		
MBLK	Dichlorprop			<0.25	ug/L				
MRL_CHK	Dichlorprop		0.5	0.253	ug/L	51	(50-150)		
MS2_201304120166	Dichlorprop	ND	1.9	1.70	ug/L	91	(70-130)		
MSD2_201304120166	Dichlorprop	ND	1.9	1.63	ug/L	87	(70-130)	30	4.2
CCCM	Dinoseb		1.0	1.27	ug/L	127	(70-130)		
MBLK	Dinoseb			<0.1	ug/L				
MRL_CHK	Dinoseb		0.2	0.104	ug/L	52	(50-150)		
MS2_201304120166	Dinoseb	ND	0.75	0.805	ug/L	107	(70-130)		
MSD2_201304120166	Dinoseb	ND	0.75	0.773	ug/L	103	(70-130)	30	4.1
CCCM	Pentachlorophenol		0.2	0.258	ug/L	129	(70-130)		
MBLK	Pentachlorophenol			<0.02	ug/L				
MRL_CHK	Pentachlorophenol		0.04	0.0403	ug/L	101	(50-150)		
MS2_201304120166	Pentachlorophenol	ND	0.15	0.155	ug/L	103	(70-130)		

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD2_201304120166	Pentachlorophenol	ND	0.15	0.150	ug/L	100	(70-130)	30	3.3
CCCM	Picloram		0.5	0.633	ug/L	127	(70-130)		
MBLK	Picloram			<0.05	ug/L				
MRL_CHK	Picloram		0.1	0.0532	ug/L	53	(50-150)		
MS2_201304120166	Picloram	ND	0.38	0.408	ug/L	109	(70-130)		
MSD2_201304120166	Picloram	ND	0.38	0.386	ug/L	103	(70-130)	30	5.8
CCCM	Tot DCPA Mono&Diacid Degradate		0.5	0.492	ug/L	98	(70-130)		
MBLK	Tot DCPA Mono&Diacid Degradate			<0.5	ug/L				
MRL_CHK	Tot DCPA Mono&Diacid Degradate		0.1	0.0814	ug/L	81	(50-150)		
MS2_201304120166	Tot DCPA Mono&Diacid Degradate	ND	0.38	0.409	ug/L	109	(70-130)		
MSD2_201304120166	Tot DCPA Mono&Diacid Degradate	ND	0.38	0.398	ug/L	106	(70-130)	30	2.7
QC Ref# 702862 - Chloride, Sulfate by EPA 300.0 by EPA 300.0						**Analysis Date: 04/15/2013**			
LCS1	Chloride		25	25.7	mg/L	103	(90-110)		
LCS2	Chloride		25	25.7	mg/L	103	(90-110)	20	0.0
MBLK	Chloride			<0.5	mg/L				
MRL_CHK	Chloride		0.5	0.421	mg/L	84	(50-150)		
MS_201304090252	Chloride	3.8	13	17.3	mg/L	108	(80-120)		
MSD_201304090252	Chloride	3.8	13	17.3	mg/L	108	(80-120)	20	0.0
QC Ref# 702945 - ICPMS Metals by EPA 200.8						**Analysis Date: 04/16/2013**			
LCS1	Antimony Total ICAP/MS		50	54.8	ug/L	110	(85-115)		
LCS2	Antimony Total ICAP/MS		50	54.9	ug/L	110	(85-115)	20	0.0
MBLK	Antimony Total ICAP/MS			<1	ug/L				
MRL_CHK	Antimony Total ICAP/MS		1.0	1.11	ug/L	111	(50-150)		
MS_201304120485	Antimony Total ICAP/MS	ND	50	50.1	ug/L	100	(70-130)		
MS2_201304120486	Antimony Total ICAP/MS	ND	50	49.5	ug/L	99	(70-130)		
MSD_201304120485	Antimony Total ICAP/MS	ND	50	50.2	ug/L	100	(70-130)	20	0.20
MSD2_201304120486	Antimony Total ICAP/MS	ND	50	49.4	ug/L	99	(70-130)	20	0.0
LCS1	Arsenic Total ICAP/MS		20	21.6	ug/L	108	(85-115)		
LCS2	Arsenic Total ICAP/MS		20	21.8	ug/L	109	(85-115)	20	0.46
MBLK	Arsenic Total ICAP/MS			<1	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1.0	1.13	ug/L	113	(50-150)		
MS_201304120485	Arsenic Total ICAP/MS	ND	20	20.6	ug/L	100	(70-130)		
MS2_201304120486	Arsenic Total ICAP/MS	ND	20	20.5	ug/L	99	(70-130)		
MSD_201304120485	Arsenic Total ICAP/MS	ND	20	20.4	ug/L	99	(70-130)	20	0.49
MSD2_201304120486	Arsenic Total ICAP/MS	ND	20	20.4	ug/L	99	(70-130)	20	0.49
LCS1	Barium Total ICAP/MS		100	110	ug/L	110	(85-115)		
LCS2	Barium Total ICAP/MS		100	110	ug/L	110	(85-115)	20	0.0

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	Barium Total ICAP/MS			<2	ug/L				
MRL_CHK	Barium Total ICAP/MS		2.0	2.22	ug/L	111	(50-150)		
MS_201304120485	Barium Total ICAP/MS	5.071	100	106	ug/L	100	(70-130)		
MS2_201304120486	Barium Total ICAP/MS	4.9	100	104	ug/L	99	(70-130)		
MSD_201304120485	Barium Total ICAP/MS	5.071	100	105	ug/L	100	(70-130)	20	0.95
MSD2_201304120486	Barium Total ICAP/MS	4.9	100	104	ug/L	99	(70-130)	20	0.0
LCS1	Beryllium Total ICAP/MS		5.0	5.42	ug/L	108	(85-115)		
LCS2	Beryllium Total ICAP/MS		5.0	5.30	ug/L	106	(85-115)	20	2.2
MBLK	Beryllium Total ICAP/MS			<1	ug/L				
MRL_CHK	Beryllium Total ICAP/MS		1.0	1.07	ug/L	107	(50-150)		
MS_201304120485	Beryllium Total ICAP/MS	ND	5.0	5.00	ug/L	100	(70-130)		
MS2_201304120486	Beryllium Total ICAP/MS	ND	5.0	5.06	ug/L	101	(70-130)		
MSD_201304120485	Beryllium Total ICAP/MS	ND	5.0	5.00	ug/L	100	(70-130)	20	0.0
MSD2_201304120486	Beryllium Total ICAP/MS	ND	5.0	5.00	ug/L	100	(70-130)	20	1.2
LCS1	Cadmium Total ICAP/MS		20	22.0	ug/L	110	(85-115)		
LCS2	Cadmium Total ICAP/MS		20	22.1	ug/L	110	(85-115)	20	0.0
MBLK	Cadmium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Cadmium Total ICAP/MS		0.5	0.550	ug/L	110	(50-150)		
MS_201304120485	Cadmium Total ICAP/MS	ND	20	20.3	ug/L	101	(70-130)		
MS2_201304120486	Cadmium Total ICAP/MS	ND	20	20.1	ug/L	100	(70-130)		
MSD_201304120485	Cadmium Total ICAP/MS	ND	20	20.1	ug/L	100	(70-130)	20	0.99
MSD2_201304120486	Cadmium Total ICAP/MS	ND	20	19.8	ug/L	99	(70-130)	20	1.5
LCS1	Chromium Total ICAP/MS		100	106	ug/L	106	(85-115)		
LCS2	Chromium Total ICAP/MS		100	106	ug/L	106	(85-115)	20	0.0
MBLK	Chromium Total ICAP/MS			<1	ug/L				
MRL_CHK	Chromium Total ICAP/MS		1.0	1.16	ug/L	116	(50-150)		
MS_201304120485	Chromium Total ICAP/MS	ND	100	94.7	ug/L	94	(70-130)		
MS2_201304120486	Chromium Total ICAP/MS	ND	100	94.4	ug/L	94	(70-130)		
MSD_201304120485	Chromium Total ICAP/MS	ND	100	94.4	ug/L	94	(70-130)	20	0.32
MSD2_201304120486	Chromium Total ICAP/MS	ND	100	94.0	ug/L	94	(70-130)	20	0.32
LCS1	Copper Total ICAP/MS		100	110	ug/L	110	(85-115)		
LCS2	Copper Total ICAP/MS		100	110	ug/L	110	(85-115)	20	0.0
MBLK	Copper Total ICAP/MS			<2	ug/L				
MRL_CHK	Copper Total ICAP/MS		2.0	2.20	ug/L	110	(50-150)		
MS_201304120485	Copper Total ICAP/MS	ND	100	95.2	ug/L	95	(70-130)		
MS2_201304120486	Copper Total ICAP/MS	ND	100	94.3	ug/L	94	(70-130)		
MSD_201304120485	Copper Total ICAP/MS	ND	100	94.5	ug/L	94	(70-130)	20	0.74
MSD2_201304120486	Copper Total ICAP/MS	ND	100	93.6	ug/L	94	(70-130)	20	0.75

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	Lead Total ICAP/MS		20	22.2	ug/L	111	(85-115)		
LCS2	Lead Total ICAP/MS		20	22.1	ug/L	111	(85-115)	20	0.45
MBLK	Lead Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Lead Total ICAP/MS		0.5	0.571	ug/L	114	(50-150)		
MS_201304120485	Lead Total ICAP/MS	ND	20	19.6	ug/L	98	(70-130)		
MS2_201304120486	Lead Total ICAP/MS	ND	20	19.5	ug/L	98	(70-130)		
MSD_201304120485	Lead Total ICAP/MS	ND	20	19.7	ug/L	99	(70-130)	20	0.51
MSD2_201304120486	Lead Total ICAP/MS	ND	20	19.4	ug/L	97	(70-130)	20	0.51
LCS1	Nickel Total ICAP/MS		50	54.3	ug/L	109	(85-115)		
LCS2	Nickel Total ICAP/MS		50	54.5	ug/L	109	(85-115)	20	0.37
MBLK	Nickel Total ICAP/MS			<5	ug/L				
MRL_CHK	Nickel Total ICAP/MS		5.0	5.59	ug/L	112	(50-150)		
MS_201304120485	Nickel Total ICAP/MS	ND	50	47.4	ug/L	94	(70-130)		
MS2_201304120486	Nickel Total ICAP/MS	ND	50	46.8	ug/L	93	(70-130)		
MSD_201304120485	Nickel Total ICAP/MS	ND	50	47.4	ug/L	94	(70-130)	20	0.0
MSD2_201304120486	Nickel Total ICAP/MS	ND	50	46.7	ug/L	93	(70-130)	20	0.21
LCS1	Selenium Total ICAP/MS		20	21.6	ug/L	108	(85-115)		
LCS2	Selenium Total ICAP/MS		20	22.0	ug/L	110	(85-115)	20	1.8
MBLK	Selenium Total ICAP/MS			<5	ug/L				
MRL_CHK	Selenium Total ICAP/MS		5.0	5.31	ug/L	106	(50-150)		
MS_201304120485	Selenium Total ICAP/MS	ND	20	21.7	ug/L	104	(70-130)		
MS2_201304120486	Selenium Total ICAP/MS	ND	20	21.4	ug/L	103	(70-130)		
MSD_201304120485	Selenium Total ICAP/MS	ND	20	21.9	ug/L	106	(70-130)	20	0.92
MSD2_201304120486	Selenium Total ICAP/MS	ND	20	21.2	ug/L	102	(70-130)	20	0.47
LCS1	Thallium Total ICAP/MS		20	21.6	ug/L	108	(85-115)		
LCS2	Thallium Total ICAP/MS		20	21.9	ug/L	110	(85-115)	20	1.4
MBLK	Thallium Total ICAP/MS			<1	ug/L				
MRL_CHK	Thallium Total ICAP/MS		1.0	1.14	ug/L	114	(50-150)		
MS_201304120485	Thallium Total ICAP/MS	ND	20	19.5	ug/L	97	(70-130)		
MS2_201304120486	Thallium Total ICAP/MS	ND	20	19.5	ug/L	97	(70-130)		
MSD_201304120485	Thallium Total ICAP/MS	ND	20	19.6	ug/L	98	(70-130)	20	0.51
MSD2_201304120486	Thallium Total ICAP/MS	ND	20	19.4	ug/L	97	(70-130)	20	0.51
LCS1	Uranium ICAP/MS		20	22.3	ug/L	111	(85-115)		
LCS2	Uranium ICAP/MS		20	22.1	ug/L	111	(85-115)	20	0.90
MBLK	Uranium ICAP/MS			<1	ug/L				
MRL_CHK	Uranium ICAP/MS		1.0	1.12	ug/L	112	(50-150)		
MS_201304120485	Uranium ICAP/MS	ND	20	20.6	ug/L	99	(70-130)		
MS2_201304120486	Uranium ICAP/MS	ND	20	20.8	ug/L	100	(70-130)		

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD_201304120485	Uranium ICAP/MS	ND	20	20.7	ug/L	100	(70-130)	20	0.48
MSD2_201304120486	Uranium ICAP/MS	ND	20	20.4	ug/L	98	(70-130)	20	1.9
QC Ref# 702950 - Specific Conductance by SM2510B						**Analysis Date: 04/16/2013**			
DUP_201304120220	Specific Conductance	74		74.1	umho/cm		(0-20)	20	0.40
DUP_201304150262	Specific Conductance	550		546	umho/cm		(0-20)	20	0.037
LCS1	Specific Conductance		1000	1010	umho/cm	101	(95-105)		
LCS2	Specific Conductance		1000	1010	umho/cm	101	(95-105)	20	0.0
MBLK	Specific Conductance			<2	umho/cm				
MRL_CHK	Specific Conductance		2.0	1.50	umho/cm	75	(50-150)		
QC Ref# 703074 - Volatile Organics by GCMS by EPA 524.2						**Analysis Date: 04/16/2013**			
LCS1	1,1,1,2-Tetrachloroethane		5.0	5.13	ug/L	103	(70-130)		
LCS2	1,1,1,2-Tetrachloroethane		5.0	5.16	ug/L	103	(70-130)	20	0.58
MBLK	1,1,1,2-Tetrachloroethane			<0.5	ug/L				
MRL_CHK	1,1,1,2-Tetrachloroethane		0.5	0.480	ug/L	96	(50-150)		
LCS1	1,1,1-Trichloroethane		5.0	5.18	ug/L	104	(70-130)		
LCS2	1,1,1-Trichloroethane		5.0	5.75	ug/L	115	(70-130)	20	10
MBLK	1,1,1-Trichloroethane			<0.5	ug/L				
MRL_CHK	1,1,1-Trichloroethane		0.5	0.500	ug/L	100	(50-150)		
LCS1	1,1,2,2-Tetrachloroethane		5.0	5.19	ug/L	104	(70-130)		
LCS2	1,1,2,2-Tetrachloroethane		5.0	5.07	ug/L	101	(70-130)	20	2.3
MBLK	1,1,2,2-Tetrachloroethane			<0.5	ug/L				
MRL_CHK	1,1,2,2-Tetrachloroethane		0.5	0.520	ug/L	104	(50-150)		
LCS1	1,1,2-Trichloroethane		5.0	5.19	ug/L	104	(70-130)		
LCS2	1,1,2-Trichloroethane		5.0	5.36	ug/L	107	(70-130)	20	3.2
MBLK	1,1,2-Trichloroethane			<0.5	ug/L				
MRL_CHK	1,1,2-Trichloroethane		0.5	0.460	ug/L	92	(50-150)		
LCS1	1,1-Dichloroethane		5.0	5.08	ug/L	102	(70-130)		
LCS2	1,1-Dichloroethane		5.0	5.28	ug/L	106	(70-130)	20	3.9
MBLK	1,1-Dichloroethane			<0.5	ug/L				
MRL_CHK	1,1-Dichloroethane		0.5	0.530	ug/L	106	(50-150)		
LCS1	1,1-Dichloroethylene		5.0	5.39	ug/L	108	(70-130)		
LCS2	1,1-Dichloroethylene		5.0	5.51	ug/L	110	(70-130)	20	2.2
MBLK	1,1-Dichloroethylene			<0.5	ug/L				
MRL_CHK	1,1-Dichloroethylene		0.5	0.530	ug/L	106	(50-150)		
LCS1	1,1-Dichloropropene		5.0	4.77	ug/L	95	(70-130)		
LCS2	1,1-Dichloropropene		5.0	5.04	ug/L	101	(70-130)	20	5.5
MBLK	1,1-Dichloropropene			<0.5	ug/L				

Spike recovery is already corrected for native results.
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Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.
RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
(S) - Indicates surrogate compound.
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Laboratory QC
Report: 431199

AECOS, Inc.

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	1,1-Dichloropropene		0.5	0.470	ug/L	94	(50-150)		
LCS1	1,2,3-Trichlorobenzene		5.0	4.80	ug/L	96	(70-130)		
LCS2	1,2,3-Trichlorobenzene		5.0	4.74	ug/L	95	(70-130)	20	1.3
MBLK	1,2,3-Trichlorobenzene			<0.5	ug/L				
MRL_CHK	1,2,3-Trichlorobenzene		0.5	0.690	ug/L	138	(50-150)		
LCS1	1,2,3-Trichloropropane		5.0	4.94	ug/L	99	(70-130)		
LCS2	1,2,3-Trichloropropane		5.0	5.12	ug/L	102	(70-130)	20	3.6
MBLK	1,2,3-Trichloropropane			<0.5	ug/L				
MRL_CHK	1,2,3-Trichloropropane		0.5	0.490	ug/L	98	(50-150)		
LCS1	1,2,4-Trichlorobenzene		5.0	4.65	ug/L	93	(70-130)		
LCS2	1,2,4-Trichlorobenzene		5.0	4.60	ug/L	92	(70-130)	20	1.1
MBLK	1,2,4-Trichlorobenzene			<0.5	ug/L				
MRL_CHK	1,2,4-Trichlorobenzene		0.5	0.680	ug/L	136	(50-150)		
LCS1	1,2,4-Trimethylbenzene		5.0	4.31	ug/L	86	(70-130)		
LCS2	1,2,4-Trimethylbenzene		5.0	4.25	ug/L	85	(70-130)	20	1.4
MBLK	1,2,4-Trimethylbenzene			<0.5	ug/L				
MRL_CHK	1,2,4-Trimethylbenzene		0.5	0.610	ug/L	122	(50-150)		
LCS1	1,2-Dichloroethane		5.0	4.93	ug/L	99	(70-130)		
LCS2	1,2-Dichloroethane		5.0	5.27	ug/L	105	(70-130)	20	6.7
MBLK	1,2-Dichloroethane			<0.5	ug/L				
MRL_CHK	1,2-Dichloroethane		0.5	0.530	ug/L	106	(50-150)		
LCS1	1,2-Dichloroethane-d4 (S)			95.4	%	95	(70-130)		
LCS2	1,2-Dichloroethane-d4 (S)			95.6	%	96	(70-130)		
MBLK	1,2-Dichloroethane-d4 (S)			110	%	110	(70-130)		
MRL_CHK	1,2-Dichloroethane-d4 (S)			103	%	103	(70-130)		
MRLLW	1,2-Dichloroethane-d4 (S)			102	%	102	(70-130)		
LCS1	1,2-Dichloropropane		5.0	5.30	ug/L	106	(70-130)		
LCS2	1,2-Dichloropropane		5.0	5.59	ug/L	112	(70-130)	20	5.3
MBLK	1,2-Dichloropropane			<0.5	ug/L				
MRL_CHK	1,2-Dichloropropane		0.5	0.510	ug/L	102	(50-150)		
LCS1	1,3,5-Trimethylbenzene		5.0	4.42	ug/L	88	(70-130)		
LCS2	1,3,5-Trimethylbenzene		5.0	4.26	ug/L	85	(70-130)	20	3.7
MBLK	1,3,5-Trimethylbenzene			<0.5	ug/L				
MRL_CHK	1,3,5-Trimethylbenzene		0.5	0.610	ug/L	122	(50-150)		
LCS1	1,3-Dichloropropane		5.0	5.19	ug/L	104	(70-130)		
LCS2	1,3-Dichloropropane		5.0	5.50	ug/L	110	(70-130)	20	5.8
MBLK	1,3-Dichloropropane			<0.5	ug/L				
MRL_CHK	1,3-Dichloropropane		0.5	0.470	ug/L	94	(50-150)		

Spike recovery is already corrected for native results.
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RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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Laboratory QC
Report: 431199

AECOS, Inc.

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	2,2-Dichloropropane		5.0	4.89	ug/L	98	(70-130)		
LCS2	2,2-Dichloropropane		5.0	5.14	ug/L	103	(70-130)	20	5.0
MBLK	2,2-Dichloropropane			<0.5	ug/L				
MRL_CHK	2,2-Dichloropropane		0.5	0.490	ug/L	98	(50-150)		
LCS1	2-Butanone (MEK)		50	49.2	ug/L	98	(70-130)		
LCS2	2-Butanone (MEK)		50	52.4	ug/L	105	(70-130)	20	6.3
MBLK	2-Butanone (MEK)			<5.0	ug/L				
MRL_CHK	2-Butanone (MEK)		5.0	4.94	ug/L	99	(50-150)		
LCS1	4-Bromofluorobenzene (S)			97.2	%	97	(70-130)		
LCS2	4-Bromofluorobenzene (S)			97.2	%	97	(70-130)		
MBLK	4-Bromofluorobenzene (S)			104	%	104	(70-130)		
MRL_CHK	4-Bromofluorobenzene (S)			101	%	101	(70-130)		
MRLLW	4-Bromofluorobenzene (S)			102	%	102	(70-130)		
LCS1	4-Methyl-2-Pentanone (MIBK)		50	50.4	ug/L	101	(70-130)		
LCS2	4-Methyl-2-Pentanone (MIBK)		50	52.3	ug/L	105	(70-130)	20	3.7
MBLK	4-Methyl-2-Pentanone (MIBK)			<5	ug/L				
MRL_CHK	4-Methyl-2-Pentanone (MIBK)		5.0	5.76	ug/L	115	(50-150)		
LCS1	Benzene		5.0	5.16	ug/L	103	(70-130)		
LCS2	Benzene		5.0	5.47	ug/L	109	(70-130)	20	5.8
MBLK	Benzene			<0.5	ug/L				
MRL_CHK	Benzene		0.5	0.480	ug/L	96	(50-150)		
LCS1	Bromobenzene		5.0	5.10	ug/L	102	(70-130)		
LCS2	Bromobenzene		5.0	5.33	ug/L	107	(70-130)	20	4.4
MBLK	Bromobenzene			<0.5	ug/L				
MRL_CHK	Bromobenzene		0.5	0.430	ug/L	86	(50-150)		
LCS1	Bromochloromethane		5.0	5.19	ug/L	104	(70-130)		
LCS2	Bromochloromethane		5.0	5.32	ug/L	106	(70-130)	20	2.5
MBLK	Bromochloromethane			<0.5	ug/L				
MRL_CHK	Bromochloromethane		0.5	0.510	ug/L	102	(50-150)		
LCS1	Bromodichloromethane		5.0	5.07	ug/L	101	(70-130)		
LCS2	Bromodichloromethane		5.0	5.22	ug/L	104	(70-130)	20	2.9
MBLK	Bromodichloromethane			<0.5	ug/L				
MRL_CHK	Bromodichloromethane		0.5	0.530	ug/L	106	(50-150)		
LCS1	Bromoethane		5.0	5.22	ug/L	104	(70-130)		
LCS2	Bromoethane		5.0	5.45	ug/L	109	(70-130)	20	4.3
MBLK	Bromoethane			<0.5	ug/L				
MRL_CHK	Bromoethane		0.5	0.470	ug/L	94	(50-150)		
LCS1	Bromoform		5.0	4.71	ug/L	94	(70-130)		

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RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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AECOS, Inc.

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	Bromoform		5.0	4.95	ug/L	99	(70-130)	20	5.0
MBLK	Bromoform			<0.5	ug/L				
MRL_CHK	Bromoform		0.5	0.350	ug/L	70	(50-150)		
LCS1	Bromomethane (Methyl Bromide)		5.0	4.92	ug/L	98	(70-130)		
LCS2	Bromomethane (Methyl Bromide)		5.0	5.13	ug/L	103	(70-130)	20	4.2
MBLK	Bromomethane (Methyl Bromide)			<0.5	ug/L				
MRL_CHK	Bromomethane (Methyl Bromide)		0.5	0.610	ug/L	122	(50-150)		
LCS1	Carbon disulfide		5.0	5.19	ug/L	104	(70-130)		
LCS2	Carbon disulfide		5.0	5.43	ug/L	109	(70-130)	20	4.5
MBLK	Carbon disulfide			<0.5	ug/L				
MRL_CHK	Carbon disulfide		0.5	0.470	ug/L	94	(50-150)		
LCS1	Carbon Tetrachloride		5.0	4.98	ug/L	100	(70-130)		
LCS2	Carbon Tetrachloride		5.0	5.14	ug/L	103	(70-130)	20	3.2
MBLK	Carbon Tetrachloride			<0.5	ug/L				
MRL_CHK	Carbon Tetrachloride		0.5	0.420	ug/L	84	(50-150)		
LCS1	Chlorobenzene		5.0	4.84	ug/L	97	(70-130)		
LCS2	Chlorobenzene		5.0	5.16	ug/L	103	(70-130)	20	6.4
MBLK	Chlorobenzene			<0.5	ug/L				
MRL_CHK	Chlorobenzene		0.5	0.420	ug/L	84	(50-150)		
LCS1	Chlorodibromomethane		5.0	5.16	ug/L	103	(70-130)		
LCS2	Chlorodibromomethane		5.0	5.16	ug/L	103	(70-130)	20	0.0
MBLK	Chlorodibromomethane			<0.5	ug/L				
MRL_CHK	Chlorodibromomethane		0.5	0.460	ug/L	92	(50-150)		
LCS1	Chloroethane		5.0	4.80	ug/L	96	(70-130)		
LCS2	Chloroethane		5.0	5.05	ug/L	101	(70-130)	20	5.1
MBLK	Chloroethane			<0.5	ug/L				
MRL_CHK	Chloroethane		0.5	0.510	ug/L	102	(50-150)		
LCS1	Chloroform (Trichloromethane)		5.0	5.46	ug/L	109	(70-130)		
LCS2	Chloroform (Trichloromethane)		5.0	5.82	ug/L	116	(70-130)	20	6.4
MBLK	Chloroform (Trichloromethane)			<0.5	ug/L				
MRL_CHK	Chloroform (Trichloromethane)		0.5	0.530	ug/L	106	(50-150)		
LCS1	Chloromethane(Methyl Chloride)		5.0	4.28	ug/L	86	(70-130)		
LCS2	Chloromethane(Methyl Chloride)		5.0	4.74	ug/L	95	(70-130)	20	10
MBLK	Chloromethane(Methyl Chloride)			<0.5	ug/L				
MRL_CHK	Chloromethane(Methyl Chloride)		0.5	0.550	ug/L	110	(50-150)		
LCS1	cis-1,2-Dichloroethylene		5.0	4.99	ug/L	100	(70-130)		
LCS2	cis-1,2-Dichloroethylene		5.0	5.19	ug/L	104	(70-130)	20	3.9
MBLK	cis-1,2-Dichloroethylene			<0.5	ug/L				

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RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	cis-1,2-Dichloroethylene		0.5	0.500	ug/L	100	(50-150)		
LCS1	cis-1,3-Dichloropropene		5.0	4.62	ug/L	92	(70-130)		
LCS2	cis-1,3-Dichloropropene		5.0	5.01	ug/L	100	(70-130)	20	8.1
MBLK	cis-1,3-Dichloropropene			<0.5	ug/L				
MRL_CHK	cis-1,3-Dichloropropene		0.5	0.400	ug/L	80	(50-150)		
LCS1	Dibromomethane		5.0	5.19	ug/L	104	(70-130)		
LCS2	Dibromomethane		5.0	5.22	ug/L	104	(70-130)	20	0.58
MBLK	Dibromomethane			<0.5	ug/L				
MRL_CHK	Dibromomethane		0.5	0.480	ug/L	96	(50-150)		
LCS1	Dichlorodifluoromethane		5.0	5.19	ug/L	104	(70-130)		
LCS2	Dichlorodifluoromethane		5.0	5.43	ug/L	109	(70-130)	20	4.5
MBLK	Dichlorodifluoromethane			<0.5	ug/L				
MRL_CHK	Dichlorodifluoromethane		0.5	0.570	ug/L	114	(50-150)		
LCS1	Dichloromethane		5.0	4.90	ug/L	98	(70-130)		
LCS2	Dichloromethane		5.0	5.00	ug/L	100	(70-130)	20	2.0
MBLK	Dichloromethane			<0.5	ug/L				
MRL_CHK	Dichloromethane		0.5	0.510	ug/L	102	(50-150)		
LCS1	Di-isopropyl ether		5.0	4.95	ug/L	99	(70-130)		
LCS2	Di-isopropyl ether		5.0	5.22	ug/L	104	(70-130)	20	5.3
MBLK	Di-isopropyl ether			<3.0	ug/L				
MRL_CHK	Di-isopropyl ether		0.5	0.490	ug/L	98	(50-150)		
LCS1	Ethyl benzene		5.0	4.30	ug/L	86	(70-130)		
LCS2	Ethyl benzene		5.0	4.51	ug/L	90	(70-130)	20	4.8
MBLK	Ethyl benzene			<0.5	ug/L				
MRL_CHK	Ethyl benzene		0.5	0.660	ug/L	132	(50-150)		
LCS1	Hexachlorobutadiene		5.0	5.47	ug/L	109	(70-130)		
LCS2	Hexachlorobutadiene		5.0	5.18	ug/L	104	(70-130)	20	5.5
MBLK	Hexachlorobutadiene			<0.5	ug/L				
MRL_CHK	Hexachlorobutadiene		0.5	0.530	ug/L	106	(50-150)		
LCS1	Isopropylbenzene		5.0	4.18	ug/L	84	(70-130)		
LCS2	Isopropylbenzene		5.0	4.35	ug/L	87	(70-130)	20	4.0
MBLK	Isopropylbenzene			<0.5	ug/L				
MRL_CHK	Isopropylbenzene		0.5	0.620	ug/L	124	(50-150)		
LCS1	m,p-Xylenes		10	8.80	ug/L	88	(70-130)		
LCS2	m,p-Xylenes		10	9.08	ug/L	91	(70-130)	20	3.1
MBLK	m,p-Xylenes			<0.5	ug/L				
MRL_CHK	m,p-Xylenes		1.0	1.27	ug/L	127	(50-150)		
MRLLW	m,p-Xylenes		0.5	0.980	ug/L	**196**	(50-150)		

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RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	m-Dichlorobenzene (1,3-DCB)		5.0	4.91	ug/L	98	(70-130)		
LCS2	m-Dichlorobenzene (1,3-DCB)		5.0	5.14	ug/L	103	(70-130)	20	4.6
MBLK	m-Dichlorobenzene (1,3-DCB)			<0.5	ug/L				
MRL_CHK	m-Dichlorobenzene (1,3-DCB)		0.5	0.360	ug/L	72	(50-150)		
LCS1	Methyl Tert-butyl ether (MTBE)		5.0	4.83	ug/L	97	(70-130)		
LCS2	Methyl Tert-butyl ether (MTBE)		5.0	4.88	ug/L	98	(70-130)	20	1.0
MBLK	Methyl Tert-butyl ether (MTBE)			<0.5	ug/L				
MRL_CHK	Methyl Tert-butyl ether (MTBE)		0.5	0.470	ug/L	94	(50-150)		
LCS1	Naphthalene		5.0	4.31	ug/L	86	(70-130)		
LCS2	Naphthalene		5.0	4.38	ug/L	88	(70-130)	20	1.6
MBLK	Naphthalene			<0.5	ug/L				
MRL_CHK	Naphthalene		0.5	0.710	ug/L	142	(50-150)		
LCS1	n-Butylbenzene		5.0	4.50	ug/L	90	(70-130)		
LCS2	n-Butylbenzene		5.0	4.56	ug/L	91	(70-130)	20	1.3
MBLK	n-Butylbenzene			<0.5	ug/L				
MRL_CHK	n-Butylbenzene		0.5	0.600	ug/L	120	(50-150)		
LCS1	n-Propylbenzene		5.0	4.18	ug/L	84	(70-130)		
LCS2	n-Propylbenzene		5.0	4.15	ug/L	83	(70-130)	20	0.72
MBLK	n-Propylbenzene			<0.5	ug/L				
MRL_CHK	n-Propylbenzene		0.5	0.620	ug/L	124	(50-150)		
LCS1	o-Chlorotoluene		5.0	4.94	ug/L	99	(70-130)		
LCS2	o-Chlorotoluene		5.0	5.17	ug/L	103	(70-130)	20	4.5
MBLK	o-Chlorotoluene			<0.5	ug/L				
MRL_CHK	o-Chlorotoluene		0.5	0.350	ug/L	70	(50-150)		
LCS1	o-Dichlorobenzene (1,2-DCB)		5.0	5.40	ug/L	108	(70-130)		
LCS2	o-Dichlorobenzene (1,2-DCB)		5.0	5.63	ug/L	113	(70-130)	20	4.2
MBLK	o-Dichlorobenzene (1,2-DCB)			<0.5	ug/L				
MRL_CHK	o-Dichlorobenzene (1,2-DCB)		0.5	0.520	ug/L	104	(50-150)		
LCS1	o-Xylene		5.0	4.13	ug/L	83	(70-130)		
LCS2	o-Xylene		5.0	4.20	ug/L	84	(70-130)	20	1.7
MBLK	o-Xylene			<0.5	ug/L				
MRL_CHK	o-Xylene		0.5	0.610	ug/L	122	(50-150)		
LCS1	p-Chlorotoluene		5.0	4.44	ug/L	89	(70-130)		
LCS2	p-Chlorotoluene		5.0	4.53	ug/L	91	(70-130)	20	2.0
MBLK	p-Chlorotoluene			<0.5	ug/L				
MRL_CHK	p-Chlorotoluene		0.5	0.600	ug/L	120	(50-150)		
LCS1	p-Dichlorobenzene (1,4-DCB)		5.0	5.13	ug/L	103	(70-130)		
LCS2	p-Dichlorobenzene (1,4-DCB)		5.0	5.24	ug/L	105	(70-130)	20	2.1

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Laboratory QC
Report: 431199

AECOS, Inc.

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	p-Dichlorobenzene (1,4-DCB)			<0.5	ug/L				
MRL_CHK	p-Dichlorobenzene (1,4-DCB)		0.5	0.420	ug/L	84	(50-150)		
LCS1	p-Isopropyltoluene		5.0	4.17	ug/L	83	(70-130)		
LCS2	p-Isopropyltoluene		5.0	4.26	ug/L	85	(70-130)	20	2.1
MBLK	p-Isopropyltoluene			<0.5	ug/L				
MRL_CHK	p-Isopropyltoluene		0.5	0.600	ug/L	120	(50-150)		
LCS1	sec-Butylbenzene		5.0	4.42	ug/L	88	(70-130)		
LCS2	sec-Butylbenzene		5.0	4.54	ug/L	91	(70-130)	20	2.7
MBLK	sec-Butylbenzene			<0.5	ug/L				
MRL_CHK	sec-Butylbenzene		0.5	0.620	ug/L	124	(50-150)		
LCS1	Styrene		5.0	4.18	ug/L	84	(70-130)		
LCS2	Styrene		5.0	4.10	ug/L	82	(70-130)	20	1.9
MBLK	Styrene			<0.5	ug/L				
MRL_CHK	Styrene		0.5	0.600	ug/L	120	(50-150)		
LCS1	tert-amyl Methyl Ether		5.0	4.49	ug/L	90	(70-130)		
LCS2	tert-amyl Methyl Ether		5.0	4.67	ug/L	93	(70-130)	20	3.9
MBLK	tert-amyl Methyl Ether			<3	ug/L				
MRL_CHK	tert-amyl Methyl Ether		0.5	0.710	ug/L	142	(50-150)		
LCS1	tert-Butyl Ethyl Ether		5.0	5.18	ug/L	104	(70-130)		
LCS2	tert-Butyl Ethyl Ether		5.0	5.58	ug/L	112	(70-130)	20	7.4
MBLK	tert-Butyl Ethyl Ether			<3	ug/L				
MRL_CHK	tert-Butyl Ethyl Ether		0.5	0.520	ug/L	104	(50-150)		
LCS1	tert-Butylbenzene		5.0	4.27	ug/L	85	(70-130)		
LCS2	tert-Butylbenzene		5.0	4.25	ug/L	85	(70-130)	20	0.47
MBLK	tert-Butylbenzene			<0.5	ug/L				
MRL_CHK	tert-Butylbenzene		0.5	0.640	ug/L	128	(50-150)		
LCS1	Tetrachloroethylene (PCE)		5.0	4.99	ug/L	100	(70-130)		
LCS2	Tetrachloroethylene (PCE)		5.0	5.34	ug/L	107	(70-130)	20	6.8
MBLK	Tetrachloroethylene (PCE)			<0.5	ug/L				
MRL_CHK	Tetrachloroethylene (PCE)		0.5	0.490	ug/L	98	(50-150)		
LCS1	Toluene		5.0	5.21	ug/L	104	(70-130)		
LCS2	Toluene		5.0	5.60	ug/L	112	(70-130)	20	7.2
MBLK	Toluene			<0.5	ug/L				
MRL_CHK	Toluene		0.5	0.470	ug/L	94	(50-150)		
LCS1	Toluene-d8 (S)			103	%	103	(70-130)		
LCS2	Toluene-d8 (S)			105	%	105	(70-130)		
MBLK	Toluene-d8 (S)			80.4	%	80	(70-130)		
MRL_CHK	Toluene-d8 (S)			100	%	100	(70-130)		

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Report: 431199

AECOS, Inc.

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRLLW	Toluene-d8 (S)			93.4	%	93	(70-130)		
LCS1	trans-1,2-Dichloroethylene		5.0	4.96	ug/L	99	(70-130)		
LCS2	trans-1,2-Dichloroethylene		5.0	5.19	ug/L	104	(70-130)	20	4.5
MBLK	trans-1,2-Dichloroethylene			<0.5	ug/L				
MRL_CHK	trans-1,2-Dichloroethylene		0.5	0.440	ug/L	88	(50-150)		
LCS1	trans-1,3-Dichloropropene		5.0	4.78	ug/L	96	(70-130)		
LCS2	trans-1,3-Dichloropropene		5.0	5.02	ug/L	100	(70-130)	20	4.9
MBLK	trans-1,3-Dichloropropene			<0.5	ug/L				
MRL_CHK	trans-1,3-Dichloropropene		0.5	0.400	ug/L	80	(50-150)		
LCS1	Trichloroethylene (TCE)		5.0	4.92	ug/L	98	(70-130)		
LCS2	Trichloroethylene (TCE)		5.0	5.41	ug/L	108	(70-130)	20	9.5
MBLK	Trichloroethylene (TCE)			<0.5	ug/L				
MRL_CHK	Trichloroethylene (TCE)		0.5	0.500	ug/L	100	(50-150)		
LCS1	Trichlorofluoromethane		5.0	4.18	ug/L	84	(70-130)		
LCS2	Trichlorofluoromethane		5.0	4.38	ug/L	88	(70-130)	20	4.7
MBLK	Trichlorofluoromethane			<0.5	ug/L				
MRL_CHK	Trichlorofluoromethane		0.5	0.520	ug/L	104	(50-150)		
LCS1	Trichlorotrifluoroethane(Freon		5.0	4.65	ug/L	93	(70-130)		
LCS2	Trichlorotrifluoroethane(Freon		5.0	4.69	ug/L	94	(70-130)	20	0.86
MBLK	Trichlorotrifluoroethane(Freon			<0.5	ug/L				
MRL_CHK	Trichlorotrifluoroethane(Freon		0.5	0.520	ug/L	104	(50-150)		
LCS1	Vinyl chloride (VC)		5.0	4.64	ug/L	93	(70-130)		
LCS2	Vinyl chloride (VC)		5.0	4.94	ug/L	99	(70-130)	20	6.3
MBLK	Vinyl chloride (VC)			<0.3	ug/L				
MRL_CHK	Vinyl chloride (VC)		0.5	0.540	ug/L	108	(50-150)		
MRLLW	Vinyl chloride (VC)		0.25	0.240	ug/L	96	(50-150)		
QC Ref# 703111 - Mercury Total by EPA 245.1						**Analysis Date: 04/17/2013**			
LCS1	Mercury		1.5	1.48	ug/L	99	(85-115)		
LCS2	Mercury		1.5	1.56	ug/L	104	(85-115)	20	5.3
MBLK	Mercury			<0.2	ug/L				
MRL_CHK	Mercury		0.2	0.218	ug/L	109	(50-150)		
MS_201304130025	Mercury	ND	1.5	1.64	ug/L	108	(70-130)		
MS_201304130008	Mercury	ND	1.5	1.62	ug/L	107	(70-130)		
MSD_201304130008	Mercury	ND	1.5	1.65	ug/L	109	(70-130)	20	1.8
MSD_201304130025	Mercury	ND	1.5	1.65	ug/L	109	(70-130)	20	0.61
QC Ref# 703127 - EPA Method 504.1 by EPA 504.1						**Analysis Date: 04/17/2013**			
CCCM	1,2,3-Trichloropropane		1.3	1.08	ug/L	86	(70-130)		

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RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
DUP_201304170178	1,2,3-Trichloropropane	ND		ND	ug/L		(0-20)		
MBLK	1,2,3-Trichloropropane			<0.04	ug/L				
MRL_CHK	1,2,3-Trichloropropane		0.05	0.0438	ug/L	88	(60-140)		
MRLLW	1,2,3-Trichloropropane		0.04	0.0367	ug/L	92	(60-140)		
MS_201304170177	1,2,3-Trichloropropane	ND	1.3	0.990	ug/L	80	(65-135)		
CCCM	1,2-Dibromo-3-chloropropane		0.25	0.198	ug/L	79	(70-130)		
DUP_201304170178	1,2-Dibromo-3-chloropropane	ND		ND	ug/L		(0-20)		
MBLK	1,2-Dibromo-3-chloropropane			<0.01	ug/L				
MRL_CHK	1,2-Dibromo-3-chloropropane		0.01	0.0127	ug/L	127	(60-140)		
MS_201304170177	1,2-Dibromo-3-chloropropane	ND	0.25	0.175	ug/L	71	(65-135)		
CCCM	1,2-Dibromoethane		0.25	0.204	ug/L	82	(70-130)		
DUP_201304170178	1,2-Dibromoethane	ND		ND	ug/L		(0-20)		
MBLK	1,2-Dibromoethane			<0.01	ug/L				
MRL_CHK	1,2-Dibromoethane		0.01	0.0116	ug/L	116	(60-140)		
MS_201304170177	1,2-Dibromoethane	ND	0.25	0.188	ug/L	76	(65-135)		
CCCM	1,2-Dibromopropane (S)			94.2	%	94	(60-140)		
DUP_201304170178	1,2-Dibromopropane (S)			95.0	%	95	(60-140)		
MBLK	1,2-Dibromopropane (S)			92.3	%	92	(60-140)		
MRL_CHK	1,2-Dibromopropane (S)			84.9	%	85	(60-140)		
MRLLW	1,2-Dibromopropane (S)			80.4	%	80	(60-140)		
MS_201304170177	1,2-Dibromopropane (S)			82.3	%	82	(60-140)		
QC Ref# 703365 - Aldicarbs by EPA 531.2						**Analysis Date: 04/18/2013**			
CCCH	3-Hydroxycarbofuran		25	24.9	ug/L	100	(70-130)		
CCCM	3-Hydroxycarbofuran		10	9.91	ug/L	99	(70-130)		
LCS1	3-Hydroxycarbofuran		10	9.92	ug/L	99	(70-130)		
MBLK	3-Hydroxycarbofuran			<0.16	ug/L				
MRL_CHK	3-Hydroxycarbofuran		0.5	0.576	ug/L	115	(50-150)		
MS_201304170155	3-Hydroxycarbofuran	ND	10	10.6	ug/L	106	(70-130)		
MSD_201304170155	3-Hydroxycarbofuran	ND	10	10.1	ug/L	101	(70-130)	20	4.8
CCCH	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate (i			98.0	%	98	(70-130)		
CCCM	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate (i			94.4	%	94	(70-130)		
LCS1	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate (i			103	%	103	(70-130)		
MBLK	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate (i			83.9	%	84	(70-130)		
MRL_CHK	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate (i			93.9	%	94	(70-130)		
MS_201304170155	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate (i			86.2	%	86	(70-130)		
MSD_201304170155	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate (i			88.3	%	88	(70-130)		
CCCH	Aldicarb (Temik)		25	21.4	ug/L	86	(70-130)		
CCCM	Aldicarb (Temik)		10	8.44	ug/L	85	(70-130)		

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RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	Aldicarb (Temik)		10	8.31	ug/L	83	(70-130)		
MBLK	Aldicarb (Temik)			<0.16	ug/L				
MRL_CHK	Aldicarb (Temik)		0.5	0.425	ug/L	85	(50-150)		
MS_201304170155	Aldicarb (Temik)	ND	10	9.68	ug/L	97	(70-130)		
MSD_201304170155	Aldicarb (Temik)	ND	10	9.70	ug/L	97	(70-130)	20	0.21
CCCH	Aldicarb sulfone		25	24.4	ug/L	98	(70-130)		
CCCM	Aldicarb sulfone		10	9.64	ug/L	96	(70-130)		
LCS1	Aldicarb sulfone		10	8.92	ug/L	89	(70-130)		
MBLK	Aldicarb sulfone			<0.16	ug/L				
MRL_CHK	Aldicarb sulfone		0.5	0.478	ug/L	96	(50-150)		
MS_201304170155	Aldicarb sulfone	ND	10	9.74	ug/L	97	(70-130)		
MSD_201304170155	Aldicarb sulfone	ND	10	9.90	ug/L	99	(70-130)	20	1.6
CCCH	Aldicarb sulfoxide		25	23.5	ug/L	94	(70-130)		
CCCM	Aldicarb sulfoxide		10	9.13	ug/L	91	(70-130)		
LCS1	Aldicarb sulfoxide		10	9.42	ug/L	94	(70-130)		
MBLK	Aldicarb sulfoxide			<0.16	ug/L				
MRL_CHK	Aldicarb sulfoxide		0.5	0.479	ug/L	96	(50-150)		
MS_201304170155	Aldicarb sulfoxide	ND	10	9.60	ug/L	96	(70-130)		
MSD_201304170155	Aldicarb sulfoxide	ND	10	9.24	ug/L	92	(70-130)	20	3.8
CCCH	Baygon		25	24.6	ug/L	98	(70-130)		
CCCM	Baygon		10	9.22	ug/L	92	(70-130)		
LCS1	Baygon		10	9.36	ug/L	94	(70-130)		
MBLK	Baygon			<0.16	ug/L				
MRL_CHK	Baygon		0.5	0.459	ug/L	92	(50-150)		
MS_201304170155	Baygon	ND	10	9.94	ug/L	99	(70-130)		
MSD_201304170155	Baygon	ND	10	9.81	ug/L	98	(70-130)	20	1.3
CCCH	Carbaryl		25	25.3	ug/L	101	(70-130)		
CCCM	Carbaryl		10	9.79	ug/L	98	(70-130)		
LCS1	Carbaryl		10	9.97	ug/L	100	(70-130)		
MBLK	Carbaryl			<0.16	ug/L				
MRL_CHK	Carbaryl		0.5	0.502	ug/L	100	(50-150)		
MS_201304170155	Carbaryl	ND	10	10.2	ug/L	102	(70-130)		
MSD_201304170155	Carbaryl	ND	10	9.83	ug/L	98	(70-130)	20	3.7
CCCH	Carbofuran (Furadan)		25	24.7	ug/L	99	(70-130)		
CCCM	Carbofuran (Furadan)		10	9.32	ug/L	93	(70-130)		
LCS1	Carbofuran (Furadan)		10	8.89	ug/L	89	(70-130)		
MBLK	Carbofuran (Furadan)			<0.16	ug/L				
MRL_CHK	Carbofuran (Furadan)		0.5	0.512	ug/L	102	(50-150)		

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MS_201304170155	Carbofuran (Furadan)	ND	10	10.2	ug/L	102	(70-130)		
MSD_201304170155	Carbofuran (Furadan)	ND	10	10.1	ug/L	101	(70-130)	20	0.99
CCCH	Methiocarb		25	24.1	ug/L	96	(70-130)		
CCCM	Methiocarb		10	9.55	ug/L	96	(70-130)		
LCS1	Methiocarb		10	9.97	ug/L	100	(70-130)		
MBLK	Methiocarb			<0.16	ug/L				
MRL_CHK	Methiocarb		0.5	0.447	ug/L	89	(50-150)		
MS_201304170155	Methiocarb	ND	10	9.64	ug/L	96	(70-130)		
MSD_201304170155	Methiocarb	ND	10	9.55	ug/L	96	(70-130)	20	0.94
CCCH	Methomyl		25	24.6	ug/L	99	(70-130)		
CCCM	Methomyl		10	9.15	ug/L	92	(70-130)		
LCS1	Methomyl		10	9.75	ug/L	98	(70-130)		
MBLK	Methomyl			<0.16	ug/L				
MRL_CHK	Methomyl		0.5	0.473	ug/L	95	(50-150)		
MS_201304170155	Methomyl	ND	10	9.86	ug/L	99	(70-130)		
MSD_201304170155	Methomyl	ND	10	9.89	ug/L	99	(70-130)	20	0.30
CCCH	Oxamyl (Vydate)		25	24.5	ug/L	98	(70-130)		
CCCM	Oxamyl (Vydate)		10	9.41	ug/L	94	(70-130)		
LCS1	Oxamyl (Vydate)		10	9.08	ug/L	91	(70-130)		
MBLK	Oxamyl (Vydate)			<0.16	ug/L				
MRL_CHK	Oxamyl (Vydate)		0.5	0.459	ug/L	92	(50-150)		
MS_201304170155	Oxamyl (Vydate)	ND	10	9.52	ug/L	95	(70-130)		
MSD_201304170155	Oxamyl (Vydate)	ND	10	9.89	ug/L	99	(70-130)	20	3.8
QC Ref# 703538 - Fluoride by SM 4500F-C						**Analysis Date: 04/23/2013**			
LCS1	Fluoride		1.0	1.08	mg/L	108	(81-116)		
LCS2	Fluoride		1.0	1.08	mg/L	108	(81-116)	20	0.0
MBLK	Fluoride			<0.05	mg/L				
MRL_CHK	Fluoride		0.05	0.0494	mg/L	99	(50-150)		
MS_201304120220	Fluoride	ND	1.0	1.08	mg/L	106	(73-124)		
MS2_201304180510	Fluoride	0.21	1.0	1.26	mg/L	105	(73-124)		
MSD_201304120220	Fluoride	ND	1.0	1.08	mg/L	107	(73-124)	20	0.0
MSD2_201304180510	Fluoride	0.21	1.0	1.31	mg/L	110	(73-124)	20	3.9
QC Ref# 703984 - 2,3,7,8-TCDD_Dioxin by EPA 1613B						**Analysis Date: 04/23/2013**			
LCS1	2,3,7,8-TCDD		200	186	pg/L	93	(73-146)		
MBLK	2,3,7,8-TCDD			<1.67	pg/L				
MRL_CHK	2,3,7,8-TCDD		5.0	4.90	pg/L	98	(50-150)		
MS_201304150339	2,3,7,8-TCDD	ND	200	188	pg/L	94	(73-146)		

Spike recovery is already corrected for native results.
Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining.
Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.
RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
(S) - Indicates surrogate compound.
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Report: 431199

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD_201304150339	2,3,7,8-TCDD	ND	200	183	pg/L	91	(73-146)	20	2.7
LCS1	C12-2,3,7,8-TCDD (S)			97.1	%	97	(25-141)		
MBLK	C12-2,3,7,8-TCDD (S)			103	%	103	(31-137)		
MRL_CHK	C12-2,3,7,8-TCDD (S)			95.0	%	95	(31-137)		
MS_201304150339	C12-2,3,7,8-TCDD (S)			95.1	%	95	(25-141)		
MSD_201304150339	C12-2,3,7,8-TCDD (S)			92.3	%	92	(25-141)		
QC Ref# 704057 - Endothall by EPA 548.1						**Analysis Date: 04/19/2013**			
LCS1	Endothall		25	22.2	ug/L	89	(65-114)		
MBLK	Endothall			<5	ug/L				
MRL_CHK	Endothall		5.0	4.45	ug/L	89	(50-150)		
MS_201304080083	Endothall	ND	25	24.4	ug/L	98	(61-113)		
MS_2ND_201304100349	Endothall	ND	25	24.2	ug/L	97	(61-113)		
MSD_201304080083	Endothall	ND	25	27.2	ug/L	109	(61-113)	30	11
QC Ref# 704382 - Gross Alpha/Beta Radiation by EPA 900.0						**Analysis Date: 04/18/2013**			
DUP1_201304110514	Alpha, Gross	ND		ND	pCi/L		(0-20)		
DUP2_201304120184	Alpha, Gross	ND		ND	pCi/L		(0-20)		
LCS1	Alpha, Gross		34	28.4	pCi/L	85	(80-120)		
LCS2	Alpha, Gross		34	27.9	pCi/L	83	(80-120)	20	2.1
MBLK	Alpha, Gross			<3	pCi/L				
MS_201304100349	Alpha, Gross	ND	34	39.0	pCi/L	115	(70-130)		
DUP1_201304110514	Beta, Gross	ND		ND	pCi/L		(0-20)		
DUP2_201304120184	Beta, Gross	ND		ND	pCi/L		(0-20)		
LCS1	Beta, Gross		32	36.6	pCi/L	113	(80-120)		
LCS2	Beta, Gross		32	33.6	pCi/L	104	(80-120)	20	8.6
MBLK	Beta, Gross			<3	pCi/L				
MS_201304100349	Beta, Gross	ND	32	28.9	pCi/L	88	(70-130)		
QC Ref# 705241 - Radium 226 by Ra-226 GA						**Analysis Date: 05/16/2013**			
LCS1	Radium 226		10	11.5	pCi/L	114	(80-120)		
LCS2	Radium 226		10	11.6	pCi/L	115	(80-120)	20	0.87
MBLK	Radium 226			<1	pCi/L				
MS_201304080087	Radium 226	ND	10	11.3	pCi/L	101	(70-130)		
QC Ref# 705245 - Radium 228 by RA-228 GA						**Analysis Date: 05/16/2013**			
LCS1	Radium 228		9.8	8.92	pCi/L	92	(80-120)		
LCS2	Radium 228		9.8	8.76	pCi/L	90	(80-120)	20	1.8
MBLK	Radium 228			<1	pCi/L				
MS_201304080087	Radium 228	ND	9.8	8.64	pCi/L	89	(70-130)		

Spike recovery is already corrected for native results.
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RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
QC Ref# 705441 - Semivolatiles by GCMS by EPA 525.2						**Analysis Date: 05/01/2013**			
LCS1	1,3-Dimethyl-2-nitrobenzene (S)			92.6	%	93	(70-130)		
LCS2	1,3-Dimethyl-2-nitrobenzene (S)			93.5	%	94	(70-130)		
MBLK	1,3-Dimethyl-2-nitrobenzene (S)			94.5	%	95	(70-130)		
MRL_CHK	1,3-Dimethyl-2-nitrobenzene (S)			97.2	%	97	(70-130)		
MS_201304170149	1,3-Dimethyl-2-nitrobenzene (S)			94.4	%	94	(70-130)		
MSD_201304170149	1,3-Dimethyl-2-nitrobenzene (S)			91.1	%	91	(70-130)		
LCS1	Acenaphthene-d10 (I)			104	%	104	(50-150)		
LCS2	Acenaphthene-d10 (I)			104	%	104	(50-150)		
MBLK	Acenaphthene-d10 (I)			105	%	105	(50-150)		
MRL_CHK	Acenaphthene-d10 (I)			103	%	103	(50-150)		
MS_201304170149	Acenaphthene-d10 (I)			103	%	103	(50-150)		
MSD_201304170149	Acenaphthene-d10 (I)			98.6	%	99	(50-150)		
LCS1	Atrazine		2.0	2.07	ug/L	103	(70-130)		
LCS2	Atrazine		2.0	2.18	ug/L	109	(70-130)	20	5.2
MBLK	Atrazine			<0.025	ug/L				
MRL_CHK	Atrazine		0.05	0.0520	ug/L	104	(50-150)		
MS_201304170149	Atrazine	ND	2.0	2.07	ug/L	104	(70-130)		
MSD_201304170149	Atrazine	ND	2.0	2.44	ug/L	122	(70-130)	20	16
LCS1	Benzo(a)pyrene		2.0	2.21	ug/L	111	(70-130)		
LCS2	Benzo(a)pyrene		2.0	2.25	ug/L	112	(70-130)	20	1.8
MBLK	Benzo(a)pyrene			<0.01	ug/L				
MRL_CHK	Benzo(a)pyrene		0.02	0.0170	ug/L	85	(50-150)		
MS_201304170149	Benzo(a)pyrene	ND	2.0	2.23	ug/L	112	(70-130)		
MSD_201304170149	Benzo(a)pyrene	ND	2.0	2.32	ug/L	116	(70-130)	20	4.0
LCS1	Chrysene-d12 (I)			107	%	107	(50-150)		
LCS2	Chrysene-d12 (I)			108	%	108	(50-150)		
MBLK	Chrysene-d12 (I)			106	%	106	(50-150)		
MRL_CHK	Chrysene-d12 (I)			105	%	105	(50-150)		
MS_201304170149	Chrysene-d12 (I)			102	%	103	(50-150)		
MSD_201304170149	Chrysene-d12 (I)			115	%	115	(50-150)		
LCS1	Di-(2-Ethylhexyl)adipate		2.0	1.72	ug/L	86	(70-130)		
LCS2	Di-(2-Ethylhexyl)adipate		2.0	1.75	ug/L	88	(70-130)	20	1.7
MBLK	Di-(2-Ethylhexyl)adipate			<0.15	ug/L				
MRL_CHK	Di-(2-Ethylhexyl)adipate		0.3	0.289	ug/L	96	(50-150)		
MS_201304170149	Di-(2-Ethylhexyl)adipate	ND	2.0	1.70	ug/L	85	(70-130)		
MSD_201304170149	Di-(2-Ethylhexyl)adipate	ND	2.0	1.78	ug/L	89	(70-130)	20	4.6

Spike recovery is already corrected for native results.
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Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.
RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	Di(2-Ethylhexyl)phthalate		2.0	1.99	ug/L	99	(70-130)		
LCS2	Di(2-Ethylhexyl)phthalate		2.0	2.03	ug/L	101	(70-130)	20	2.0
MBLK	Di(2-Ethylhexyl)phthalate			<0.15	ug/L				
MRL_CHK	Di(2-Ethylhexyl)phthalate		0.6	0.576	ug/L	96	(50-150)		
MS_201304170149	Di(2-Ethylhexyl)phthalate	ND	2.0	2.10	ug/L	105	(70-130)		
MSD_201304170149	Di(2-Ethylhexyl)phthalate	ND	2.0	2.04	ug/L	102	(70-130)	20	2.9
LCS1	Heptachlor		2.0	1.93	ug/L	96	(70-130)		
LCS2	Heptachlor		2.0	1.94	ug/L	97	(70-130)	20	0.52
MBLK	Heptachlor			<0.015	ug/L				
MRL_CHK	Heptachlor		0.04	0.0290	ug/L	73	(50-150)		
MS_201304170149	Heptachlor	ND	2.0	1.89	ug/L	95	(70-130)		
MSD_201304170149	Heptachlor	ND	2.0	1.94	ug/L	97	(70-130)	20	2.6
LCS1	Hexachlorobenzene		2.0	1.88	ug/L	94	(70-130)		
LCS2	Hexachlorobenzene		2.0	1.91	ug/L	96	(70-130)	20	1.6
MBLK	Hexachlorobenzene			<0.025	ug/L				
MRL_CHK	Hexachlorobenzene		0.05	0.0420	ug/L	84	(50-150)		
MS_201304170149	Hexachlorobenzene	ND	2.0	1.87	ug/L	94	(70-130)		
MSD_201304170149	Hexachlorobenzene	ND	2.0	2.10	ug/L	105	(70-130)	20	12
LCS1	Hexachlorocyclopentadiene		2.0	1.93	ug/L	97	(70-130)		
LCS2	Hexachlorocyclopentadiene		2.0	1.96	ug/L	98	(70-130)	20	1.5
MBLK	Hexachlorocyclopentadiene			<0.025	ug/L				
MRL_CHK	Hexachlorocyclopentadiene		0.05	0.0470	ug/L	94	(50-150)		
MS_201304170149	Hexachlorocyclopentadiene	ND	2.0	1.80	ug/L	90	(70-130)		
MSD_201304170149	Hexachlorocyclopentadiene	ND	2.0	1.81	ug/L	91	(70-130)	20	0.55
LCS1	Molinate		2.0	2.01	ug/L	100	(70-130)		
LCS2	Molinate		2.0	2.09	ug/L	104	(70-130)	20	3.9
MBLK	Molinate			<0.05	ug/L				
MRL_CHK	Molinate		0.1	0.0910	ug/L	91	(50-150)		
MS_201304170149	Molinate	ND	2.0	2.03	ug/L	101	(70-130)		
MSD_201304170149	Molinate	ND	2.0	2.06	ug/L	103	(70-130)	20	1.5
LCS1	Perylene-d12 (S)			101	%	101	(70-130)		
LCS2	Perylene-d12 (S)			101	%	101	(70-130)		
MBLK	Perylene-d12 (S)			89.5	%	90	(70-130)		
MRL_CHK	Perylene-d12 (S)			84.5	%	84	(70-130)		
MS_201304170149	Perylene-d12 (S)			96.9	%	97	(70-130)		
MSD_201304170149	Perylene-d12 (S)			101	%	101	(70-130)		
LCS1	Phenanthrene-d10 (I)			112	%	113	(50-150)		
LCS2	Phenanthrene-d10 (I)			112	%	112	(50-150)		

Spike recovery is already corrected for native results.
Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining.
Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.
RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	Phenanthrene-d10 (I)			108	%	108	(50-150)		
MRL_CHK	Phenanthrene-d10 (I)			110	%	110	(50-150)		
MS_201304170149	Phenanthrene-d10 (I)			111	%	111	(50-150)		
MSD_201304170149	Phenanthrene-d10 (I)			116	%	116	(50-150)		
LCS1	Simazine		2.0	2.05	ug/L	103	(70-130)		
LCS2	Simazine		2.0	1.98	ug/L	99	(70-130)	20	3.5
MBLK	Simazine			<0.025	ug/L				
MRL_CHK	Simazine		0.05	0.0280	ug/L	56	(50-150)		
MS_201304170149	Simazine	ND	2.0	2.04	ug/L	102	(70-130)		
MSD_201304170149	Simazine	ND	2.0	2.26	ug/L	113	(70-130)	20	10
LCS1	Thiobencarb		2.0	1.95	ug/L	98	(70-130)		
LCS2	Thiobencarb		2.0	1.99	ug/L	99	(70-130)	20	2.0
MBLK	Thiobencarb			<0.1	ug/L				
MRL_CHK	Thiobencarb		0.1	0.0850	ug/L	85	(50-150)		
MS_201304170149	Thiobencarb	ND	2.0	2.00	ug/L	100	(70-130)		
MSD_201304170149	Thiobencarb	ND	2.0	2.02	ug/L	101	(70-130)	20	1
LCS1	Triphenylphosphate (S)			95.2	%	95	(70-130)		
LCS2	Triphenylphosphate (S)			97.9	%	98	(70-130)		
MBLK	Triphenylphosphate (S)			97.6	%	98	(70-130)		
MRL_CHK	Triphenylphosphate (S)			95.9	%	96	(70-130)		
MS_201304170149	Triphenylphosphate (S)			96.8	%	97	(70-130)		
MSD_201304170149	Triphenylphosphate (S)			102	%	102	(70-130)		

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RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
(S) - Indicates surrogate compound.
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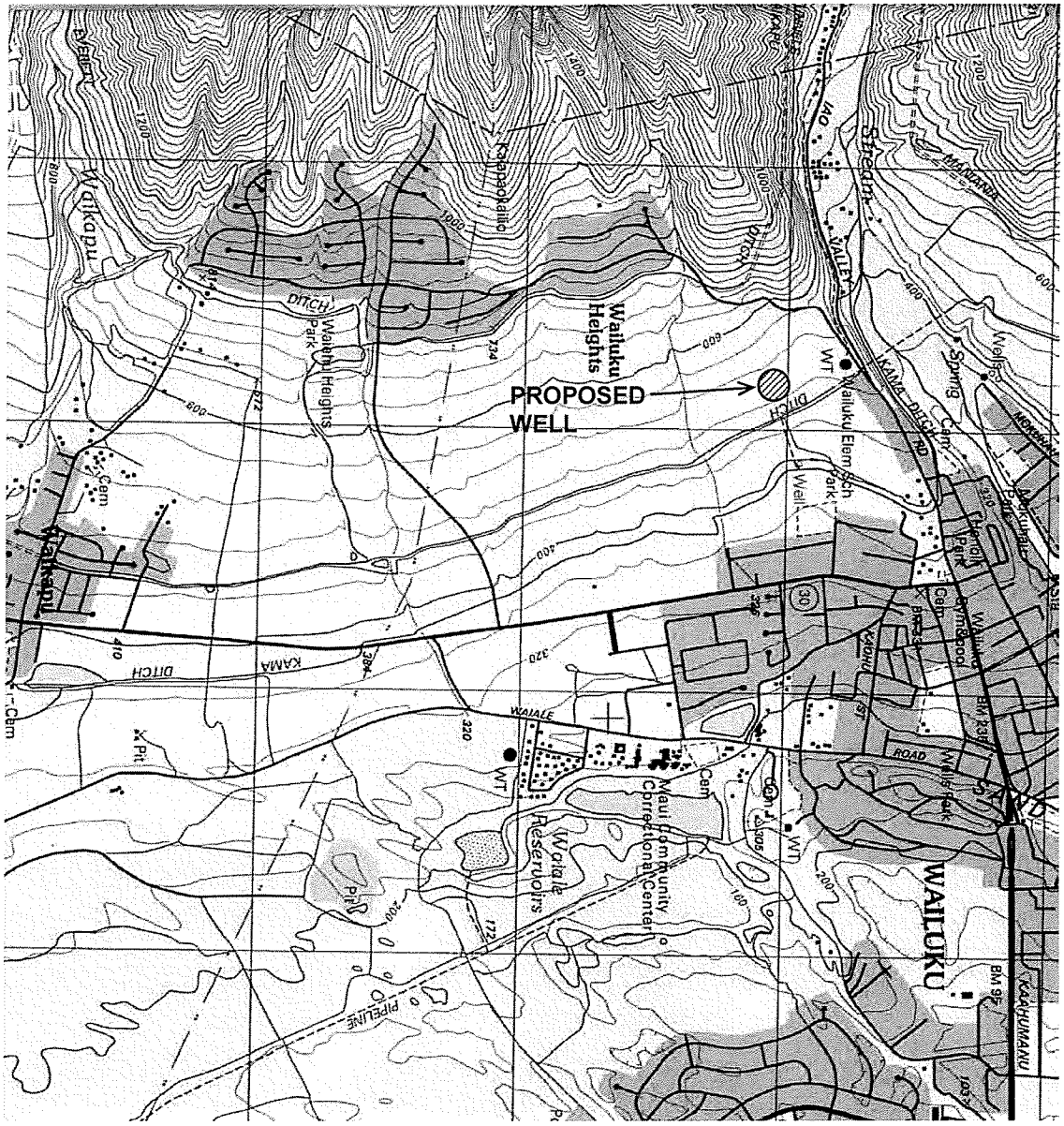
APPENDIX C.

Preliminary Design Report

PRELIMINARY DESIGN REPORT
For Wailuku Exploratory Well

Wailuku, Maui, Hawaii
Tax Map Key (2) 3-5-001: 067



Prepared for:

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

Date: August 28, 2009

Prepared by:

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TABLE OF CONTENTS

I. PURPOSE

The purpose of this report is to provide recommendations on the location, size, and capacity of the proposed exploratory well. This report will consider sustainability of the aquifer, the effects of spreading pumping within the aquifer, and other hydrogeological factors. In addition, the report will consider the well's proximity to water infrastructure and projects in the area.

II. DESCRIPTION

The Maui County Department of Water Supply (DWS) plans to construct an exploratory well in Wailuku, Maui within the Iao Aquifer System. (See Figure 1 - CWRM Hydrologic Units Map, page 9.) This project is part of the department's continuing efforts to spread out the pumping within the aquifer to prevent a reduction of water quality due to concentrated pumping at a few locations.

The proposed exploratory well is located above old Wailuku Town within the Kehalani Mauka development. The Maui County zoning designation of this area is Wailuku-Kahului Project District 3. The well site, a portion of an undeveloped parcel, lies about 1,000 feet to the south of the intersection of Main Street, Alu Road, and Iao Valley Road, and is about 200 feet to the northwest of the end of the Kehalani Mauka Parkway. The well site is a portion of Tax Map Key (2) 3-5-001: 067. (See Figure 2 - Location Map, page 10 and Figure 3 - Vicinity Map, page 11.)

III. BACKGROUND

A. Groundwater Hydrologic Units

The State Commission on Water Resource Management (CWRM) established groundwater hydrologic units or sustainable yields for each island to manage groundwater resources. CWRM divided each island into broad regions or sectors, and further divided each region into sub-regions or systems. These dividing lines serve as management tools and do not necessarily represent subsurface boundaries as evidenced by communication of groundwater between these areas.

As shown on the hydrologic units map, the proposed exploratory well falls within the Iao Aquifer System which is a part of the Wailuku Sector. Also within the Wailuku Sector are the Waihee Aquifer System to the northwest of the Iao Aquifer System and the Waikapu Aquifer System to the south of the Iao Aquifer System.

B. Iao Aquifer

The Iao Aquifer System has a sustainable yield of 20 million gallons per day (mgd). In 2003, CWRM designated the Iao Aquifer System as a groundwater management area and limited groundwater withdrawal from the aquifer to 90 percent of its sustainable yield (on

a 12-month moving average basis) or 18 mgd. At the present time, the 12-month moving average is 16.1 mgd. Pumping is concentrated at Waihee Wells, Waiehu Heights Wells, Mokuhau Wells, and Shaft 33, with the majority of withdrawals north of Iao Stream. (Mink & Yuen, *Replacement Well No. 2*, July 2009.) (See Figure 5 - Well Field Map, page 13.)

C. Shaft 33

Shaft 33 (State Well No. 5330-05), constructed in 1946 and put into operation in 1948, provided irrigation water for Wailuku Sugar Company's sugar cane operations. The installation consists of a portal at an elevation of about 400 feet above mean sea level (amsl), a 730-foot long tunnel inclined at 30 degrees from horizontal, and a pump chamber at an elevation of about 31 feet amsl. The pump chamber is approximately 20 feet wide, 30 feet long, and 30 feet high, with three 310-foot deep wells drilled ten feet apart. Based on available records, the horizontal location of the pump chamber is close to or just mauka of the Waihee Ditch. The approximate surface elevation of this point is about 460 feet amsl.

Through an agreement with the landowner, Kehalani Mauka LLC, DWS has pumped groundwater from Shaft 33 for a number of years. DWS uses one of the three wells equipped with a 3,900-gallons-per-minute pump and pumps an average of nearly 5 mgd. The use of Shaft 33 was intended to be an intern measure until development of other new wells. (Mink & Yuen, *Replacement Well No. 2*, July 2009.)

D. Waikapu Tank Site Well and Iao Tank Site Well

Two DWS well development projects in the Iao Aquifer System are under construction. The construction work involves installation of pumps, controls, and piping for the Waikapu Tank Site Well (State Well No. 5131-01) and the Iao Tank Site Well (State Well No. 5230-03). DWS initiated these projects to phase out the use of Shaft 33 and to spread out the withdrawals from the aquifer. The final environmental assessments were issued and findings of no significant impact for the Waikapu project and the Iao project were published in 2005 and in 2009, respectively. These two projects were preceded by successful exploratory well projects at those locations. Pump tests at each location established an installed peak capacity of 1,400 gallons per minute for each well.

DWS is updating its *Maui County Water Use and Development Plan* (WUDP). State law mandates each county to adopt such a plan to serve as a long-range planning document for water use. The draft of the *Central District Final Candidate Strategies Report* (Haiku Design & Analysis, June 17, 2009), one of the WUDP chapters, places the Waikapu Tank Site Well and the Iao Tank Site Well on a list of "committed, short term, and backup well resources." The report also identifies a replacement well for Shaft 33 as one of those resources. Since these wells are within the Iao Aquifer System, the report states that although the new wells would not add to water production capability, such resources would provide equipment redundancy and contribute towards system reliability.

IV. ANALYSIS

A. Hydrogeological Factors

A geologic map of the region of the Iao Aquifer System south of Iao Stream shows that exposed volcanic rock consists of Wailuku Basalt (QTwl). The exposed rock is visible along the ridges above the developed areas of Wailuku Heights. Wailuku Basalt is very permeable. Most of the DWS wells within the aquifer draw water from this geologic layer. Overlying the Wailuku Basalt formation are older alluvial deposits (QTao) that form a thick, relatively impermeable, sedimentary wedge. Overlying the old alluvial deposits are older dune deposits (Qdo) and recent alluvium (Qa) from Iao and Waikapu Streams. (See Figure 1 on page 6 of Mink & Yuen report, *Replacement Well No. 2,* July 2009, in Appendix A.)

Shaft 33, Waikapu Tank Site Well, and Iao Tank Site Well draw water from the Wailuku Basalt formation. A recent groundwater availability study for the Wailuku area indicates that Shaft 33 penetrates the alluvial deposits and enters the Wailuku Basalt formation at an elevation of 68± feet amsl. (Gingerich, 2008.) Shaft 33's pump chamber at an elevation of 31± feet amsl and its three 310-foot deep wells below the chamber are within this formation. A single well, equipped with a 3,900 gpm pump with an average withdrawal of nearly 5 mgd, confirms the permeability of the aquifer.

Pump test results of the Waikapu Tank Site Well and the Iao Tank Site Well also confirm the permeability of the aquifer. The constant-rate test for four days for the Waikapu Tank Site Well at 1,425 gpm yielded a drawdown of 5.54 feet. A similar test for the Iao Tank Site Well at 1,400 gpm yielded a drawdown of 3.0 feet. These results indicate high transmissivity values and a permeable aquifer.

The chloride values determined as part of the constant-rate test for the Waikapu Tank Site Well and the Iao Tank Site Well were 31 milligrams per liter (mg/L) and 25 mg/L, respectively. These low chloride values are due in part to compliance with CWRM's well construction standards for basal aquifers. The standards require that the bottom elevation of the well not exceed one-fourth of the theoretical thickness of the basal freshwater lens or 41 times the basal head. (Mink & Yuen, *Replacement Well No. 2*, July 2009)

B. Aquifer Sustainability

CWRM adopted an estimated sustainable yield of 20 mgd for the Iao Aquifer System for basal groundwater sources. This figure was based on the Robust Analytical Model (RAM) developed by John Mink. RAM is a volumetric model that accounts for average amount of recharge, the initial water level in the aquifer, and an equilibrium water level as a result of pumping at a given rate. It assumes that wells are optimally spaced within an aquifer and that wells extract water from the freshwater core of the aquifer. However, RAM does not account for the spatial distribution of wells within the aquifer, the effect of one well upon another, or the sustainable capacities of individual wells or well fields.

The spacing of existing wells within the Iao Aquifer System and their depths may be detrimental to the sustainability of the aquifer. There is a concentration of wells on the north side of Iao Stream. These sources withdraw about 70 percent of the total amount of groundwater from the aquifer. Other potentially detrimental characteristics include wells that are drilled too deep, are spaced too closely, or concentrate pumping at a single location.

A recent study, *Ground-Water Availability in the Wailuku Area, Maui, Hawaii,* prepared by Stephen B. Gingerich, and commissioned by DWS and the United States Geological Survey, presented a groundwater flow model for the Wailuku Sector including the Waihee, Iao, and Waikapu Aquifer Systems. The study considered a number of scenarios based on different recharge conditions and pumping conditions. The first two simulate the present well configuration with different pumping rates. Scenario 3 simulates redistributed withdrawal from the aquifer. Results of these three scenarios are summarized below. (Mink & Yuen, *Addendum Report,* July 2009.)

TABLE 1
Simulation Scenarios and Results
(adapted from Gingerich, 2008)

Scenario	Recharge Condition (over West Maui and Central Maui)	Pumping Condition in Iao Aquifer	Results After 150 Years
1	350 mgd: 2000-2004 land use condition with 1926-2004 rainfall	2006 withdrawal rate: 16.8 mgd	Water levels 2-3 feet lower than present; 50% salinity at Waiehu Deep Monitor Well rises 250 feet
2	350 mgd: 2000-2004 land use condition with 1926-2004 rainfall	1996 withdrawal rate: 20.1 mgd	Water levels in some well fields decline more than 5 feet; 50% salinity at Waiehu Deep Monitor Well rises 300 feet
3	350 mgd: 2000-2004 land use condition with 1926-2004 rainfall	Using withdrawal rate near CWRM sustainable yield 19.14 mgd	Water levels decline more than 5 feet at new well fields and 1 foot higher (relative to Scenario 1) at existing well fields; 50% salinity at Waiehu Deep Monitor Well rises 240-250 feet

The following trends can be inferred from these simulations. Comparison of Scenario 1 and Scenario 2 indicates that a lower withdrawal rate causes less stress on the aquifer. Stressing the aquifer results in lowering of the well's water level and rising of the well's 50-percent salinity depth. Comparison of Scenario 3 and Scenario 1 indicates that redistributing withdrawal from the aquifer is beneficial. Despite an increase in withdrawal from 16.8 mgd to 19.14 mgd, the lowering of the well's water level is not severe and the 50-percent salinity depth remains unchanged. The validity of the model can be tested by implementing a beneficial scenario, such as redistributing withdrawals, and by monitor-

ing water levels and salinity.

C. Spreading Pumpage

Various factors affect the lowering of the water level or drawdown due to wells in close proximity to each other. These factors include pumping rate, aquifer transmissivity, and distance between the wells. Mink & Yuen's *Addendum Report* includes a detailed explanation of this formula for steady-state drawdown. (See pages 6 and 7 of Mink & Yuen, *Addendum Report*, July 2009 in Appendix B.) Low pumping rates, high aquifer transmissivity, and large distances between the wells result in less drawdown.

D. Existing Water System

The exploratory well's proximity to existing DWS facilities allows for easy connection to those facilities. The proposed exploratory well is close to an existing utility lot (Lot WL-1) that runs between Kehalani Mauka Parkway and the Iao Tank Site. (See Figure 6 - Parcel Map, page 14.) This lot consists of a dirt road that adjoins the Waihee Ditch. An existing 16-inch pipeline runs within this lot and connects the Iao Tank to the Kehalani development. If the exploratory well is successful, this utility lot can serve as the corridor for a future water transmission line between the well and the Iao Tank.

E. Other Factors

The well site is suitable for construction of a future pumping station. The elevation of the site is about 505 feet above mean sea level. The site generally slopes down from West to East with a surface slope of about 8 percent. There are no flood hazards at the site. The flood insurance rate map of the area shows that the area is within Zone C, an area subject to minimal flooding.

According to the Soil Conservation Service, the on-site soil consists of Wailuku silty clay, 3 to 7 percent slopes (WvB). The Wailuku series includes well-drained soils on alluvial fans on the island of Maui derived from weathered basic igneous rock. The survey characterizes the soil as having a dark reddish-brown surface layer approximately 12 inches thick, a subsoil layer approximately 48 inches thick, moderate permeability, slow runoff, and slight erosion hazard. (See Figure 4 - Soil Map, page 12.)

V. RECOMMENDATIONS

A. Site Construction

The well site is within an undeveloped parcel close to the end of the improved section of Kehalani Mauka Parkway. To access the site, a temporary roadway will be constructed from the end of the improved street to the site. Approximately 10,000 square feet of land will be acquired for the well site. This land area allows for future construction of a pumping station consisting of pump pad and piping, pump control enclosure, and service driveway. Interim

site improvements for the exploratory well project include grading of the immediate work area to create a gently sloping pad and constructing a chain link security fence around the site.

B. Exploratory Well Construction

After preparation of the site, the exploratory well will be drilled, cased, and tested. The drilling process involves drilling a pilot hole with a small-diameter bit, and enlarging or reaming the hole with larger bits. The casing process involves welding sections of casing, installing the sections in the drilled hole, and placing gravel or grout in the space between the drilled hole and the casing. The testing process involves installing a test pump in the well, performing a step-drawdown test and constant-rate test, taking water samples and performing water quality tests, and removing the test pump. The pump test and water quality data will then be analyzed to determine the feasibility of developing the exploratory well as a new potable water source.

Design of the exploratory well will conform to requirements of the CWRM, State Department of Health (DOH) wellhead protection protocols, and DWS standards. CWRM standards will limit the depth of the well to one-fourth the thickness of the theoretical thickness of the basal freshwater lens or 41 times the basal head. Assuming the basal head is 10 feet amsl, the bottom elevation is -102± feet amsl. DOH wellhead protection standards include grouting of the annular space between the drilled hole and the solid well casing, protecting the well from flooding, and preventing polluting activities around the site and upstream of the site. Due to penetration into the permeable Wailuku Basalt formation at an elevation of 68± feet amsl, DWS anticipates an installed peak capacity of 1,400 gpm. A well with a drilled diameter of 24 inches and a casing diameter of 18 inches will accommodate such a pump. (See Figure 1 on page 8 of Mink & Yuen, *Addendum Report*, July 2009 in Appendix B.)

The following is a summary of preliminary design data for the exploratory well.

TABLE 2
Wailuku Exploratory Well
Preliminary Design Data

Description	Value	Unit
Installed Peak Capacity	1,400	gallons per minute
24-hour Capacity	2.0	million gallons per day (mgd)
16-hour Capacity	1.3	mgd
Well Diameter	24	inches
Casing Diameter	18	inches
Surface Elevation	505	feet above mean sea level
Bottom Elevation	-102	feet above mean sea level
Total Depth	607	feet
Solid Casing with Grout Seal	515	feet
Louvered Casing with Open Hole	92	feet

C. Construction Costs

Summarized below are anticipated costs for the site construction and exploratory well construction.

TABLE 3
Wailuku Exploratory Well
Preliminary Opinion of Probable Construction Costs

Description	Quantity	Unit	Unit Price	Total
Site Preparation	1	each	$70,000	$70,000
12-inch Pilot Hole Drilling	607	lin. ft.	170	103,190
18-inch Hole Reaming	607	lin. ft.	200	121,400
24-inch Hole Reaming	607	lin. ft.	220	133,540
18-inch Solid Casing	515	lin. ft.	90	46,350
18-inch Louvered Casing	92	lin. ft.	100	9,200
Annular Space Grouting	515	lin. ft.	60	30,900
Test Pump Installation	1	each	33,000	33,000
Pump Tests	1	each	29,000	29,000
Chain Link Fence	1	each	10,000	10,000
Subtotal				586,580
Contingencies @ 15%				87,987
Total				674,567
Total (rounded off)				**$675,000**

VI. REFERENCES

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2. C. Takumi Engineering, Inc., *Chapter 343, Hawaii Revised Statutes (HRS) Final Environmental Assessment, Finding of No Significant Impact Anticipated (FONSI) for the Development of the Waikapu Tank Site Exploratory Well (State Well No. 5131-01), Waikapu, Maui, Hawaii, TMK: 3-5-04:0 99 & 22,* Wailuku, Hawaii, prepared for County of Maui Department of Water Supply, July 19, 2005.

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4. Fukunaga & Associates, Inc., *Chapter 343, Hawaii Revised Statutes (HRS) Final Environmental Assessment for the Drilling and Testing Waikapu Tank Site Exploratory Well (State Well No. 6131-01), TMK: 3-5-04: 99, Waikapu, Maui, Hawaii*, Ho-

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7. Haiku Design & Analysis, *Maui County Water Use and Development Plan, Central District, Final Candidate Strategies Report (Report Review Draft),* Haiku, Hawaii, prepared for County of Maui Department of Water Supply, June 17, 2009.

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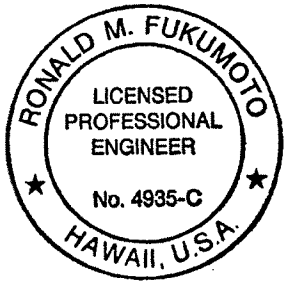
9. Mink & Yuen, Inc., *Addendum Report, Replacement Well No. 2, Iao Aquifer System, Wailuku, Maui, Hawaii*, Honolulu, Hawaii, prepared for Ronald M. Fukumoto Engineering, Inc., July 2009.

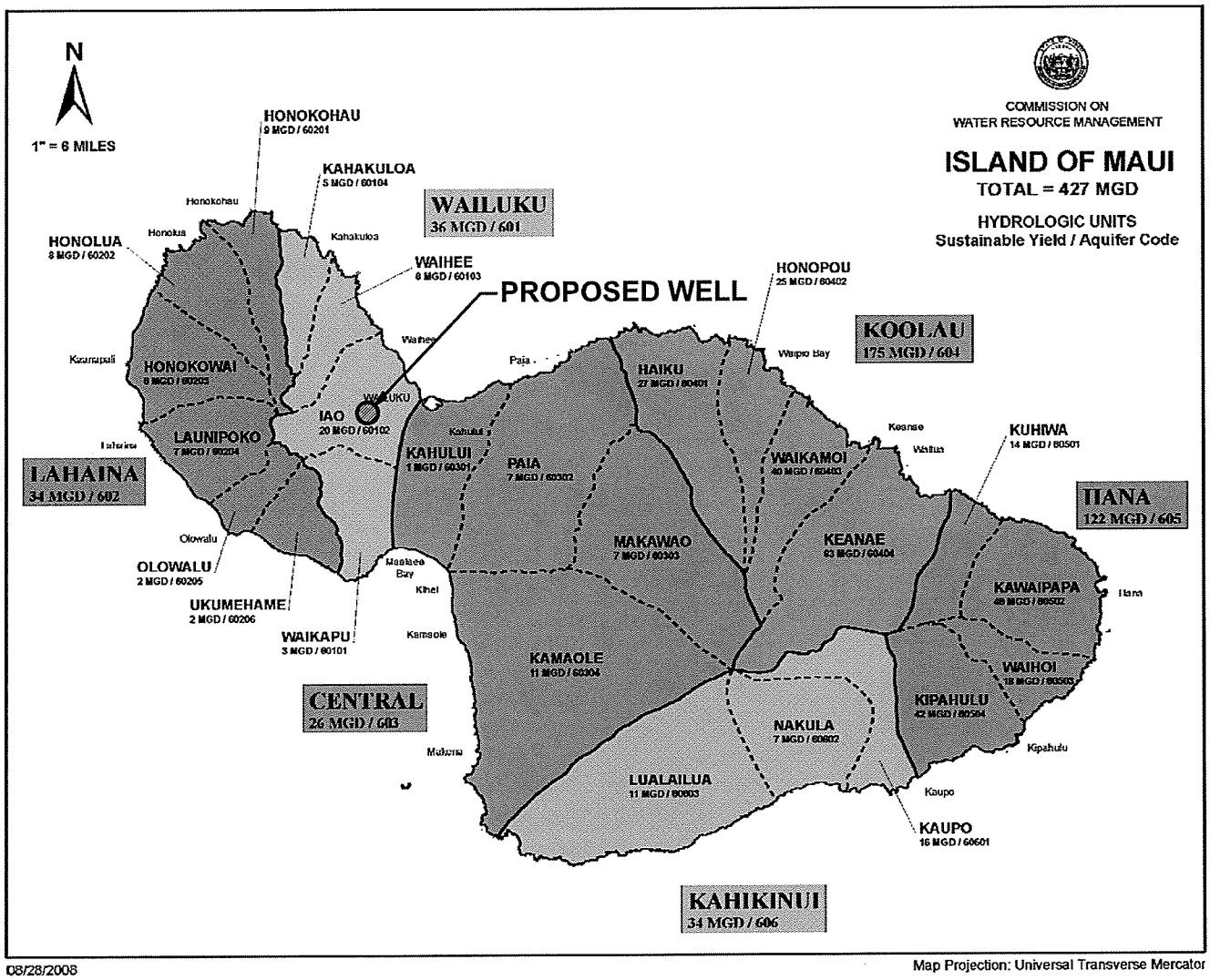
10. U. S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, Washington, D.C., August 1972.

11. Wilson Okamoto Corporation, *Hawaii Water Plan, Water Resource Protection Plan,* Honolulu, Hawaii, prepared for State of Hawaii, Department of Land and Natural Resources, Commission on Water Resource Management, June 2008.



This work was prepared by
me or under my supervision.

Ronald M. Fukumoto



08/28/2008

Map Projection: Universal Transverse Mercator

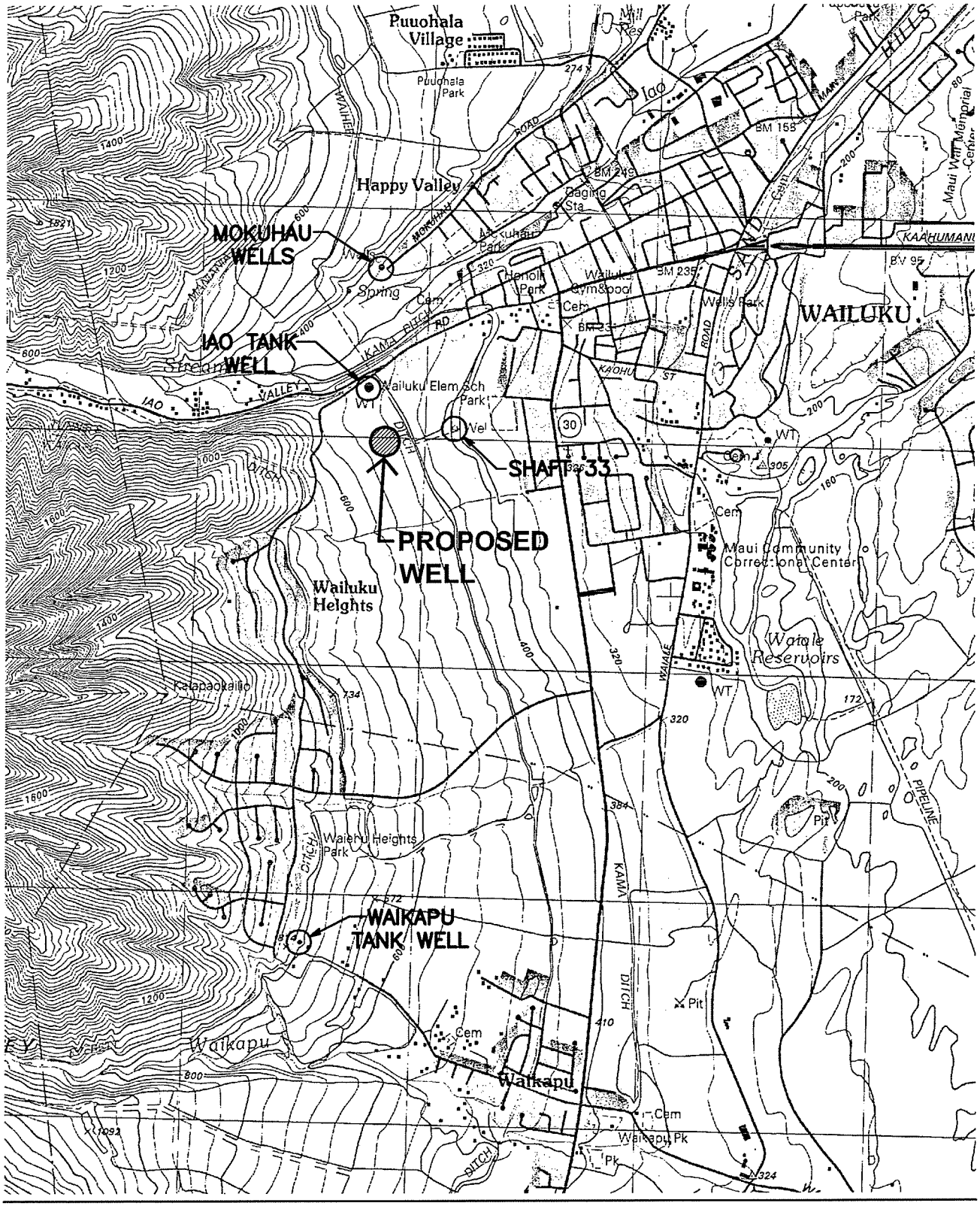
CWRM HYDROLOGIC UNITS MAP

Figure 1

SCALE IN MILES

NORTH 0 4 8 16 24

SOURCE: COMMISSION ON WATER RESOURCE MANAGEMENT

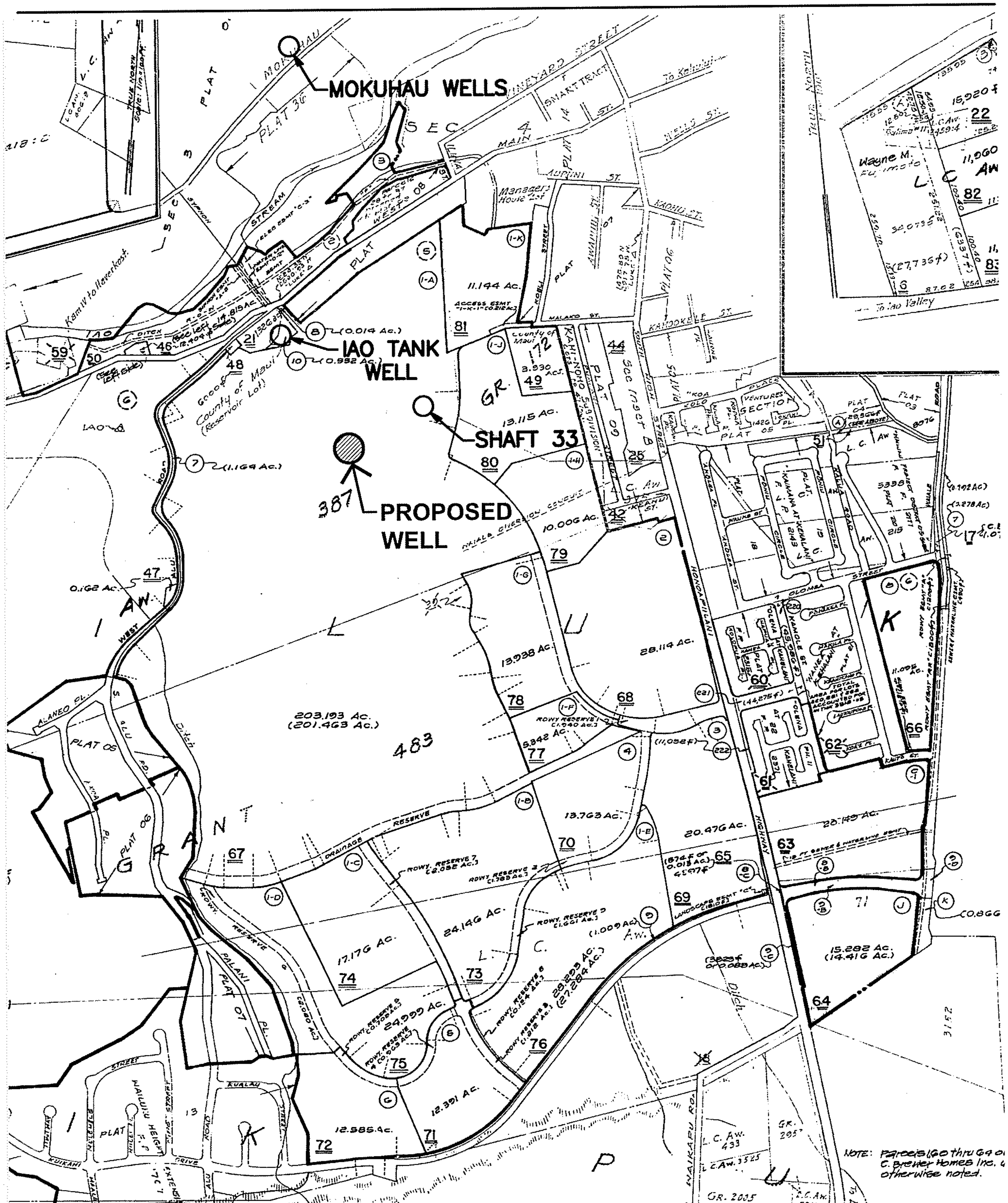


LOCATION MAP (USGS Map)

SCALE IN FEET

Figure 2

SOURCE: USGS WAILUKU QUADRANGLE MAP



VICINITY MAP (Tax Map)

NORTH

SCALE IN FEET

0 500 1000 1500 2000

Figure 3

SOURCE: TAX MAP KEY (2) 3-5-001

PREPARED FOR: DEPT. OF WATER SUPPLY, COUNTY OF MAUI

PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.

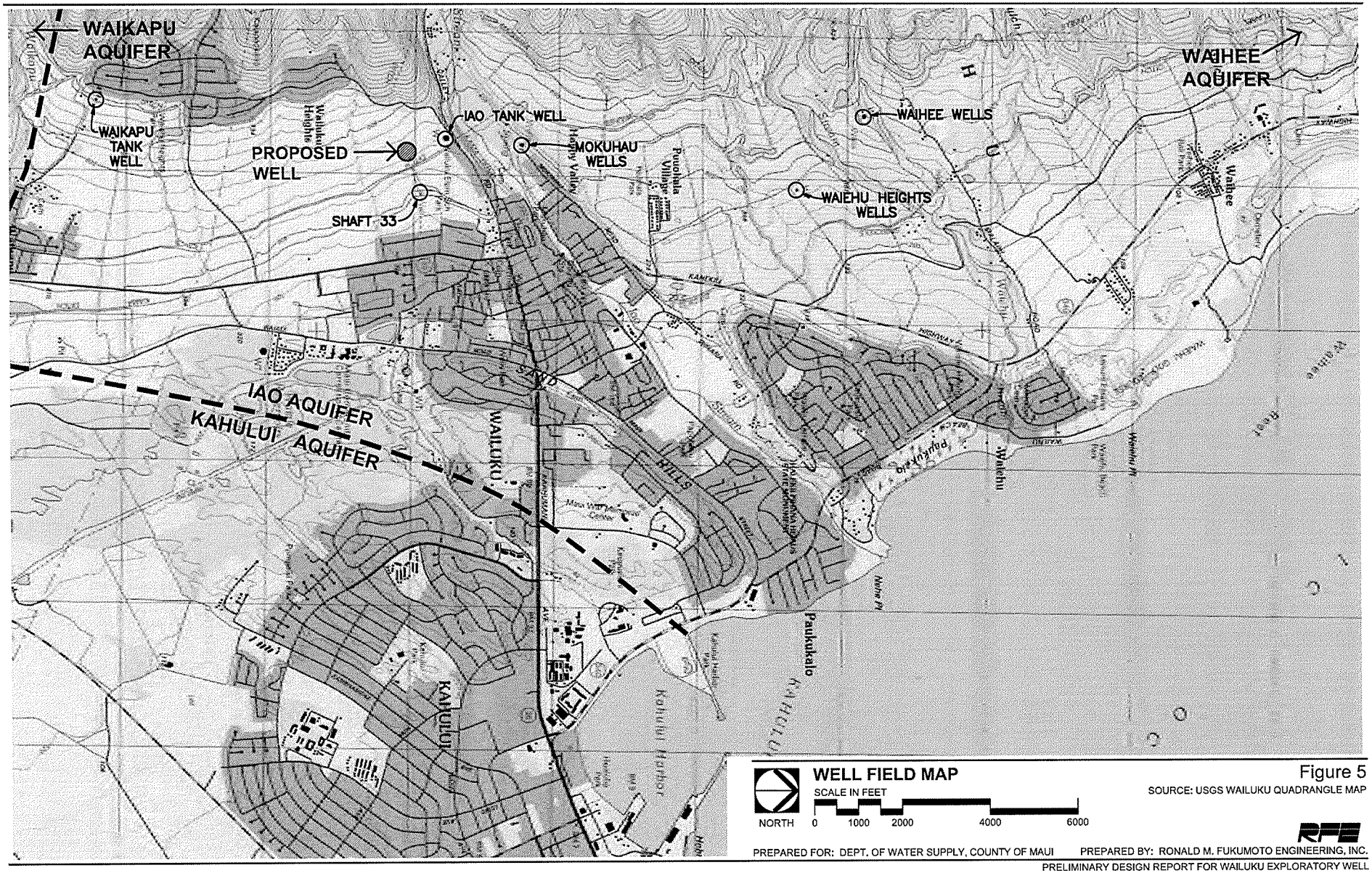
SOIL MAP

SCALE IN FEET

NORTH 0 1000 2000 4000 6000

Figure 4

SOURCE: SOIL SURVEY



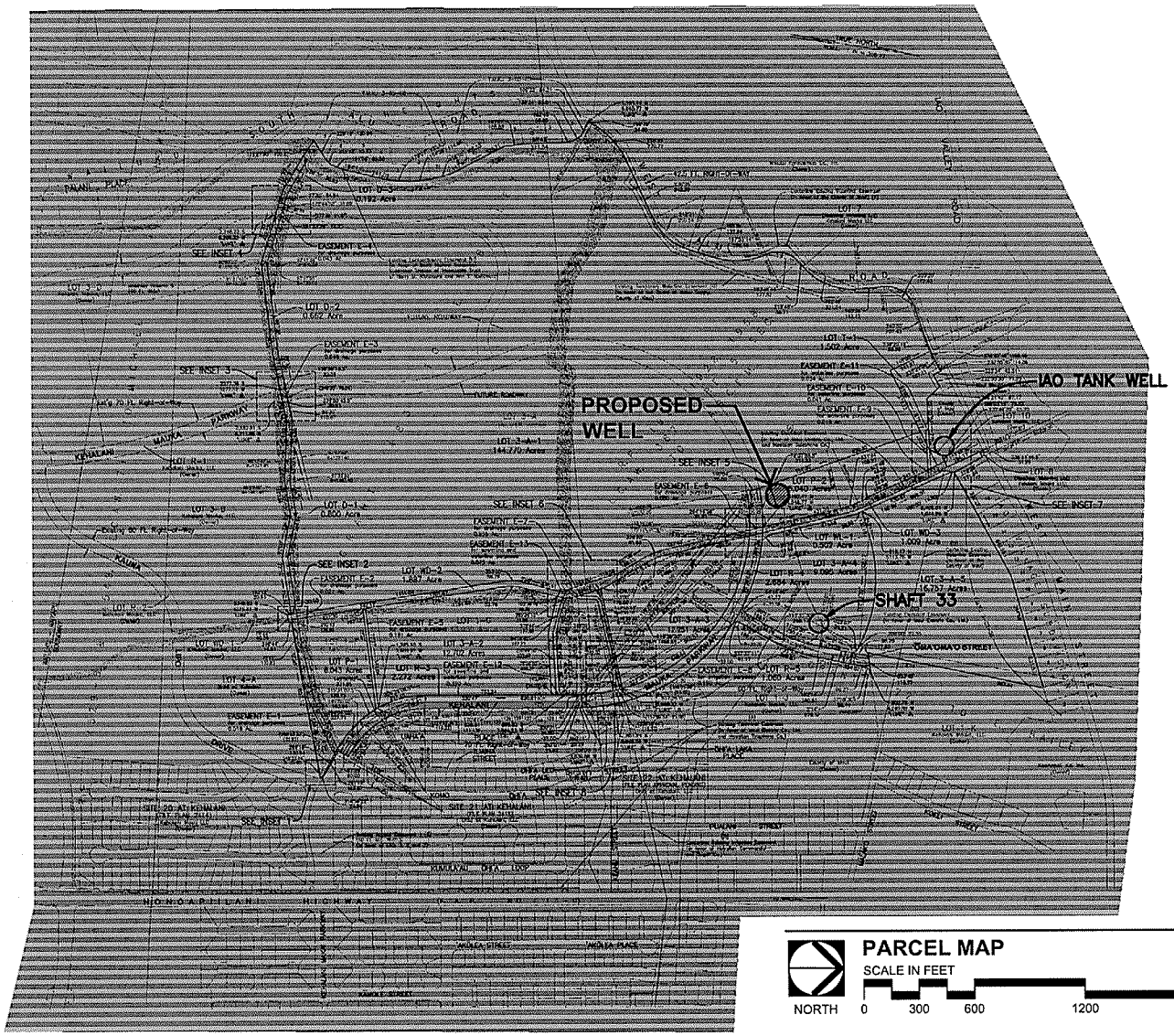
WELL FIELD MAP

SCALE IN FEET

Figure 5

SOURCE: USGS WAILUKU QUADRANGLE MAP

PREPARED FOR: DEPT. OF WATER SUPPLY, COUNTY OF MAUI PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.



PARCEL MAP

SCALE IN FEET

NORTH 0 300 600 1200 1800

Figure 6

SOURCE: KEHALANI MAUKA (LARGE-LOT) SUBDIVISION NO. 3-B
WARREN S. UNEMORI ENGINEERING, INC.

PREPARED FOR: DEPT. OF WATER SUPPLY, COUNTY OF MAUI

PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.

APPENDIX A

Replacement Well No. 2
Iao Aquifer System
Wailuku, Maui, Hawaii

REPLACEMENT WELL NO. 2
IAO AQUIFER SYSTEM
WAILUKU, MAUI, HAWAII

PREPARED FOR:

Maui Department of Water Supply
County of Maui
200 South High Street
Wailuku, Maui, Hawaii 96793-2155

PREPARED BY:

Mink & Yuen, Inc.
1670 Kalakaua Ave., Suite 605
Honolulu, Hawaii 96826

July 2009

Background

Maui Department of Water Supply (DWS) is anticipating the closure of Wailuku Shaft 33 (well no. 5330-05). Because of that, DWS has drilled two wells and is planning to drill four additional new replacement wells for a total installed capacity of 12.98 million gallons per day (mgd). These wells will be spaced out south of Iao Stream and will not concentrate pumping at one location as is presently the case at Shaft 33. The two drilled wells are at the north and south ends of the portion of the Iao Aquifer System that is south of Iao Stream. The Iao Tank site well (well no. 5230-03) is at the northern end and the Waikapu Tank site well (well no. 5131-01) is at the southern. DWS has applied to the Commission on Water Resource Management (CWRM) for 2 mgd capacity pumps for each well.

Since 1991, Shaft 33 supplies an average of almost 5 mgd into the DWS' Central Maui (Wailuku) Water System. The 30° inclined shaft was constructed in 1946 and put into operation in 1948 supplying additional irrigation water to sugarcane. Instead of a skimming tunnel developing the top of the basal aquifer, the shaft has three pumping wells, each 310 ft. deep, drilled ten feet apart in a pump chamber (Wissmar, 1981). The portal elevation is 400± ft., msl and the inclined shaft is 730 ft. long to the pump chamber. The floor elevation is 31.09 feet above mean sea level (ft., msl). Wissmar (1981) shows that the pump chamber is situated slightly mauka of the surface location of Iao Ditch. The ditch elevation is 457 ft., msl.

Originally the installed capacity of Shaft 33 was 27.75 mgd, although the average pumpage in 1953 was 9.7 mgd and peaking at 11.7 mgd in 1971 (Mink, 1986, p. 4). DWS utilizes the shaft using one well with a 3900 gallon per minute

(gpm) pump. The chlorides remain relatively stable at 60± mg/L (DWS reports chlorides to the CWRM) despite pumping almost 5 mgd.

Geology and Hydrology of the Iao Aquifer South of Iao Stream

The sustainable yield of the Iao Aquifer System is 20 mgd (George A. L. Yuen and Assoc., 1990; CWRM, 2008). The Iao aquifer was designated a Ground-Water Management Area on June 30, 2003. Total groundwater pumpage on a 12-month moving average basis is not to exceed 90 percent of the sustainable yield or 18 mgd. At the present time, the 12-month moving average is 16.1 mgd. The majority of DWS pumpage occurs north of Iao Stream. Only Shaft 33 and about 1 mgd of treated surface water supplies the DWS system south of Iao Stream.

Figure 1 is a geologic map (Sherrod and others, 2007) of the area. The digital geologic map is based on pioneering work by Stearns and Macdonald (1942). The new nomenclature for rock units is from Langenheim and Clague (1987). Figure 1 shows that in the region of the Iao Aquifer System south of Iao Stream, the volcanic rocks exposed belong to the shield-building lava flows of the Wailuku Basalt (QTwl). These thin-bedded pahoehoe and aa lava flows make up the very permeable basal aquifer from which most of the DWS sources pump from. Inland volcanic dikes are exposed (depicted as red lines in Figure 1) which create high-level dike impounded aquifers that are developed by high-level tunnels and the Kepaniwai Well (well no. 5332-05) north of Iao Stream. The post-caldera Honolua Volcanics (Qul) are not exposed here, but are exposed south of Waikapu Stream near the recently drilled Maalaea 4 well (well no. 5030-01).

Overlying the Wailuku Basalt are older alluvial deposits (QTao), which form a thick, relatively impermeable, sedimentary wedge. Overlying the old

alluvial deposits are older dune deposits (Qdo) and recent alluvium (Qa) from Iao and Waikapu streams.

Wailuku Basalt is first exposed in Shaft 33 at elevation 68 ft., msl (Gingerich, 2008, Table A-1). Using the elevation of Iao Ditch at 457 ft., msl, it is roughly 389 ft. to the basalt/alluvium contact below the ground's surface.

DWS wells drilled into the dike-free basal aquifer of the Wailuku Basalt are good producers, as evidenced by high discharge rates and low drawdowns. The constant rate aquifer test for the Iao Tank Well pumped 1,400 gpm (2± mgd) four days (5760 minutes) with only 3 ft. of drawdown. A computer-calculated transmissivity value taken from the time-drawdown curve is 104,000 ft^2/day. A similar test for the Waikapu Tank Well yielded a drawdown of 5.54 ft. at a pumping rate of 1,425 gpm. The calculated transmissivity is 117,000 ft^2/day (CWRM well data files). These high transmissivity values indicate a permeable aquifer.

The chloride values for the Iao Tank and the Waikapu Tank wells were 25 mg/L and 31 mg/L, respectively. The low chloride values are due in part to the design of the wells and adherence to the CWRM's Section 2.2 of the "Hawaii Well Construction and Pump Installation Standards" (2004). New wells exploiting basal aquifers are designed to keep the bottom elevation from not exceeding one-fourth the theoretical thickness of the basal lens (41 times the basal head). By constructing wells this way, upconing of more saline water from depth is minimized as well as the long-term optimization of the aquifer.

Water levels in the Iao aquifer are depressed due to pumping. Large pumping centers such as Mokuhau, Waiehu Heights, Waihee, and Shaft 33 create drawdown cones in the vicinity of the pumps. For example, the water level

measured in the Iao Tank Well prior to testing was 8.67 ft., msl, which is influenced by Shaft 33 pumpage, and to a lesser extent, by heavy pumpage north of Iao Stream. These drawdown cones lower water levels throughout the aquifer system. These drawdown water levels do not reflect the actual water level in the aquifer that is in balance with the mid-point of the transition zone (50 percent seawater concentration). In 2000, DWS in conjunction with CWRM and the USGS turned off all the pumps for seven hours within the Iao and North Waihee aquifer systems. The measured recovery at Shaft 33 was 1.5 ft. within the first half hour. Recovery continued to 2 ft. at the end of seven hours. Mink (unpublished February 8, 2000 memorandum to CWRM) calculated that full recovery in Iao would take place in less than three months. Full recovery would occur when the water level is in balance with the mid-point of the transition zone of the basal lens.

Location of Replacement Well No. 2

Replacement Well No. 2 is located at a future county park site, south of the Iao Tank Well. To accurately locate the well and to determine the distance between the wells, the existing Iao Tank Well and the replacement well were located using a Garmin 60Cx GPS. The Iao Tank Well is located about 80 ft. south of the Iao Tank, with a benchmark elevation of 505.55 ft., msl. A Suunto altimeter was set at the well site. The GPS location is: 20° 52′ 58.0″N and 156° 30′ 46.9″W with an error of ±9 ft.

Replacement Well No. 2 is situated in an area where a drilling rig would have easy access to the site and enough room for drill operations. The site selected is located at: 20° 52′ 48.4″N and 156° 30′ 41.5″W with an error of ±12 ft. The Suunto altimeter elevation is 505± ft., msl. Figure 2 shows the location of Replacement Well No. 2 in relation to the Iao Tank Well. The distance between

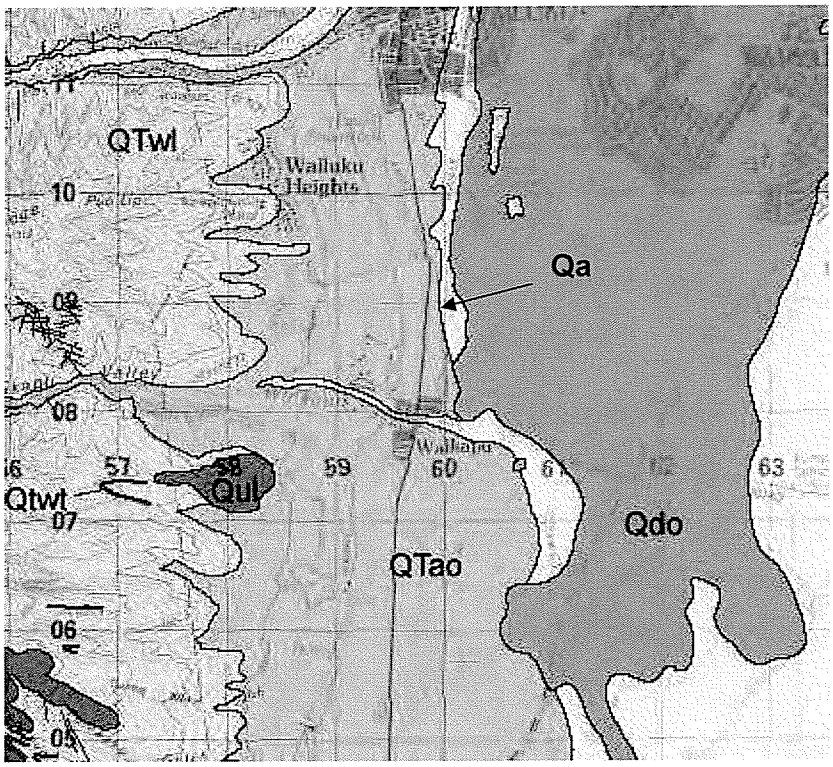
the two well sites is approximately 1,000 ft. A more accurate measurement can be made by employing the haversine formula to determine distance between two GPS locations. The resulting distance between the two sites is 1,096± ft. The location of the new well places it several hundred feet southwest of Shaft 33 pump chamber (see Figure 2). Because of its location near the Shaft 33 pump, the replacement well may have chloride greater than the 25 mg/L encountered at the Iao Tank Site well.

The replacement well should also be drilled so that the bottom hole elevation is within the optimization standard prescribed by CWRM's well standards, which is one quarter of the thickness of the lens (41 times the head). Assuming the head is 10 ft., msl, then the bottom elevation is -102.5 ft., msl.

All other CWRM, DOH Wellhead Protection protocols, and County Water System Standards shall be followed. The well casing and louvered screen shall be 18 inches in diameter with a 3-inch annulus. This well diameter is the same as the Waikapu Tank Well but less than the Iao Tank Well. A well of this diameter will easily accommodate a 1,400 gpm pump. The grout seal shall be to the bottom of the solid casing and louvered screen below to the bottom of the hole. The bottom elevation can be adjusted to conform to geological conditions encountered during drilling.

Wailuku Basalt should be encountered at an elevation greater than 68 ft., msl as in Shaft 33. The replacement well should have no trouble producing good quality groundwater at an installed capacity of 1,400 gpm.

The feasibility of drilling three additional wells (replacement wells 1, 3, and 4) in the vicinity of the existing wells cannot be determined at this time. More studies will be necessary before a firm conclusion can be reached.



Qf	**Fill (Holocene)**
Qa	**Alluvium (Holocene)**
Qbd	**Beach deposits (Holocene)**
Qdy	**Younger dune deposits (Holocene)**
Qls	**Landslide deposits (Holocene)**
Qtc	**Talus and colluvium (Holocene)**
Qdo	**Older dune deposits (Holocene and Pleistocene)**
Qcbc	**Calcareous breccia and conglomerate (Pleistocene)**
QTao	**Older alluvium (Pleistocene and Pliocene)**

Honolua Volcanics (Pleistocene)—Divided into:

Qul	**Lava flows**
Qud	**Domes**
Quv	**Vent deposits**
Qui	**Intrusive rocks**

Wailuku Basalt (Pleistocene and Pliocene(?))—Divided into:

QTwl	**Lava flows**
QTwv	**Vent deposits**
QTwt	**Tuff**
QTwpc	**Pit crater deposits**
QTwlc	**Lava cone**
QTwp	**Phreatic explosion debris**
QTwdc	**Dike complex**
QTwcc	**Caldera complex**
QTwi	**Intrusive rocks**

——— **Contact—Approximately located**

——— **Fault—Approximately located; dotted where concealed**

Figure 1

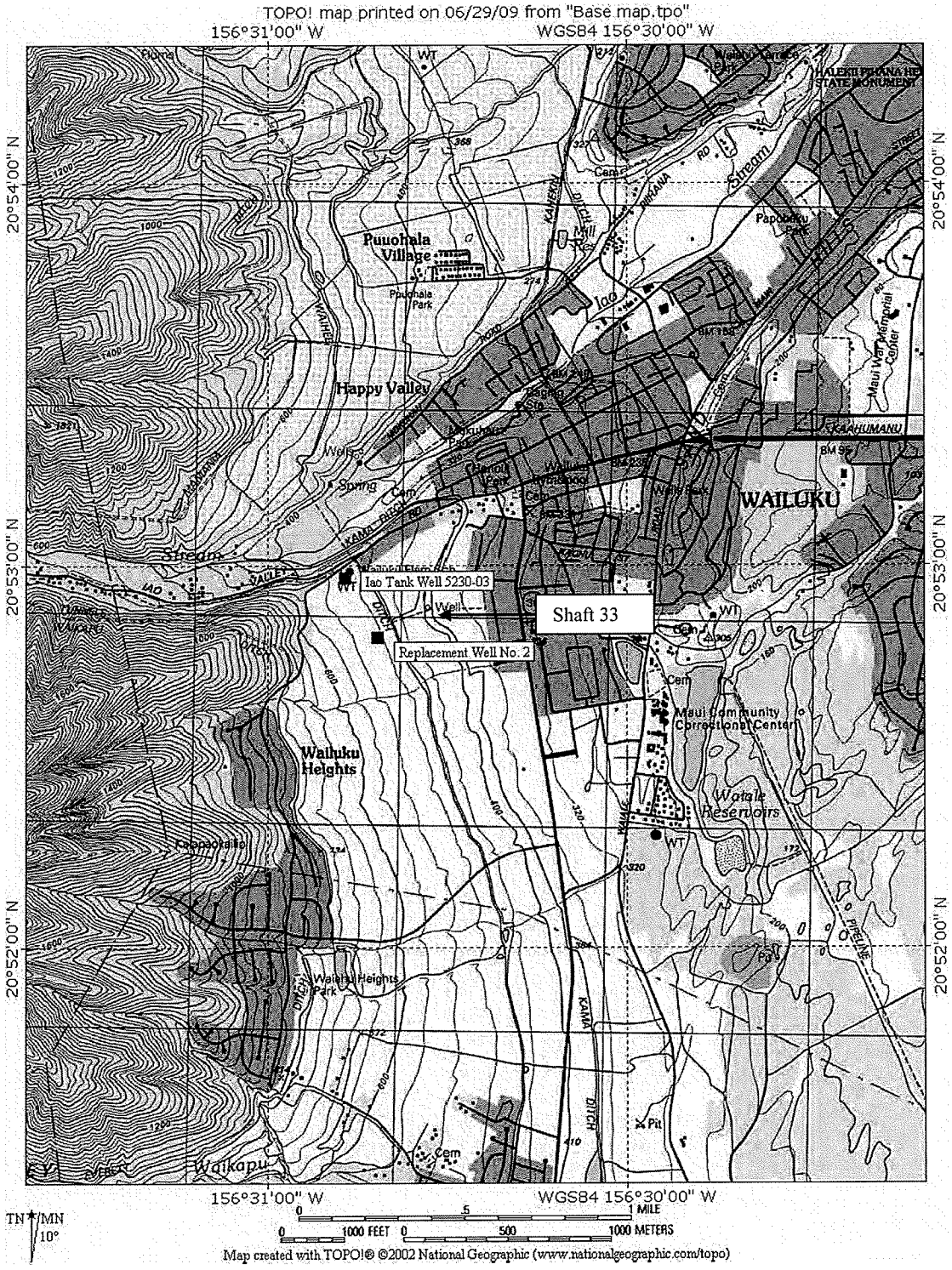

TOPO! map printed on 06/29/09 from "Base map.tpo"
156°31'00" W
WGS84 156°30'00" W
20°54'00" N
20°53'00" N
20°52'00" N
Puuohala Village
Happy Valley
WAILUKU
Iao Tank Well 5230-03
Shaft 33
Replacement Well No. 2
Maui Community Correctional Center
Wailuku Heights
Waiale Reservoirs
Waikapu
HALEKII PIHANA HEIAU STATE MONUMENT
Maui War Memorial Center
KAHULUI
PIPELINE
KAMA DITCH
Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)

Figure 2

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APPENDIX B

Addendum Report
Replacement Well No. 2
Iao Aquifer System
Wailuku, Maui, Hawaii

ADDENDUM REPORT
REPLACEMENT WELL NO. 2
IAO AQUIFER SYSTEM
WAILUKU, MAUI, HAWAII

PREPARED FOR:

RONALD M. FUKUMOTO ENGINEERING, INC.
1721 WILI PA LOOP, SUITE 203
WAILUKU, HAWAII 96793

PREPARED BY:

MINK AND YUEN, INC.
1670 KALAKAUA AVENUE, SUITE 605
HONOLULU, HAWAII 96826

JULY, 2009

Introduction

This report is an Addendum to a report, entitled, "Replacement Well No. 2, Iao Aquifer System, Wailuku, Maui, Hawaii" that was submitted to Maui Department of Water Supply (DWS) on July 10, 2009. Subsequently, the DWS requested more information. This report will discuss three topics: 1) location, capacity, and preliminary design of the replacement well; 2) the sustainability of the aquifer; and 3) the need of spreading pumpage from one large source (Wailuku Shaft 33) to several smaller sources. This report only considers the area of the Iao Aquifer System that is south of Iao Stream.

Location, Capacity, and Design of Replacement Well No. 2

In the earlier report, Figure 2 shows the location of Replacement Well No. 2 (herein referred to as Well 2) in relation to the existing unused Iao Tank Well (State well no. 5230-03) and Shaft 33 (State well no. 5330-05). The location of Well 2 in NAD83 datum is: 20° 52′ 48.4″N and 156° 30′ 41.5″W with an error of ±12 ft. The approximate elevation is 505± feet mean sea level (ft., msl). The topographic map depicted in Figure 2 shows the location of Well 2 at several hundred feet from the existing Shaft 33's pump room and wells. A more accurate land survey needs to be completed to determine the actual distance from the existing pump room to Well 2.

Wells drilled in the Iao Aquifer System, south of Iao Stream, develop potable groundwater from a very permeable basal aquifer within the thin-bedded pahoehoe and aa lava flows of the Wailuku Basalt. Shaft 33 currently pumps about 5 million gallons per day (mgd) with a steady chloride

concentration of 60± mg/L. The existing Iao Tank Well and the Waikapu Tank Well at the north and south ends of this portion of the aquifer, respectively, each have been tested up to 1,400 gallons per minute (gpm) or 2 mgd, with measured drawdowns of 3 and 5.5 ft., respectively. In late 1995 the pump room in Shaft 33 flooded and shorted out the pump. At the time of the short, the pump was producing about 5.5 mgd. A water level recorder at the shaft recorded the groundwater recovery to be over 6 ft. When pumping resumed at the end of July 1996 at a pumping rate of about 4.5 mgd, there was almost 6 ft. drawdown (Meyer and Presley, 2001, Figure 17). Given these data, the new Well 2 should exhibit similar hydrologic characteristics; that is, a well that can produce 1,400 gpm with low drawdown and relatively low chlorides. In a 16-hour maximum day the installed capacity of 2 mgd is equivalent to 1.32 mgd or 176,470 ft^3/day.

Figure 1 of this report is a generalized cross-section of the proposed design of Well 2. The design reflects conditions for new wells as determined by the Commission on Water Resource Management (CWRM) revised "Hawaii Well Construction and Pump Installation Standards" (CWRM, 2004). To accommodate a 1,400-gpm pump, the well's casing diameter should be 18 inches. This would require a 24-inch diameter well to comply with the 3-inch annulus requirement of the well standards. The casing thickness should be at least 0.375 inches to conform to public water supply standards and Hawaii well construction standards. The bottom elevation of the well should be consistent with CWRM requirement to optimize the utility of the aquifer by limiting the depth of the well to one quarter of the thickness of the freshwater portion of the basal lens. In the report submitted to DWS, the bottom elevation is -102.5 ft, msl. Obviously, this elevation can be adjusted due the geologic conditions encountered during drilling. Notification of changes to well depth need to be communicated to CWRM.

In addition to the design standards described above, Department of Health requirement regarding wellhead protection protocols of the source are adhered to. For example, providing adequate protection of the well site by construction of a well pad that is high and large enough to protect the well from flooding. Any polluting activities in and around the drill site, as well as up gradient from the site, should be identified.

Sustainability of the Aquifer

The estimated sustainable yield of the Iao Aquifer System as adopted by CWRM is 20 mgd (George Yuen and Assoc., 1990, CWRM, 2008). This estimate is for the basal sources only. The 20 mgd is a global number that was based upon the methodology developed by John Mink for his Robust Analytical Model (RAM). RAM is employed by CWRM to determine amount of water that can be safely withdrawn indefinitely (steady-state). The model is volumetric and based upon the average amount of recharge, the original water level in the aquifer, and an equilibrium water level as a result of pumping at a given rate. RAM does not take into account the spatial geometry of wells within an aquifer, the effect of one well upon another, or the sustainable capacities of individual wells or well fields, as this is determined by operational history. It does assume that wells are distributed optimally within an aquifer and that the wells extract water from the freshwater core.

In the Iao Aquifer System, there is a concentration of DWS well fields on the north side of Iao Stream. These sources pump about 70 percent of the total DWS withdrawal from the Iao Aquifer System. Some of these sources, for example the Mokuhau and the Waiehu Heights wells, are drilled either too deep, are too closely spaced or both so that their utility has been compromised over the

years (Mink, 1986). Groundwater production south of Iao Stream is concentrated at Shaft 33.

Recently, the U. S. Geological Survey (USGS) attempted to refine the sustainable yield (which the USGS calls "groundwater availability") using a three-dimensional groundwater flow model (Gingerich, 2008) of the Wailuku Sector (Waihee, Iao, and Waikapu aquifer systems). Of the seven scenarios investigated by Gingerich (2008), the first two illustrate the present well configuration and Scenario 3 represents redistributed pumping. Each scenario was taken out for 150 years (54,788 days) to simulate equilibrium or steady-state. Table 6 of Gingerich's report provides the conditions for each scenario. The first three scenarios and their results are summarized below in Table 1:

Table 1 (adapted from Gingerich, 2008)

Scenario	Recharge Condition[1]	Pumping Condition In Iao Aquifer	Results After 150 Years
1	350 mgd: 2000-04 land use condition with 1926-2004 rainfall	2006 withdrawal rate: 16.8 mgd	Water levels 2-3 ft. lower than present; 50% salinity at Waiehu Deep Monitor Well rises 250 ft.
2	350 mgd: 2000-04 land use condition with 1926-2004 rainfall	1996 withdrawal rate: 20.1 mgd	Water levels in some well fields decline more than 5 ft.: 50% salinity at Waiehu Deep Monitor Well rises 300 ft.
3	350 mgd: 2000-04 land use condition with 1926-2004 rainfall	Using withdrawal rate near CWRM sustainable yield: 19.14 mgd	Water levels decline more than 5 ft. at new well fields & 1 ft. higher (relative to Scenario 1) at existing well fields: 50% salinity at Waiehu Deep Monitor Well rises 240-250 ft.

[1]350 mgd recharge over West Maui and Central Maui.

Though Scenario 3 shows an increase in salinity and a decline in water levels, Gingerich (2008) does not use salinity profile data from the new Iao Deep Monitor Well (5230-02). This well is located between Shaft 33 and the DWS Waikapu Tank Well (5131-01) on Kuikahi Drive adjacent to the DWS reservoir. Since May 2006 CWRM has done eight salinity profiles. The transition zone in this well is about 300 ft. thick with the top of the transition zone (2 percent salinity) is at -650± ft., msl and the mid-point of the transition zone (50 percent salinity) is at -950± ft., msl (CWRM data). Although the measured water level at Iao Deep Monitor Well reflects the pumpage within the Iao Aquifer System generally and Shaft 33 particularly, the actual equilibrium water level that is in balance with the transition zone mid-point elevation (Ghyben-Herzberg conditions) is about 23± ft., msl.

Gingerich (2008, Figure 46) also notes that if streamflow were restored in streams where irrigation ditches presently remove water for agricultural purposes, the effect of redistributed pumping south of Iao Stream would be a water level decline on the order of 2 ft.

Effects of Spreading Pumpage

At the present time, Shaft 33 pumps almost 5 mgd. In the redistributed pumpage scenario (Gingerich, 2008, Table 8), only 58 percent of the total pumpage (19.14 mgd) comes from source north of Iao Stream and 7 mgd of that is from wells replacing Shaft 33. This is less than the 16-hour day for the anticipated installed capacity of 12.98 mgd for the Shaft 33 replacement wells. However, interference between these wells is beyond the scope of this report.

Spreading the pumpage over a larger area will have less of an effect on the aquifer than concentrating in one place. Although the USGS report (2008) shows

water level declines of 5 ft. south of Iao Stream in Scenario 3, the upconing of the transition zone is measured at Waiehu Deep Monitor Well and not at Iao Deep Monitor Well. In addition to locating the wells far enough apart to minimize well interference, the bottom elevations should be within the CWRM (2004) prescribed upper quarter of the freshwater aquifer to minimize upconing below the well bore.

To estimate the steady-state drawdown at some distance from the pumping well the following relationship is used:

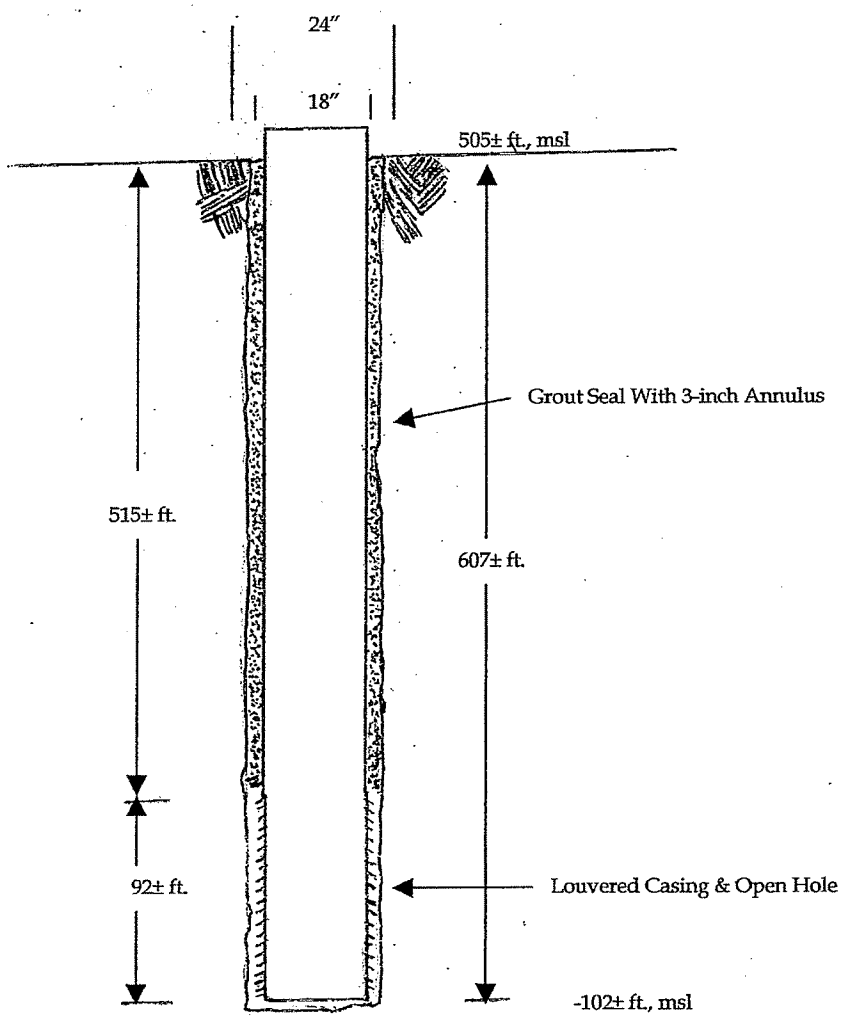
$$s = Q/2\pi T \ln\{1.5/R\,(Tt/S)^{0.5}\}$$

Where s is steady-state drawdown assuming t is 150 years or 54,788 days, aquifer transmissivity or T is 110,500 ft^2/day (average of T values for the Iao Tank Well and the Waikapu Tank Well reported in Replacement Well report), Q is or 176,470 ft^3/day (maximum day or 16-hour day with an installed pump capacity of 1,400 gpm), R is the distance between Well 2 and Iao Tank well or 1,096 ft., and S or specific yield taken at 0.10.

This relationship assumes no recharge or leakage into the aquifer, that it is infinite and homogeneous, and that the aquifer in the vicinity of these wells is unconfined. The resulting steady-state drawdown at the Iao Tank Well is 1.49 ft. If the Iao Tank Well were also pumping at the same Q, then the drawdown at a location midway between the wells (548 ft.) would be 3.34 ft. (1.67 ft. if one well pumping), as the drawdowns would be additive. If the Q were 2 mgd (269,519 ft^3/day) and all other parameters the same, the steady-state at Iao Tank Well would be 2.26 ft.

Assuming Shaft 33 pump room is located where Well 2 will be sited and pumping 5 mgd or 668,021 ft^3/day, the resulting steady-state drawdown at Iao

Tank Well will be 5.60 ft. Clearly, spreading the pumpage throughout the aquifer will have less of an effect on steady-state water level decline. If a greater T value (670,000 ft^2/day) is used, as suggested by aquifer tests in wells north of Iao Stream (Mink, 1977), then the stead-steady water level decline would be lessened considerably.



Preliminary Design for Replacement Well 2

Figure 1

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APPENDIX D.

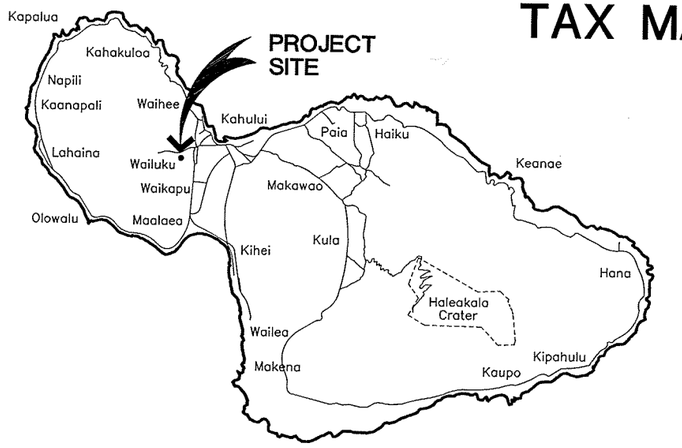
Construction Plans

WAILUKU WELL DEVELOPMENT

TAX MAP KEY (2) 3-5-001: 100, 093, 091, & 021

DWS JOB NO. 09-12

WAILUKU, MAUI, HAWAII



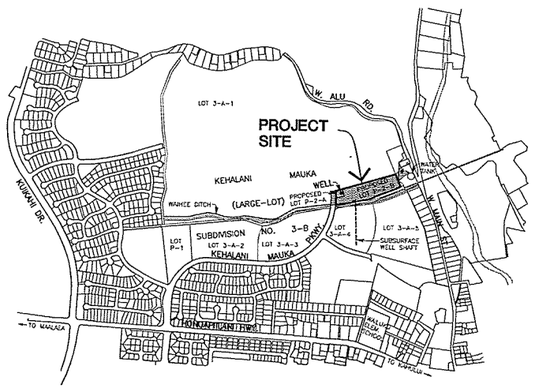
MAP OF MAUI
SCALE IN MILES
NORTH 5 0 5 10 15

PREPARED FOR:

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, HAWAII 96793

PREPARED BY:

RONALD M. FUKUMOTO ENGINEERING, INC.
Civil Engineering & Land Surveying Consultants
1721 Wili Pa Loop, Suite 203 • Wailuku, Hawaii 96793



VICINITY MAP
SCALE IN FEET
NORTH 1000 0 1000 2000 3000

SUBCONSULTANTS:

STRUCTURAL ENGINEER:

ARNOLD T. OKUBO & ASSOCIATES, INC.
94-529 UKEE STREET, SUITE 107
WAIPAHU, HAWAII 96797
PHONE: (808) 671-5184
FAX: (808) 671-5187

ELECTRICAL ENGINEER:

ECM, INC.
130 NORTH MARKET STREET
WAILUKU, HAWAII 96793
PHONE: (808) 242-8070
FAX: (808) 244-9539

APPROVALS:

DIRECTOR,
DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
(APPROVAL GRANTED FOR WORK WITHIN COUNTY RIGHT-OF-WAY)

11-28-12
DATE

DIRECTOR, DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
(APPROVAL LIMITED TO WATER IMPROVEMENTS WHICH WILL BE DEDICATED TO THE DEPARTMENT OF WATER SUPPLY)

5-21-13
DATE

INDEX OF DRAWINGS:

WAILUKU WELL DEVELOPMENT
DWS JOB NO. 09-12

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200 South High Street
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WAILUKU WELL DEVELOPMENT
TAX MAP KEY (2) 3-05-001:100, 093, 091, & 021
DWS JOB NO. 09-12
WAILUKU, MAUI, HAWAII

TITLE SHEET

RONALD M. FUKUMOTO
LICENSED PROFESSIONAL ENGINEER
No. 4935-C
HAWAII, U.S.A.

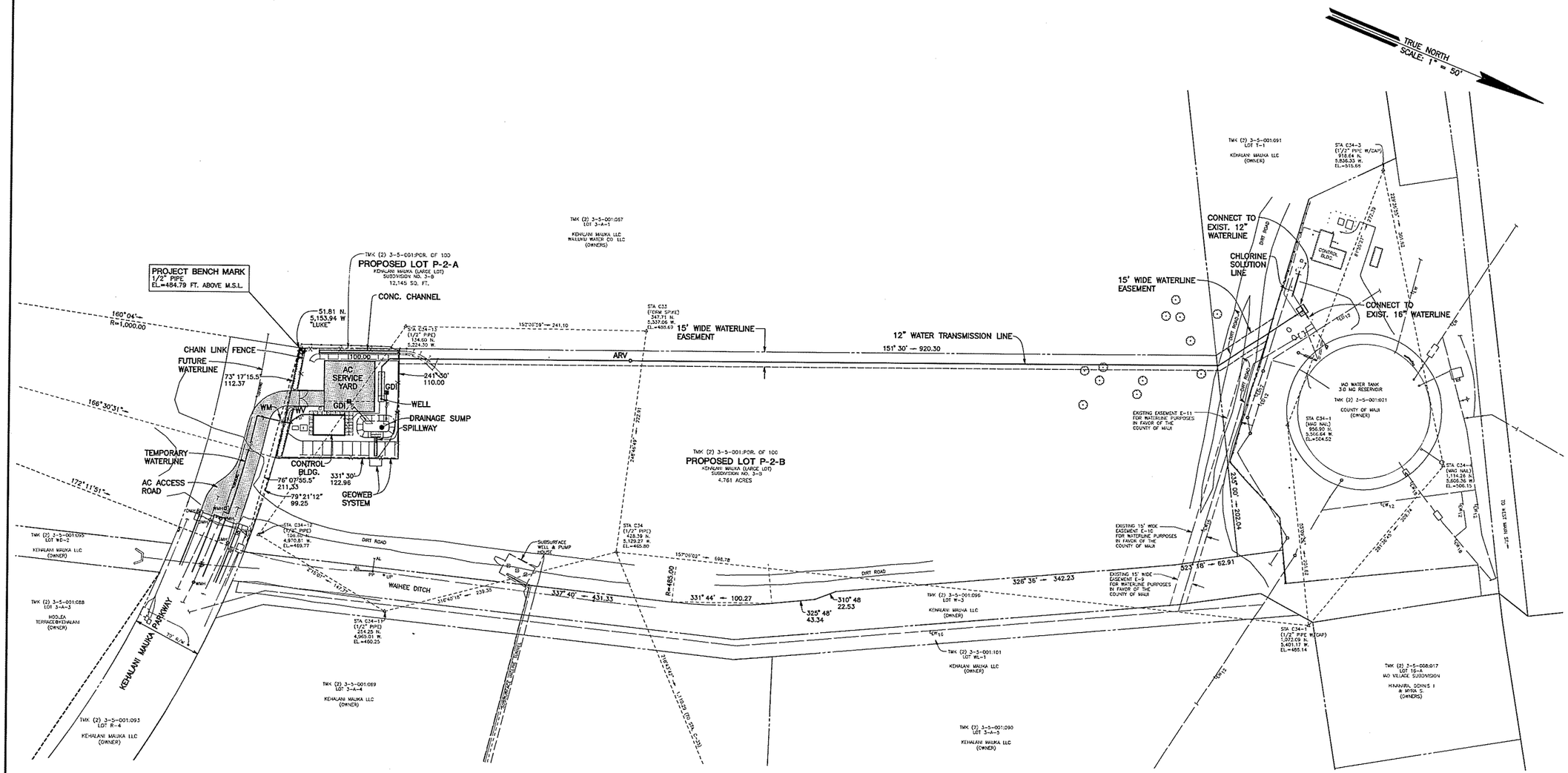
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION, AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION AS DEFINED IN HAR 16-115-2.

Ronald M. Fukumoto
LICENSE EXPIRES: 4/30/2014

DESIGN BY:	M.K.S./H.K.
DRAWN BY:	S.W.
CHECKED BY:	R.F.
DATE:	SEPTEMBER 27, 2012
FILE NO:	COM36

SHEET T-1
1 OF 29

WAILUKU WELL DEVELOPMENT DWS JOB NO. 09-12



GENERAL PLAN
SCALE: 1" = 50'

GRAPHIC SCALE IN FEET
0 25 50 75 100

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Prepared for:
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WAILUKU WELL DEVELOPMENT
TAX MAP KEY (2) 3-05-001:100, 093, 091, & 021
DWS JOB NO. 09-12
WAILUKU, MAUI, HAWAII

GENERAL PLAN

RONALD M. FUKUMOTO
LICENSED PROFESSIONAL ENGINEER
No. 4935-C
HAWAII, U.S.A.

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DESIGN BY:	M.K.S./H.K.
DRAWN BY:	S.W.
CHECKED BY:	R.F.
DATE:	SEPTEMBER 27, 2012
FILE NO:	COM36

SHEET C-1
2 OF 29

CONSTRUCTION NOTES

GENERAL NOTES

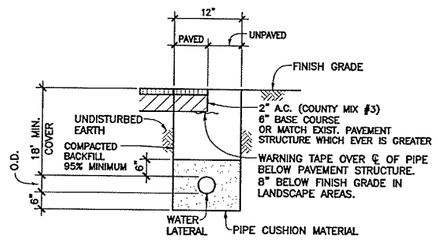
1. LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE BASED ON AVAILABLE "AS-BUILT" OF RECORD CONSTRUCTION PLANS AND ARE APPROXIMATE ONLY AND THEIR ACCURACY IS NOT GUARANTEED.
2. EXISTING CONTOURS AND FEATURES ARE BASED TOPOGRAPHIC SURVEY PREFORMED BY RONALD M. FUKUMOTO ENGINEERING, INC. ON MARCH 22 THROUGH APRIL 1, 2010 AND MARCH 29 THROUGH APRIL 1, 2012.
3. ELEVATIONS SHOWN ARE BASED ON U.S.G.S. BENCH MARK #331, LOCATED ON THE FIRST CONCRETE TERRACE (SOUTH SIDE) OF THE MAUI COUNTY COURTHOUSE. ELEVATION=331.07 FEET ABOVE MEAN SEA LEVEL.
4. PROJECT BENCH MARK IS A 1/2-INCH PIPE SET 6.77 FEET FROM THE SOUTH CORNER OF THE EXPLORATORY WELL SITE. ELEVATION=484.79 FEET ABOVE MEAN SEA LEVEL.
5. EXISTING GRADES SHALL BE VERIFIED BY THE CONTRACTOR BEFORE PROCEEDING WITH GRADING WORK. SHOULD ANY DISCREPANCIES BE DISCOVERED IN THE EXISTING GRADES OR DIMENSIONS GIVEN ON THE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER BEFORE PROCEEDING ANY FURTHER WITH THE WORK, OTHERWISE HE WILL BE HELD RESPONSIBLE FOR ANY COST INVOLVED IN THE CORRECTION OF CONSTRUCTION PLACED DUE TO SUCH DISCREPANCIES.
6. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF EXISTING UTILITIES WITHIN PROJECT LIMITS BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR DAMAGES DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ALL UNDERGROUND UTILITIES.
7. THE CONTRACTOR SHALL REPORT ANY INCONSISTENCIES WITH THE PROPOSED PLAN TO THE OWNER'S REPRESENTATIVE AND SHALL DEMOLISH, REMOVE, OR RELOCATE ALL EXISTING UTILITIES, IMPROVEMENTS, ETC. INCONSISTENT WITH THE PROPOSED PLAN AS DIRECTED BY THE OWNER'S REPRESENTATIVE AND AT THE CONTRACTOR'S EXPENSE.
8. THE LATEST REVISIONS OF THE "STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION," SEPTEMBER 1984 AND THE "HAWAII STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION," 2005 SHALL BE INCLUDED AS PART OF THESE CONSTRUCTION PLANS. THE CONTRACTOR SHALL OBTAIN THE LATEST REVISIONS BEFORE COMMENCING CONSTRUCTION.
9. SHOULD HISTORIC SITES SUCH AS WALLS, PLATFORMS, PAVEMENTS AND MOUNDS, OR REMAINS SUCH AS ARTIFACTS, BURIALS, CONCENTRATION OF CHARCOAL OR SHELLS BE ENCOUNTERED DURING CONSTRUCTION WORK, WORK SHALL CEASE IN THE IMMEDIATE VICINITY OF THE FIND AND THE FIND SHALL BE PROTECTED FROM FURTHER DAMAGE. THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE STATE HISTORIC PRESERVATION DIVISION (PH: 243-1285 OR 243-4640), WHICH WILL ASSESS THE SIGNIFICANCE OF THE FIND AND RECOMMEND MITIGATION MEASURES, IF NECESSARY.
10. PURSUANT TO CHAPTER 6E OF THE HAWAII REVISED STATUTES, ALL CONTRACTORS SHALL ENSURE THAT IN THE EVENT THAT ANY HUMAN SKELETAL REMAINS ARE INADVERTENTLY DISCOVERED DURING CONSTRUCTION, THE REMAINS SHALL NOT BE MOVED AND ANY ACTIVITY IN THE IMMEDIATE AREA THAT COULD DAMAGE THE REMAINS OR THE POTENTIAL HISTORIC SITE SHALL CEASE AND THE DEPARTMENT OF LAND AND NATURAL RESOURCES' HISTORIC PRESERVATION DIVISION (PH: 243-1285 OR 243-4640), THE APPROPRIATE MEDICAL EXAMINER OR CORONER, AND THE POLICE DEPARTMENT (TELEPHONE: 244-6400), SHALL BE CONTACTED. ALL LESSEES USING EXISTING DIRT ROADS TO ACCESS THEIR PROPERTY SHALL CONTINUE TO BE PROVIDED ACCESS TO THEIR PROPERTY AT ALL TIMES DURING CONSTRUCTION ACTIVITIES BY THE CONTRACTOR.
11. PRIOR TO ANY LAND ALTERATION, ALL TASKS OF THE HISTORIC SITES INTERIM PROTECTION PLAN MUST BE IN PLACE FOR THE ISOLATED NON-BURIAL SITES TO BE PRESERVED AND THE HISTORIC PRESERVE. ISOLATED SIGNIFICANT HISTORIC SITES AND THE HISTORIC PRESERVE MUST HAVE PROTECTION MEASURES IN PLACE PRIOR TO ANY LAND ALTERATION. SUCH PROTECTION SHALL INCLUDE PERMANENT FENCING AND TEMPORARY PLASTIC CONSTRUCTION FENCING. THE CONSTRUCTION CREWS MUST BE BRIEFED ON THE IMPORTANCE OF THESE PROTECTIVE MEASURES.

GRADING NOTES

1. FINISH SPOT ELEVATIONS AND FINISH CONTOURS, AS SHOWN ON PLAN REPRESENTS FINISH GRADING. THE SITE WORK CONTRACTOR SHALL COORDINATE WITH THE LANDSCAPE CONTRACTOR THE LOCATION AND DEPTH OF TOPSOIL. THE FINISH SUBGRADE SHALL REFLECT THE FINISH GRADE LESS SPECIFIED TOPSOIL DEPTH.
2. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN THE MEASURES OF THE BEST MANAGEMENT PRACTICE (BMP) PLAN. ALL GRADING OPERATIONS SHALL BE PERFORMED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER POLLUTION CONTROL AND WATER QUALITY STANDARDS CONTAINED IN THE PUBLIC HEALTH REGULATIONS, STATE DEPARTMENT OF HEALTH, ON WATER POLLUTION CONTROL AND WATER QUALITY STANDARDS.
3. THE CONTRACTOR SHALL REMOVE ALL SILT AND DEBRIS RESULTING FROM HIS WORK AND DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS, AND OTHER AREAS. THE COSTS INCURRED FOR ANY NECESSARY REMEDIAL ACTION BY THE STATE DEPARTMENT OF HEALTH SHALL BE PAYABLE BY THE CONTRACTOR.
4. THE CONTRACTOR, AT HIS EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE OF DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.
5. CONSTRUCTION DEBRIS AND WASTES SHALL BE DEPOSITED AT AN APPROPRIATE SITE. THE CONTRACTOR SHALL INFORM THE ENGINEER OF THE LOCATION OF DISPOSAL SITES. THE DISPOSAL SITE MUST ALSO FULFILL REQUIREMENTS OF THE GRADING ORDINANCES.
6. THE CONTRACTOR SHALL NOT DEMOLISH OR CLEAR ANY STRUCTURE, SITE OR VACANT LOT WITHOUT FIRST ASCERTAINING THE PRESENCE OR ABSENCE OF RODENTS WHICH MAY ENDANGER THE PUBLIC HEALTH BY DISPERSAL FROM SUCH PREMISES. SHOULD SUCH INSPECTION REVEAL THE PRESENCE OF SUCH RODENTS, THE CONTRACTOR SHALL ERADICATE SUCH RODENTS BEFORE DEMOLISHING OR CLEARING SAID STRUCTURE, SITE OR VACANT LOT.
7. THE FOLLOWING MEASURES SHALL BE TAKEN TO CONTROL DUST AND EROSION DURING THE SITE DEVELOPMENT PERIOD:
   A. MINIMIZE TIME OF CONSTRUCTION.
   B. RETAIN EXISTING GROUND COVER UNTIL THE LATEST DATE TO COMPLETE CONSTRUCTION.
   C. CONSTRUCT REMAINING PERMANENT EROSION AND DRAINAGE CONTROL FEATURES AS EARLY AS POSSIBLE.
   D. USE TEMPORARY AREA SPRINKLERS IN NON-ACTIVE CONSTRUCTION AREAS WHEN GROUND COVER IS REMOVED.
   E. STATION WATER TRUCK ON-SITE DURING CONSTRUCTION PERIOD TO PROVIDE FOR IMMEDIATE SPRINKLING, AS NEEDED, IN ACTIVE CONSTRUCTION AREAS (WEEKENDS AND HOLIDAYS INCLUDED).
   F. USE TEMPORARY BERMS AND CUT-OFF DITCHES, WHERE NEEDED, FOR CONTROL OF EROSION. IMPLEMENT AND MAINTAIN THE MEASURES OF THE BMP PLAN.
   G. GRADED AREAS SHALL BE THOROUGHLY WATERED AFTER CONSTRUCTION ACTIVITY HAS CEASED FOR THE DAY AND ON WEEKENDS.
   H. ALL CUT AND FILL SLOPES SHALL BE SODDED OR PLANTED IMMEDIATELY AFTER GRADING WORK HAS BEEN COMPLETED.

COMPACTION REQUIREMENTS

1. TESTING OF MATERIALS SHALL BE CONDUCTED BY AN APPROVED INDEPENDENT TESTING AGENCY IN ACCORDANCE WITH ASTM STANDARD METHODS OR AS SPECIFIED BY THE DEPARTMENT OF PUBLIC WORKS, ENGINEERING DIVISION, AS FOLLOWS:
   A. EMBANKMENT/SELECT BORROW AND SUBGRADE MATERIALS: ONE (1) COMPACTION TEST PER 600 SQUARE YARDS, PER LIFT OF MATERIAL;
   B. AGGREGATE SUBBASE COURSE: ONE (1) COMPACTION TEST PER 400 SQUARE YARDS, PER LIFT OF MATERIAL; ONE (1) GRADATION AND SAND EQUIVALENT TEST PER PROJECT;
   C. AGGREGATE BASE COURSE: ONE (1) COMPACTION TEST PER 300 SQUARE YARDS, PER LIFT OF MATERIAL; ONE (1) GRADATION AND SAND EQUIVALENT TEST PER PROJECT;
   D. ASPHALT CONCRETE PAVEMENT OR ASPHALT TREATED BASE COURSE: THREE (3) A.C. CORES FOR THICKNESS AND DENSITY TESTS PER PROJECT;
   E. TRENCH BACKFILL MATERIAL: ONE (1) TEST FOR EACH 300 LINEAL FEET OF TRENCH PER LIFT OF MATERIAL.
2. CONTRACTOR SHALL SUBMIT ALL TESTING REPORTS INCLUDING RESULTS TO THE COUNTY'S INSPECTION AGENCY FOR REVIEW AND APPROVAL PRIOR TO COUNTY'S ACCEPTANCE OF WORK.
3. THE CONTRACTOR SHALL BE REQUIRED TO NOTIFY THE COUNTY OF ANY TESTING FAILURES AND CORRECT EACH FAILURE PRIOR TO PROCEEDING TO THE NEXT PHASE OF CONSTRUCTION. NONCOMPLIANCE WILL REQUIRE REMOVAL OF ALL SUBSEQUENT WORK TO CORRECT THE AREA OF FAILURE. ALL COSTS OF TESTING, REMOVAL, AND RECONSTRUCTION, SHALL BE BORNE BY THE CONTRACTOR.

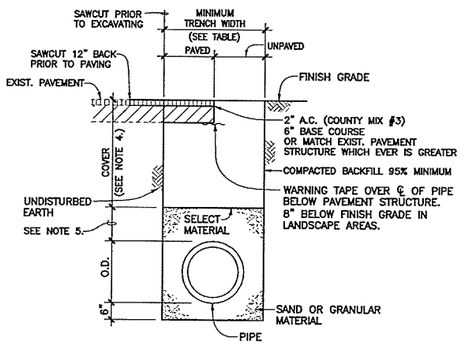


1 / C-2 **TYPICAL WATER LATERAL AND TEMPORARY WATERLINE TRENCH SECTION**
NOT TO SCALE

WATER SYSTEM

1. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF WATER SUPPLY (DWS), IN WRITING, ONE (1) WEEK PRIOR TO COMMENCEMENT OF WORK.
2. ALL MATERIALS USED AND METHOD OF CONSTRUCTION OF WATER SYSTEM FACILITIES SHALL BE IN ACCORDANCE WITH THE LATEST REVISIONS OF DWS STANDARDS. CONTRACTOR SHALL OBTAIN THE LATEST REVISIONS OF THE DWS STANDARD DETAILS BEFORE COMMENCING CONSTRUCTION.
3. ALL WATER SYSTEM WORK SHALL BE PERFORMED BY CONTRACTORS POSSESSING VALID STATE OF HAWAII CONTRACTOR'S LICENSES, REGARDLESS OF THE VALUE OF THE WORK.
4. THE EXACT DEPTH AND LOCATION OF EXISTING WATERLINES, SERVICE LATERALS AND OTHER UTILITIES ARE NOT KNOWN. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE SAME PRIOR TO TRENCHING FOR THE NEW WATERLINE. THE COST OF LOWERING, RELOCATING OR ADJUSTING EXISTING WATERLINES, SERVICE LATERALS AND OTHER UTILITIES SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE NEW WATERLINE, UNLESS NOTED OTHERWISE, AND WILL NOT BE PAID FOR SEPARATELY.
5. CONCRETE FOR REACTION BLOCKS AND ANCHOR BLOCKS SHALL BE DWS CLASS 2500.
6. THE MAXIMUM DISTANCE BETWEEN VALVE NUT AND TOP OF VALVE MANHOLE COVER SHALL BE THREE (3) FEET.
7. THE CONTRACTOR SHALL SUBMIT A MATERIALS LIST TO DWS FOR APPROVAL PRIOR TO CONSTRUCTION.
8. CONNECTION TO DWS SYSTEM:
   A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL NECESSARY FITTINGS AND OTHER MATERIALS AND EQUIPMENT REQUIRED FOR THE HOOK-UP. HE SHALL VERIFY THE EXACT LOCATION, DEPTH, TYPE, AND CONDITION OF THE EXISTING LINE BEFORE ORDERING MATERIALS FOR THE HOOK-UP. HE SHALL, HOWEVER, CHECK WITH DWS BEFORE EXCAVATING FOR VERIFICATION PURPOSES.
   B. WHENEVER FEASIBLE, MECHANICAL JOINT FITTINGS SHALL BE USED FOR BURIED APPLICATIONS, AND FLANGED JOINT FITTINGS SHALL BE USED FOR EXPOSED APPLICATIONS.
   C. AUTHORIZED DWS PERSONNEL MAY BE REQUIRED TO MAKE THE FINAL CONNECTION TO THE EXISTING LINE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS INCURRED BY DWS FOR SAID WORK, INCLUDING THE COST OF PRESSURE TESTING AND DISINFECTION.
   D. IF THE DWS PROVIDES ONLY INSPECTION AND SUPERVISING OPERATORS, AND DOES NOT PROVIDE PERSONNEL FOR THE ACTUAL CONNECTION, THE CONTRACTOR SHALL PROVIDE ALL PIPEFITTERS AND LABORS TO MAKE THE CONNECTION.
   E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL MATERIAL, EQUIPMENT AND LABOR FOR TRENCH EXCAVATION, BACKFILLING, CLEANING AND CHLORINATION, PAVING, AND OTHER WORK NECESSARY TO COMPLETE THE HOOK-UP, AS DIRECTED BY AND TO THE SATISFACTION OF DWS.
9. MINIMUM COVER OVER WATER MAIN, 6" DIAMETER OR LARGER, SHALL BE 3'-0". MINIMUM COVER FOR 4" DIAMETER SHALL BE 2'-6". MINIMUM COVER FOR DIAMETERS LESS THAN 4" SHALL BE 1'-6".
10. BOLTS FOR EXPOSED FLANGED DUCTILE IRON PIPE JOINTS SHALL BE EITHER SILICON BRONZE BOLTS AND NUTS OR 316 STAINLESS STEEL BOLTING WITH THE HEAVY DUTY STAINLESS STEEL NUTS (ONLY) FURNISHED WITH TRIPAC 2000 BLUE COATING SYSTEM. ANTI-SEIZE SHALL NOT BE USED. T-BOLTS FOR DUCTILE IRON MECHANICAL JOINT (MJ) PIPE AND FITTING CONNECTIONS IN UNDERGROUND SITUATIONS SHALL BE ONE OF THE FOLLOWING SYSTEMS:
   A. 316 STAINLESS STEEL T-BOLTS WITH THE HEAVY DUTY STAINLESS STEEL NUTS (ONLY) FURNISHED WITH TRIPAC 2000 BLUE COATING SYSTEM. ANTI-SEIZE SHALL NOT BE USED.
   B. COR-TEN T-BOLTS AND NUTS WITH HIGH GRADE ZINC SACRIFICIAL ANODES, EQUIVALENT TO "DURATRON" SACRIFICIAL "SAC-NUT" MODULES, INSTALLED ON THE NUTS FOR ALL STANDARD COR-TEN T-BOLTS.
   C. COR-TEN T-BOLTS AND NUTS BOTH FACTORY COATED WITH TRIPAC 2000 BLUE COATING SYSTEM BY "TRIPAC FASTENERS".
11. ALL BURIED METALS SHALL BE WRAPPED WITH POLY-WRAP. FOR ALL BURIED INSTALLATIONS OF DUCTILE IRON PIPE AND FITTINGS, POLY-WRAP IS REQUIRED EXCEPT WITHIN CONCRETE JACKETS.
12. LUBRICATE HYDRANT NOZZLE THREADS WITH NON-TOXIC GREASE.
13. THE CONTRACTOR SHALL PAINT AND NUMBER THE FIRE HYDRANT. NUMBERING TO BE FURNISHED BY DWS.
14. WATER MAINS AND APPURTENANCES SHALL BE SUBJECT TO HYDROSTATIC TESTING IN ACCORDANCE WITH THE LATEST REVISION OF AWWA C600, UNDER THE "HYDROSTATIC TESTING" SECTION, TO A PRESSURE OF AT LEAST 1.5 TIMES THE WORKING PRESSURE. UNLESS OTHERWISE STATED IN THE CONSTRUCTION DOCUMENTS OR LIMITED BY THE PRESSURE RATING OF EQUIPMENT, THE PRESSURE TEST AND LEAKAGE TEST SHALL BE PERFORMED AT 225 POUNDS PER SQUARE INCH PRESSURE.
15. THE DEVELOPER SHALL SUBMIT A COST LIST ALONG WITH AN AFFIDAVIT FOR THE WATER SYSTEM PRIOR TO ACCEPTANCE.
16. THE CONTRACTOR SHALL SUBMIT TWO SETS OF RECORD DRAWINGS VIA A CONSULTANT PRIOR TO ACCEPTANCE OF THE WATER SYSTEM. AN ELECTRONIC IMAGE FILE IN TIFF FORMAT SHALL BE PROVIDED TO THE DWS FOR ALL PROJECTS.

REVISED: 12/1/07



2 / C-2 **TYPICAL TRENCH SECTION & PAVEMENT RESTORATION DETAIL**
SCALE: 1/2" = 1'-0"

CHLORINATION OF WATER SYSTEM PIPELINES

1. WATER MAINS AND APPURTENANCES SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C651. ALL PROCEDURES AND MATERIALS (LIQUID CHLORINE OR CALCIUM HYPOCHLORITE) USED FOR THE CHLORINATION OF THE PROJECT SHALL CONFORM TO AWWA REQUIREMENTS.
2. PRIOR TO CHLORINATION, THE PROJECT PIPELINES SHALL BE THOROUGHLY CLEANED. CLEANING OF LINES 8" AND LARGER SHALL BE BY PIGGING USING FOAM PIGS. SMALLER LINES CAN BE FLUSHED IN ACCORDANCE WITH AWWA REQUIREMENTS IF ADEQUATE WATER SUPPLY IS PROVIDED, OTHERWISE BY PIGGING. THE CONTRACTOR SHALL SUBMIT HIS PLAN FOR PIPELINE CLEANING, INCLUDING FITTING REQUIREMENTS FOR PIGGING, FOR APPROVAL PRIOR TO PROCEEDING.
3. THE INTERIOR SURFACES OF THE PROJECT SHALL BE EXPOSED TO THE CHLORINATING SOLUTION FOR A MINIMUM OF 24 HOURS AND THE CHLORINE RESIDUAL SHALL NOT BE LESS THAN 10 PPM AFTER SUCH TIME.
4. SHOULD CALCIUM HYPOCHLORITE BE USED, NO SOLID AND/OR UNDISSOLVED PORTION OF THE COMPOUND SHALL BE INTRODUCED INTO ANY SECTION OF THE PROJECT TO BE CHLORINATED.
5. AT THE END OF THE 24-HOUR DISINFECTION PERIOD, REPRESENTATIVE SAMPLES SHALL BE TAKEN AND ANALYZED TO ASSURE A CHLORINE RESIDUAL OF AT LEAST 10 PPM. MEASUREMENTS FOR CHLORINE RESIDUAL TESTS SHALL BE BY A TRAINED, QUALIFIED TESTER APPROVED BY THE DIRECTOR.
6. SHOULD THE RESULTS INDICATE ADEQUATE CHLORINATION, THE PROJECT SHALL BE THOROUGHLY FLUSHED AND FILLED WITH POTABLE WATER FROM THE EXISTING POTABLE WATER SYSTEM AND AGAIN TESTED FOR CHLORINE RESIDUAL. THE FLUSHING SHALL BE CONSIDERED ADEQUATE IF THE TEST RESULTS INDICATE THAT THE WATER IN THE PROJECT HAS A COMPARABLE CHLORINE RESIDUAL AS THE WATER IN THE EXISTING SYSTEM.
7. FOLLOWING THE ACCEPTABLE FLUSHING OF THE HIGH CONCENTRATION CHLORINE SOLUTION, TWO CONSECUTIVE SETS OF ACCEPTABLE SAMPLES SHALL BE TAKEN AT LEAST 24 HOURS APART FROM REPRESENTATIVE POINTS IN THE PROJECT AND SUBJECTED TO MICROBIOLOGICAL TESTS PERFORMED BY A CERTIFIED LABORATORY APPROVED BY THE DEPARTMENT OF HEALTH. AT LEAST ONE SET OF SAMPLES SHALL BE COLLECTED AND TESTED FROM EVERY 1,200 FEET OF THE NEW WATER MAIN, PLUS ONE SET FROM THE END OF THE LINE AND AT LEAST ONE SET FROM EACH BRANCH. POSITIVE RESULTS WILL NOT BE ACCEPTABLE AND THE ENTIRE CHLORINATION PROCESS WILL BE REPEATED.
8. ANALYSIS FOR RESIDUAL CHLORINE SHALL BE MADE IN ACCORDANCE WITH "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER", AMERICAN PUBLIC HEALTH ASSOCIATION, CURRENT EDITION.
9. MICROBIOLOGICAL TESTS SHALL BE MADE IN ACCORDANCE WITH "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER", AMERICAN PUBLIC HEALTH ASSOCIATION, CURRENT EDITION.
10. THE DEVELOPER/CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH ALL OF THE FOREGOING.

REVISED: 12/1/07

TRENCH SECTION NOTES:

1. ALL WORK AND MATERIALS REQUIRED TO COMPLETE THE AC PAVING SHALL CONFORM TO REQUIREMENTS OF THE "HAWAII STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND PUBLIC WORKS CONSTRUCTION 1994".
2. CONTRACTOR SHALL PROVIDE A TEMPORARY COLD MIX PATCH IF PERMANENT RESTORATION CANNOT BE MADE WITHIN 24 HOURS OF BACKFILL.
3. ALL EXPOSED AREAS TO BE GRASSED.
4. MINIMUM COVER:
   A. UNDER ROAD PAVEMENT = 36"
   B. UNDER SHOULDER AREA:
      1. SMALLER THAN 4" = 24"
      2. 4" = 30"
      3. 6" AND LARGER = 36"
5. PIPE CUSHION MATERIAL ABOVE PIPE:
   A. 12" FOR PIPES 16" OR LARGER
   B. 6" FOR PIPES 12" OR SMALLER
6. ANY DAMAGES TO EXISTING UTILITIES SHALL BE REPLACED AND/OR RESTORED TO ITS ORIGINAL CONDITION AT NO ADDITIONAL COST TO OWNER.
7.

PIPE SIZE	TRENCH WIDTH
<4"	12"
4"	24"
6"	24"
8"	24"
12"	30"
16"	30"
24"	48"

RFE

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WAILUKU WELL DEVELOPMENT
TAX MAP KEY (2) 3-05-001:100, 093, 091, & 021
DWS JOB NO. 09-12
WAILUKU, MAUI, HAWAII

CONSTRUCTION NOTES & DETAILS

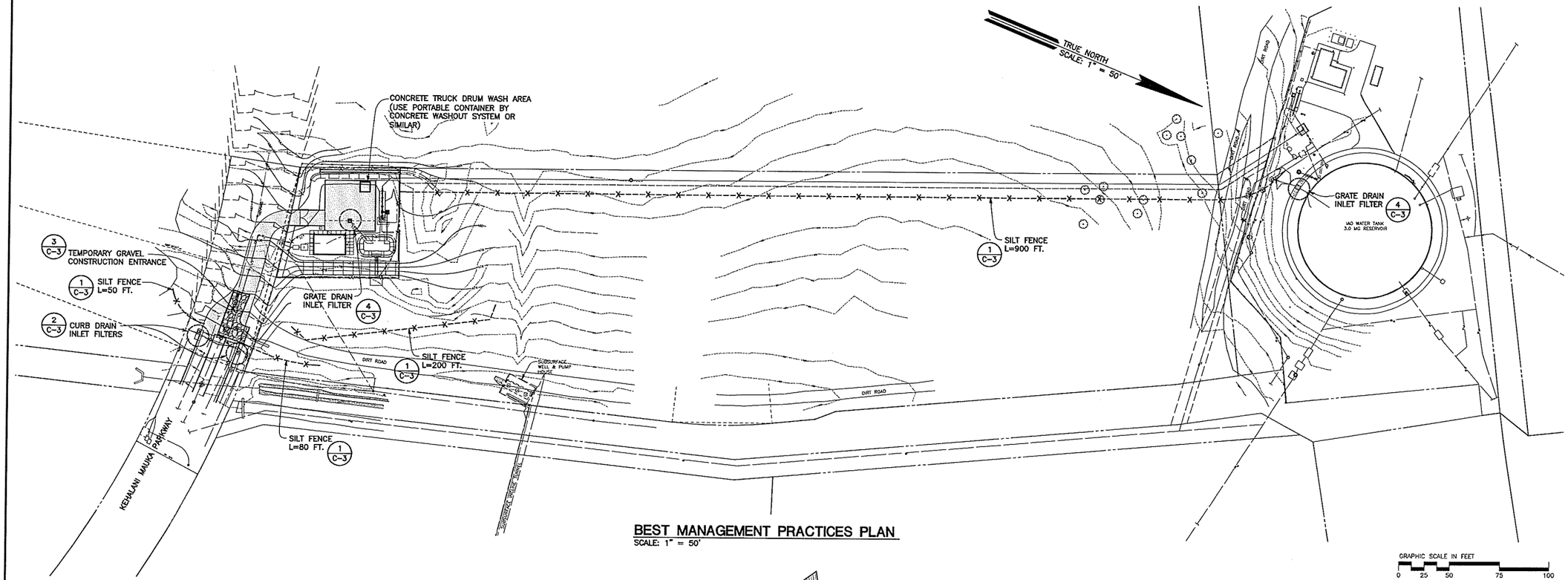
RONALD M. FUKUMOTO LICENSED PROFESSIONAL ENGINEER No. 4935-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION, AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION AS DEFINED IN HAR 16-115-2.

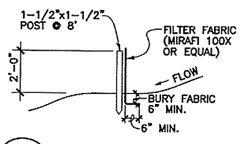
Ronald M. Fukumoto
LICENSE EXPIRES: 4/30/2014

DESIGN BY:	M.K.S./H.K.
DRAWN BY:	S.W.
CHECKED BY:	R.F.
DATE:	SEPTEMBER 27, 2012
FILE NO:	COM36

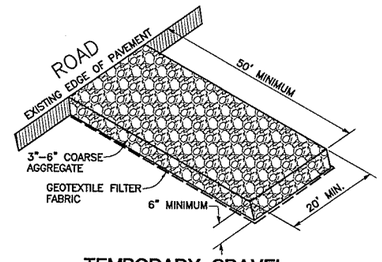
SHEET C-2
3 OF 29



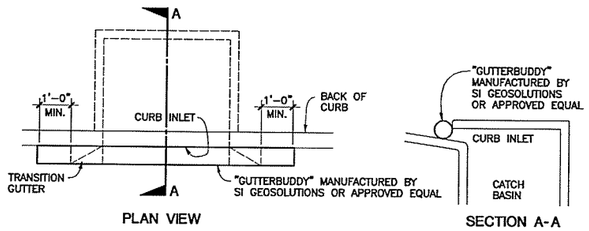
BEST MANAGEMENT PRACTICES PLAN
SCALE: 1" = 50'



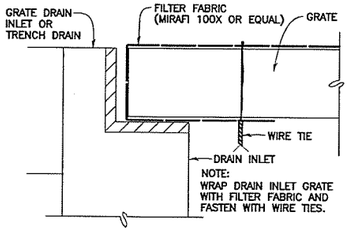
1 C-3 **SILT FENCE SECTION**
NOT TO SCALE



3 C-3 **TEMPORARY GRAVEL CONSTRUCTION ENTRANCE**
NOT TO SCALE



2 C-3 **CURB DRAIN INLET FILTER**
NOT TO SCALE



4 C-3 **GRATE DRAIN INLET FILTER**
NOT TO SCALE

EROSION CONTROL NOTES

THE FOLLOWING IS AN OUTLINE OF THE EROSION CONTROL MEASURES THAT WILL BE IMPLEMENTED FOR THIS PROJECT.

1. GENERAL EROSION CONTROL MEASURES
   - A. MINIMIZE TIME OF CONSTRUCTION.
   - B. RETAIN EXISTING GROUND COVER UNTIL THE LATEST DATE TO COMPLETE CONSTRUCTION.
   - C. PROVIDE TEMPORARY GRAVEL APRON(S) (APPROXIMATELY 50' LONG BY 20' WIDE) AT POINT OF CONNECTION TO PAVED STREET TO PREVENT TRACKING OF SEDIMENTS ONTO STREET.
   - D. CONTROL DUST BY SPRINKLING WITH WATER WAGONS OR OTHER SUITABLE METHODS. GRADED AREAS SHALL BE THOROUGHLY WATERED AFTER CONSTRUCTION ACTIVITY HAS CEASED FOR THE DAY AND ON WEEKENDS.
   - E. USE TEMPORARY BERMS AND CUT-OFF DITCHES, WHERE NEEDED, FOR CONTROL OF EROSION.
   - F. CONSTRUCT PERMANENT EROSION AND DRAINAGE CONTROL FEATURES AS EARLY AS POSSIBLE. ALL CUT AND FILL SLOPES SHALL BE SODDED OR PLANTED IMMEDIATELY AFTER GRADING WORK HAS BEEN COMPLETED.
   - G. MAINTAIN EROSION CONTROL MEASURES UNTIL ESTABLISHMENT OF GRASS AND LANDSCAPE PLANTING.
2. SITE-SPECIFIC EROSION CONTROL MEASURES
   - A. INSTALL SILT FENCES AS NOTED ON PLAN. INSPECT FENCES WEEKLY AND AFTER STORMS. REMOVE AND STABILIZE SEDIMENT WHEN IT REACHES A HEIGHT OF 8 INCHES AT THE FENCE.
   - B. INSTALL GRATED DRAIN INLET FILTER AS NOTED ON PLAN. INSPECT FILTER WEEKLY AND AFTER STORMS. REMOVE AND DISPOSE OF SEDIMENT AFTER EACH STORM EVENT.
3. ADDITIONAL EROSION CONTROL NOTES
   - A. ALL CONTROL MEASURES SHALL BE CHECKED AND REPAIRED AS NECESSARY WEEKLY IN DRY PERIODS AND WITHIN 24 HOURS AFTER ANY RAINFALL OF 1/2 INCH OR GREATER WITHIN A 24-HOUR PERIOD. DURING PROLONGED PERIODS OF RAINFALL, DAILY CHECKING IS NECESSARY. THE PERMITTEE SHALL MAINTAIN RECORDS OF THE DURATION AND ESTIMATED VOLUME OF STORM WATER DISCHARGE(S), CHECKS, AND REPAIRS.
   - B. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE AND FUNCTIONAL BEFORE EARTH MOVING OPERATIONS BEGIN. THESE MEASURES SHALL BE PROPERLY CONSTRUCTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
   - C. A SPECIFIC INDIVIDUAL SHALL BE DESIGNATED TO BE RESPONSIBLE FOR EROSION AND SEDIMENT CONTROLS ON EACH PROJECT.
   - D. TEMPORARY SOIL STABILIZATION WITH APPROPRIATE VEGETATION SHALL BE APPLIED ON AREAS THAT WILL REMAIN UNFINISHED FOR MORE THAN 30 CALENDAR DAYS.
   - E. PERMANENT SOIL STABILIZATION WITH PERENNIAL VEGETATION OR PAVEMENT SHALL BE APPLIED AS SOON AS PRACTICAL AFTER FINAL GRADING. IRRIGATION AND MAINTENANCE OF THE PERENNIAL VEGETATION SHALL BE PROVIDED FOR 30 DAYS OR UNTIL THE VEGETATION TAKES ROOT, WHICHEVER IS SHORTER.

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WAILUKU WELL DEVELOPMENT
TAX MAP KEY (2) 3-05-001:100, 093, 091, & 021
DWS JOB NO. 09-12
WAILUKU, MAUI, HAWAII

CONSTRUCTION EROSION CONTROL BEST MANAGEMENT PRACTICES PLAN

RONALD M. FUKUMOTO
LICENSED PROFESSIONAL ENGINEER
No. 4935-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION, AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION AS DEFINED IN HAR 16-115-2.
LICENSE EXPIRES: 4/30/2014

DESIGN BY:	M.K.S./H.K.
DRAWN BY:	S.W.
CHECKED BY:	R.F.
DATE:	SEPTEMBER 27, 2012
FILE NO:	COM36

SHEET C-3
4 OF 29

GENERAL NOTES

A. DESIGN LOADS:

1. LIVE LOADS:

   ROOF . . . . . 20 PSF

2. 3 SECOND GUST
   WIND SPEED . . . . . 105 MPH, EXPOSURE C PER IBC 2003

3. SEISMIC . . . . . IBC 2003
   S_S = 1.0
   S_1 = 0.265
   SITE CLASS D

B. FOUNDATION:

1. THE SUBGRADE SOIL SHALL BE MOISTURE CONDITIONED TO WITHIN 0 & 3 PERCENT OF THE WET SIDE OF OPTIMUM MOISTURE CONTENT AND COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY DENSITY (AS DETERMINED BY THE ASTM D 1557 TEST PROCEDURE) IF THE MATERIAL IS GRANULAR OR TO A MINIMUM OF 90% OF THE MAXIMUM DRY DENSITY (AS DETERMINED BY THE ASTM D 1557 TEST PROCEDURE) IF THE MATERIAL IS FINE-GRAINED.
2. THE SELECT BORROW GRAVEL SHALL BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE ASTM D 1557 TEST PROCEDURE. EACH LIFT SHALL NOT EXCEED 6" IN COMPACTED THICKNESS.
3. THE #3 FINE GRAVEL SHALL BE COMPACTED BY MEANS OF A VIBRATORY PLATE COMPACTOR MAKING A MINIMUM OF 4 PASSES.
4. THE BUILDING SLAB SHOULD BE SUPPORTED BY A MINIMUM OF 24 INCHES OF GRANULAR SOIL.
5. ALLOWABLE SOIL BEARING PRESSURE = 1,500 PSF (FOR DEAD AND LIVE LOADS)
   ALLOWABLE SOIL BEARING PRESSURE = 2,000 PSF (FOR SHORT DURATION WIND AND SEISMIC LOADS)
6. SOIL VALUES AND RECOMMENDATIONS IS FROM SOIL REPORT BY ISLAND GEOTECHNICAL ENGINEERING, INC., PROJECT NO. 121562-FM, DATED AUGUST 31, 2012, ENTITLED "WAILUKU WELL DEVELOPMENT, KEHALANI MAUKA PARKWAY, WAILUKU, MAUI, HAWAII".
7. SITE GRADING SHALL BE FULLY COMPLETED PRIOR TO FOUNDATION WORK.
8. SOILS ENGINEER SHALL APPROVE ALL FILL AND BACKFILL MATERIALS.

C. REINFORCED CONCRETE:

1. ALL CONCRETE WORK SHALL CONFORM TO ACI 318-05.
2. THE MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF CONCRETE AT 28 DAYS SHALL BE:

   FOUNDATION . . . . . 3,000 PSI
   SLAB-ON-GRADE . . . . . 4,000 PSI
   CONCRETE TOPPING/STRUCT. SLABS/BOND BEAMS . . . . . 4,000 PSI
   PRECAST CONCRETE PLANKS . . . . . 6,000 PSI
   (4,000 PSI AT RELEASE)

2. MATERIAL FOR CURING CONCRETE SHALL BE:

   IMPERVIOUS SHEATHING - WATERPROOF PAPER, POLYETHYLENE SHEATHING, OF POLYETHYLENE COATED BURLAP CONFORMING TO ASTM C-171
3. LIQUID MEMBRANE-FORMING COMPOUND - ASTM C-309, WHITE PIGMENTED, TYPE 2, FREE OF PARAFFIN OR PETROLEUM.
4. JOINT SEALING MATERIALS: ASTM D-1190 OR ASTM D-1850 INSIDE BUILDINGS: ASTM D-1190 OUTSIDE BUILDINGS.
5. PERFORMED JOINT FILLER: ASTM D-1751 OR ASTM 1752.
6. VAPOR BARRIER MATERIAL: POLYETHYLENE SHEATHING OF NOT LESS THAN 6-MIL NOMINAL THICKNESS.
7. WELDED WIRE FABRIC: ASTM A-185, 6 x 6 - W1.4 x W1.4, GALVANIZED, UNLESS OTHERWISE INDICATED.

D. REINFORCED STEEL:

1. ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60, EXCEPT #3 OR #4 STIRRUPS AND TIES SHALL BE GRADE 40.
2. ALL BARS MARKED CONTINUOUS (CONT.) ON THE PLANS SHALL BE LAPPED 48 BAR DIAMETERS AT ALL LAPS, SPLICES, INTERSECTIONS, AND CORNERS.
3. IT SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO INSPECT AND ENSURE THAT ALL OF THE REINFORCING STEEL HAS BEEN INSTALLED IN ACCORDANCE TO THE CONTRACT DOCUMENTS. THE GENERAL CONTRACTOR SHALL COMPLETE HIS INSPECTION AND MAKE THE NECESSARY CORRECTIONS BEFORE NOTIFYING THE ENGINEER TO OBTAIN APPROVAL TO POUR CONCRETE. THE ENGINEER SHALL BE GIVEN SUFFICIENT (48 HOURS) TIME TO ALSO INSPECT THE PLACEMENT OF THE REINFORCING STEEL PRIOR TO POURING CONCRETE.
4. ALL REINFORCING STEEL SHALL BE TIED IN PLACE BEFORE POURING CONCRETE.
5. ALL CONCRETE REINFORCEMENT DETAILING AND PLACEMENT SHALL CONFORM TO ACI 315 AND ACI 318-05 UNLESS OTHERWISE INDICATED.
6. THE FOLLOWING MINIMUM COVER SHALL BE PROVIDED FOR REINFORCEMENT:

	MINIMUM COVER, INCH
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	3
CONCRETE EXPOSED TO EARTH OR WEATHER:	
#6 BARS AND LARGER	2
#5 BARS AND SMALLER	1-1/2

E. PRESTRESSED CONCRETE:

1. TENDONS FOR PRESTRESSING STEEL SHALL BE STANDARD SEVEN-WIRE UNCOATED, STRESS RELIEVED STRANDS.
2. TENSIONING FOR PRESTRESSING STEEL:

   ULTIMATE STRENGTH . . . . . 270 ksi
   TENSIONING LOAD . . . . . 189 ksi
   DESIGN LOAD . . . . . 154 ksi

3. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF STRAND LAYOUT CALCULATIONS AND OTHER PRESTRESSING DETAILS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.
4. ALL REINFORCING AND PRE-TENSIONED STEEL SHALL BE FIRMLY SECURED IN FORMS TO OBTAIN THE DIMENSIONS AND LOCATIONS SHOWN ON THE PLANS.
5. PLANKS SHALL BE CAST ON FORMS AND STRANDS SHALL BE RELEASED AFTER THE CONCRETE HAS ATTAINED A STRENGTH OF 4,000 PSI (SEE CONCRETE SPECIFICATIONS).
6. DO NOT USE POWDER DRIVEN FASTENER IN PRESTRESSED CONCRETE EXCEPT AS NOTED IN THE SPECIFICATION OR AS APPROVED BY THE ENGINEER.
7. ALL INSERTS AND ANCHORS FOR SUSPENDED MECHANICAL AND ARCHITECTURAL WORK SHALL BE CAST-IN-PLACE WHEREVER POSSIBLE.
8. SLIGHT DEVIATIONS IN SPACING OF SLAB TENDONS ARE PERMITTED WHERE REQUIRED TO AVOID OPENINGS OR INSERTS WHICH ARE SPECIFICALLY LOCATED.
9. TENDONS SHALL CLEAR OPENINGS BY 2 1/2" MINIMUM.
10. FOR STRANDS, SHORING AND CAMBER REQUIREMENTS, SEE DETAIL 4/S-8.
11. NO FIELD DRILLING OR CUT-OUTS SHALL BE ALLOWED AND ABSOLUTELY NO STRANDS SHALL BE CUT.

F. MASONRY:

1. CONCRETE MASONRY UNITS (CMU) SHALL BE THE TWO CORE LOAD BEARING TYPE CONFORMING TO ASTM C90, GRADE N-11. UNITS SHALL BE CURED BEFORE INSTALLATION. PROVIDE JAMBS, SILLS, LINTELS, CORNERS, AND OTHER REQUIRED MASONRY UNITS OF STANDARD SHAPES.
2. MASONRY ULTIMATE COMPRESSIVE STRENGTH SHALL BE f'm = 1,350 PSI.
3. MORTAR: 2,500 PSI (TYPE M) MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS.
4. GROUT: 2,500 PSI MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS.
5. REINFORCING:
   a. ALL CMU WALLS SHALL BE REINFORCED WITH 1-#5 VERTICAL REINFORCING BARS AT 16" O.C. MINIMUM SPACING. AND 2-#4 HORIZONTAL REINFORCING BARS AT 48" O.C. UNLESS OTHERWISE NOTED.
   b. USE 1-#5 VERTICAL AT ALL CORNERS, JAMBS, INTERSECTIONS, MULLIONS, AND DISCONTINUOUS ENDS.
   c. INSTALL NO. 9 GAUGE HORIZONTAL JOINT REINFORCING CONFORMING TO ASTM A82-76 AT 16" O.C. UNLESS OTHERWISE SHOWN ON THE PLANS. LAP 12" MINIMUM AT ALL SPLICES, CORNERS, AND INTERSECTIONS.

G. CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING ANY CONSTRUCTION OR FABRICATION AND SHALL COORDINATE WORK WITH ALL OTHER TRADES. CHECK ARCHITECTURAL, ELECTRICAL, MECHANICAL, AND CIVIL DRAWINGS FOR ANCHORS, INSERTS, PENETRATIONS, GROOVES, CHAMFERS, ETC.
2. NO PENETRATIONS WILL BE ALLOWED THROUGH ANY STRUCTURAL MEMBERS WITHOUT THE APPROVAL OF THE STRUCTURAL ENGINEER.
3. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE, 2003 EDITION.
4. THE CONTRACTOR SHALL DETAIL, FURNISH, AND INSTALL ALL MEMBERS, CONNECTIONS, AND ACCESSORIES NOT SHOWN BUT WHICH ARE REQUIRED TO COMPLETE THE WORK AND SHALL SUBMIT THEM TO THE ENGINEER FOR APPROVAL. COST OF THESE MEMBERS, CONNECTIONS, AND ACCESSORIES SHALL BE INCLUDED IN THE CONTRACTOR'S BID PRICE. THE CONTRACTOR SHALL PERFORM HIS WORK IN A WORKMANLIKE MANNER.
5. SUBMIT SIX (6) COPIES OF SHOP DRAWINGS FOR CONCRETE AND MASONRY REINFORCING STEEL, PRESTRESSED CONCRETE, AND OF ALL STRUCTURAL WORK TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.
6. INSTALL A POLYETHYLENE MOISTURE BARRIER (MINIMUM 0.01 INCH THICKNESS) UNDER ALL CONCRETE SLABS.

08/31/12

REV. NO.	DESCRIPTION	DATE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND WILL BE UNDER MY PERIODIC OBSERVATION.
Arnold T. Okubo
SIGNATURE
LICENSE EXPIRES: 04/30/14

ARNOLD T. OKUBO * No. 4173-S * LICENSED PROFESSIONAL ENGINEER * U.S.A. * HAWAII

Arnold T. Okubo & Associates, Inc.
CONSULTING ENGINEERS
OAHU, HAWAII

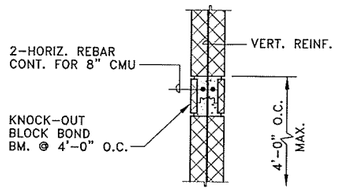
WAILUKU WELL DEVELOPMENT
TMK:(2) 3-5-001: POR. OF 100
WAILUKU, MAUI, HAWAII

DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI
DWS JOB NO. 09-12

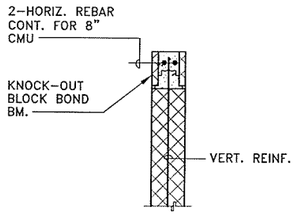
GENERAL NOTES

JOB NO.	
DESIGNED BY:	ATO
DRAWN BY:	RMA/LC
CHECKED BY:	ATO
DATE:	SEPT. 27, 2012

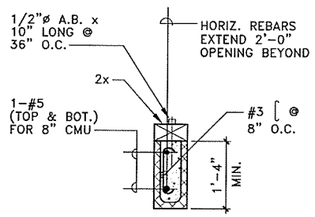
SHEET NUMBER
S - 1
15 OF 29 SHEETS



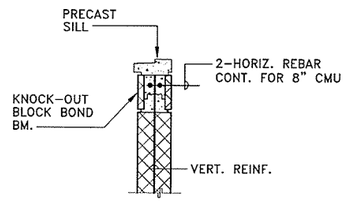
AT KNOCK-OUT BLOCK BOND BEAM



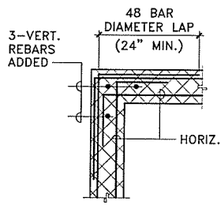
AT TOP OF WALL



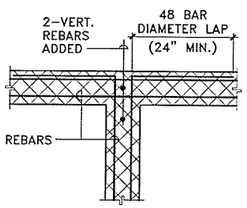
AT LINTEL BEAM



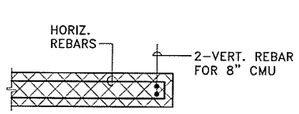
AT SILL



CONDITION AT CORNERS

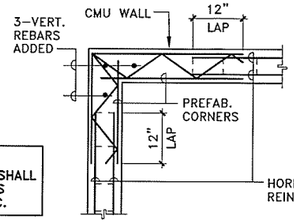


CONDITION AT INTERSECTIONS

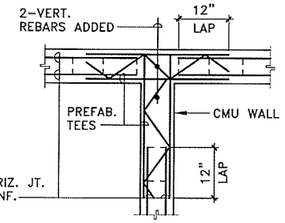


CONDITION AT DISCONTINUOUS ENDS

NOTE (FOR 8" CMU ONLY):
ALL HORIZ. BARS, UNLESS SHOWN, SHALL BE 2-#4. ALL VERT. BARS, UNLESS SHOWN, SHALL BE 1-#5 @ 16" O.C.



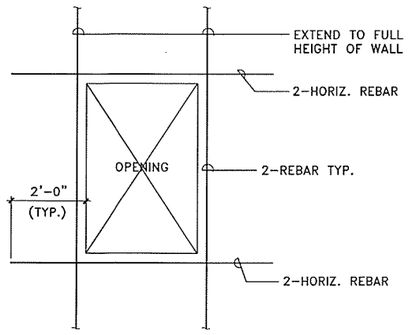
CONDITION AT CORNERS



CONDITION AT INTERSECTIONS

1/S-2 TYPICAL 8" CONCRETE MASONRY UNIT (CMU) DETAILS

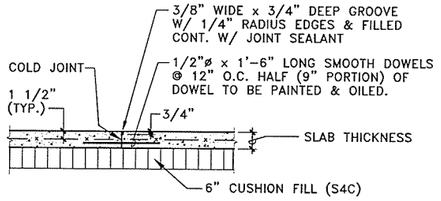
NOT TO SCALE



ELEVATION

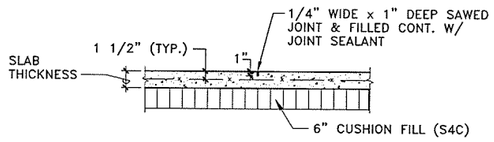
TYPICAL MIN. REINFORCING AT 8" CMU WALL OPENINGS

2/S-2 NOT TO SCALE



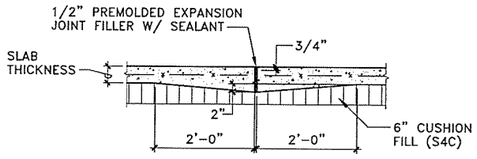
TYPICAL CONSTRUCTION JOINT DETAIL (C.J.)

3/S-2 SCALE: 3/4" = 1'-0"



TYPICAL SAWED JOINT DETAIL (S.J.)

4/S-2 SCALE: 3/4" = 1'-0"



TYPICAL EXPANSION JOINT DETAIL (E.J.)

5/S-2 SCALE: 3/4" = 1'-0"

TYYPICAL CORNER DETAIL AT CONCRETE BOND BEAM

6/S-2 NOT TO SCALE

TYYPICAL FOUNDATION DETAIL AT CORNERS

7/S-2 NOT TO SCALE

08/31/12

REV. NO.	DESCRIPTION	DATE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY PERSONAL OBSERVATION.
SIGNATURE
LICENSE EXPIRES: 04/30/14

TETSUJI OKUBO * U.S.A. * ARNOLD * HAWAII
LICENSED PROFESSIONAL ENGINEER No. 4173-S

Arnold T. Okubo & Associates, Inc.
CONSULTING ENGINEERS
OAHU, HAWAII

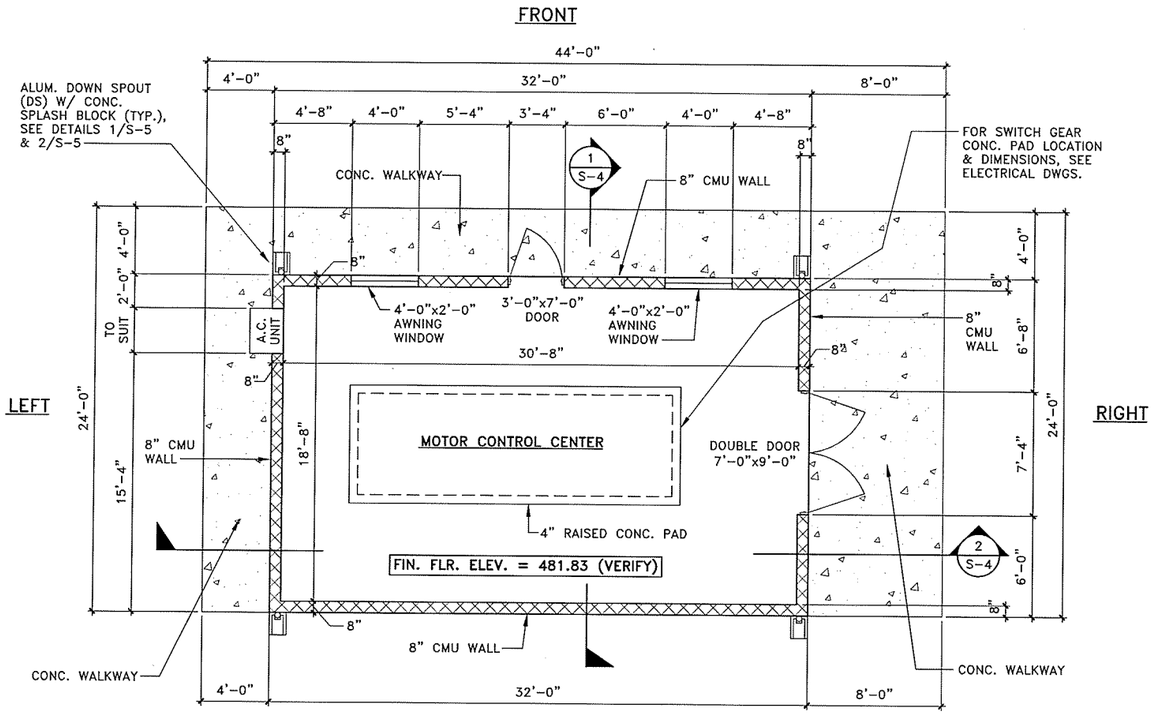
WAILUKU WELL DEVELOPMENT
TMK:(2) 3-5-001:: POR. OF 100
WAILUKU, MAUI, HAWAII

DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI
DWS JOB NO. 09-12

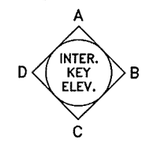
TYPICAL DETAILS

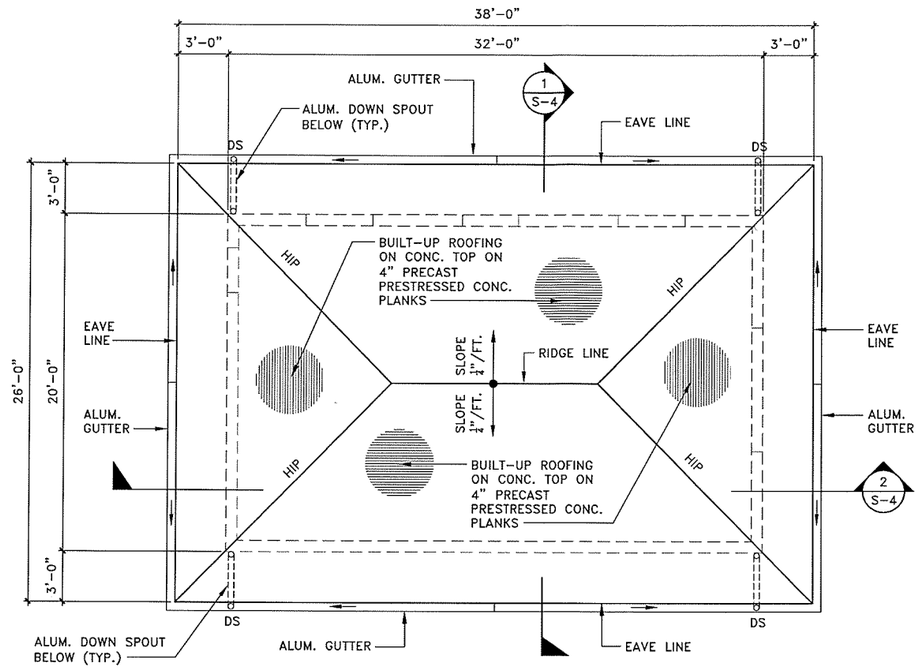
JOB NO.
DESIGNED BY: ATO
DRAWN BY: RMA/LC
CHECKED BY: ATO
DATE: SEPT. 27, 2012

SHEET NUMBER
S - 2
16 OF 29 SHEETS

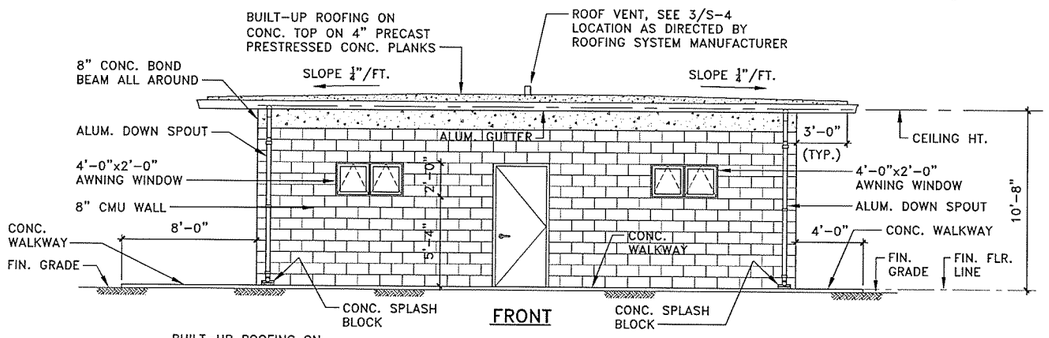


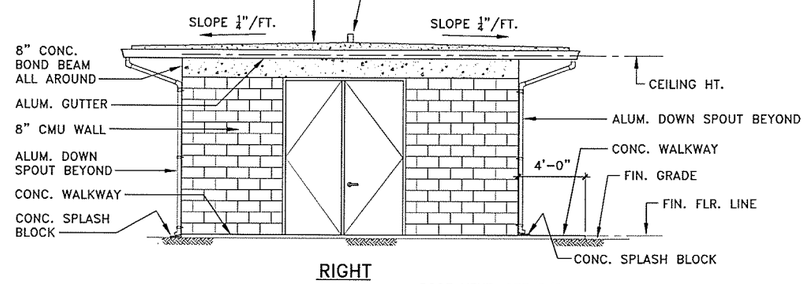
A S-3 BUILDING FLOOR PLAN
SCALE: 1/4" = 1'-0"

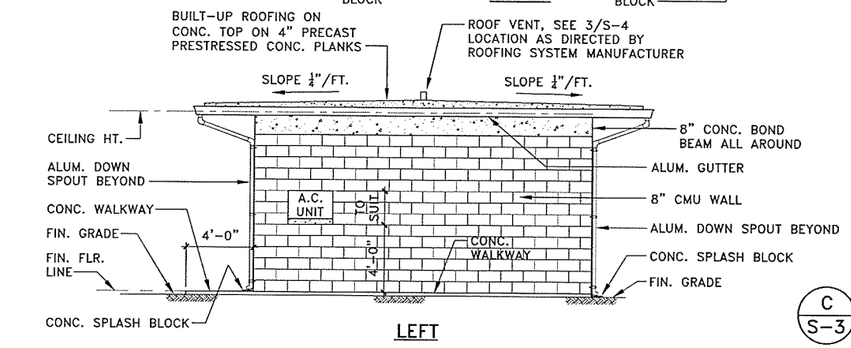


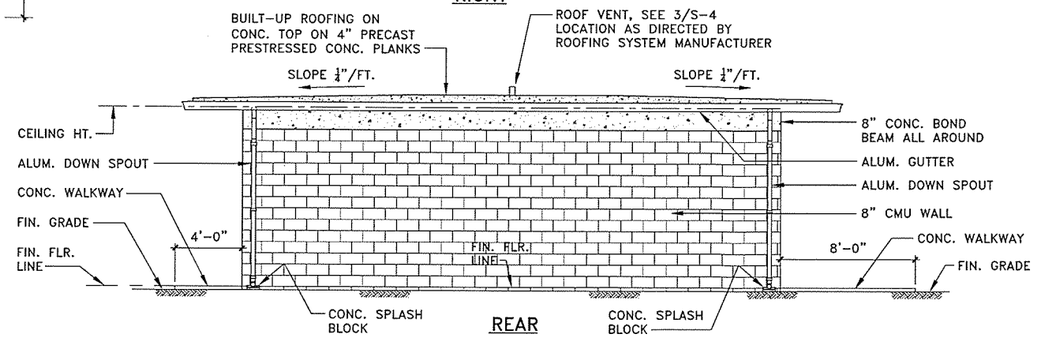


B S-3 BUILDING ROOF PLAN
SCALE: 1/4" = 1'-0"









C S-3 EXTERIOR ELEVATIONS
SCALE: 1/4" = 1'-0"

08/31/12

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Signature
LICENSE EXPIRES: 04/30/14
ARNOLD T. OKUBO * No. 4173-S * LICENSED PROFESSIONAL ENGINEER * U.S.A. * HAWAII

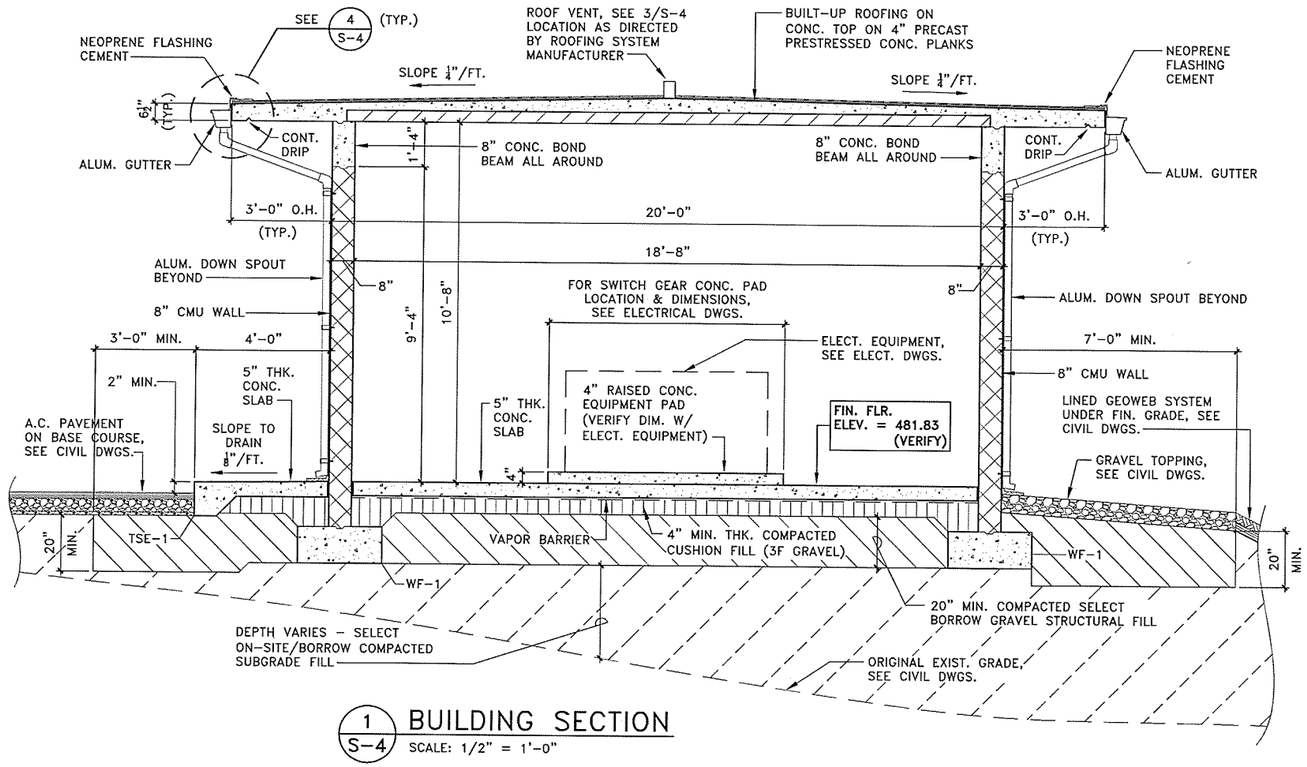
Arnold T. Okubo & Associates, Inc.
CONSULTING ENGINEERS
OAHU, HAWAII

WAILUKU WELL DEVELOPMENT
TMK:(2) 3-5-001: POR. OF 100
WAILUKU, MAUI, HAWAII
DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI
DWS JOB NO. 09-12
BUILDING FLOOR & ROOF PLANS, EXTERIOR ELEVATIONS

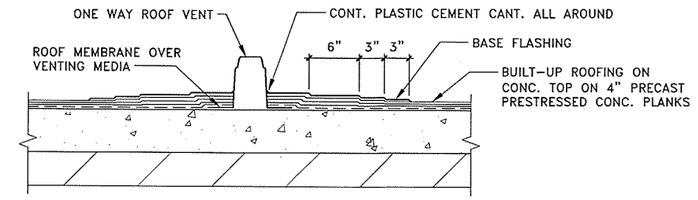
JOB NO.	
DESIGNED BY:	ATO
DRAWN BY:	RMA/LC
CHECKED BY:	ATO
DATE:	SEPT. 27, 2012

SHEET NUMBER
S - 3
17 OF 29 SHEETS

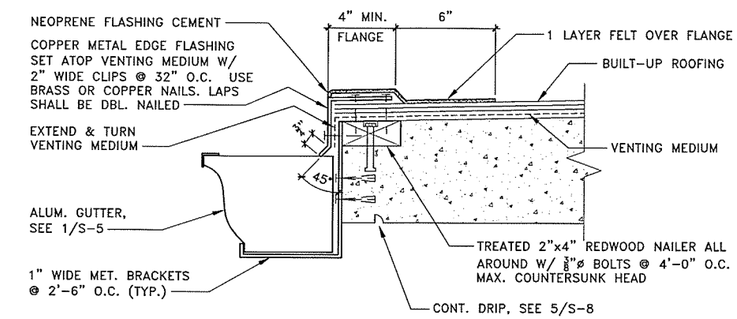
REV. NO.	DESCRIPTION	DATE



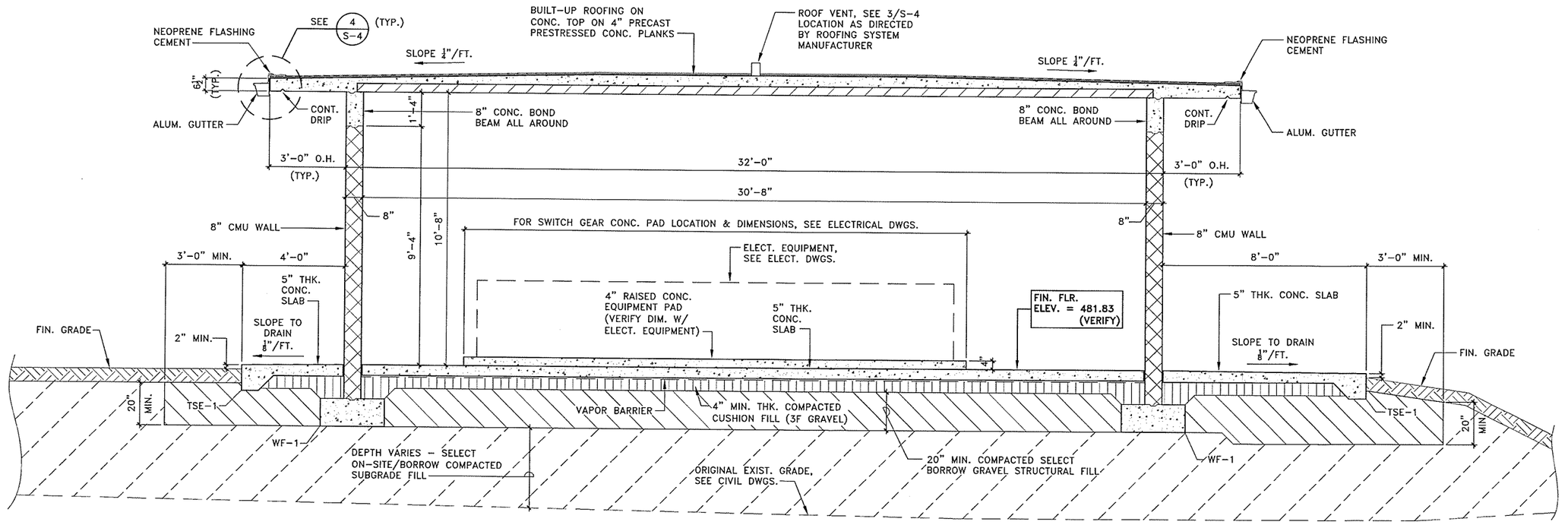
1/S-4 BUILDING SECTION
SCALE: 1/2" = 1'-0"



3/S-4 TYPICAL ROOF VENT DETAIL
NOT TO SCALE



4/S-4 ROOF EDGE DETAIL
SCALE: 3" = 1'-0"



2/S-4 BUILDING SECTION
SCALE: 1/2" = 1'-0"

08/31/12

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Arnold T. Okubo
SIGNATURE
LICENSE EXPIRES: 04/30/14
ARNOLD T. OKUBO * LICENSED PROFESSIONAL ENGINEER * No. 4173-S * U.S.A. * HAWAII *

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CONSULTING ENGINEERS
OAHU, HAWAII

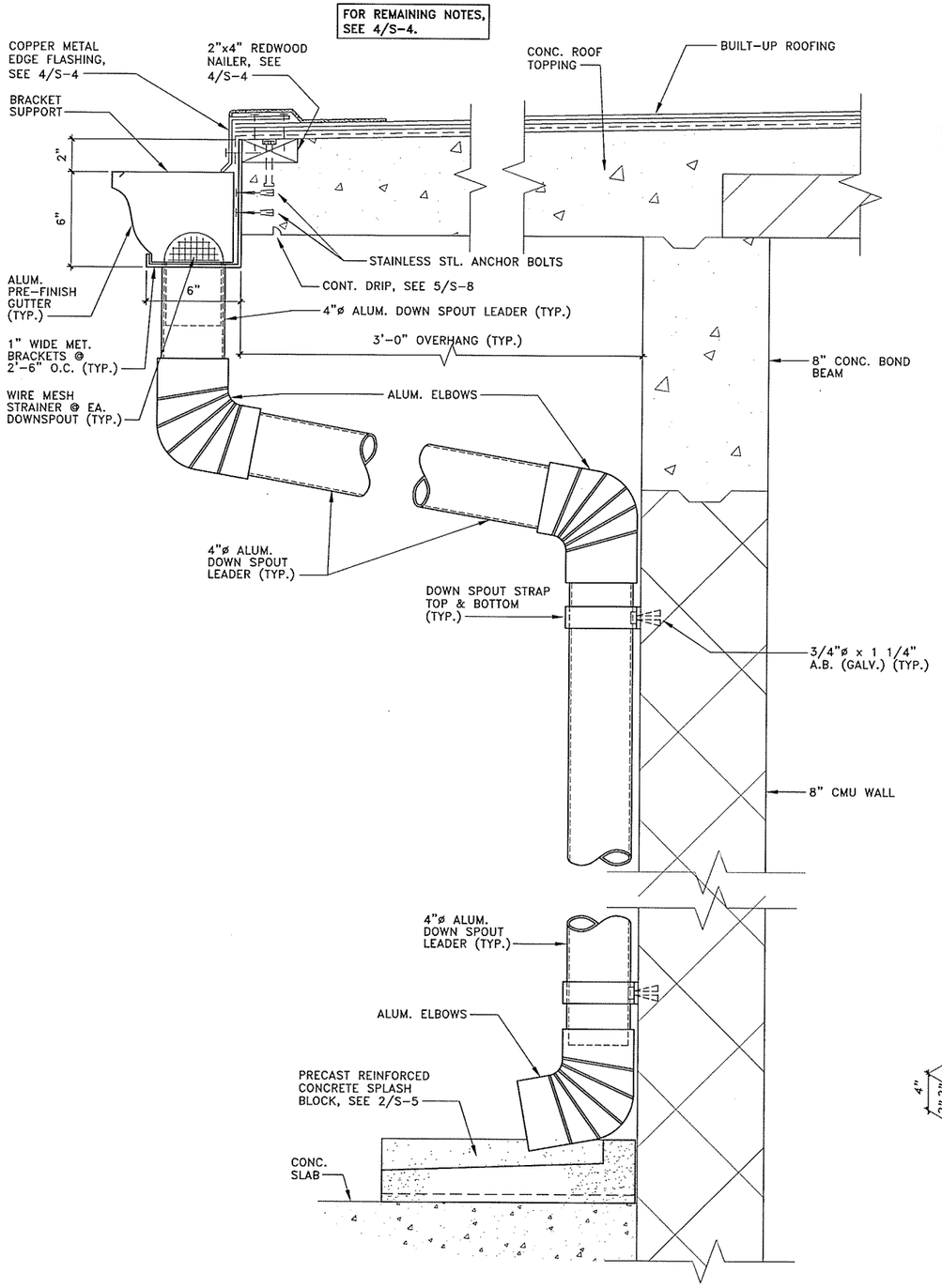
WAILUKU WELL DEVELOPMENT
TMK:(2) 3-5-001: POR. OF 100
WAILUKU, MAUI, HAWAII

DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI
DWS JOB NO. 09-12

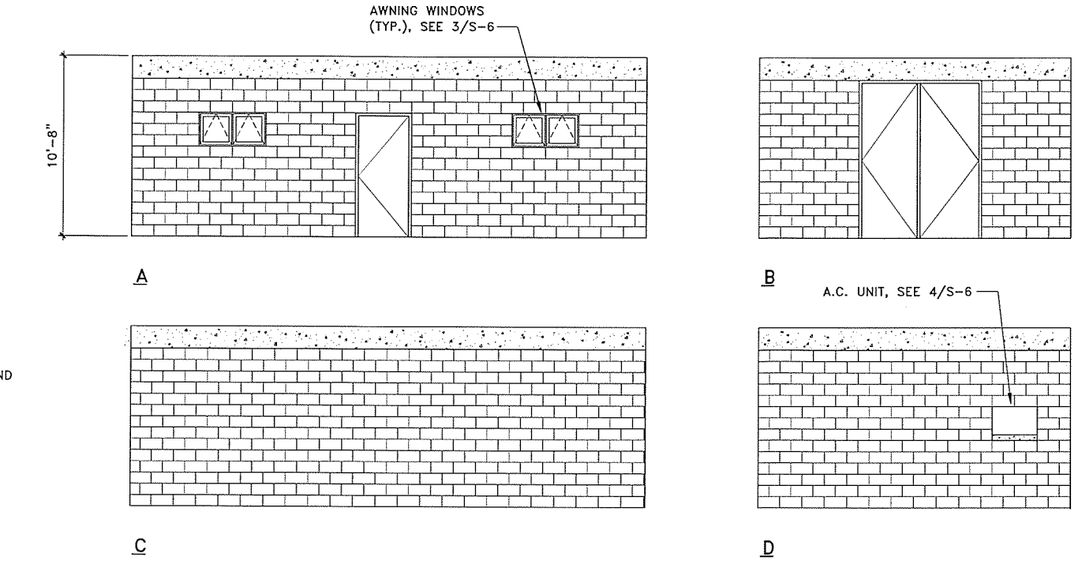
BUILDING SECTIONS & DETAILS

JOB NO.	
DESIGNED BY:	ATO
DRAWN BY:	RMA/LC
CHECKED BY:	ATO
DATE:	SEPT. 27, 2012

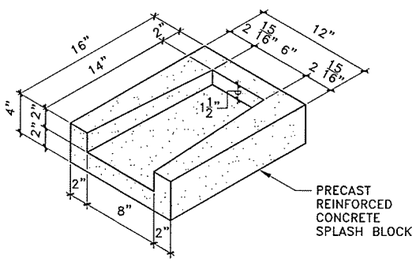
SHEET NUMBER
S - 4
18 OF 29 SHEETS



1/S-5 GUTTER DETAIL
SCALE: 3" = 1'-0"



A/S-5 INTERIOR ELEVATIONS
SCALE: 1/4" = 1'-0"



2/S-5 SPLASH BLOCK - ISOMETRIC VIEW
NOT TO SCALE

08/31/12

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SIGNATURE
LICENSE EXPIRES: 04/30/14
ARNOLD T. OKUBO * LICENSED PROFESSIONAL ENGINEER * No. 4173-S * U.S.A. * HAWAII *

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TMK:(2) 3-5-001: POR. OF 100
WAILUKU, MAUI, HAWAII

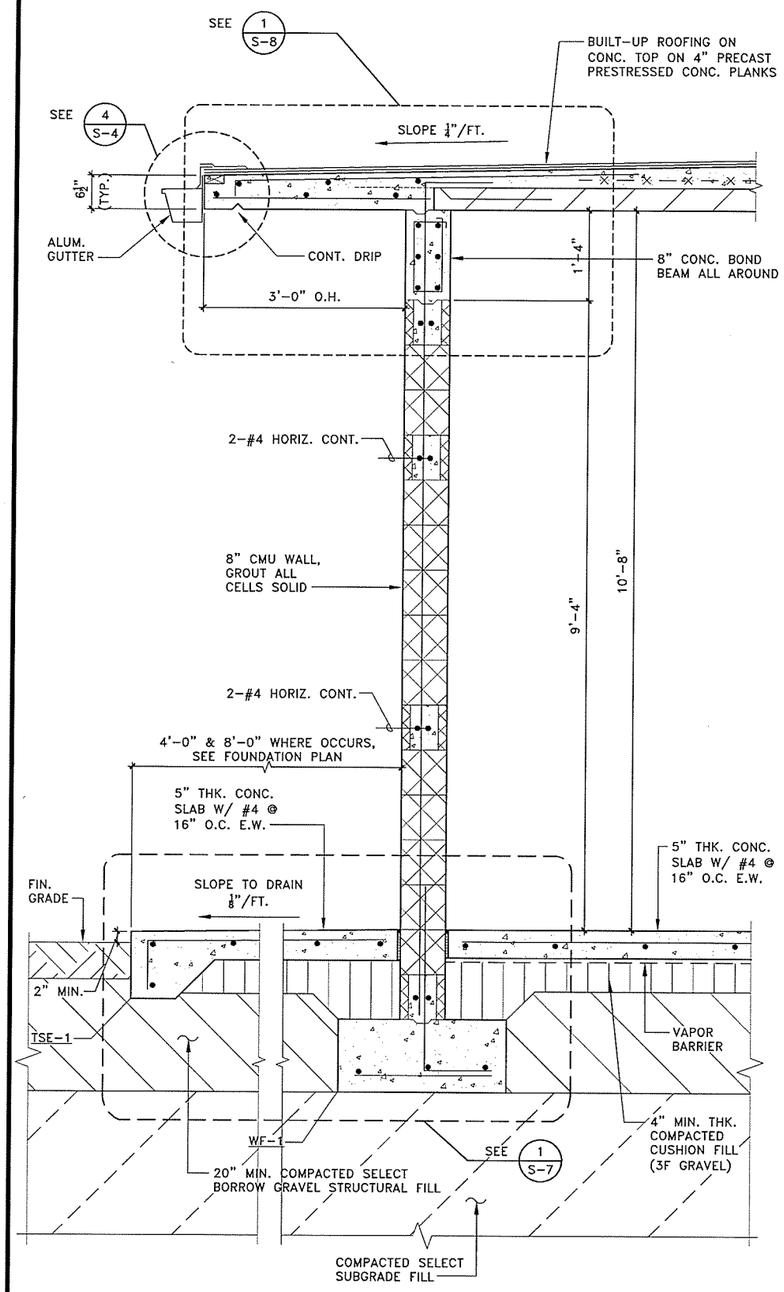
DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI
DWS JOB NO. 09-12

INTERIOR ELEVATIONS, GUTTER, & SPLASH BLOCK DETAILS

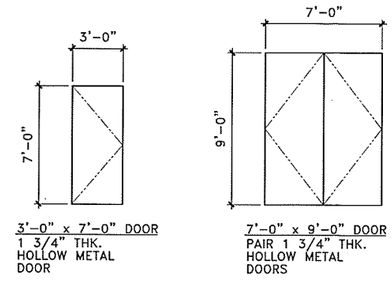
JOB NO.	
DESIGNED BY:	ATO
DRAWN BY:	RMA/LC
CHECKED BY:	ATO
DATE:	SEPT. 27, 2012

SHEET NUMBER
S - 5
19 OF 29 SHEETS

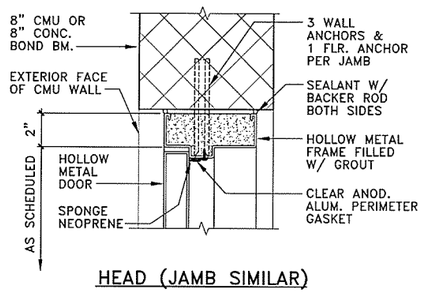
REV. NO.	DESCRIPTION	DATE



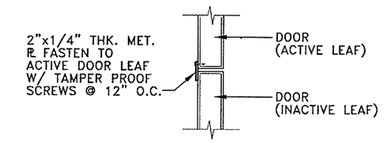
1/S-6 TYPICAL WALL SECTION
SCALE: 1" = 1'-0"



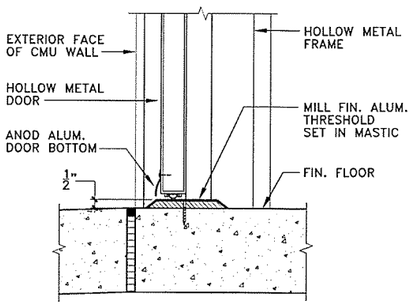
A/S-6 DOOR SCHEDULE
SCALE: 1/4" = 1'-0"



HEAD (JAMB SIMILAR)

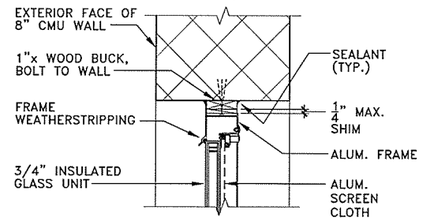


MEETING STILE

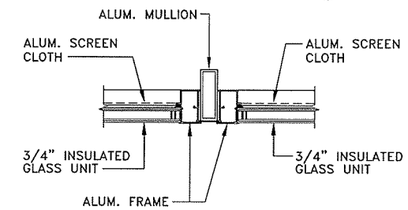


THRESHOLD

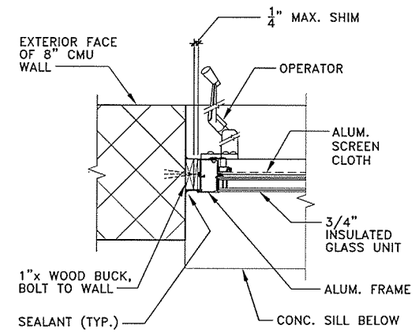
2/S-6 DOOR DETAILS
SCALE: 3" = 1'-0"



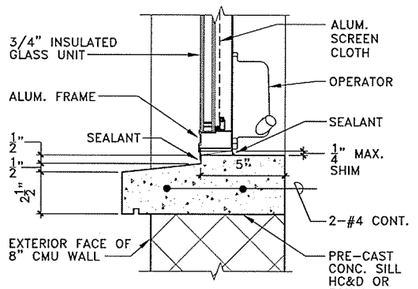
HEAD



MULLION

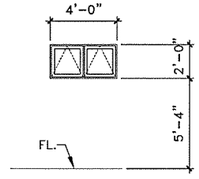


JAMB



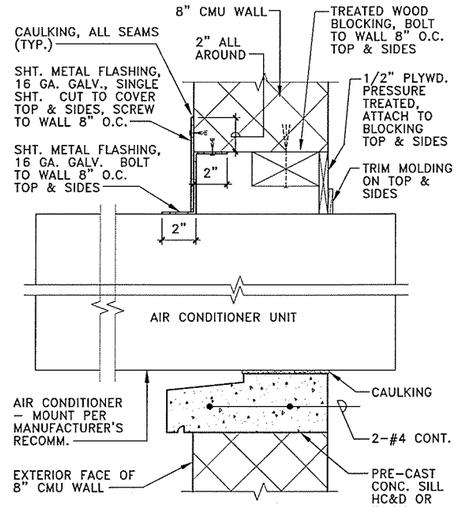
SILL

3/S-6 WINDOW DETAILS
SCALE: 3" = 1'-0"



4'-0" x 2'-0" WINDOW
ALUMINUM AWNING W/ ALUMINUM INSECT SCREEN

B/S-6 WINDOW SCHEDULE
SCALE: 1/4" = 1'-0"



4/S-6 AIR CONDITIONER DETAIL
SCALE: 3" = 1'-0"

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY PERIODIC OBSERVATION.
SIGNATURE: Arnold T. Okubo
LICENSE EXPIRES: 04/30/14
ARNOLD TETSUJI OKUBO * No. 4173-S * LICENSED PROFESSIONAL ENGINEER * U.S.A. HAWAII
Arnold T. Okubo & Associates, Inc.
CONSULTING ENGINEERS
OAHU, HAWAII

WAILUKU WELL DEVELOPMENT
TMK:(2) 3-5-001: POR. OF 100
WAILUKU, MAUI, HAWAII

DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI
DWS JOB NO. 09-12

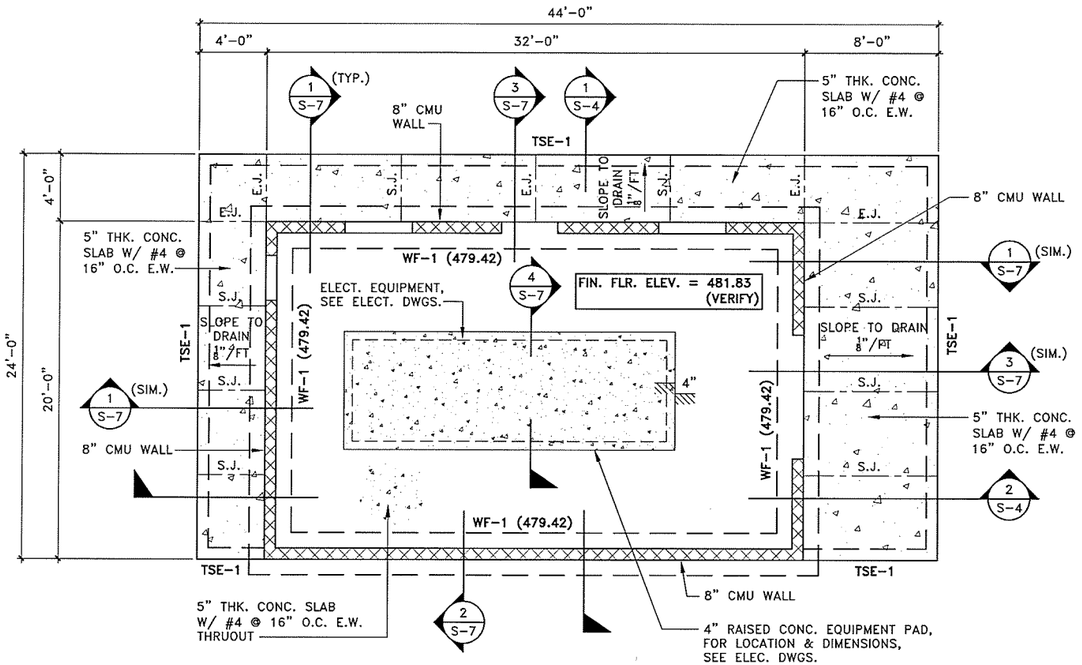
TYPICAL WALL SECTION, DOOR & WINDOW SCHEDULES & DETAILS

JOB NO.	
DESIGNED BY:	ATO
DRAWN BY:	RMA/LC
CHECKED BY:	ATO
DATE:	SEPT. 27, 2012

SHEET NUMBER
S-6
20 OF 29 SHEETS

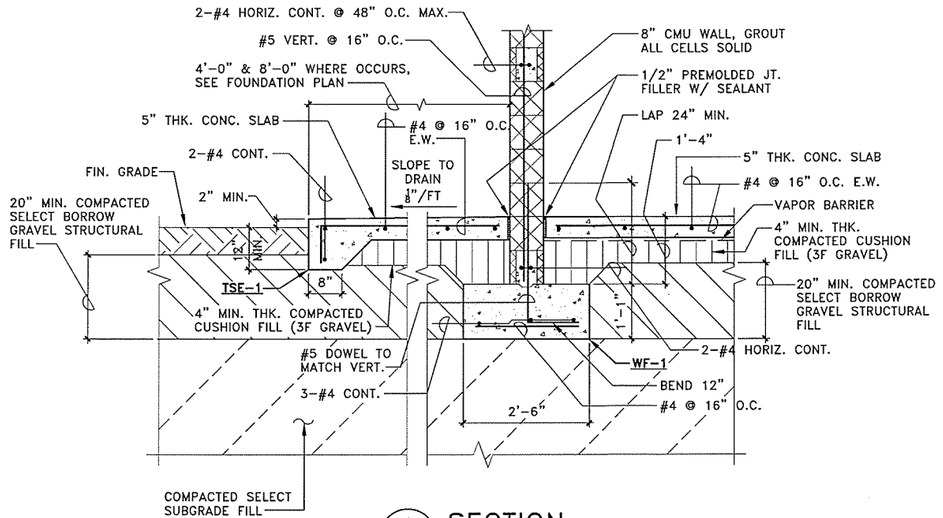
REV. NO.	DESCRIPTION	DATE

08/31/12

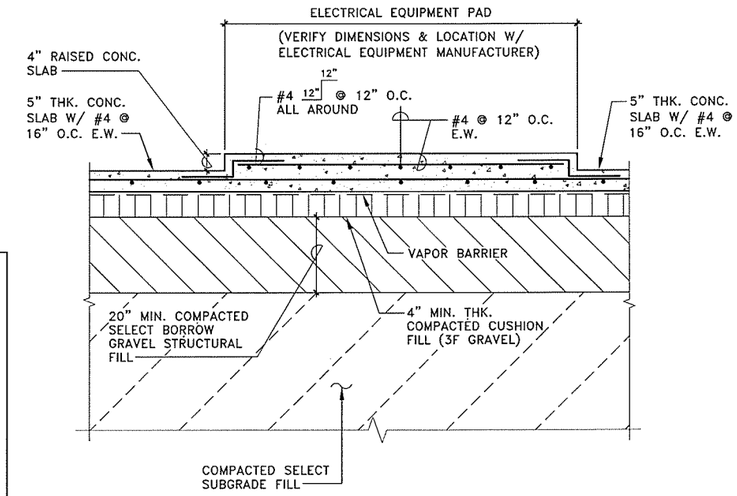


A S-7 BUILDING FOUNDATION PLAN
SCALE: 1/4" = 1'-0"

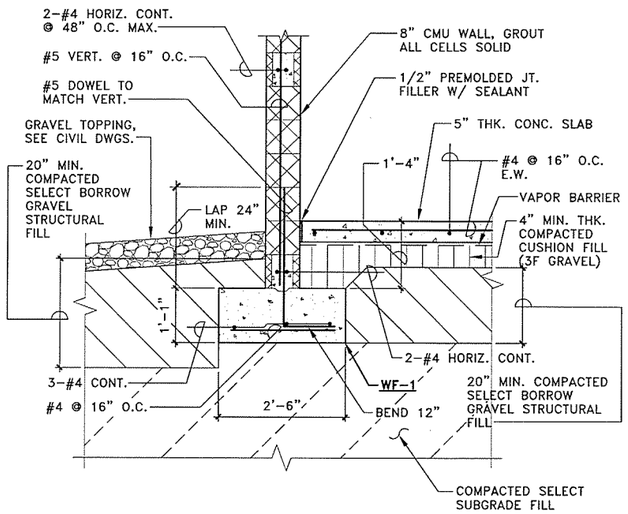
(479.42) DENOTES BOTTOM FOOTING ELEVATION (VERIFY)



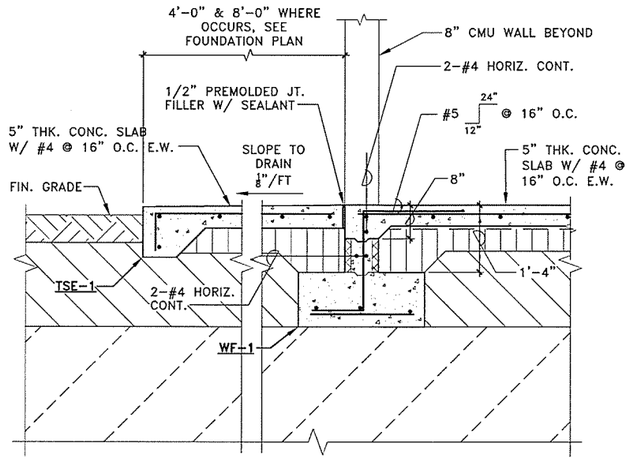
1 S-7 SECTION
SCALE: 3/4" = 1'-0"



4 S-7 TYPICAL RAISED CONCRETE SLAB DETAIL
SCALE: 3/4" = 1'-0"



2 S-7 SECTION
SCALE: 3/4" = 1'-0"



NOTE:
FOR REMAINING NOTES, SEE 1/S-7.

3 S-7 SECTION
SCALE: 3/4" = 1'-0"

08/31/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE OBSERVED BY ME OR MY DESIGNATED REPRESENTATIVE.
SIGNATURE: Arnold T. Okubo
LICENSE EXPIRES: 04/30/14
ARNOLD T. OKUBO * LICENSED PROFESSIONAL ENGINEER * No. 4173-S * HAWAII, U.S.A.

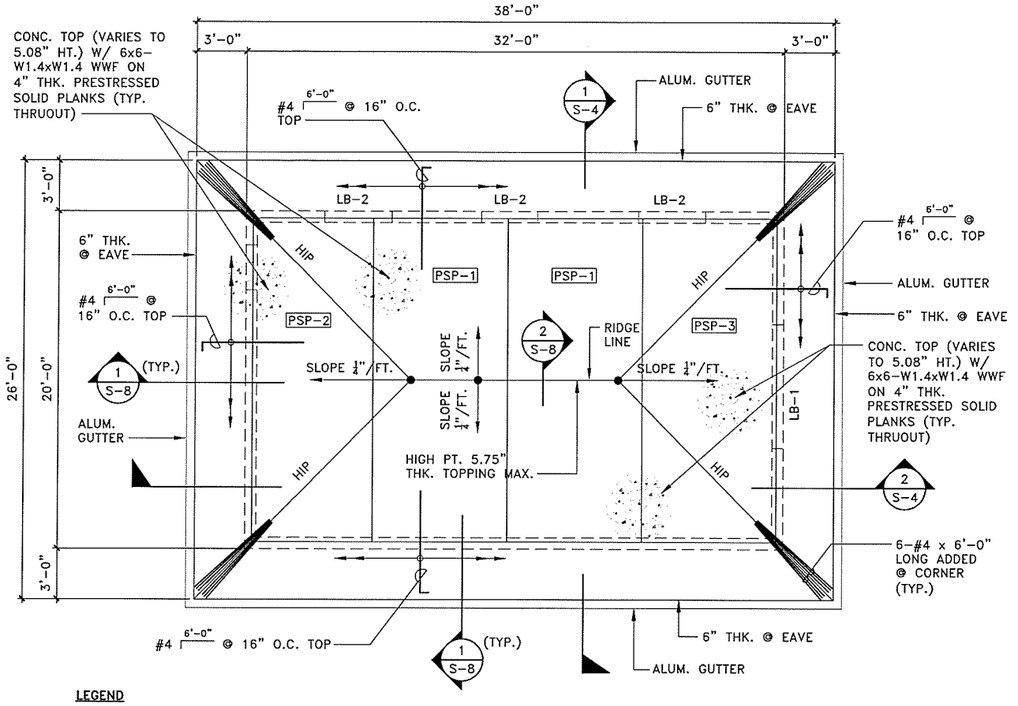
Arnold T. Okubo & Associates, Inc.
CONSULTING ENGINEERS
OAHU, HAWAII

WAILUKU WELL DEVELOPMENT
TMK:(2) 3-5-001: POR. OF 100
WAILUKU, MAUI, HAWAII
DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI
DWS JOB NO. 09-12
BUILDING FOUNDATION PLAN & SECTIONS

JOB NO.
DESIGNED BY: ATO
DRAWN BY: RMA/LC
CHECKED BY: ATO
DATE: SEPT. 27, 2012

SHEET NUMBER
S - 7
21 OF 29 SHEETS

REV. NO.	DESCRIPTION	DATE

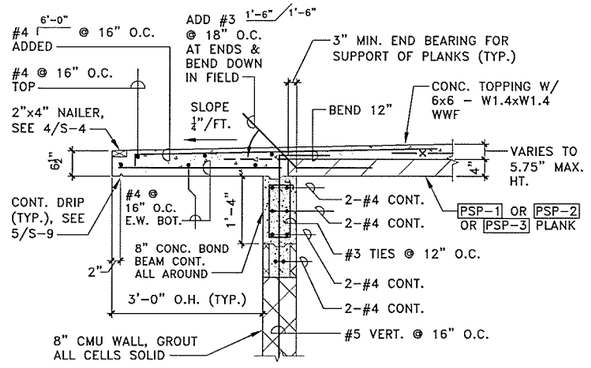


LEGEND

PSP-1 DENOTES 4" THK. PRECAST PRESTRESSED SOLID PLANK

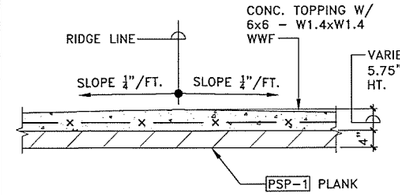
A S-9 BUILDING ROOF FRAMING PLAN (CONCRETE TOPPING OVER PRESTRESSED SOLID PLANK)

SCALE: 1/4" = 1'-0"



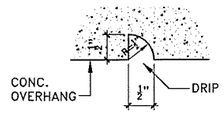
1 S-8 SECTION

SCALE: 3/4" = 1'-0"



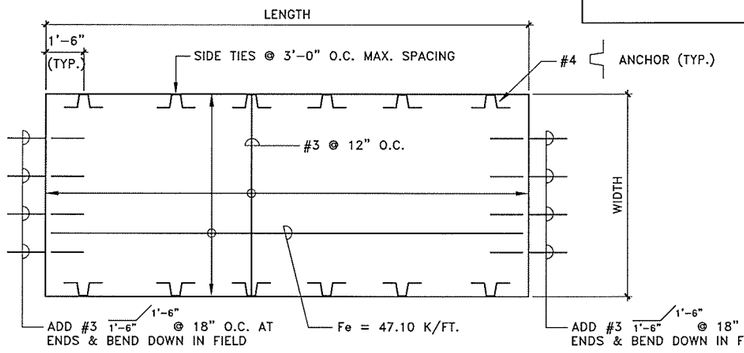
2 S-8 SECTION

SCALE: 3/4" = 1'-0"



5 S-8 DRIP DETAIL

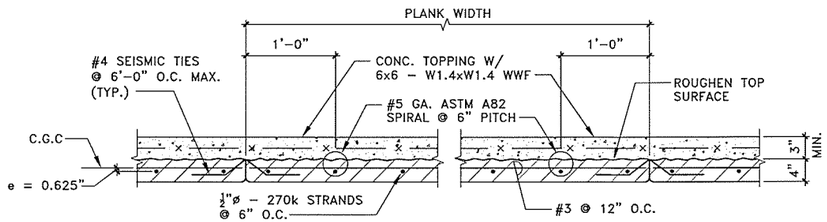
NOT TO SCALE



NOTE: OMIT SIDE TIE CONNECTORS FOR PLANKS AT OUTER EDGES.

A PLANK PLAN (PSP-1, PSP-2 & PSP-3)

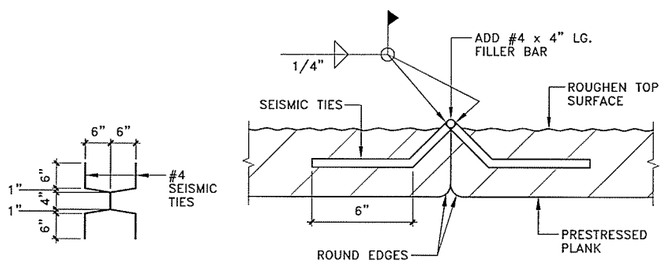
NOT TO SCALE



Fe DENOTES EFFECTIVE PRESTRESSING FORCE (KIPS/FT.)

B PLANK SECTION

NOT TO SCALE



A SEISMIC TIES

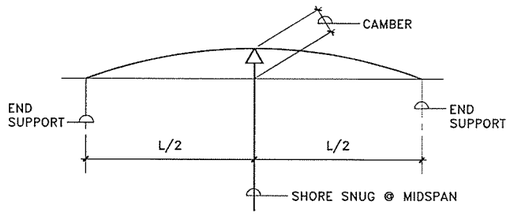
SCALE: 3/4" = 1'-0"

B SECTION

SCALE: 3" = 1'-0"

3 S-8 TYPICAL SEISMIC TIES DETAILS

SCALE AS SHOWN



C PLANK SHORING DETAIL

NOT TO SCALE

SHORING PROCEDURES

1. PLACE PLANK/SLAB ON 2 END SUPPORTS.
2. SHORE SNUG AT MIDSPAN.
3. CAST CONCRETE TOPPING.

4 S-8 PRESTRESSED SOLID PLANK DETAILS (PSP-1, PSP-2, & PSP-3)

NOT TO SCALE

REV. NO.	DESCRIPTION	DATE

08/31/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY PERIODIC OBSERVATION.

Arnold T. Okubo

SIGNATURE

LICENSE EXPIRES: 04/30/14

ARNOLD T. OKUBO * No. 4173-S * LICENSED PROFESSIONAL ENGINEER * STATE OF HAWAII

Arnold T. Okubo & Associates, Inc.
CONSULTING ENGINEERS
OAHU, HAWAII

WAILUKU WELL DEVELOPMENT
TMK:(2) 3-5-001: POR. OF 100
WAILUKU, MAUI, HAWAII

DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI
DWS JOB NO. 09-12

BUILDING ROOF FRAMING PLAN & SECTIONS, PRESTRESSED SOLID PLANK DETAILS

JOB NO.	
DESIGNED BY:	ATO
DRAWN BY:	RMA/LC
CHECKED BY:	ATO
DATE:	SEPT. 27, 2012

SHEET NUMBER

S - 8

22 OF 29 SHEETS

GENERAL NOTES:

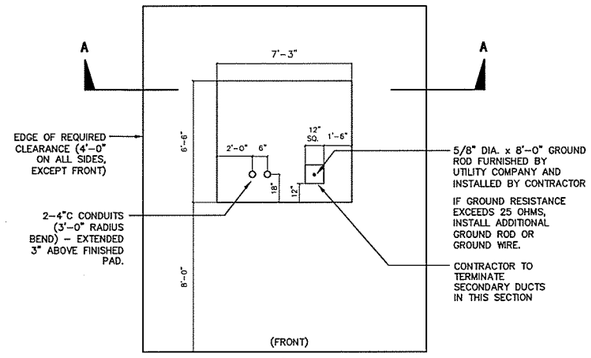
1. PROVIDE A COMPLETE AND OPERATING ELECTRICAL SYSTEM. PROVIDE SHALL MEAN "FURNISH AND INSTALL". WORK INCLUDES INSTALLATION OF ALL ELECTRICAL EQUIPMENT AND SYSTEMS, INCLUDING ANY FURNISHED BY OWNER, COMPLETE AND OPERATIONAL TO DOCUMENTS.
2. THE CONTRACTOR SHALL COMPLY WITH THE CONSTRUCTION PRACTICES AND REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE (NFPA 70), NATIONAL ELECTRICAL SAFETY CODE, AMERICAN ELECTRICIANS HANDBOOK BY CROFT EDISON ELECTRIC INSTITUTE, APPLICABLE INSTRUCTIONS OF MANUFACTURERS OF EQUIPMENT AND MATERIALS SUPPLIED FOR THE PROJECT, AND ALL ORDINANCES, RULES AND POLICIES OF THE STATE AND COUNTY IN WHICH THE WORK IS TO BE PERFORMED.
3. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL FEES, PERMITS, LICENSES AND INSPECTIONS REQUIRED FOR THIS WORK.
4. ALL CONDUIT SHALL BE MINIMUM SIZE 3/4 INCH. EMT SHALL BE USED INDOORS. GALVANIZED RIGID STEEL SHALL BE USED IN EXPOSED OUTDOOR LOCATIONS. CONDUIT BELOW GRADE SHALL BE SCHEDULE 40 PVC. TRANSFORM ALL PVC CONDUIT TO RIGID GALVANIZED STEEL BEFORE PENETRATING SLAB.
5. FITTINGS FOR EMT CONDUIT SHALL BE COMPRESSION TYPE. SET SCREW FITTINGS SHALL NOT BE ALLOWED.
6. CONDUITS SIZES CALLED OUT ON THE DRAWINGS ARE NOT NECESSARILY BASED ON THE MINIMUM SIZE ALLOWED BY THE NATIONAL ELECTRICAL CODE AND MAY BE PURPOSELY OVERSIZED FOR FUTURE CONDUCTORS OR TO AVOID EXCESS CONDUIT HEATING. CONDUIT SIZES NOT CALLED OUT ON THE DRAWINGS SHALL BE SIZED BY THE CONTRACTOR BASED ON THE ACTUAL NUMBER OF CONDUCTORS TO BE INSTALLED, USING THE NATIONAL ELECTRICAL CODE AS A GUIDE. IN NO CASE SHALL CONDUIT SIZES BE SMALLER THAN IS REQUIRED BY THE NATIONAL ELECTRICAL CODE.
7. ALL CIRCUITS SHALL INCLUDE AN INSULATED GREEN GROUNDING CONDUCTOR, SIZED PER TABLE 250-122 OF THE NATIONAL ELECTRICAL CODE. THIS CONDUCTOR SHALL BE CARRIED IN ALL RACEWAYS INCLUDING THOSE INSTALLED FOR SWITCH LEGS AND SHALL BE ATTACHED TO THE DEVICE OR EQUIPMENT HOUSING USING A SUITABLE GROUNDING LUG.
8. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL JUNCTION AND PULL BOXES REQUIRED FOR THE INSTALLATION OF ELECTRICAL DEVICES AND EQUIPMENT, WHETHER OR NOT SPECIFICALLY INDICATED ON THE PLANS. SIZING OF THESE BOXES SHALL BE PER THE NATIONAL ELECTRICAL CODE.
9. THE CONTRACTOR SHALL FURNISH ALL EQUIPMENT FOR TEMPORARY CONSTRUCTION POWER AS REQUIRED.
10. SHOULD PROJECT CONDITIONS REQUIRE REARRANGEMENT OF WORK, THE CONTRACTOR SHALL MARK SUCH CHANGES ON THE FIELD POSTED DRAWINGS. IF THESE CHANGES REQUIRE ALTERNATE METHODS TO THOSE SPECIFIED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL SUBMIT DRAWINGS SHOWING THE PROPOSED ALTERNATE METHODS TO THE CONTRACTING OFFICER. THE CONTRACTOR SHALL NOT PROCEED UNTIL APPROVAL IS OBTAINED. REARRANGEMENT OF WORK FOR THE PURPOSE OF COORDINATION SHALL NOT BE CONSIDERED AN ITEM FOR EXTRA COST.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND DETAILED SCHEDULING OF THE SITE INSPECTION WORK BY UTILITY COMPANIES AND ALL OTHER CONCERNED PARTIES AND AGENCIES.
12. PROVIDE PROTECTION FOR MATERIAL AND EQUIPMENT FROM LOSS, DAMAGE, CORROSION AND EFFECTS OF MOISTURE. REPAIR OR REPLACE DAMAGED ITEMS AT NO ADDITIONAL COST TO THE OWNER.
13. VISIT PROJECT SITE PRIOR TO BID SUBMITTAL TO ASCERTAIN CONDITIONS AND COST ALLOWANCES THAT AFFECT THE PROPOSED WORK.
14. INSTALL MATERIALS AND EQUIPMENT IN WORKMANLIKE MANNER AND IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, UNLESS OTHERWISE SPECIFIED OR DIRECTED BY THE ENGINEER.
15. MATERIALS AND WORKMANSHIP SUBJECT TO INSPECTION AT ANY TIME BY THE OWNER OR HIS REPRESENTATIVE; CORRECT ANY WORK OR MATERIALS NOT IN ACCORDANCE WITH DRAWINGS OR FOUND TO BE DEFICIENT OR DEFECTIVE IN A MANNER SATISFACTORY TO THE OWNER AT NO ADDITIONAL COST.
16. PROVIDE ALL FIRST QUALITY, NEW MATERIALS, FREE FROM DEFECTS SUITABLE FOR SPACE PROVIDED AND APPROVED BY UL WHERE STANDARDS HAVE BEEN PROVIDED BY THAT AGENCY.
17. PROVIDE STANDARD MATERIALS AND EQUIPMENT OF MANUFACTURER'S REGULARLY ENGAGED IN THE PRODUCTION OF THESE PRODUCTS. PROVIDE PRODUCTS OF A SINGLE MANUFACTURER WHERE TWO OR MORE UNITS OF THE SAME CALL ARE REQUIRED.
18. ALL WIRING TO BE STRANDED TYPE THWN COPPER UNLESS NOTED OTHERWISE, #12 AWG MINIMUM. ALL WIRING SHALL BE IN CONDUIT, 3/4" MINIMUM. THHN IS ALLOWABLE FOR #10 AND SMALLER.

DUCTLINE NOTES

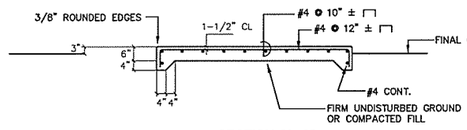
1. REFER TO ELECTRICAL PLAN FOR DUCT SIZES AND QUANTITIES.
2. DIRECT BURIED AND CONCRETE ENCASED ELECTRICAL CONDUITS SHALL BE PVC SCHEDULE 40 CONDUITS.
3. DIRECT BURIED CONDUITS OF LIKE USE SHALL BE SEPARATED BY A MINIMUM OF 3". A MINIMUM SEPARATION OF 12" MUST BE MAINTAINED BETWEEN ELECTRICAL CONDUITS AND TELEMETRY CONDUITS.

   CONCRETE ENCASED CONDUITS OF LIKE USE MAY BE SEPARATED BY 1-1/2". CONDUITS OF UNLIKE USES MUST BE SEPARATED BY 3".
4. CONTRACTOR SHALL COORDINATE DUCTLINE AND TRENCHING DETAILS WITH UTILITY COMPANIES.
5. UPON COMPLETION OF ALL DUCTLINES, THE CONTRACTOR SHALL PASS A BULLET SHAPED, WOODEN TEST MANDREL 1/2" SMALLER IN DIAMETER THAN THE CONDUITS, THROUGH THE ENTIRE LENGTH OF EACH DUCT SECTION TO TEST FOR FREEDOM OF BURRS AND OBSTRUCTIONS. THE CONTRACTOR SHALL REMOVE ALL BURRS, OBSTRUCTION AND FOREIGN MATTER TO THE SATISFACTION OF THE UTILITY COMPANIES' INSPECTORS.

   UPON COMPLETION OF THE TELEMETRY DUCTLINE, THE CONTRACTOR SHALL PASS A BLOCKED SHAPED, WOODEN TEST MANDREL, 12" LONG AND 1/4" SMALLER IN DIAMETER THAN THE CONDUIT THROUGH THE ENTIRE LENGTH OF EACH DUCT SECTION. THE DUCTS SHALL BE SWABBED AND CLEARED OF ALL BURRS, OBSTRUCTIONS AND FOREIGN MATERIAL.
6. THE UTILITY COMPANIES' INSPECTORS SHALL INSPECT THE UNDERGROUND DUCTLINES AND STRUCTURES PRIOR TO AND DURING ALL CONCRETE POUR AND BACKFILL OPERATIONS.
7. ALL HORIZONTAL AND VERTICAL BENDS SHALL HAVE A MINIMUM RADIUS OF 20'-0".
8. CONCRETE COMPRESS STRENGTH SHALL BE 3,000 PSI IN 28 DAYS.
9. THE CONTRACTOR SHALL INSTALL A WARNING TAPE OVER DUCTLINE AS SHOWN THE TAPE SHALL BE 4" WIDE AND 8 MILS THICK, YELLOW IN COLOR WITH BLACK IMPRINTED WARNING MESSAGE.



PLAN VIEW

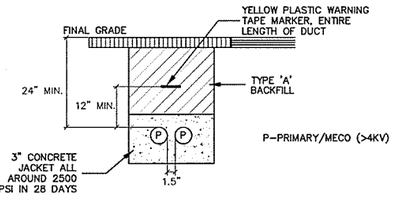


SECTION "A-A"

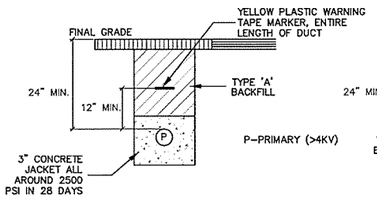
THREE PHASE TRANSFORMER PAD
NOT TO SCALE

CONTRACTOR NOTES:

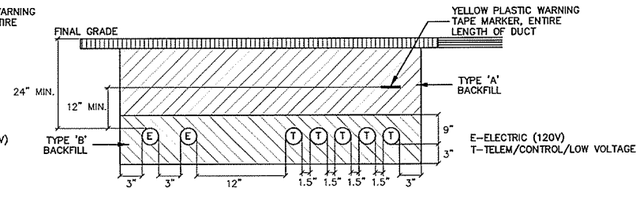
1. THE CONTRACTOR IS TO FURNISH MATERIALS AND CONSTRUCT THE FACILITIES FOR THE PADMOUNT TRANSFORMER INCLUDING THE CONCRETE PAD. PRIMARY AND SECONDARY DUCTS AND ANCHOR BOLTS. CONCRETE CURB AND ROCK FILL AROUND THE PAD, WHEN REQUIRED, SHALL ALSO BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
2. MECO SHALL HAVE 24-HOUR ACCESS TO THE TRANSFORMER WITHOUT GOING THROUGH LOCKED AREAS.
3. MECO SHALL HAVE A MINIMUM OF 10 FEET WIDE VEHICULAR ACCESS TO THE TRANSFORMER INSTALLATION.
4. BENDS DUE TO CHANGES OF GRADE ARE TO HAVE MINIMUM RADIUS OF 20 FEET. THE DUCT IS TO BE PVC SCHEDULE 40 PIPE. THE CONTRACTOR IS TO INSTALL DUCT FROM THE PAD TO THE RISER POLE OR HANDHOLE AS DESIGNATED ON THE PLAN.
5. ONE COPPER WELD GROUND ROD 5/8 INCH DIAM. X 8 FEET LONG IS TO BE PROVIDED AND INSTALLED BY THE CONTRACTOR. THE ROD IS TO EXTEND 6 INCHES ABOVE THE FINISHED PAD. TIE THE ROD TO A WATER PIPE WITH #1/0 COPPER WIRE. THIS TIE MAY BE ELIMINATED WHERE THE WATER PIPE IS MORE THAN 25 FEET AWAY.
6. NO PERMANENT OR TEMPORARY STRUCTURE OR OBJECT SHALL BE ERECTED OR PLACED WITHIN FOUR FEET OF THE EDGE OF THE CONCRETE TRANSFORMER PAD AND 8 FEET IN FRONT, UNLESS APPROVED BY MECO.
7. WHEN THE CONCRETE PAD IS LOCATED IN THE VICINITY OF EXISTING OR FUTURE COMBUSTIBLE MATERIAL, COMBUSTIBLE BUILDINGS, THE CONTRACTOR SHALL PROVIDE SAFEGUARDS A OUTLINED IN THE NEC LATEST REVISION SUBJECT TO THE APPROVAL OF THE CITY & COUNTY BUILDING INSPECTORS.
8. THE FRONT SIDE OF THE CONCRETE PAD SHALL ALWAYS BE LOCATED TO FACE THE VEHICULAR ACCESS AND SHALL BE FREE OF ANY OBSTRUCTIONS AT ALL TIMES.
9. WHEN PARTS OF BUILDING STRUCTURES ARE LOCATED DIRECTLY OVER THE CONCRETE PAD, A MINIMUM CLEARANCE OF 9 FEET FROM THE PAD GRADE IS REQUIRED. THE CUSTOMER SHALL PROVIDE ADEQUATE SAFEGUARDS AS OUTLINED IN THE NEC, LATEST REVISION, AND IS SUBJECT TO APPROVAL OF THE CITY & COUNTY BUILDING INSPECTORS.
10. ALL DUCTLINES SHALL CONTAIN A "MULE TAPE" PULL LINE (WESCO CAT. #072592000 OR EQUIVALENT).
11. AFTER THE CONDUITS ARE INSTALLED, THE CONTRACTOR SHALL PASS A SMOOTH BULLET-SHAPED WOODEN TEST MANDREL THROUGH THE ENTIRE LENGTH OF EACH CONDUIT TO TEST FRO FREEDOM OF BURRS AND OBSTRUCTIONS.
12. A UTILITY STAND-BY MAN IS REQUIRED TO BE AT THE SITE AT THE TIME ANY NON-UTILITY CO. PERSONNEL WILL BE BREAKING INTO OR ENTERING ANY FACILITIES THAT CONTAIN ENERGIZED UTILITY EQUIPMENT OR CABLES. CALL MECO - PHONE 871-777.



DUCT SECTION A
NOT TO SCALE



DUCT SECTION B
NOT TO SCALE



DUCT SECTION C
NOT TO SCALE

COUNTY OF MAUI
MAUI COUNTY CODE, CHAPTER 16.16A ENERGY CODE

TO THE BEST OF MY KNOWLEDGE, THIS PROJECT'S DESIGN SUBSTANTIALLY CONFORMS TO THE ENERGY CODE FOR:

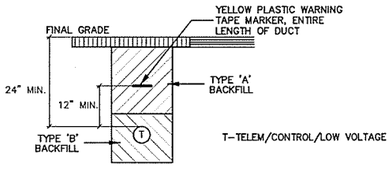
_____ BUILDING COMPONENT SYSTEMS
X ELECTRICAL COMPONENT SYSTEMS
_____ MECHANICAL COMPONENT SYSTEMS

SIGNATURE: [signature] DATE: 9-7-12
NAME: JERAL M FUKUDA
TITLE: PROJECT ENGINEER
LICENSE NO.: 10378-E

MAUI COUNTY CODE CHAPTER 20.35
OUTDOOR LIGHTING

THE ELECTRICAL OUTDOOR LIGHTING SYSTEM AND EQUIPMENT HAVE BEEN REVIEWED BY ME AN TO THE BEST OF MY KNOWLEDGE, THIS DESIGN SUBSTANTIALLY CONFORMS TO THE REQUIREMENTS SPECIFIED IN MAUI COUNTY CODE CHAPTER 20.35 OUTDOOR LIGHTING.

[signature] — SIGNATURE
PROJECT ENGINEER — TITLE
JERAL M FUKUDA — NAME (PRINT)
10378-E — STATE OF HAWAII P.E. LICENSE NUMBER



DUCT SECTION D
NOT TO SCALE

DUCTLINE NOTES:

1. REFER TO ELECTRICAL PLAN FOR DUCT SIZES AND QUANTITIES.
2. CONCRETE ENCASED CONDUITS SHALL BE PVC TYPE 'EB' OR SCH. 40 PVC. ABS TYPE 'DB' PIPES ARE ALSO ACCEPTABLE.
3. DIRECT BURIED CONDUITS SHALL BE PVC SCH. 40 PIPES.
4. CONCRETE ENCASED CONDUITS OF LIKE USE MAYBE SEPARATED BY 1-1/2". CONDUITS OF UNLIKE USES MAYBE SEPARATED BY 3". A MINIMUM 3" SEPARATION MUST BE MAINTAINED BETWEEN ELECTRICAL DUCTS AND TV/TEL DUCTS.
5. DIRECT BURIED CONDUITS OF LIKE USE SHALL BE SEPARATED BY A MINIMUM OF 3". A MINIMUM SEPARATION OF 12" MUST BE MAINTAINED BETWEEN DIRECT BURIED ELECTRICAL CONDUITS AND TEL./TV CONDUITS.
6. CONCRETE COMPREHENSIVE STRENGTH SHALL BE 2,500 PSI IN 28 DAYS.
7. DUCTLINE TRENCHES MAY BE BACKFILLED 24 HOURS AFTER CONCRETE IS POURED.
8. CONTRACTOR SHALL COORDINATE DUCTLINE AND TRENCHING DETAILS WITH UTILITY COMPANIES PROJECT PLAN.
9. REFERENCE SPECIFICATION: MECO SPEC. CS7001 WITH LATEST REVISION.

TYPE "A" - BEACH SAND, EARTH, OR EARTH AND GRAVEL. IF EARTH AND GRAVEL, THE MAXIMUM ROCK SHALL BE 1" AND THE MIXTURE SHALL CONTAIN NOT MORE THAN 50% BY VOLUME OF ROCK PARTICLES.

TYPE "B" - BEACH SAND, EARTH, OR EARTH AND GRAVEL. IF EARTH AND GRAVEL, THE MIXTURE MUST PASS A 1/2" MESH SCREEN AND CONTAIN NOT MORE THAN 20% BY VOLUME OF ROCK PARTICLES. CORAL OR CORAL WASTE WILL NOT BE ACCEPTABLE.

ECM LLC
Electrical Engineering Consultants
MAUI OFFICE
130 North Market Street
Wailuku, Maui, HI. 96793
Phone: (808)242-9070
Fax: (808)244-9599
E-mail: ecm@ecm-maui.com

JERAL M. FUKUDA
LICENSED PROFESSIONAL ENGINEER
No. 10378-E
HAWAII, U.S.A.

APRIL 30, 2014
EXPIRATION DATE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. (SUPERVISION OF CONSTRUCTION AS DEFINED UNDER SECTION 16-82-2 OF CHAPTER 82: RULES OF THE BOARD OF PROFESSIONAL ENGINEERS, ARCHITECTS AND LAND SURVEYORS; STATE OF HAWAII.)

Note: Contractor shall check and verify all dimensions at job before job before proceeding with work.

REVISIONS					
NO	DATE	DESCRIPTION			INI

JOB NO. 2012-37
DATE: SEPTEMBER 27, 2012
DRAWN BY: RMB
DESIGNED BY: JMF
CHECKED BY: JMF

ELECTRICAL PLANS FOR:
WAILUKU WELL DEVELOPMENT
DWS JOB NO. 09-12
WAILUKU, MAUI, HAWAII
TMK: (2) 3-5-001:067

SHEET NO.
E-1
23 OF 29 SHEETS

2012-37
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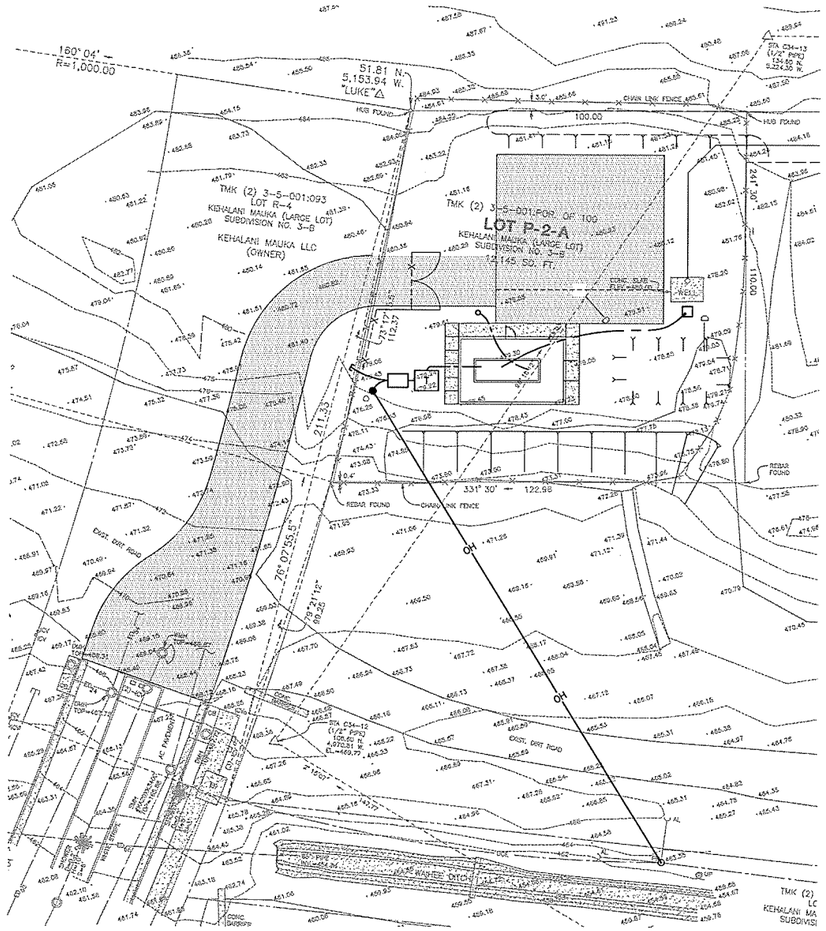
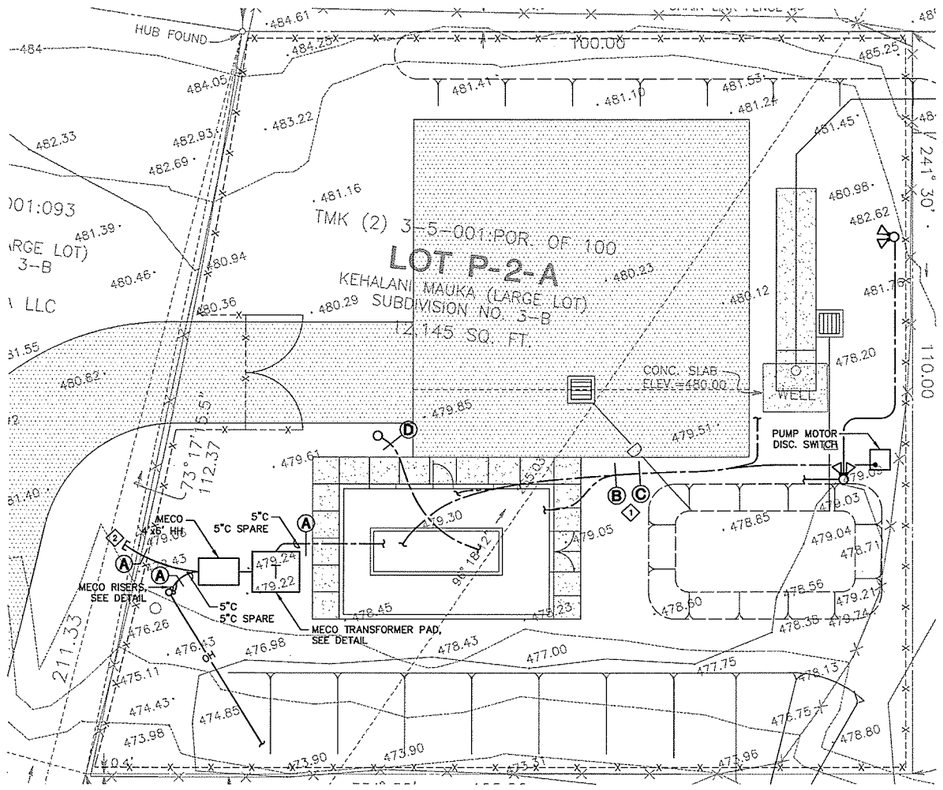
2012-37-E1



OVERALL ELECTRICAL SITE PLAN

N SCALE: 1" = 20'-0"

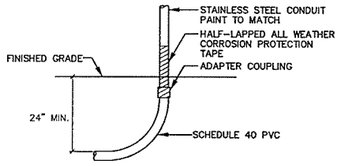


ENLARGED ELECTRICAL SITE PLAN

N SCALE: 1" = 10'-0"

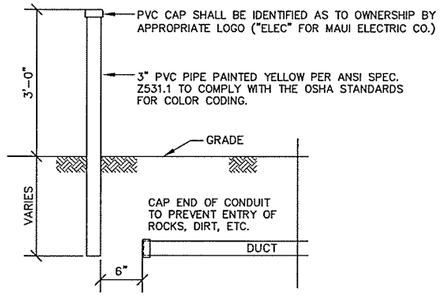
ENLARGED ELECTRICAL SITE PLAN NOTES:

1. 4"C–PUMP, 1"C–BUBBLER, 2–1"C–TELEM, 1"C–CONT, 1"C–SPARE, 1"C–LIGHTS/RCPT, ¾"C HEATER.
2. SEE DUCTLINE STUB–OUT LOCATION MARKER DETAIL.
3. ANTENNA POLE, SEE DETAIL



CONDUIT TRANSITION DETAIL

NOT TO SCALE

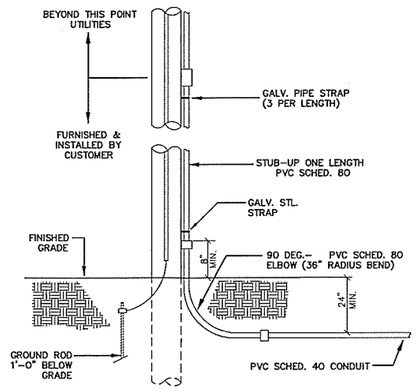


NOTES:

1. INSTALL MARKER AT EACH STUB–OUT.

DUCTLINE STUB–OUT LOCATION MARKER

NOT TO SCALE



RISER POLE DETAIL

NOT TO SCALE

2012–37–E2

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APRIL 30, 2014
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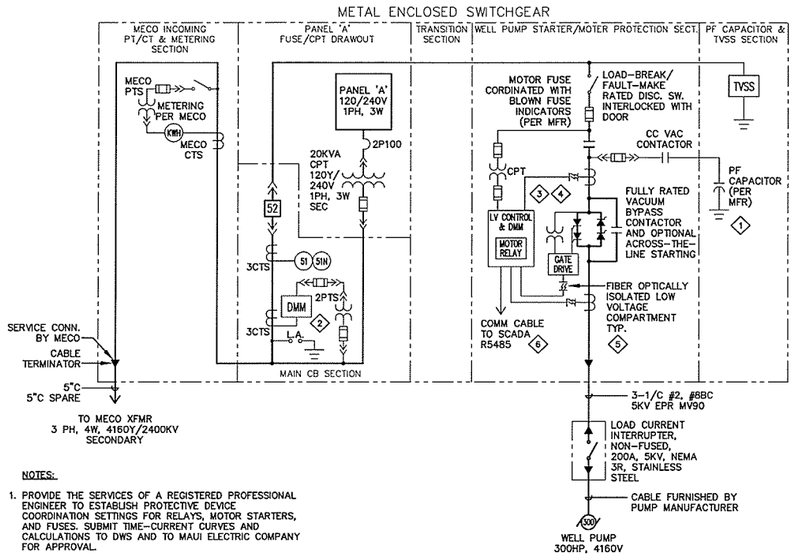
JOB NO. 2012–37
DATE: SEPTEMBER 27, 2012
DRAWN BY: RMB
DESIGNED BY: JMF
CHECKED BY: JMF

ELECTRICAL PLANS FOR:
WAILUKU WELL DEVELOPMENT
DWS JOB NO. 09–12
TMK: (2) 3–5–001:067
WAILUKU, MAUI, HAWAII

SHEET NO.
E–2
24 OF 29 SHEETS



NOTES:

1. PROVIDE THE SERVICES OF A REGISTERED PROFESSIONAL ENGINEER TO ESTABLISH PROTECTIVE DEVICE COORDINATION SETTINGS FOR RELAYS, MOTOR STARTERS, AND FUSES. SUBMIT TIME-CURRENT CURVES AND CALCULATIONS TO DWS AND TO MAUI ELECTRIC COMPANY FOR APPROVAL.
2. MECO TO FURNISH CTS & PTS AND TO SEND THEM TO THE SWITCHBOARD MANUFACTURER FOR INSTALLATION IN SWITCHGEAR. COORDINATE ALL WORK BETWEEN MECO AND SWITCHBOARD MANUFACTURER.
3. PROVIDE ONE SPARE STARTER CONTACTOR "M" & ONE SPARE RVSS TRUCK.

METAL-ENCLOSED SWITCHGEAR - SINGLE-LINE DIAGRAM

NOT TO SCALE

FLAGGED NOTES:

1. POWER FACTOR CORRECTION CAPACITORS AND ISOLATION CONTACTORS (CC) SHALL BE SIZED PER MOTOR MANUFACTURER'S RECOMMENDATION TO CORRECT POWER FACTOR TO A MINIMUM OF 95%. CONTRACTOR SHALL DISCONNECT CAPACITORS FROM SYSTEM DURING PUMP MOTOR START UP.

2. DIGITAL MULTIMETERING DEVICE
UNIT SHALL BE CAPABLE OF METERING AS MINIMUM:

A. AC AMPERES: PHASE A,B,C
B. AC VOLTAGE: PHASE A-B, PHASE B-C, PHASE C-A
C. WATTS
D. POWER FACTOR
E. FREQUENCY
F. WATT-HOURS

3. FULLY PROGRAMMABLE ELECTRONIC RELAY (MOTORTRONICS RX SERIES) WITH THE FOLLOWING FEATURES (NEMA DESIG.):

A. 19 REDUCED VOLTAGE SOFT STARTER
B. 27 UNDERVOLTAGE
C. 37 UNDERCURRENT
D. 46 CURRENT IMBALANCE
E. 47 PHASE ROTATION
F. 48 LOCKED ROTOR / INCOMPLETE SEQUENCE
G. 49 I^2T ELECTRONIC MOTOR OVERCURRENT TRIP
H. 50 INSTANTANEOUS ELECTRONIC OVERCURRENT TRIP
I. 51 OVERCURRENT
J. 55 POWER FACTOR TRIP
K. 59 OVERVOLTAGE PROTECTION
L. 66 STARTS PER HOUR AND TIME BETWEEN STARTS
M. 81 FREQUENCY VARIANCE
N. 86 LOCKOUT / START INHIBIT
O. 50N/51G/N GROUND FAULT DETECTION, INSTANTANEOUS AND CURRENT
P. 49/38 STATOR AND BEARING RTD PROTECTION
Q. 14 SPEED SWITCH AND TACHOMETER TRIP

THE RELAY SHALL ALSO INCLUDE THE FOLLOWING REAL-TIME CLOCK FEATURES:

A. COAST DOWN/BACK SPIN LOCKOUT (PROGRAMMABLE UP TO 60 MINUTES) PREVENTS A START ATTEMPT WHEN THE MOTOR / LOAD IS BACKSPINNING WHEN THE MOTOR IS TURNED OFF.

B. ELAPSED TIME METERING INDICATES RUN TIME FOR SCHEDULED MAINTENANCE OR TROUBLE SHOOTING HELP.

C. TIME BETWEEN STARTS LOCKOUT ELIMINATES MOTOR AND EQUIPMENT DAMAGE CAUSED BY REPEATED START COMMANDS.

D. TIME AND DATE STAMPING OF FAULTS FOR PRECISE RECORDING OF WHAT HAPPENED WHEN.

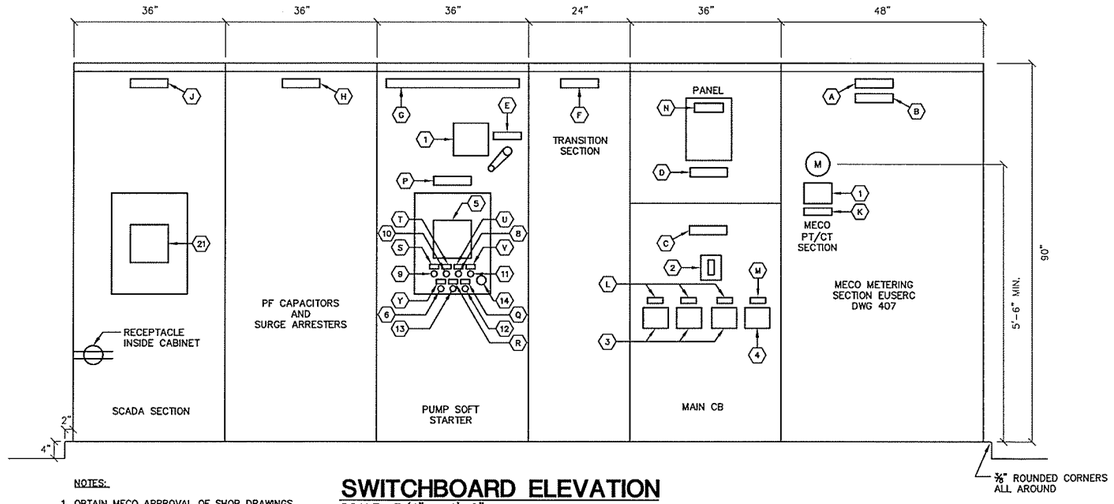
E. STARTS-PER-HOUR LOCKOUT/SHORT CYCLE TIMER ALLOWS YOU TO PROGRAM THE MAXIMUM NUMBER OF STARTS PER HOUR AND PROVIDES A PROGRAMMED "WAIT TIME" (0-60 MINUTES) BETWEEN START ATTEMPTS.

4. DIGITAL MULTIMETERING DEVICE
FOR STARTER MONITOR SHALL DISPLAY AS A MINIMUM:

A. PHASE A, B, C AND GROUND FAULT
B. AVERAGE CURRENT OF THE % OF IMBALANCE AND THE MOTOR'S RPM
C. MOTOR LOAD AS A PERCENTAGE OF MOTOR FLA
D. LINE FREQUENCY AND PRESENT PHASE SEQUENCE
E. PERCENTAGE OF REMAINING THERMAL REGISTER
F. THERMAL CAPACITY REQUIRED TO START THE MOTOR
G. AVERAGE TIME REQUIRED TO START
H. AVERAGE CURRENT DURING START
I. MEASURED I^2T REQUIRED TO START THE MOTOR
J. AMOUNT OF TIME REQUIRED TO START THE MOTOR DURING THE LAST SUCCESSFUL START
K. PHASE A, B, C CURRENTS AND POWER FACTOR
L. PHASE A, B, C CURRENTS AND GROUND FAULT
M. KW AND KVA
N. KVAR AND POWER FACTOR
O. PEAK ON AND KW DEMAND
P. PEAK ON AND KVA DEMAND
Q. PEAK ON AND KVAR DEMAND
R. PEAK ON AND AMPS DEMAND

5. PROVIDE MOTORTRONICS SOLID STATE MOTOR STARTER RATED AT 300 HP, OVERLOAD PROTECTION, OVERCURRENT PROTECTION, AND OTHER MOTOR PROTECTION FEATURES SHALL BE SET TO MATCH NAMEPLATE RATING OF PUMP. PROVIDE ONE TOTAL SPARE 300 HP SOLID STATE MOTOR STARTER AND TRUCK. STARTER SHALL BE INTERCHANGEABLE WITH STARTERS AT WAIHEE WELLS. DELIVER TO DWS BASEYARD.

6. COMMUNICATION TO MOTORTRONICS MOTOR STARTER SHALL BE MODBUS ETHERNET.



NOTES:

1. OBTAIN MECO APPROVAL OF SHOP DRAWINGS FOR SWITCHBOARD PRIOR TO FABRICATION.

SWITCHBOARD ELEVATION

SCALE: 3/4" = 1'-0"

WAILUKU WELL MCC NAMEPLATE AND COMPONENTS SCHEDULE

NAMEPLATES		COMPONENTS	
A	MECO METERING SECTION	1	VIEW PORT
B	UTILITY COMPANY INSTRUMENT TRANSFORMERS	2	CONTROL SWITCH
C	MAIN CIRCUIT BREAKER	3	DEVICE 51
D	15 KVA CONTROL POWER TRANSFORMER WITH PRIMARY FUSE AND SECONDARY CB	4	DEVICE 51N
E	PUMP STARTER DISCONNECT	5	ELECTRONIC PROGRAMMABLE MOTOR PROTECTION RELAY
F	BUS TRANSITION SECTION	6	HAND-OFF-AUTO SW
G	WELL PUMP STARTER	7	WHITE LIGHT LED W/ PUSH TO TEST SW - POWER
H	PF CORRECTION CAPACITORS AND SURGE ARRESTORS	8	AMBER LIGHT LED W/ PUSH TO TEST SW - TROUBLE
J	SCADA SECTION	9	RED LIGHT LED W/ PUSH TO TEST SW - MOTOR RUN
K	DIGITAL MULTI-FUNCTION METER FOR INCOMING SERVICE	10	GREEN LIGHT LED W/ PUSH TO TEST SW - MOTOR STOP
L	PHASE OVERCURRENT RELAY	11	BLUE LIGHT LED W/PUSH TO TEST SW - SCADA CALL
M	GROUND OVERCURRENT RELAY	12	EMERGENCY STOP PB
N	PANEL 'A'	13	RESET PB
P	MOTOR PROTECTION RELAY	14	ELAPSED TIME METER
Q	EMERGENCY STOP	15	
R	RESET	16	
S	MOTOR RUNNING	17	
T	MOTOR STOPPED	18	
U	INCOMPLETE SEQUENCE	19	
V	PUMP ENABLED BY SCADA	20	
W		21	MAPLE TOUCH PANEL ETHERNET HM15150X
Y	HAND-OFF-AUTO	22	
Z		23	
AA		24	
BB		25	
CC		26	
DD		27	
EE		28	
FF		29	
GG		30	
HH		31	
JJ		32	
		33	

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DWS JOB NO. 09-12
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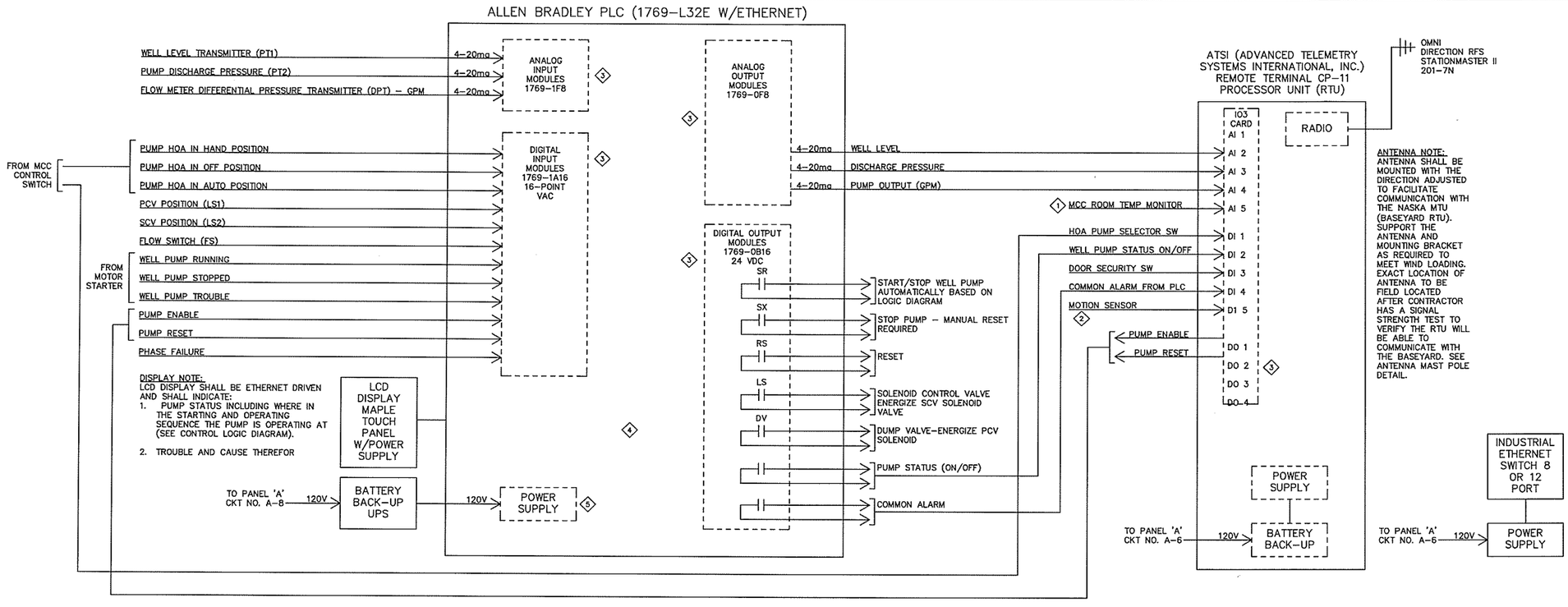
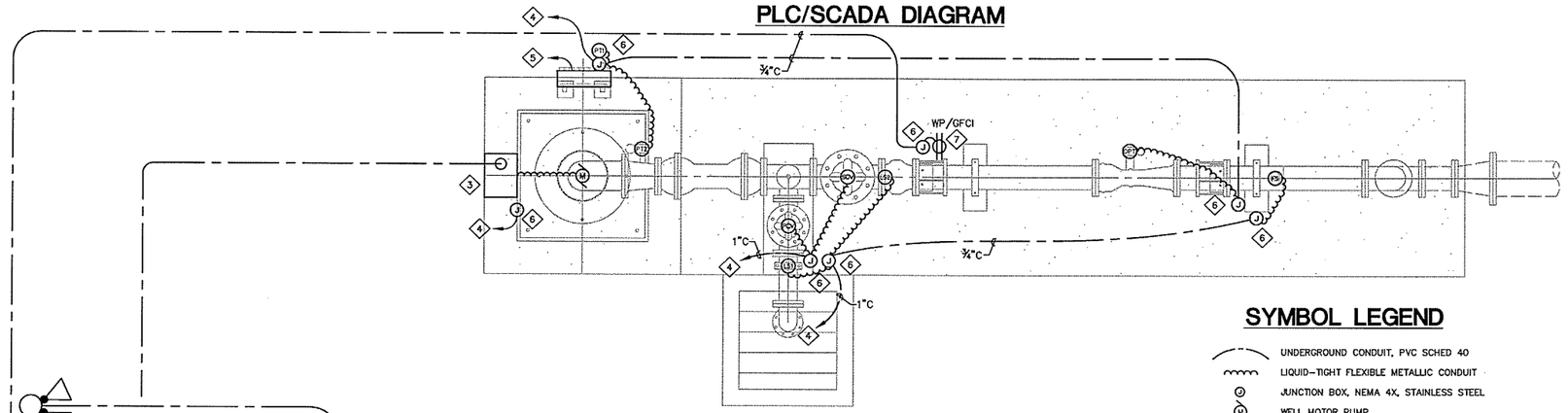
TMK: (2) 3-5-001:067

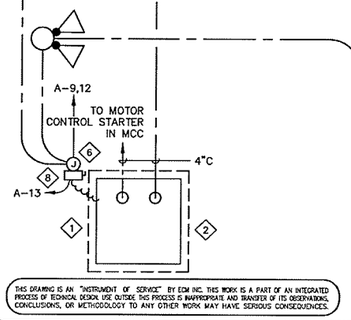
SHEET NO.
E-3
25 OF 29 SHEETS

2012-37-E3



PLC/SCADA DIAGRAM





ELECTRICAL PIPING PLAN
SCALE: 1/2" = 1'-0"

SYMBOL LEGEND

- UNDERGROUND CONDUIT, PVC SCHED 40
- LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT
- (J) JUNCTION BOX, NEMA 4X, STAINLESS STEEL
- (M) WELL MOTOR PUMP
- (DPT) DIFFERENTIAL PRESSURE TRANSMITTER (4-20ma)
- (FS) FLOW SWITCH
- (LS) PCV VALVE LIMIT SWITCH
- (LS) SCV CONTROL VALVE LIMIT SWITCH
- (SCV) DUMP VALVE SOLENOID CONNECTION
- (PT) WELL LEVEL TRANSMITTER (4-20ma)
- (PT) PUMP DISCHARGE PRESSURE TRANSMITTER (4-20ma)
- (PCV) CONTROL VALVE SOLENOID CONNECTION

PLC/SCADA DIAGRAM NOTES:

1. MCC ROOM TEMPERATURE MONITOR, MOORE INDUSTRIES, T2X/PT10/4-20ma, 8-24VDC VTD DWB.
2. OUTDOOR MOTION SENSOR, OPTEX VX-402.
3. FUSE AND SURGE PROTECTION FOR ALL INPUTS AND OUTPUTS TO RTU/PLC.
4. TERMINAL BLOCKS WITH FUSE DOOR: 1492 H4 100-300 VAC, 1492 H5 10-57 VDC; DIN RAILS: 1492-DR5; 24 VDC RELAYS: 700-HA-X2Z24; RELAY SOCKETS: 700-HN204.
5. POWER SUPPLY, 120 VAC TO 24 VDC, 5A, 1606 XLS.

ELECTRICAL PIPING PLAN NOTES:

1. 30"x30" MIN. CONCRETE PAD, 8" THICK WITH REBAR AT 8" O.C. EACH WAY, TOP AND BOTTOM CHAMFER ¾" ALL EXPOSED EDGES.
2. DISC. SW, 5KV, 200A, NON-FUSED, NEMA 3R, STAINLESS STEEL.
3. JUNCTION BOX, 16"x30"x12"D MIN, NEMA 3R, STAINLESS STEEL, MOUNTED TO EQUIPMENT RACK, SEE DETAIL ON E-7.
4. 1"C SCADA SECTION IN MCC, ROUTED AS REQUIRED.
5. 1"C TO BUBBLER POWER SUPPLY, ROUTED AS REQUIRED.
6. NEMA 4X, STAINLESS STEEL JUNCTION BOX, SEE MOUNTING DETAILS ON E-7.
7. RECEPTACLE, STAINLESS STEEL WP COVERPLATE/BOX, ¾"C, 2-#10, #10 GND, TO PANEL 'A' IN MCC.
8. DISCONNECT SWITCH, NEMA 4X STAINLESS STEEL, MOUNTED TO EQUIPMENT RACK, TIE TO CONDENSATION HEATER IN DISC SW, COORDINATE CONNECTION REQUIREMENT, SEE DETAIL ON E-7.

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WAILUKU, MAUI, HAWAII

SHEET NO.
E-4
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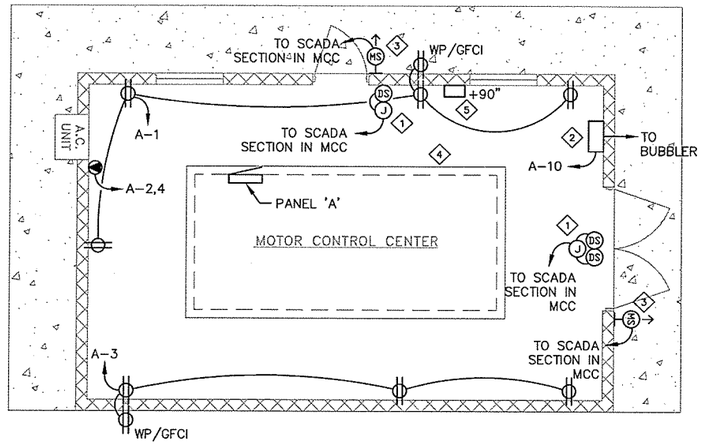
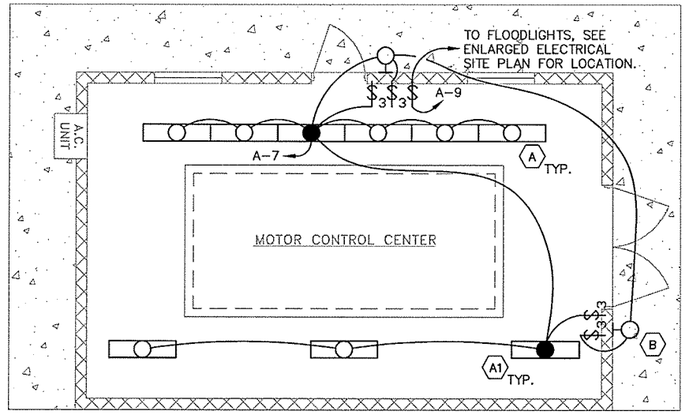


ELECTRICAL BUILDING PLAN
SCALE: 1/4" = 1'-0"



LIGHTING BUILDING PLAN
SCALE: 1/4" = 1'-0"

LIGHTING BUILDING PLAN NOTES:

1. LIGHTING IS NORMALLY OFF DURING NORMAL BUSINESS HOURS AND ONLY USED DURING EMERGENCIES AND THEREFORE EXEMPT FROM IECC TOTAL CONNECTED INTERIOR LIGHTING POWER REQUIREMENT.

SYMBOL LEGEND

- BRANCH CIRCUITS CONCEALED IN CEILING OR WALL, 2 NO. 12 WIRES UNLESS OTHERWISE NOTED. HASH MARKS INDICATE NUMBER OF WIRES WHEN MORE THAN TWO.
- BRANCH CIRCUITS AS ABOVE EXPOSED, RGSC UNLESS OTHERWISE INDICATED
- (J) JUNCTION BOX
- DUPLEX CONVENIENCE OUTLET, 2P, 3W GROUNDING TYPE. +24"
- $_3$ WALL SWITCH, THREE-WAY, +48"
- DISTRIBUTION PANEL
- (MS) MOTION SENSOR, APPROXIMATE AIMING
- (DS) BALANCED MAGNETIC DOOR SWITCH
- GFCI DENOTES A GROUND FAULT CIRCUIT INTERRUPTER DEVICE
- WP DENOTES WEATHERPROOF DEVICE

NOTE ON SYMBOLS:
MOUNTING ELEVATIONS ARE AS NOTED ABOVE.
ELEVATIONS PROVIDED ON PLANS TAKE PRECEDENCE.

ELECTRICAL BUILDING PLAN NOTES:

1. DOOR SWITCH, CONNECT TO RTU, COORDINATE EXACT LOCATION.
2. BUBBLER POWER SUPPLY.
3. MOTION SENSOR, CONNECT TO RTU, COORDINATE EXACT LOCATION.
4. VERIFY EXACT PAD REQUIREMENTS BASED ON SWTICHGEAR DIMENSIONS, SWITCHGEAR MUST HAVE DIMENSIONS THAT CAN BE INSTALLED IN BUILDING SPACE AS SHOWN WITH 5'-0" MINIMUM CLEARANCE TO INSIDE WALLS IN FRONT AND BACK AS REQUIRED BY 2008 NEC.
5. ROOM TEMPERATURE SENSOR, MOORE INDUSTRIES, T2X/PT10/4-20ma, 8-42VDC VTD DWB, ¾"C TO SCADA SECTION OF MCC, INCLUDE USB CABLE.

EXTERIOR LIGHTING POWER ALLOWANCE

APPLICATION	ALLOWED	ACTUAL
BASE ALLOWANCE, ZONE 2	600W	209W

PANEL A (IN MCC) — A.I.C. RATING: 10K

VOLTAGE: 120/240V — PHASE: 1 — WIRE: 3WSN — CIRCUITS: 24

MOUNTING: SWITCHGEAR — MAIN BRKR: 2P100 — BREAKER: BOLT ON — MAIN BUS: 100A

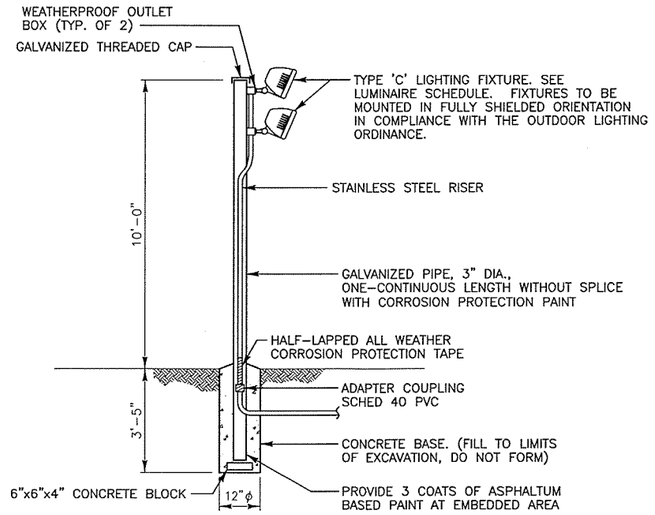
CKT	DESCRIPTION	PHASE A	PHASE B	BRKR	WIRE	CKT	DESCRIPTION	PHASE A	PHASE B	BRKR	WIRE
1	R: CONTROL ROOM	0.9		1P20	#12	2	A/C	1.0		2P20	#12
3	R: CONTROL ROOM		0.7	1P20	#12	4			1.0		
5	SWITCHBOARD CONTROLS	1.0		1P20	#12	6	R: SCADA	0.5		1P20	#12
7	L: LIGHTS		0.4	1P20	#12	8	R: PLC		1.0	1P20	#12
9	L: EXT. WORK LIGHTS	0.2		1P20	#10	10	BUBBLER P.S.	1.0		1P20	#12
11	SPACE HEATERS		1.0	1P20	#12	12	R: PUMP RCPT		1.0	1P20	#10
13	DISC SW HEATER	1.0		1P20	#10	14	SPARE	1.0		1P20	
15	SPARE		1.0	1P20		16	SPARE		1.0	1P20	
17	SPARE	1.0		1P20		18	SPARE	1.0		1P20	
19	SPARE		1.0	1P20		20	SPARE		1.0	1P20	
21	PFB					22	PFB				
23	PFB					24	PFB				
	TOTALS	4.1	4.1				TOTALS	4.5	5.0		

TOTAL CONNECTED LOAD: 17.7 KVA
ESTIMATED DEMAND: 1.0
TOTAL EST. DEMAND LOAD: 17.7 KVA 74 A Ø V =240V

R: DENOTES RECEPTACLE LOAD
L: DENOTES LIGHTING LOAD

LIGHT FIXTURE SCHEDULE

TYPE	SYMBOL	DESCRIPTION	MANUFACTURER	LAMP
A		FLUORESCENT WRAPAROUND FIXTURE, MOLDED FIBERGLASS, IMPACT RESISTAND HOUSING, FULLY GASKETED, WET LOCATION LISTED, ELECTRONIC BALLAST, 120V.	COLUMBIA LUN4-232-EU OR APPROVED EQUAL	2-F32T8
A1		SAME AS TYPE 'A' EXCEPT WITH EMERGENCY BATTERY PACK.	COLUMBIA LUN4-232-EU-EL OR APPROVED EQUAL	2-F32T8
B		LED WALL PACK, VANDAL RESISTANT, DIE CAST ALUMINUM HOUSING, FULL CUT-OFF, PHOTOCELL, DARK BRONZE ACRYLIC DIFFUSER, 120V.	HUBBELL LNC-9LU-5K-3-1-PC1 OR APPROVED EQUAL	9-LED 20.6W
C		FLUORESCENT FLOOD, DIE CAST ALUMINUM, WET LOCATION LISTED, CORROSION RESISTANT, 42W CFL, GLARE SHIELD, GRAY, 120V.	HUBBELL CAT. NO. LFS-42F-1-GR-LFS-GS OR APPROVED EQUAL	CFL 42W



FLOODLIGHT DETAIL
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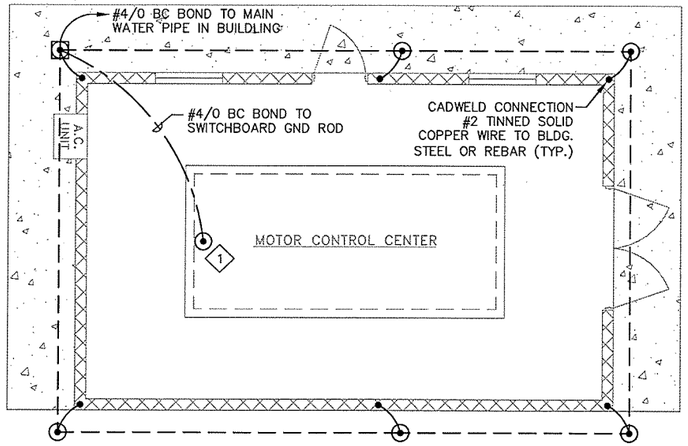
27 OF 29 SHEETS

2012-37-E5



ELECTRICAL BUILDING GROUNDING PLAN
SCALE: 1/4" = 1'-0"

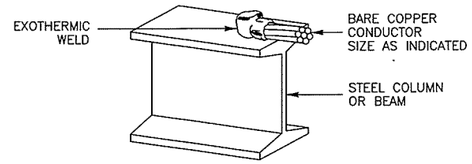
LEGEND

⊠	GROUNDING TEST WELL
⊙	GROUND ROD WITH EXOTHERMIC WELD
•	EXOTHERMIC WELD
— — —	GROUND CONDUCTORS. #4/0 SDBC UNLESS OTHERWISE INDICATED. 2'-6" BELOW FINISHED FLOOR OR GRADE

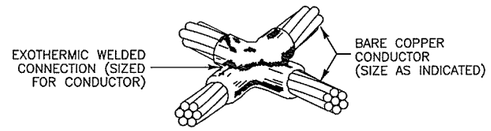
NOTE:
ALL GROUNDING CONNECTIONS TO STEEL EQUIPMENT & STRUCTURES SHALL BE COATED WITH TWO PART EPOXY.

NOTES:

1. COORDINATE EXACT GROUND LOCATION WITH FINAL SWITCHGEAR LAYOUT.



4 E-6 GROUNDING DETAIL CONDUCTOR-TO-STEEL CONNECTION
NOT TO SCALE



5 E-6 GROUNDING DETAIL CONDUCTOR-TO-CONDUCTOR CONNECTION
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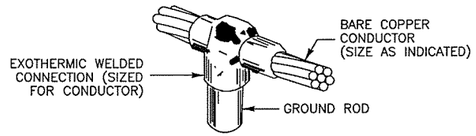
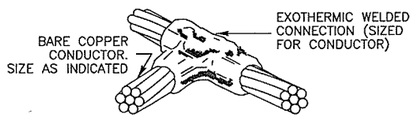
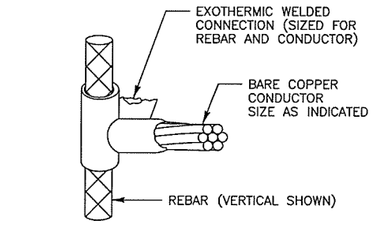


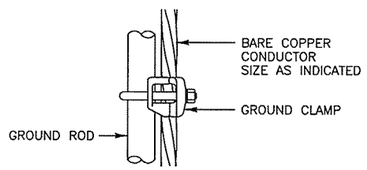
6 E-6 GROUNDING DETAIL CONDUCTOR-CONDUCTOR-TO-GROUND ROD
NOT TO SCALE



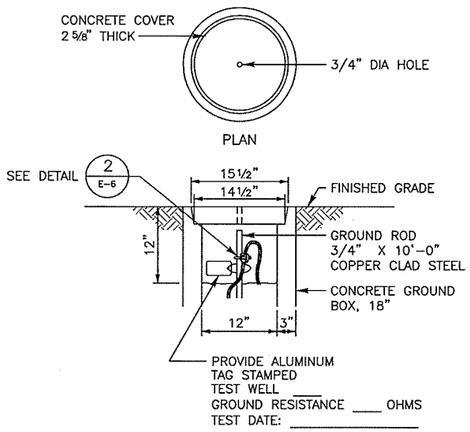
7 E-6 CONDUCTOR-TO-CONDUCTOR CONNECTION DETAIL
NOT TO SCALE



1 E-6 CONDUCTOR TO REBAR
NOT TO SCALE



2 E-6 GROUNDING DETAIL MECHANICAL GROUND CONNECTOR
NOT TO SCALE



3 E-6 TYPICAL GROUND TEST WELL BOX DETAIL
NOT TO SCALE

NOTE:
USE ALSO AS WATERSTOP FOR WALL PENETRATION.

8 E-6 CONDUCTOR-TO-CONDUCTOR CONNECTION DETAIL
NOT TO SCALE

ECM Inc.
Electrical Engineering Consultants
MAUI OFFICE
120 North Market Street
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JERAL M. FUKUDA
LICENSED PROFESSIONAL ENGINEER
No. 10378-E
HAWAII, U.S.A.

APRIL 30, 2014
EXPIRATION DATE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. (SUPERVISION OF CONSTRUCTION AS DEFINED UNDER SECTION 16-52-2 OF CHAPTER 52, RULES OF THE BOARD OF PROFESSIONAL ENGINEERS, ARCHITECTS AND LAND SURVEYORS; STATE OF HAWAII.)

Note: Contractor shall check and verify all dimensions at job before job before proceeding with work.

REVISIONS			
NO	DATE	DESCRIPTION	INI

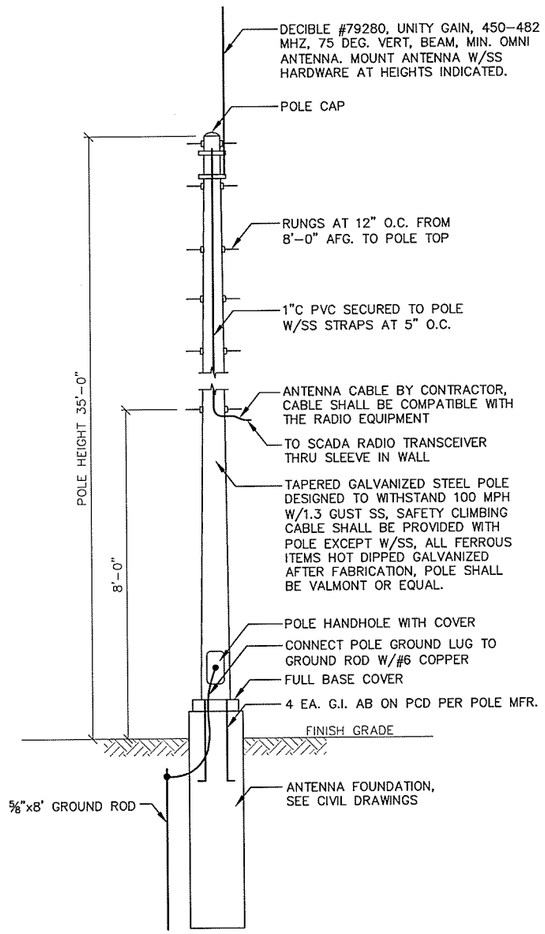
JOB NO. 2012-37
DATE: SEPTEMBER 27, 2012
DRAWN BY: RMB
DESIGNED BY: JMF
CHECKED BY: JMF

ELECTRICAL PLANS FOR:
WAILUKU WELL DEVELOPMENT
DWS JOB NO. 09-12
WAILUKU, MAUI, HAWAII
TMK: (2) 3-5-001:067

SHEET NO.
E-6
28 OF 29 SHEETS

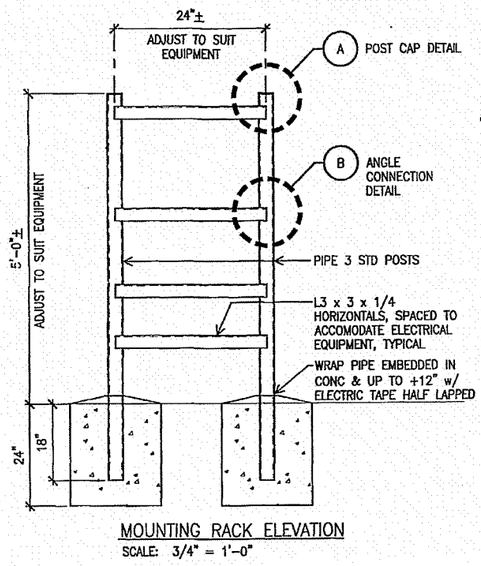
2012-37
2
1
0
24X36

2012-37-E6

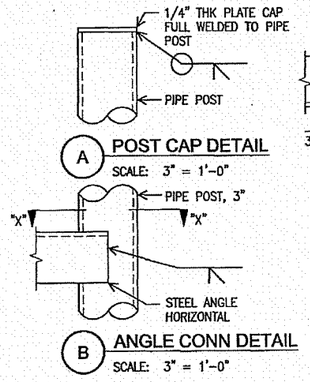


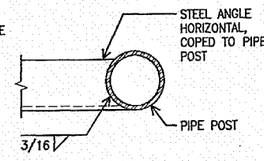
ANTENNA MAST POLE DETAIL
NOT TO SCALE

NOTE: HOT-DIP GALVINIZE RACK ASSEMBLY AFTER FABRICATION. USE STAINLESS STEEL FASTENERS AND ACCESSORIES.



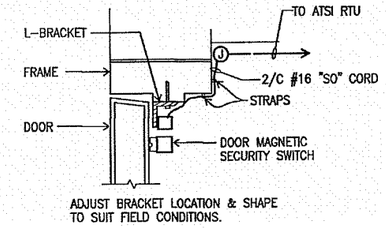
MOUNTING RACK ELEVATION
SCALE: 3/4" = 1'–0"



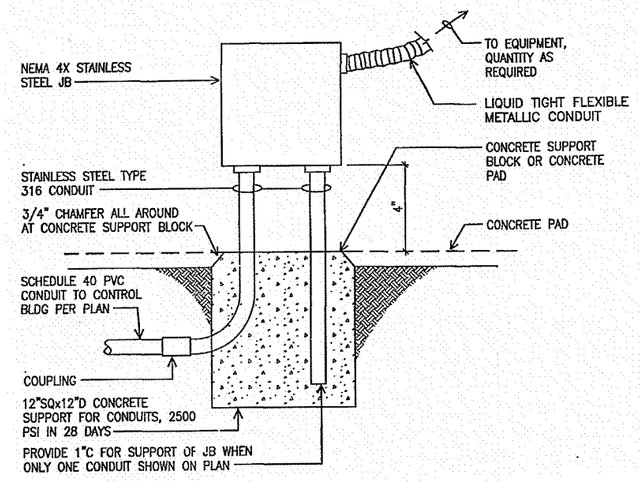


SECTION "X"-"X"
SCALE: 3" = 1'–0"

ELECTRICAL EQUIPMENT MOUNTING RACK DETAIL
SCALE: AS NOTED



DOOR MAGNETIC SECURITY SWITCH DETAIL
NOT TO SCALE



CONDUIT MOUNTED JUNCTION BOX DETAIL
NOT TO SCALE

ECM inc.
Electrical Engineering Consultants
MAIN OFFICE
130 North Market Street
Wailuku, Maui, HI. 96793
Phone: (808)242-8070
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JERAL M. FUKUDA
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TMK: (2) 3-5-001:067

SHEET NO.
E-7
29 OF 29 SHEETS

2012-37
2
1
0
24X36

2012-37-E7

APPENDIX E.

Drainage Report

DRAINAGE REPORT

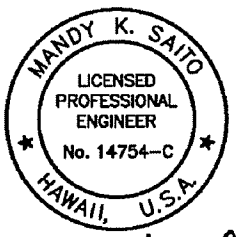
Wailuku Well Development
Wailuku, Maui, Hawaii
Tax Map Key (2) 3-5-001:100, 093, and 091

Contents Page

Owner:

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

This work was prepared by me
or under my supervision.



License Expires 4/30/2014

Consultant:

Ronald M. Fukumoto Engineering, Inc.
1721 Wili Pa Loop, Suite 203
Wailuku, Hawaii 96793
Phone: (808) 242-8611
Fax: (808) 244-7510
E-Mail: office@rfemaui.com

Date: October 12, 2012

I. PURPOSE

The purpose of this report is to present storm drainage design information and to comply with the Rules for Design of Storm Drainage Facilities in the County of Maui.

II. PROJECT DESCRIPTION

A. General Location

The project involves converting the Wailuku Exploratory Well into a production well. The Wailuku Exploratory Well is located on an undeveloped parcel, above old Wailuku Town within the Kehalani Mauka development. The project site lies about 1,000 feet to the south of the intersection of Main Street, Alu Road, and Iao Valley Road, and is about 200 feet to the northwest of the end of the Kehalani Mauka Parkway.

The limits of grading encompasses an area of about 0.95 acre and affects portions of three parcels owned by Kehalani Mauka, LLC. The tax map designates these parcels as Tax Map Key (2) 3-05-001:100, 093, and 091. The Department of Water Supply, County of Maui is seeking to purchase a 0.28-acre portion of Tax Map Key (2) 3-5-001:100 from Kehalani Mauka, LLC for the proposed pump station.

B. Project Components

The conversion of the exploratory well to a production well involves the construction of a pumping station, a transmission pipeline, and a connection to the 3.0-million gallon Iao Tank. The pump station components include a 1,400-gallon per minute deep well submersible pump, well pump piping, a 640-square foot control building, electrical controls and telemetry systems, and site improvements. Site improvements include a paved driveway, a 50-foot by 50-foot paved service yard, security fencing, domestic water service, electrical distribution circuits, and drainage improvements. The transmission pipeline consists of about 1,000 feet of 12-inch ductile iron pipe between the pumping station and the Iao Tank site. Work at the Iao Tank site involves a connection to the existing inlet piping and modifications.

III. DRAINAGE SYSTEM

A. Topography

The project site is undeveloped land with fair vegetation. Generally, the site slopes down from West to East. Elevations range from 460 feet to 490 feet above mean sea level. Slopes range from 10 to 40 percent.

B. Soil

According to the Soil Conservation Service, the on-site soils include Wailuku silty clay, 3 to 7 percent slopes (WvB). The Wailuku series consists of well-drained soils on the

alluvial fans on the island of Maui. The survey characterizes the soil as having a dark reddish-brown silty clay surface layer approximately 12 inches thick with a substratum that is gravelly and cobbly alluvium, slight to medium acidy in the surface layer, slow runoff, and slight erosion hazard. This soil is generally used for sugarcane pasture, and home sites.

C. Flood and Tsunami Hazard

The flood insurance rate map of the area shows there are no flood hazard areas on the site. The flood insurance rate map designates the site as Zone X, an area subject to minimal flooding. (See Appendix B – Flood Hazard Assessment Report)

D. Existing Drainage Improvements

There are no existing drainage improvements within project site. On-site and off-site runoff sheet flows through the site. The runoff flows down from the westerly side of the site, across the remaining portion of undeveloped land, and eventually enters the Waihee Ditch. Runoff that is not intercepted by the ditch flows towards Kehalani Mauka Parkway and enters the drainage system within the existing roadway.

E. Proposed Drainage Improvements

South Alu Road is the upper limit of the off-site drainage area. From this upper limit, runoff flows across undeveloped land towards the project site. To prevent this runoff from entering the proposed pump station site, a ditch will be constructed along the westerly boundary of the proposed pump station site. The ditch will direct runoff around the site and to a grassed swale. The grassed swale will then carry the runoff away from the proposed pump station site, and allow runoff to spread out and sheet flow towards the Waihee Ditch. (See Figure 1 – Off-Site Drainage Map, page 5.)

The proposed drainage improvements for the pump station includes inlets, drain pipes, outlet structures, a spillway structure, and a drainage sump. A grated drain inlet will be installed within the paved service yard to capture runoff from the pavement and control building. A drain pipe will route this runoff to the drainage sump. Another grated drain inlet will collect the discharge from the initial pump startup. A separate drain pipe will route the pump startup discharge to the drainage sump.

The increase in the rate of runoff and volume of runoff will be mitigated by the drainage sump. The drainage sump will collect runoff, regulate the outflow of runoff, and retain a portion of the collected runoff. As shown in the computations, a detention volume of 600 cubic feet is required to reduce the peak outflow from 1.56 cubic feet per second to 0.61 cubic feet per second. Also as shown in the computations, a retention volume of 620 cubic feet is required to keep runoff volumes at pre-development levels.

Drainage improvements that involve transmission of storm flows will conform to the "Rules for the Design of Storm Drainage Facilities in the County of Maui." The rules will be applied to the sizing and spacing of inlets, sizing of drain lines, and channels.
The Grading and Drainage Plan shows the proposed grading and drainage improvements. (See Figure 2 - Grading and Drainage Plan, page 6.)

F. Conclusion

There will be no adverse effects on the adjacent or downstream properties due to this project.

VII. REFERENCES

1. City and County of Honolulu, Department of Public Works, Division of Engineering, *Storm Drainage Standards*, Honolulu, Hawaii, May 1988.

2. County of Maui, "Title MC-15, Department of Public Works and Waste Management, Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui," Wailuku, Hawaii, November 1995.

3. Federal Emergency Management Agency, Federal Insurance Administration, *Flood Insurance Study, Maui County, Hawaii*, December 1, 1980.

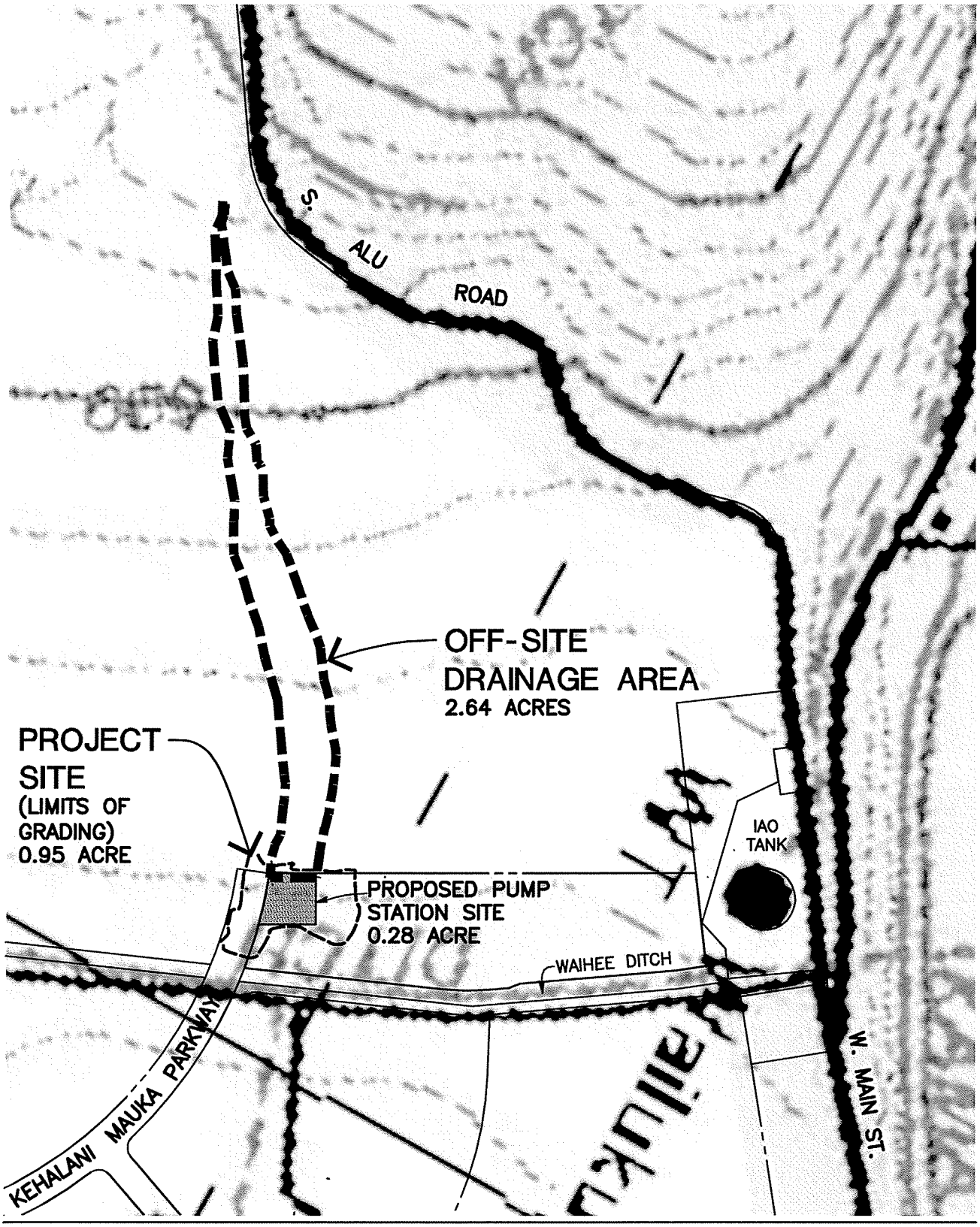
4. R. M. Towill Corporation, *Drainage Master Plan for the County of Maui*, Honolulu, Hawaii, October 1971.

5. U. S. Department of Agriculture, Soil Conservation Service, *Erosion and Sediment Control Guide for Hawaii*, Honolulu, Hawaii, March 1981.

6. U. S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, Washington, D.C., August 1972.

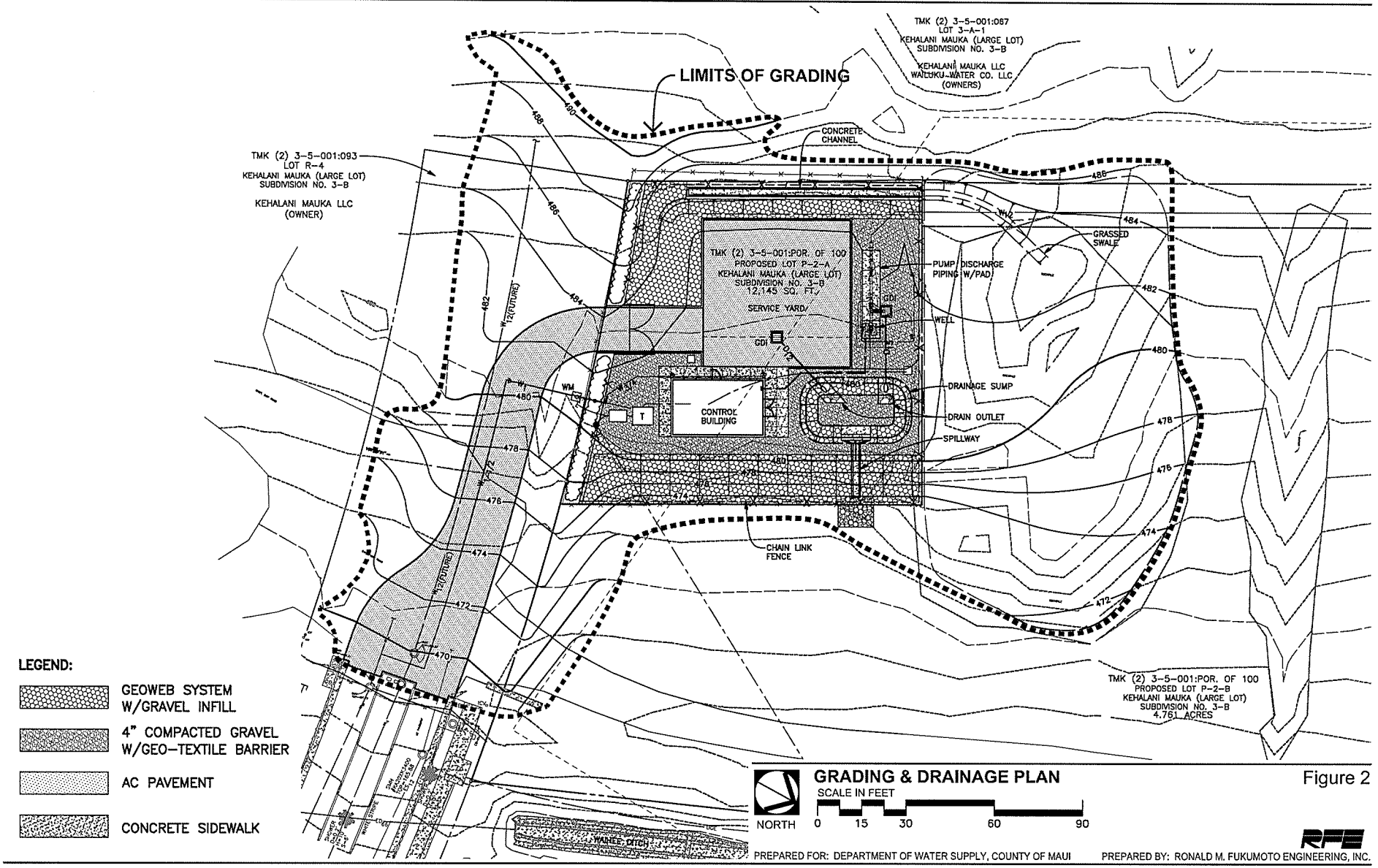
7. U. S. Department of Agriculture, Soil Conservation Service, *Urban Hydrology for Small Watersheds*, Technical Release 55, Second Edition, Washington, D.C., June 1986.

8. U. S. Department of Commerce, Weather Bureau, *Rainfall-Frequency Atlas of the Hawaiian Islands for Areas to 200 Square Miles, Durations to 24 Hours, and Return Periods from 1 to 100 Years*, Technical Paper No. 43, Washington, D.C., 1962.



DRAINAGE AREA MAP Figure 1

PREPARED FOR: DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.



GRADING & DRAINAGE PLAN

SCALE IN FEET

Figure 2

PREPARED FOR: DEPARTMENT OF WATER SUPPLY, COUNTY OF MAUI

PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.

DRAINAGE INFORMATION

A. FLOW RATE (RATIONAL METHOD)

1. RUNOFF COEFFICIENT
   a. Existing Conditions
      i. Off-site Unimproved Area — Area = 2.64 acres — C = 0.30
      ii. On-site Unimproved Area — Area = 0.28 acre — C = 0.30

2. Developed Conditions (Well Development Site)
   a. On-site

Grassed or GEOWEB System w/ Gravel Infill	Area = 0.11 acre	C = 0.30
Compacted Gravel	Area = 0.06 acre	C = 0.70
Building /Roadways/Walkways	Area = 0.11 acre	C = 0.90
	Total Area = 0.28 acre	

   $C_{COMPOSITE}$ = [(0.11 x 0.30) + (0.06 x 0.70) + (0.11 x0.90)]/ 0.28 = 0.62

3. RECURRENCE INTERVAL & RAINFALL
   a. Recurrence interval T_m = 50 years (due to sump conditions)
   b. One-hour rainfall I_{50} = 3.5 inches

4. TIME OF CONCENTRATION
   a. Existing Off-site Conditions T_c = 18 minutes
   b. Existing On-site Conditions T_c = 10 minutes
   c. Developed On-site Conditions T_c = 5 minutes

5. EXISTING RUNOFF (Rational Method)
   a. Off-site
      C = 0.30
      I_{50} = 3.5 x 1.7205 = 6.02 inches/hour
      a = 2.54 acres
      Q = Cia = 0.30 x 6.02 x 2.64 = 4.77 cfs
   b. On-site
      C = 0.30
      I_{50} = 3.5 x 2.0576 = 7.20 inches/hour
      a = 0.28 acre
      Q = Cia = 0.30 x 7.20 x 0.28 = 0.61 cfs

6. DEVELOPED RUNOFF (Rational Method)
   a. On-site
      C = 0.62
      I_{50} = 3.5 x 2.5575 = 8.95 inches/hour
      a = 0.28 acre
      Q = Cia = 0.62 x 8.95 x 0.28 = 1.56 cfs

7. INCREASE DUE TO DEVELOPMENT (Rational Method)
   a. On-site Area
   b. $\Delta Q = 1.56 - 0.61 = 0.95$ cfs

8. DETENTION VOLUME

IDF CURVE DETENTION DESIGN CALCULATIONS (based off Rational Method)

Design Data

Drainage Area = A =	0.28	acres
Developed Runoff Coefficient = C =	0.62	
Design Storm =	50	year
One Hour Rainfall = i =	3.50	inches
Present Peak Discharge = QOUT =	0.61	cfs
Developed Peak Discharge = QIN =	1.56	cfs
QOUT / QIN =	0.39	
Outflow Adjustment Coefficient = k =	0.88	

Storm Duration, minutes	Correction Factor	Rainfall Intensity, in./hr.	Runoff Volume, cu. ft.	Outflow Volume, cu. ft.	Storage Volume, cu. ft.	
T	*f*	*I = fi*	*CIAT*	*kQOUTT*	(4) - (5)	
(1)	(2)	(3)	(4)	(5)	(6)	
5	2.5575	8.951	470	161	309	
10	2.0576	7.202	756	322	434	
15	1.8381	6.433	1,014	483	531	
16	1.7971	6.290	1,057	515	542	
17	1.7578	6.152	1,098	548	550	
18	1.7205	6.022	1,138	580	558	
19	1.6855	5.899	1,177	612	565	
20	1.6529	5.785	1,215	644	571	
21	1.6227	5.679	1,253	676	577	
22	1.5946	5.581	1,290	709	581	
23	1.5684	5.489	1,326	741	585	
24	1.5438	5.403	1,362	773	589	
25	1.5206	5.322	1,397	805	592	
30	1.4184	4.964	1,564	966	598	PEAK
31	1.3997	4.899	1,595	998	597	
32	1.3814	4.835	1,625	1,031	594	
33	1.3635	4.772	1,654	1,063	591	
34	1.3459	4.711	1,682	1,095	587	
35	1.3287	4.650	1,709	1,127	582	
40	1.2479	4.368	1,835	1,288	547	
45	1.1754	4.114	1,944	1,449	495	
50	1.1103	3.886	2,041	1,610	431	
55	1.0521	3.682	2,127	1,771	356	
60	1.0000	3.500	2,206	1,932	274	

Required Detention Volume $= 598 \approx 600$ cubic feet to reduce developed flow from 1.56 cfs to pre-development flow of 0.61 cfs.

B. RETENTION VOLUME (TR-55 METHOD)

1. AREA
   On-Site Existing and Developed Conditions Area = 0.28 acre

2. RAINFALL DATA
   50 y-year, 1-hour: P=3.5 inches

3. CURVE NUMBER
   Soil: WvB Wailuku
   Hydrologic Soil Group B

   a. Existing Conditions

Open Range/Pasture Fair Condition	Area = 0.11 acre	CN = 61

   b. Existing Conditions

Open Space/GEOWEB w/Gravel Infill	Area = 0.11 acre	CN = 61
Compacted Gravel	Area = 0.06 acre	CN = 75
Building, Parking, & Walkways	Area = 0.11 acre	CN = 98
	Total Area = 0.28 acre	

   $CN_{WEIGHTED} = [(0.11x\ 61) + (0.06x\ 75) + (0.11 \times 98) / 0.28] = 79$

4. RETENTION VOLUME
   a. Existing
      $S = (1000/CN)-10 = (1000/69) - 10 = 4.49$
      $Q = (P - 0.2S)^2/(P + 0.8S) = (3.5 - 0.2 \times 4.49)^2/(3.5 + 0.8 \times 4.49) = 0.95$ inches
      Volume = (Q/12) x A x 43560 = (0.95/12) x 0.28 x 43560 = 970 cu. ft.

   b. Developed
      $S = (1000/CN)-10 = (1000/79) - 10 = 2.66$
      $Q = (P - 0.2S)^2/(P + 0.8S) = (3.5 - 0.2 \times 2.66)^2/(3.5 + 0.8 \times 2.66) = 1.57$ inches
      Volume = (Q/12) x A x 43560 = (1.57/12) x 0.28 x 43560 = 1,592 cu. ft.

   c. Retention Volume Required
      V = developed – existing
      V = 1,592 - 970 = 622 cu. ft.

   d. Pump Discharge Volume from Initial Start Up
      V_{Pump} = 1,400 gpm x 2 min x 0.13368 cu.ft./gal = 374 cu.ft.
      $V > V_{Pump}$, therefore drainage sump has adequate capacity for pump discharge volume

C. DRAINAGE SUMP SIZING
   The total required volume = 600 (detention) + 620 (retention) = 1,220 cu. ft.

D. FLOW CONTROL SPILLWAY AND EMERGENCY SPILLWAY SIZING

Determine flow control and emergency spillway size, depth, and elevation based on weir formula:

$Q = CLH^{1.5}$ (in cubic feet per second)

a = orifice area, in square feet

C = coefficient of discharge

L = length of spillway, in feet

H = head upstream of weir, in feet

D/R Basin Design Data

Top of berm elevation = 481.00 feet

Emergency spillway elevation = 480.50 feet

Emergency spillway flow depth = 0.5 foot

Detention flow control spillway elevation = 479.62 feet

Bottom of basin elevation = 478.00 feet

1. Detention Flow Control Spillway Length

   $Q = 0.61 - 0.07 = 0.54$ cfs

   $C = 2.7$

   $H = 480.50 - 479.62 = 0.88$ ft.

   $L = Q/CH^{1.5} = 0.54/2.7 \times 0.88^{1.5} = 0.24$ ft.

2. Emergency Spillway Length

   Spillway sized to handle developed runoff.

   $Q = 1.56$ cfs

   $C = 2.7$

   $H = 481.00 - 480.50 = 0.5$ ft.

   $L = Q/CH^{1.5} = 1.56/2.7 \times 0.5^{1.5} = 0.98$ ft. (minimum width)

3. Detention Spillway Outlet Channel

   Dimensions: 0.25 ft (width) x 0.88 ft. (depth)

   Area = $A = 0.25 \times 0.88 = 0.22$ ft.^{2}

   Perimeter = $P = 0.25 + 0.88 + 0.88 = 2.01$ ft.

   Manning's Coefficient = $n = 0.013$ for concrete

   Slope = $S = 0.01$ ft./ft.

   Velocity = $V = 1.486\ (A/P)^{2/3}S^{1/2}/n = 1.486 \times (0.22/2.01)^{2/3}(0.01)^{1/2}/0.013 = 2.62$ fps

   Flow Rate = $Q = VA = 2.62 \times 0.22 = 0.58$ cfs

   0.58 cfs ≤ 0.54 cfs (required), therefore O.K.

4. Emergency Spillway Outlet Channel

   Dimensions: 2.0 ft (width) x 0.5 ft (depth)

   Area = $A = 2.0 \times 0.5 = 1.0$ ft.^{2}

   Perimeter = $P = 2.0 + 0.5 + 0.5 = 3.0$ ft.

   Manning's Coefficient = $n = 0.013$ for concrete

   Slope = $S = 0.01$ ft./ft.

Velocity = V = 1.486 $(A/P)^{2/3}S^{1/2}/n$ = 1.486 x $(1.0/3.0)^{2/3}(0.01)^{1/2}/0.013$ = 5.50 fps
Flow Rate = Q = VA = 5.50 x 1.0 = 5.50 cfs
5.50 cfs >1.56 cfs (required), significantly larger than required amount

E. DRAIN INLET

The capacities of grated drain inlets shall be determined by the weir formula with a factor of safety (FS) of 2 for clogging. $Q = CPd^{1.5} / FS$ in cubic feet per second where C is 3.0, P is the available perimeter in feet, and d is the allowable ponding depth in feet.

3'x3' GDI in sump: (3" depth) $Q = 3.0 \times 12.0 \times 0.25^{1.5}/2 = 2.25$ cfs

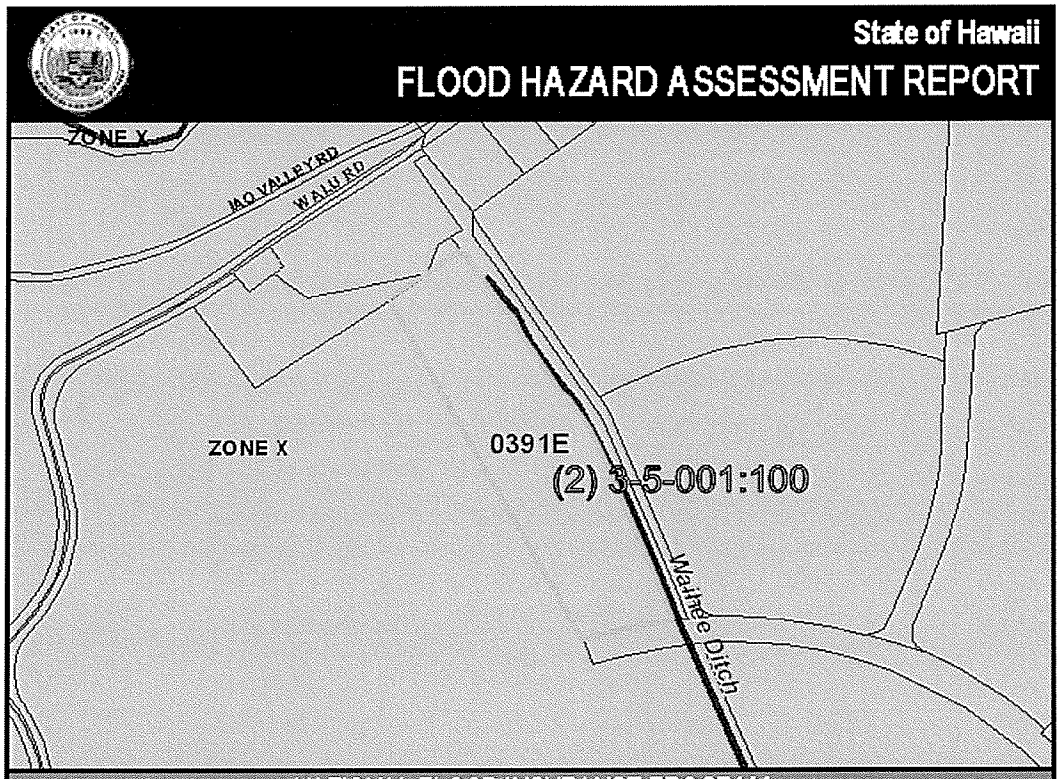
F. CONCRETE CHANNEL

Manning's Formula was used to determine the required waterway area.
$Q = AV = 1.486\ (A/P)^{2/3}S^{1/2}A/n$
A = Area of cross section (square foot)
V = Velocity (foot per second)
n = Manning's roughness coefficient
R = hydraulic radius (Area/Wetted Perimeter) (feet)
S = slope of the energy gradient (foot/foot)

Rectangle Concrete Channel
Dimensions: 2.0 ft. (width) x 0.67 ft. (depth)
n = 0.13
$A = 0.67 \times 2.0 = 1.34$ ft.^{2}
P = 0.67 + 0.67 + 2.0 = 3.34 ft.
S = 0.01 ft/ft
$Q = 1.486\ (1.34/3.34)^{2/3}(0.01)^{1/2}1.34/(0.013) = 8.33$ cfs
Therefore, the concrete channel can handle the required flow of 4.77 cfs.

FLOOD HAZARD ASSESSMENT REPORT

A. TAX MAP KEY (2) 3-5-001:100



FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (Xshaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 3-5-001:100
PARCEL ADDRESS:	KEHALANI WAILUKU, HI 96793
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030391E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	MAY 2012
IMAGERY DATA FROM:	MAY 2005

IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui	
Francis Cerizo, CFM	(808) 270-7771
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

Disclaimer: The Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use of the information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR from any liability, which may arise from its use.

If this map has been identified as 'PRELIMINARY' or 'UNOFFICIAL', please note that it is being provided for informational purposes and is not to be used for official legal decisions, regulatory compliance, or flood insurance rating. Contact your county NFIP coordinator for flood zone determinations to be used for compliance with local floodplain management regulations.

APPENDIX F.

Biological Resources Survey

BIOLOGICAL RESOURCES SURVEY

for the

WAILUKU WELL DEVELOPMENT PROJECT

WAILUKU, MAUI, HAWAII

by

ROBERT W. HOBDY
ENVIRONMENTAL CONSULTANT
Kokomo, Maui
July 2012

Prepared for:
Department of Water Supply
County of Maui

BIOLOGICAL RESOURCES SURVEY
WAILUKU WELL DEVELOPMENT PROJECT
Wailuku, Maui, Hawaii

INTRODUCTION

The Wailuku Well Development Project is situated on the upper west edge of Wailuku Town and below South Alu Road which leads to Wailuku Heights. (See Figures 1, 2 & 3). It consists of a 0.28 acre well site plot, expanded grading with a driveway to the site. Also a future 920 foot long x 15 foot wide transmission line corridor terminating with a tie-in at the Iao Tank Site which totals another 0.32 acres, project site TMK (2)3-5-01:100. This study was initiated in fulfillment of environmental requirements of the planning process.

SITE DESCRIPTION

The project site lies on former agricultural lands that slope gently down to the east from the West Maui Mountains. Vegetation consists of tall grasses with a few trees and shrubs. The well site plot is at an elevation of about 500 feet as is the transmission line corridor which travels north on a contour towards the Iao Water Tank near Iao Valley Road. Soils within the project area are uniformly of the Wailuku Silty Clay, 3-7 % slopes Series which is a deep, well-drained, dark reddish brown alluvial soil (Foote et al, 1972). Annual rainfall averages 25 inches to 28 inches, with most of this falling during the winter months (Armstrong, 1983).

BIOLOGICAL HISTORY

The original vegetation in this area consisted of a dense low statured native forest and shrubland with such components as ‘öhi’a (*Metrosideros polymorpha*), ‘a’ali’i (*Dodonaea viscosa*), olopua (*Nestegis sandwicensis*), lama (*Diospyros sandwicensis*), halapepe (*Pleomele auwahiensis*), and a variety of ferns, vines and herbaceous plants.

Hawaiians lived in the area for several centuries, farming in the valley bottoms and lowlands and utilizing forest plants for food, construction materials, weapons, fiber and medicines. They altered the landscape somewhat through cultivation and burning.

During the mid 1800s this area was cleared for sugar cane agriculture and the area was cleared, plowed, planted, burned and harvested in continuous cycles for over 100 years. Native ecosystems were replaced by sugar cane and increasing numbers of agricultural weeds.

When sugar production ended in the 1990s this area was converted to cattle grazing. All of these practices, along with recent fires that have swept through the grass lands, have resulted in an environment that is now nearly totally lacking in native plants and animal species.

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed Wailuku Well Development project which was conducted in November 2010. The objectives of the survey were to:

1. Document what plant, and animal species occur on the property or may likely occur in the existing habitat.

2. Document the status and abundance of each species.

3. Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered. 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 and fauna in this part of the island.

5. Note which aspects of the proposed development pose significant concerns for plants or for wildlife and recommend measures that would mitigate or avoid these problems.

BOTANICAL SURVEY REPORT

SURVEY METHODS

A walk-through botanical survey method was used for covering the entire project area. Notes were made on plant species, distribution and abundance as well as on terrain and substrate.

DESCRIPTION OF THE VEGETATION

The vegetation within the well site and along the transmission line corridor is nearly a monotypic stand of Guinea grass (*Megathyrsus maximus*) which can grow in dense stands to 8 feet deep. Other species of significance included Castor bean (*Ricinus communis*), glycine (*Neonotonia wightii*), opiuma (*Pithecellobium dulce*) and false mallow (*Malvastrum coromandelianum*).

A total of 51 plant species were recorded during the survey. Just one of these was a common dry land native plant, the ʻuhaloa (Waltheria indica), which is widespread in Hawaii and many other Pacific islands. The remaining 50 species were pasture plants or agricultural weeds. Most of the smaller species grew along roadways or in small clearings.

DISCUSSION AND RECOMMENDATIONS

The vegetation throughout the project area is dominated by non-native species that are of no particular environmental interest or concern. Just one common indigenous plant, ʻuhaloa, was found growing in a recently disturbed area. No federally listed Endangered or Threatened plant species (USFWS, 2009) were found, nor do any plants that are candidates for such status occur on the project area. No special plant habitats occur on or near the project and no potential wetlands occur in this dry upland site.

This project is not expected to have any significant negative impacts on the botanical resources in this part of West Maui. No recommendations regarding botanical resources are deemed necessary or appropriate.

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 two groups: Monocots and Dicots. Taxonomy and nomenclature of 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 = all those plants brought to Hawaii during the course of Polynesian 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
MONOCOTS			
CYPERACEAE (Sedge Family)			
Cyperus rotundus L.	nut sedge	non-native	uncommon
POACEAE (Grass Family)			
Brachiaria subquadripara (Trin.) Hitchc.	----------	non-native	rare
Chloris barbata (L.) Sw.	swollen fingergrass	non-native	rare
Chloris radiata (L.) Sw.	plush grass	non-native	rare
Cynodon dactylon (L.) Pers.	Bermuda grass	non-native	rare
Eleusine indica (L.) Gaertn.	wiregrass	non-native	uncommon
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	non-native	uncommon
Megathyrsus maximus (Jacq.) Simon & Jacobs	Guinea grass	non-native	abundant
DICOTS			
AMARANTHACEAE (Amaranth Family)			
Amaranthus spinosus L.	spiny amaranth	non-native	uncommon
Chenopodium carinatum R. Br.	keeled goosefoot	non-native	rare
ASTERACEAE (Sunflower Family)			
Bidens pilosa L.	Spanish needle	non-native	rare
Conyza bonariensis (L.) Cronq.	hairy horseweed	non-native	rare
Emilia fosbergii Nicolson	red pualele	non-native	rare
Sonchus oleraceus L.	pualele	non-native	rare
Tridax procumbens L.	coat buttons	non-native	rare
Verbesina encelioides (Cav.) Benth. & Hook.	golden crown-beard	non-native	uncommon
Xanthium strumarium L.	kikania	non-native	rare
BORAGINACEAE (Borage Family)			
Heliotropium amplexicaule Vahl	summer heliotrope	non-native	rare
Heliotropium procumbens Mill.	fourspike heliotrope	non-native	rare
BRASSICACEAE (Myrtle Family)			
Lepidium africanum (Burm.f.) DC.	pepperwort	non-native	rare
CONVOLVULACEAE (Morning Glory Family)			
Ipomoea triloba L.	little bell	non-native	rare
CUCURBITACEAE (Gourd Family)			
Cucumis dipsaceus Erenb. ex Spach	hedgehog gourd	non-native	rare
EUPHORBIACEAE (Spurge Family)			
Euphorbia hirta L.	hairy spurge	non-native	rare
Euphorbia hypericifolia L.	graceful spurge	non-native	rare
Ricinus communis L.	Castor bean	non-native	uncommon
FABACEAE (Pea Family)			
Chamaecrista nictitans (L.) Moench	partridge pea	non-native	uncommon
Crotalaria incana L.	fuzzy rattlepod	non-native	rare
Crotalaria pallida Aiton	smooth rattlepod	non-native	uncommon
Crotalaria retusa L.	rattlepod	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
Desmanthus pernambucanus (L.) Thellung	slender mimosa	non-native	rare
Desmodium triflorum (L.) DC.	three-flowered beggarweed	non-native	rare
Leucaena leucocephala (Lam.) de Wit	koa haole	non-native	rare
Macroptilium lathyroides (L.) Urb.	wild bean	non-native	rare
Neonotonia wightii (Wight & Arnott) Lackey	glycine	non-native	uncommon
Pithcellobium dulce (Roxb.) Benth.	öpiuma	non-native	uncommon
Prosopis pallida (Humb.&Bonpl.ex Willd.) Kunth	kiawe	non-native	rare
Samanea saman (Jacq.) Merr.	monkeypod	non-native	rare
LAMIACEAE (Mint Family)			
Leonotis nepetifolia (L.) R.Br.	lion's ear	non-native	rare
MALVACEAE (Mallow Family)			
Abutilon grandifolium (Willd) Sweet	hairy abutilon	non-native	rare
Malva parviflora L.	cheese weed	non-native	rare
Malvastrum cormandelianum (L.) Garcke	false mallow	non-native	uncommon
Sida rhombifolia L.	Cuban jute	non-native	rare
Sida spinosa L.	prickly sida	non-native	rare
Waltheria indica L.	'uhaloa	indigenous	rare
MYRTACEAE (Myrtle Family)			
Psidium guajava L.	common guava	non-native	rare
NYCTAGINACEAE (Four-o'clock Family)			
Boerhavia coccinea Mill.	scarlet spiderling	non-native	rare
OXALIDACEAE (Wood Sorrel Family)			
Oxalis corniculata L.	'ihi'ai	Polynesian	rare
PLANTAGINACEAE (Plantain Family)			
Plantago lanceolata L.	narrow-leaved plantain	non-native	uncommon
PORTULACACEAE (Purslane Family)			
Portulaca olercea L.	pigweed	non-native	rare
SOLANACEAE (Nightshade Family)			
Nicandra physalodes (L.) Gaertn.	apple of Peru	non-native	rare

FAUNA SURVEY REPORT

SURVEY METHODS

A walk-through survey method was conducted in conjunction with the botanical survey. All parts of the project area were covered. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species abundance, activities and location as well as observations of trails, tracks scat and signs of feeding. In addition an evening visit was made to the area to record crepuscular activities and vocalizations and to see if there was any evidence of occurrence of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

RESULTS

MAMMALS

Just two mammal species were observed during two site visits to the project area. Taxonomy and nomenclature follow Tomich (1986).

Mongoose (*Herpestes auropunctatus*) – One mongoose was seen darting into the underbrush from a small clearing at the well site.

Domestic dog (*Canis familiaris*) – Dog tracks and scat were seen along a dirt road where nearby residents walk their dogs.

Other mammals one would expect to find here include rats (*Rattus* spp.), mice (*Mus domesticus*) and cats (*Felis catus*). Rats and mice feed on seeds, fruits, herbaceous vegetation and insects and the cats would prey on these rodents.

A special effort was made to look for the native Hawaiian hoary bat by making an evening survey of the area. When present in an area these bats can be easily identified as they forage for insects, their distinctive flight patterns clearly visible in the flow of twilight. No evidence of such activity was observed though visibility was excellent. In addition a bat detecting device was used, set to the frequency of 27,000 to 28,000 hertz which is the typical range within which these bats are known to echolocate. No activity was detected using this device.

BIRDS

Birdlife was rather sparse in and around the project area due to the lack of habitat diversity and food. Just five species of non-native birds were recorded during two site visits. Taxonomy and nomenclature follow American Ornithologists' Union (2009).

Zebra dove (*Geopelia striata*) – These small doves were common in small flocks in flight and on the ground in clearings.

Common myna (*Acridotheres tristis*) – Several pairs of mynas were seen in flight over the project area.

Spotted dove (*Streptopelia chinensis*) – A few of these large doves were seen in flight over the project area and on the ground in clearings.

Chestnut mannikin (*Lonchura malacca*) – One flock of these small chestnut brown birds was seen feeding on seeds in the grasslands.

Japanese bush-warbler (*Cettia diphone*) – One of these secretive birds was heard calling from the underbrush.

A number of other non-native bird species might be expected in this area and at different times of year. These include the gray francolin (*Francolinus pondicerianus*), cattle egret (*Bubulcus ibis*) and the northern mockingbird (*Mimus polyglottos*) and a few others. Migratory Pacific golden-plovers (*Pluvialis fulva*) can be seen during the fall and winter months when they are here during their non-breeding phase. This habitat is not suitable for Hawaii's native forest birds that occur only at higher elevations beyond the range of mosquitoes and the diseases they transmit.

REPTILES

One reptile, the mourning gecko (*Lepidodactylus lugubris*) was heard calling at dusk during the evening survey. This gecko is common in rural areas. It is considered to be an inadvertent Polynesian introduction.

INSECTS

A few insect species were seen on the property during two site visits. Taxonomy and nomenclature follow Nishida et al (1992).

Long-tailed blue (*Lampides boeticus*) – This small, non-native, bluish-gray butterfly was common in vegetation around the proposed well site.

Common housefly (*Musca domestica*) – A few of these ubiquitous flies were seen around the project area.

Argentine ant (*Linepithema humile*) – A few colonies of these common ants were seen in soft soil in clearings.

Monarch butterfly (*Danaus plexippus*) – One monarch was seen feeding on flowers in the project area.

Green darner (*Anax junius*) – One of these medium-large, blue and green, indigenous dragonflies was seen in flight over the well site. This dragonfly is also native to the American mainland.

The habitat in this project area is not suitable for Maui's two Endangered insects. Blackburn's sphinx moth (*Manduca blackburni*) has very specialized host species in the nightshade family. None of these host plants were found on or near the project area and no Blackburn's sphinx moths or their larvae were seen. The other Endangered insect (*Drosophila neoclavisetae*) occurs in wet native forests in upper elevations of the West Maui Mountains and could not survive in this drier disturbed habitat in Wailuku.

MOLLUSKS

Just one mollusk, the African snail (Achatina fulica) was found in small numbers in the project. This large snail is an agricultural pest.

DISCUSSION AND RECOMMENDATIONS

The wildlife within and around this project area is composed almost entirely of non-native species. Of a total of 2 mammals, 5 birds, 1 reptile, 5 insects and 1 mollusk, only one indigenous dragonfly, the green darner (*Anax junius*) was recorded. This dragonfly which is widespread in Hawaii also occurs on the American mainland.

No Endangered or Threatened native animals were found during the survey, nor were any found that are candidates for such status. No special wildlife habitats were found either.

As a result of these findings, it is determined that there is little of environmental concern with regard to animal life within the proposed project. The development of this well and transmission line is not expected to have a significant negative impact on the native wildlife resources in this part of West Maui.

While no protected seabirds were found on the property, the ua'u and 'a'o are known to overfly the area at dawn and dusk to their burrows high in the mountains between the months of March and November. In late fall young birds fledge from their burrows to take their first tentative flights out to sea. These inexperienced birds are easily confused and distracted by bright lights and often crash to the ground where they are particularly vulnerable to being run over by vehicles or killed by predators.

It is recommended that any significant outdoor lighting such as street lights or flood lights that are incorporated into the project design be shielded to direct the light downward so that it is not visible from above.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within five groups: Mammals, Birds, Reptiles, 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			
Mongoose	*Herpestes auropunctatus*	non-native	rare
Dog	*Canis familiaris*	non-native	rare
BIRDS			
Zebra dove	*Geopelia striata*	non-native	common
Common myna	*Acridotheres tristis*	non-native	common
Spotted dove	*Streptopelia chinensis*	non-native	uncommon
Chestnut mannikin	*Lonchura malacca*	non-native	uncommon
Japanese bush-warbler	*Cettia diphone*	non-native	rare
REPTILES			
Mourning gecko	*Lepidodactylus lugubris*	Polynesian	uncommon
INSECTS			
Long-tailed blue	*Lampides boeticus*	non-native	common
Common housefly	*Musca domestica*	non-native	uncommon
Argentine ant	*Linepithema humile*	non-native	uncommon
Monarch butterfly	*Danaus plexippus*	non-native	rare
Green darner	*Anax junius*	indigenous	rare
MOLLUSKS			
African snail	*Achatina fulica*	non-native	uncommon

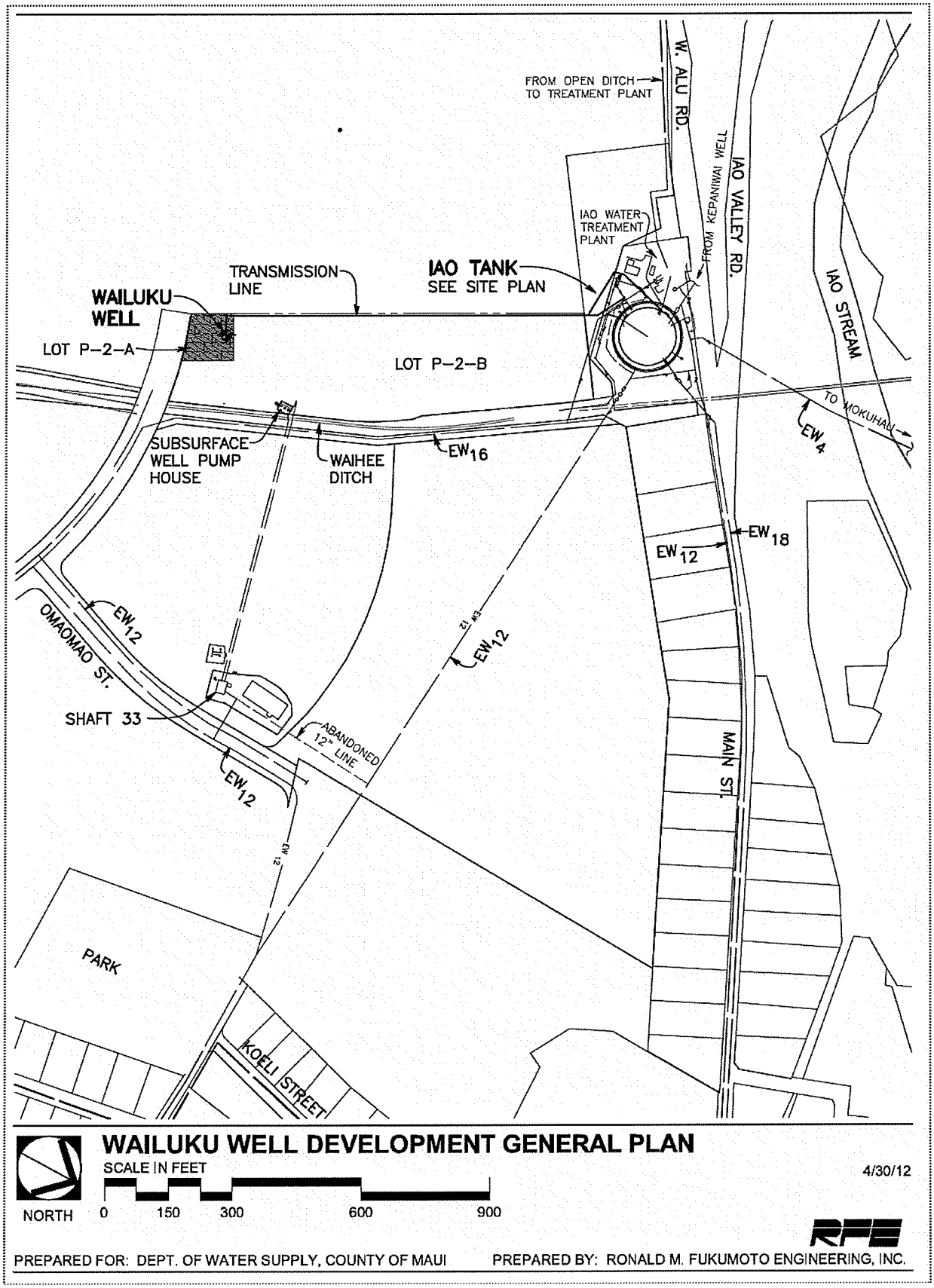

FROM OPEN DITCH TO TREATMENT PLANT
W. ALU RD.
FROM KEPANIWAI WELL
IAO VALLEY RD.
IAO STREAM
IAO WATER TREATMENT PLANT
TRANSMISSION LINE
IAO TANK
SEE SITE PLAN
WAILUKU WELL
LOT P-2-A
LOT P-2-B
TO MOKUHAU
EW4
SUBSURFACE WELL PUMP HOUSE
WAIHEE DITCH
EW16
EW18
EW12
OMAOMAO ST.
SHAFT 33
ABANDONED 12" LINE
MAIN ST.
PARK
KOELI STREET
WAILUKU WELL DEVELOPMENT GENERAL PLAN
SCALE IN FEET
NORTH
0
150
300
600
900
4/30/12
PREPARED FOR: DEPT. OF WATER SUPPLY, COUNTY OF MAUI
PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.

Figure 1

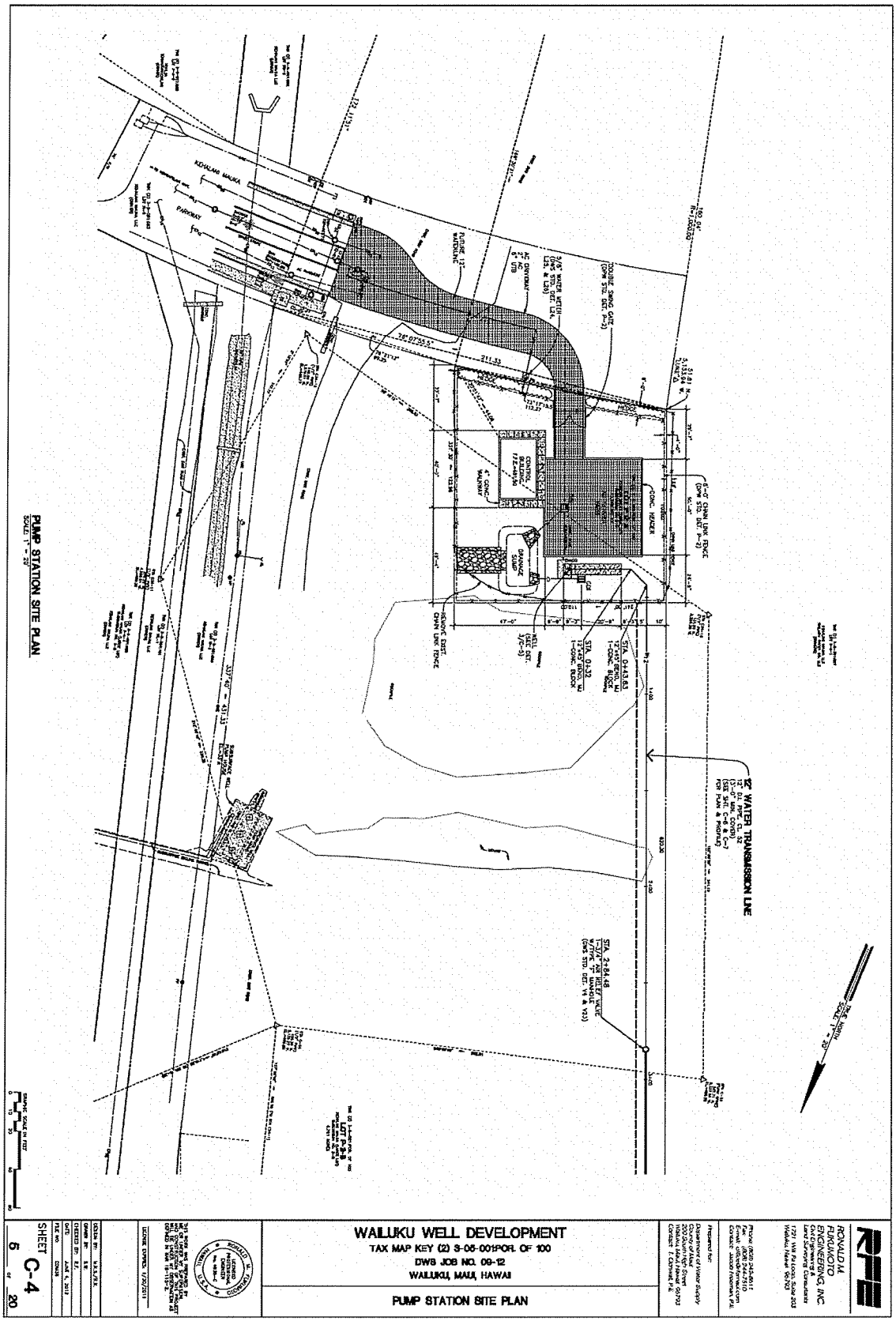

WAILUKU WELL DEVELOPMENT
TAX MAP KEY (2) 3-05-001:POR. OF 100
DWB JOB NO. 09-12
WAILUKU, MAUI, HAWAII
PUMP STATION SITE PLAN
SHEET C-4
5 OF 20
PUMP STATION SITE PLAN
SCALE: 1" = 20'
12" WATER TRANSMISSION LINE
KOALANI MAUKA
PARKWAY
CONTROL BUILDING
DRAINAGE SWALE
CONC. HEADER
4" CONC. WALKWAY
6'-0" CHAIN LINK FENCE
RONALD M. FUKUMOTO ENGINEERING, INC.

Figure 2

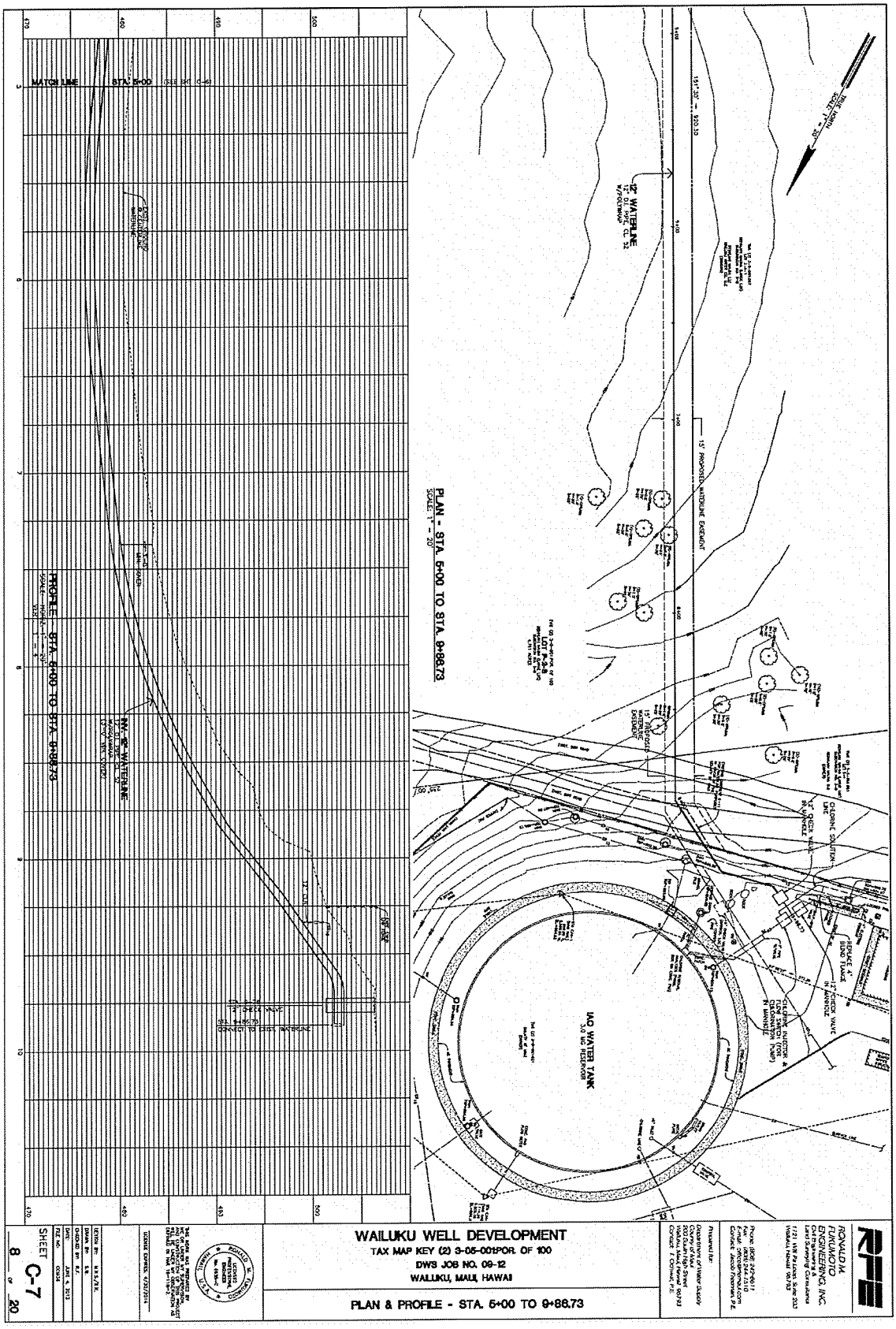

WAILUKU WELL DEVELOPMENT
TAX MAP KEY (2) 3-05-001:POR. OF 100
DWS JOB NO. 09-12
WAILUKU, MAUI, HAWAII
PLAN & PROFILE - STA. 5+00 TO 9+86.73
PLAN - STA. 5+00 TO STA. 9+86.73
PROFILE - STA. 5+00 TO STA. 9+86.73
MATCH LINE
STA. 5+00
1MG WATER TANK
3.0 MG RESERVOIR
12" WATERLINE
15' PROPOSED WATERLINE EASEMENT
SHEET C-7
RONALD M. FUKUMOTO ENGINEERING, INC.

Figure 3

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APPENDIX G.

Archaeological Field Inspection

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Ms. Jenny Pickett
SHPD-Maui
130 Mahalani Street
Wailuku, HI 96793

October 22, 2012

Re: Field Inspection of a 0.28-acre Lot in Wailuku Ahupua'a, Wailuku District, Island of Maui [TMK:(2) 3-5-01:067 (por.)]

Dear Ms. Pickett:

At the request of Ronald M. Fukumoto Engineering, Inc., Scientific Consultant Services, Inc. (SCS) conducted multiple Archaeological Field Inspections of a 0.28 acre lot and a 10-foot wide by 820-foot long easement in Wailuku Ahupua'a, Wailuku District, Island of Maui, Hawai'i [TMK: (2) 3-5-01:067 (por.)] (Figures 1-3). The lot is the site of the proposed Wailuku Exploratory Well. The purpose of the Field Inspection was to determine the presence or absence of architecture, midden deposits, and/or artifact deposits on the surface of the project area, as well as assess the potential for the presence of subsurface cultural deposits.

Location and Current Status

The project area is located at the end of Kehalani Mauka Parkway on a 0.28 acre parcel located at an elevation of 480 feet A.M.S.L. that is bounded agricultural fields that are not in production (Figures 4-7). The parcel is relatively flat and contains several mostly non-native invasive species including guinea grass, opiuma and *koa haole*.. Within the parcel are several piles of construction debris and a dirt access road.). Lot P-2 has recently been assigned a new tax map key (2) 3-5-001:100; however, the tax map has not yet been updated.

Field Methods

An initial Field Inspection was conducted by SCS archaeologist David Perzinski on November 19, 2010 under the direction of Michael Dega, Ph.D (Principal Investigator). The second Field Inspection occurred in August, 2012 by D. Perzinski, B.A. due to time lapse from the original survey. The purpose of the pedestrian survey was to assess the parcel for the presence or absence of surface features and deposits. A 100% pedestrian survey was conducted and numerous photographs were taken to document the current condition of the parcel. No subsurface testing was conducted during the Field Inspection.

Results

A 100% pedestrian survey of the parcel documented no historic sites, features, midden scatters or artifacts. The parcel is currently used for the storage of construction supplies with approximately 70% of the project area covered in invasive guinea grass.

The ground surface and subterranean reaches of the parcel have been heavily modified through time, given intensive industrial sugar cane plantation cultivation in the area, as well as recent construction storage activities. The survey was negative for both surface materials and areas thought to potentially contain subsurface cultural materials.

Conclusions

No surface or subsurface cultural remains were identified during the Field Inspection. A full inspection of the parcel failed to lead to the identification of historic surface features or architecture. Repeated instances of modern era clearing, grubbing and agricultural activities in the parcel have extensively disturbed the area, further making the likelihood of encountering any remaining surface features almost non-existent.

It is our estimation, based on this Field Inspection, that the development of the proposed well would not have an adverse impact on any significant historic properties. No further work is needed for this land parcel. However, should the inadvertent discovery of significant cultural materials and/or burials occur during construction, all work in the immediate area of the find must cease and the SHPD be notified to discuss mitigation, if necessary.

Thank you again for reviewing this document. Please call (597-1182) if you have any questions or concerns about this letter.

Best Regards,

David Perzinski B.A.,
Michael Dega, Ph.D.
Scientific Consultant Services, Inc.

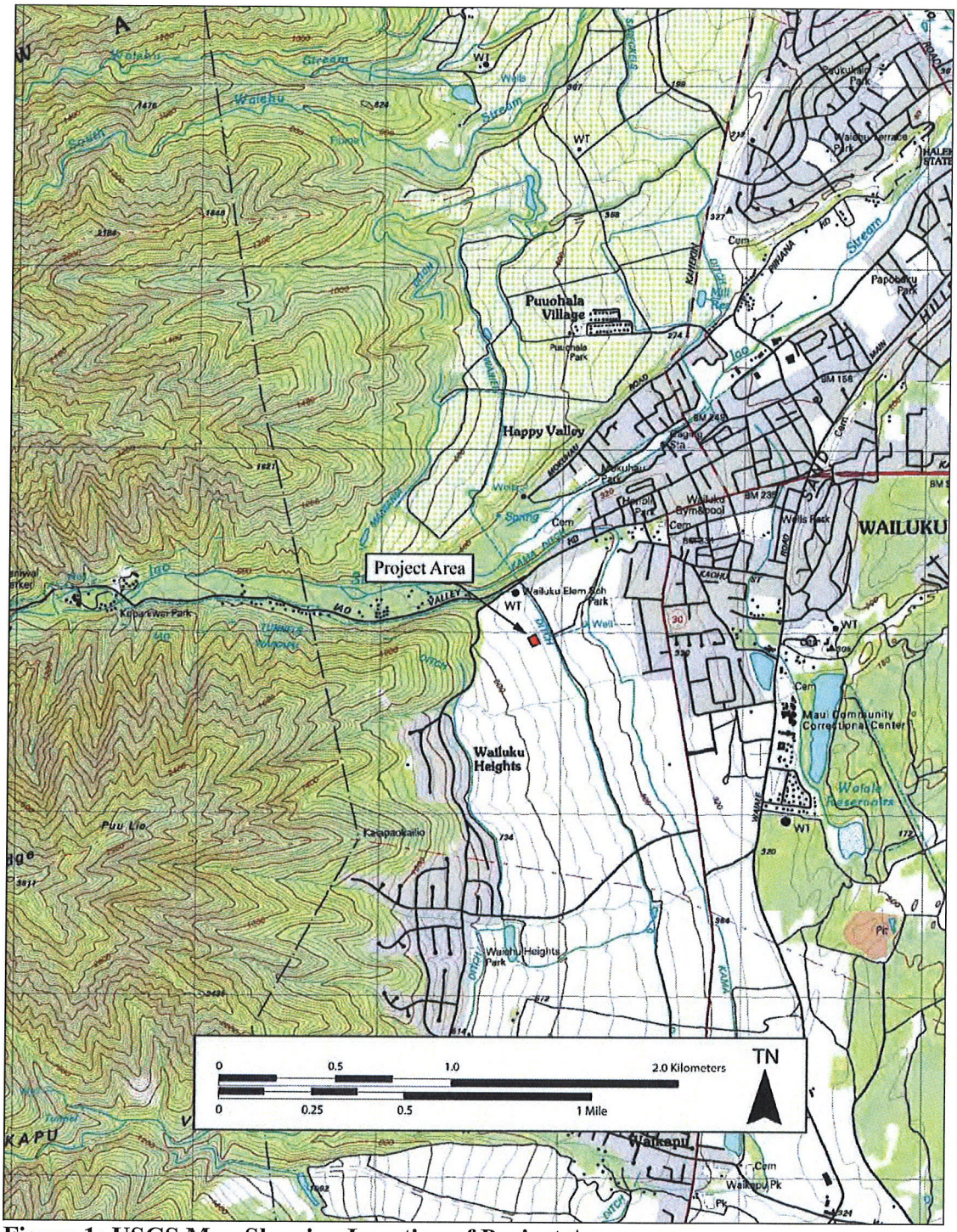


Figure 1: USGS Map Showing Location of Project Area.

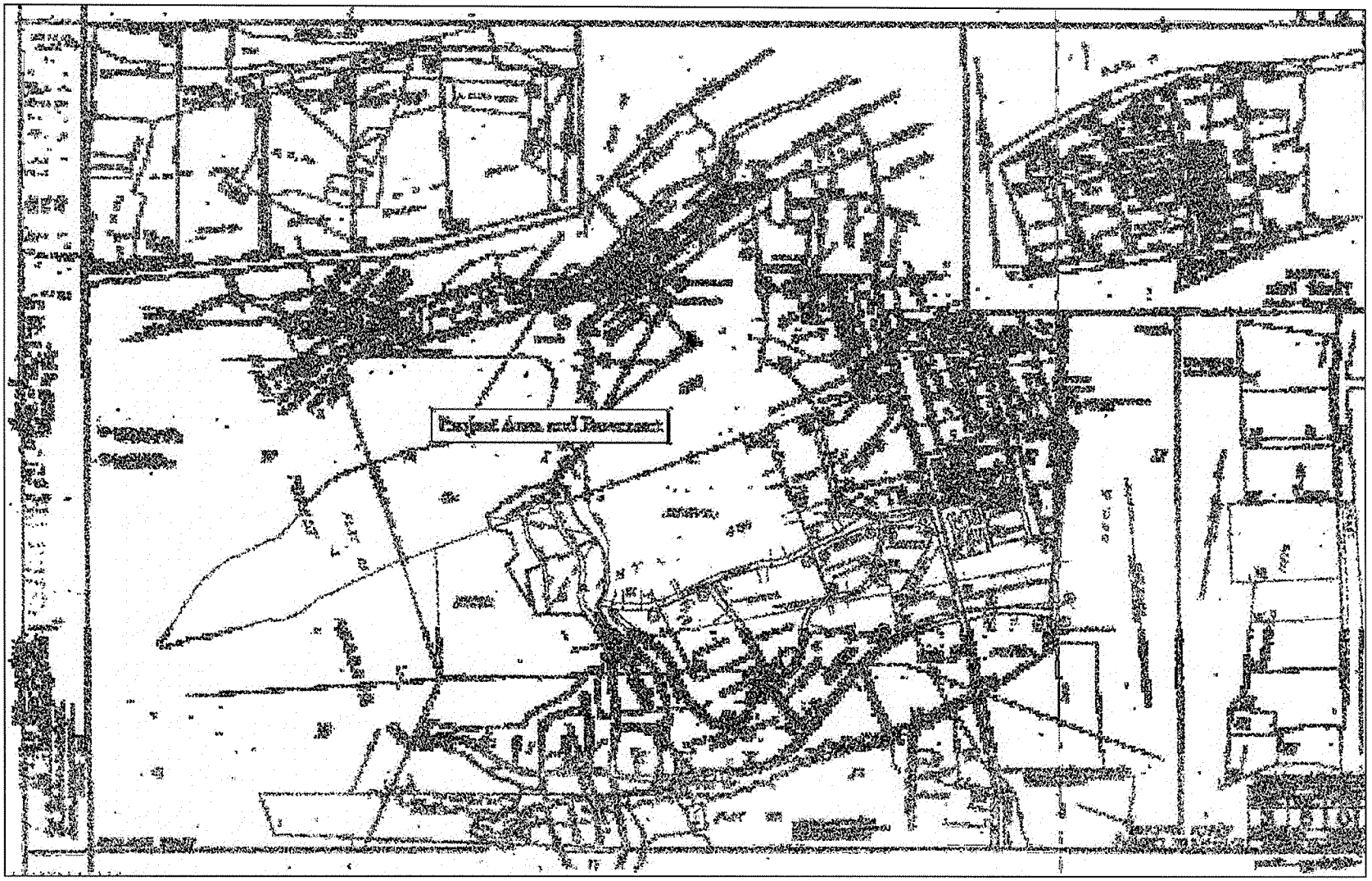


Figure 2: TMK (2) 3-5-01 Showing Location of Project Area and Easement.

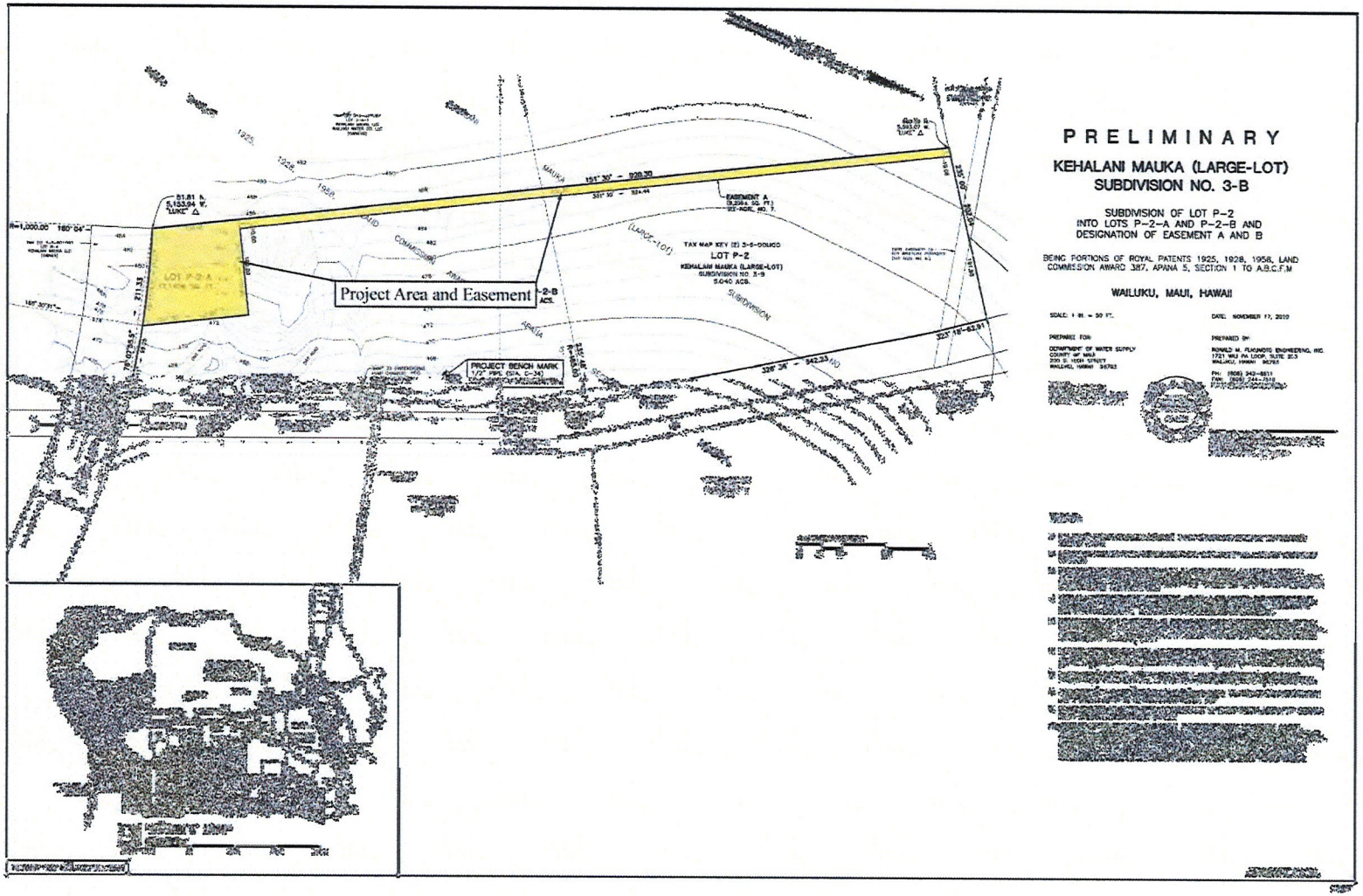


Figure 3: Plan View of Project Area Showing Proposed Well Site (plan courtesy of client).

Figure 4: View North of Project Area (in foreground), 10' Wide Easement Extends to the Left of Water Tank.

Figure 5: View West of Well Location.

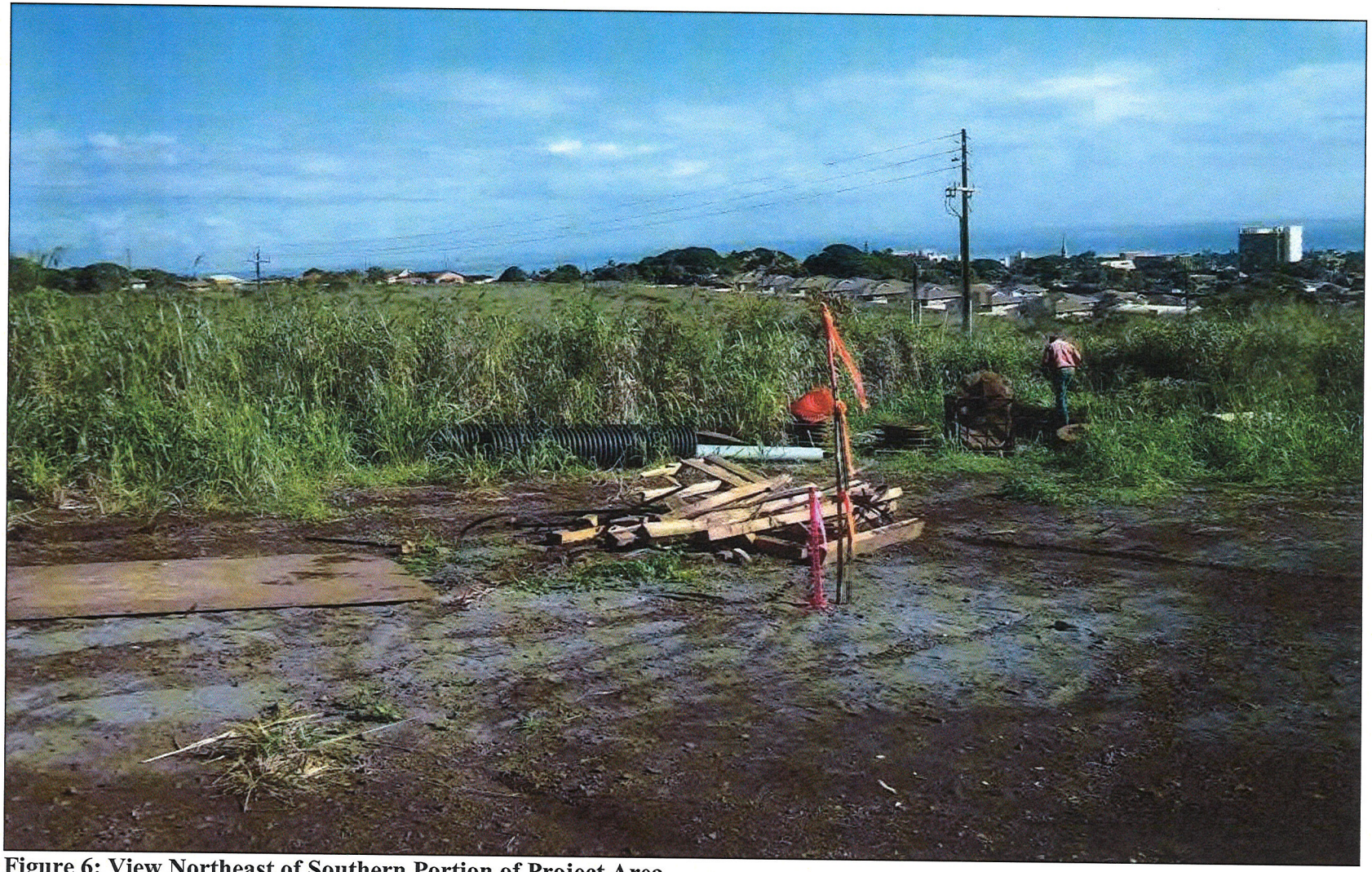


Figure 6: View Northeast of Southern Portion of Project Area.

Figure 7: View North Along Corridor Showing Guinea Grass and Recently Burned Opiuma.

APPENDIX H.

Cultural Impact Assessment

SCS Project Number 1078-CIA-3

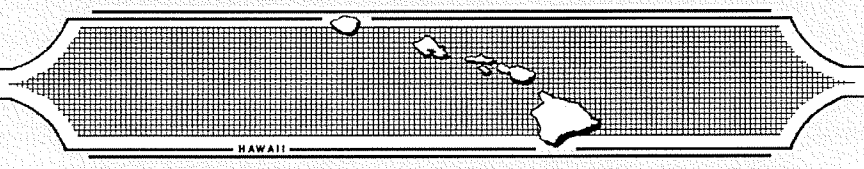
A CULTURAL IMPACT ASSESSMENT OF THE WAILUKU WELL PROJECT, WAILUKU DISTRICT, MAUI ISLAND, HAWAI`I [TMK (2) 3-5-001:067 por.; 3-5-001: 093; 3-5-001:100 por.; 3-5-001: 091; and 3-5-001: 021]

Prepared by:
Leann McGerty, B.A.
and
Robert L. Spear, Ph.D.

June 2013

Prepared for:
Ronald M. Fukumoto Engineering, Inc.
1721 Wili Pa Loop, Suite 203
Wailuku, HI 96793

SCIENTIFIC CONSULTANT SERVICES Inc.



711 Kapiolani Blvd. Suite 975 Honolulu, Hawai`i 96813

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INTRODUCTION

Scientific Consultant Services, Inc. (SCS) has been contracted by Ronald M. Fukumoto Engineering, Inc., to conduct a Cultural Impact Assessment of the Wailuku Well project, in Wailuku District, Maui Island [TMK (2) 3-5-001:067 por.; 3-5-001: 093; 3-5-001:100 por.; 3-5-001: 091; and 3-5-001: 021] (Figures 1 through 3).

The County of Maui, Department of Water Supply (DWS) plans to construct improvements to the existing Wailuku Well in order to convert the facility from an exploratory well to a production well. The Wailuku Well is located within the Kehalani Mauka development, above old Wailuku Town, on a portion of an undeveloped parcel. The well site lies approximately 1,000 feet to the south of the intersection of Main Street, Alu Road, and `Iao Valley Road, and is situated approximately 200 feet to the northwest of the end of the Kehalani Mauka Parkway. The well site is located on a 12,000-square foot portion of TMK: (2) 3-5-001:100. A new transmission line, which will cross TMK: (2) 3-5-001:100 and TMK: (2) 3-5-001:091, will connect the Wailuku Well to the existing Iao Tank Storage Facility located on Alu Road on TMK: (2) 3-5-001:021. The remainder of TMK: (2) 3-5-001:100 will be a future park, which will be completed as the adjacent development with the Kehalani Parkway is completed.

Improvements required to convert the exploratory well into a production facility include the construction and installation of a submersible deepwell vertical turbine pump, piping, electrical controls, a control building, and a 920-foot long transmission line from the pumping station to the Iao Tank Storage Facility. The pump station will occupy a 12,000-square foot chain link fenced area accessed by a new driveway off of the Kehalani Mauka Parkway. The Wailuku Well, itself, has already been drilled during the construction of the exploratory well. Thus, the drilling of a new well is not proposed as part of this project.

The Constitution of the State of Hawai`i clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of native Hawaiians. Article XII, Section 7 requires the State to "protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua`a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778" (2000). In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to native Hawaiian ahupua`a tenants to gather specific

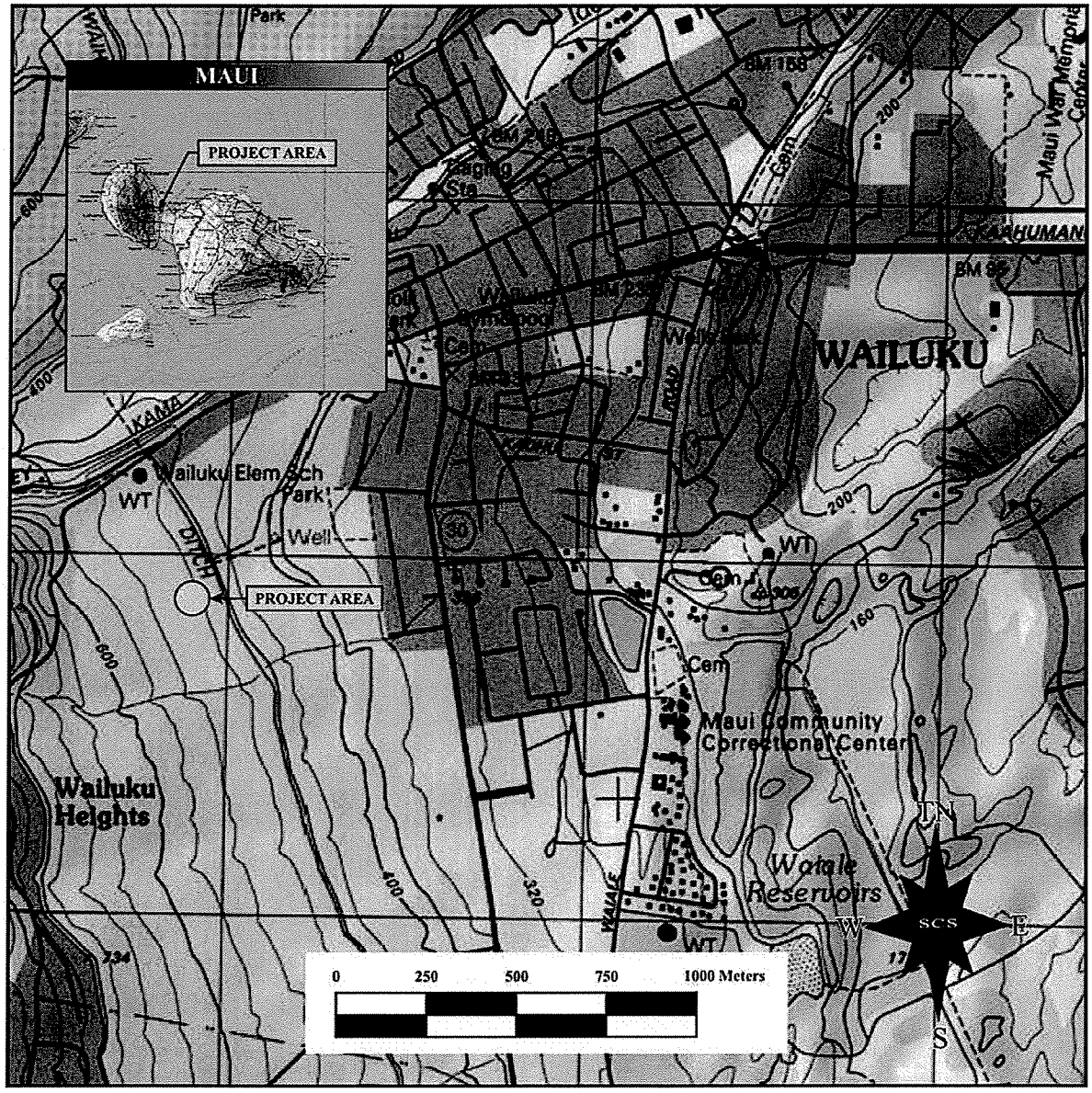

Figure 1: USGS Quadrangle Map Showing Project Area.

natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawai`i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, "native Hawaiian rights…may extend beyond the ahupua`a in which a native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner" (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

In Section 1 of Act 50, enacted by the Legislature of the State of Hawai`i (2000) with House Bill 2895, it is stated that:

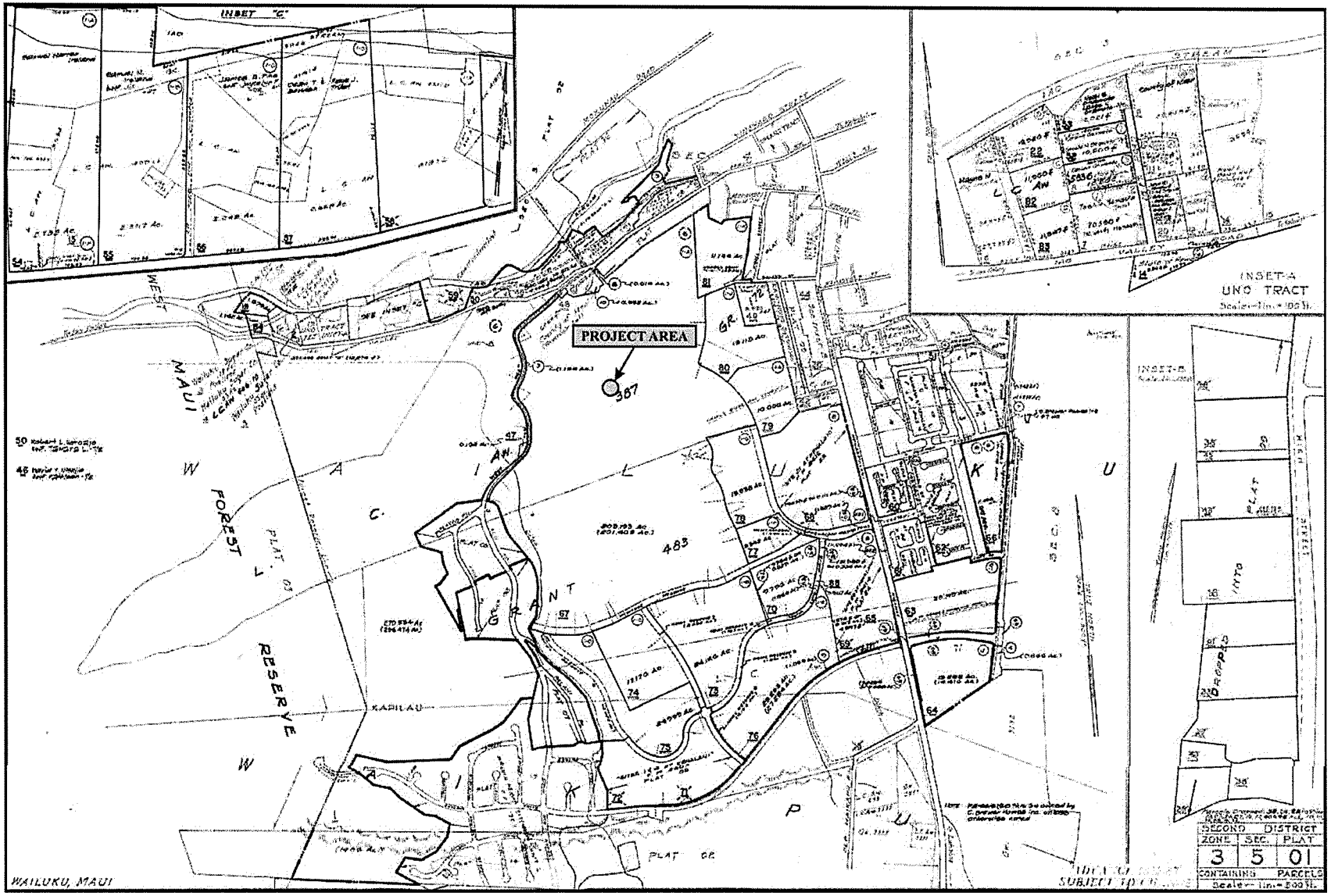

Figure 2: Tax Map Key [TMK] Showing Project Area.

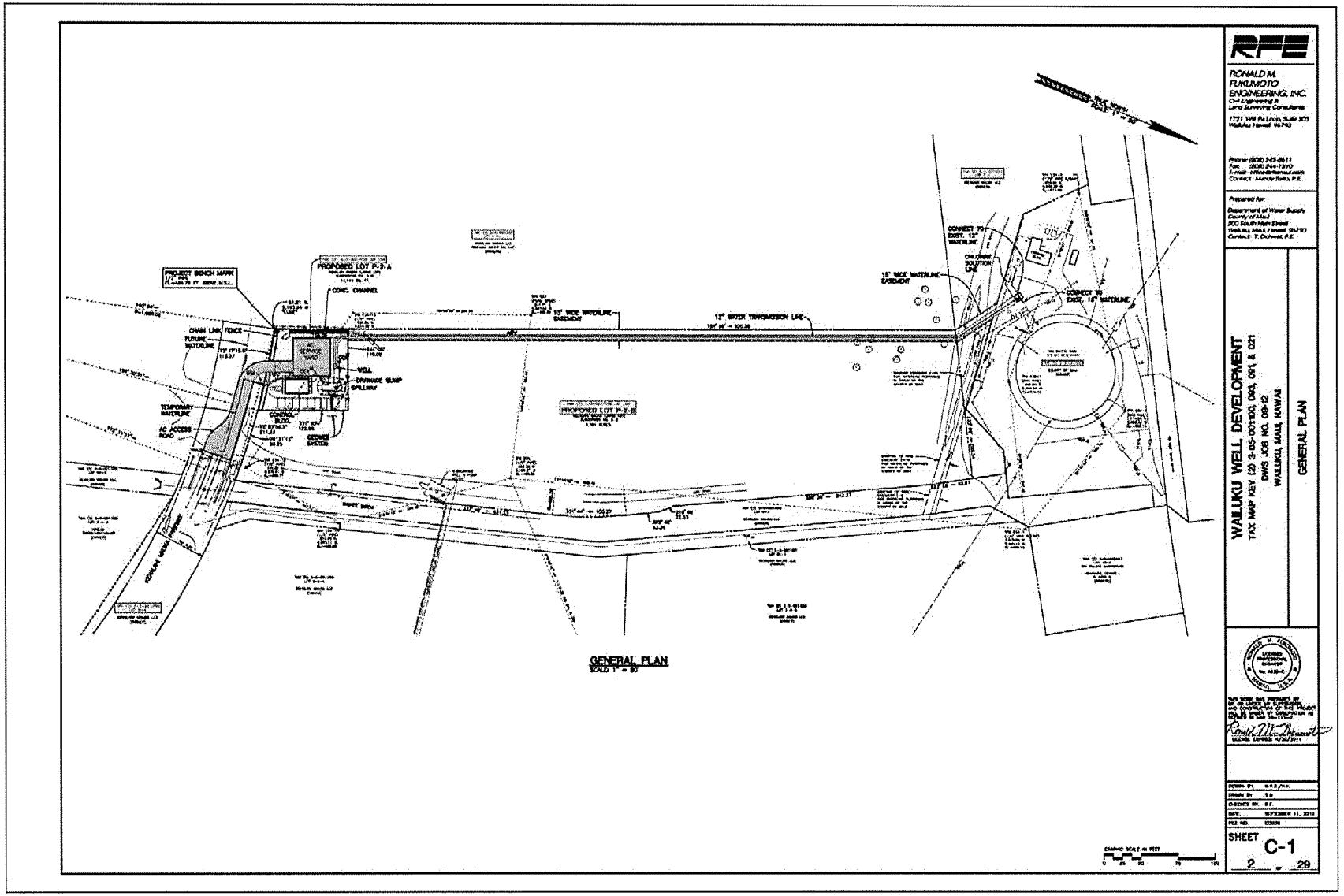

Figure 3: Plan View of Project Area Showing Proposed Well Site (plan courtesy of client).

...there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii's culture, and traditional and customary rights...[H.B. NO. 2895].

Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs and practices, and resources of native Hawaiians as well as other ethnic groups. Act 50 also requires state agencies and other developers to assess the effects of proposed land use or shore line developments on the "cultural practices of the community and State" as part of the HRS Chapter 343 environmental review process (2001).

It also re-defined the definition of "significant effect" to include "the sum of effects on the quality of the environment including actions impact a natural resource, limit the range of beneficial uses of the environment, that are contrary to the State's environmental policies. . . or adversely affect the economic welfare, social welfare or cultural practices of the community and State" (H.B. 2895, Act 50, 2000). Cultural resources can include a broad range of often overlapping categories, including places, behaviors, values, beliefs, objects, records, stories, etc. (H.B. 2895, Act 40, 2000).

Thus, Act 50 requires that an assessment of cultural practices and the possible impacts of a proposed action be included in Environmental Assessments and Environmental Impact Statements, and to be taken into consideration during the planning process. The concept of geographical expansion is recognized by using, as an example, "the broad geographical area, e.g. district or ahupua`a" (OEQC 1997). It was decided that the process should identify 'anthropological' cultural practices, rather than 'social' cultural practices. For example, limu (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice.

Therefore, the purpose of a Cultural Impact Assessment is to identify the possibility of cultural activities and resources within a project area, or its vicinity, and then assessing the potential for impacts on these cultural resources. The CIA is not intended to be a document of in depth archival-historical land research, or a record of oral family histories, unless these records contain information about specific cultural resources that might be impacted by a proposed project.

According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 1997):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religions and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, which support such cultural beliefs.

The meaning of "traditional" was explained in National Register Bulletin:

Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations', usually orally or through practice. The traditional cultural significance of a historic property, then is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices [Parker and King 1990:1].

METHODOLOGY

This Cultural Impact Assessment was prepared in accordance with the suggested methodology and content protocol in the Guidelines for Assessing Cultural Impacts (OEQC 1997). In outlining the "Cultural Impact Assessment Methodology", the OEQC states that:

> "...information may be obtained through scoping, community meetings, ethnographic interviews and oral histories..." (1997).

This report contains archival and documentary research, as well as communication with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs. This Cultural Impact Assessment was prepared in accordance with the suggested methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 1997), when possible. The assessment concerning cultural impacts may address, but not be limited to, the following matters:

> (1) a discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints of limitations which might have affected the quality of the information obtained;
>
> (2) a description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken;
>
> (3) ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained;

(4) biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or being interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area;

(5) a discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken, as well as the particular perspective of the authors, if appropriate, any opposing views, and any other relevant constraints, limitations or biases;

(6) a discussion concerning the cultural resources, practices and beliefs identified, and for the resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site;

(7) a discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project;

(8) an explanation of confidential information that has been withheld from public disclosure in the assessment;

(9) a discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs;

(10) an analysis of the potential effect of any proposed physical alteration on cultural resources, practices, or beliefs; the potential of the proposed action to isolate cultural resources, practices, or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place, and;

(11) the inclusion of bibliography of references, and attached records of interviews which were allowed to be disclosed.

Based on the inclusion of the above information, assessments of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps and land records such as Land Commission

Awards, Royal Patent Grants, and Boundary Commission records; historic accounts; and previous archaeological project reports.

INTERVIEW METHODOLOGY

Interviews are conducted in accordance with Federal and State laws, and guidelines, when knowledgeable individuals are able to identify cultural practices in, or in close proximity to the project area. If they have knowledge of traditional stories, practices and beliefs associated with a project area or if they know of historical properties within the project area, they are sought out for additional consultation and interviews. Individuals who have particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area are invited to share their relevant information concerning particular cultural resources. Often people are recommended for their expertise, and indeed, organizations, such as Hawaiian Civic Clubs, the Island Branch of Office of Hawaiian Affairs (OHA), historical societies, Island Trail clubs, and Planning Commissions are depended upon for their recommendations of suitable informants. These groups are invited to contribute their input, and suggest further avenues of inquiry, as well as specific individuals to interview. It should be stressed that this process does not include formal ethnographic interviews or oral histories as described in the OEQC's Guidelines for Assessing Cultural Impacts (1997). The assessments are intended to identify potential impacts to ongoing cultural practices or resources within a project area or in its close vicinity.

No interviews were conducted for the present project as there were no responses from any of the contacted organizations and/or individuals. There was one inquiry as to the exact location of the project area brought about from the announcement in the Maui News, from the Waikapū Community Association.

If knowledgeable individuals are identified, personal interviews are sometimes taped and then transcribed. These draft transcripts are returned to each of the participants for their review and comments. After corrections are made, each individual signs a release form, making the information available for this study. When telephone interviews occur, a summary of the information is usually sent for correction and approval, or dictated by the informant and then incorporated into the document. If no cultural resource information is forthcoming and no knowledgeable informants are suggested for further inquiry, interviews are not conducted.

Letters were sent to organizations whose jurisdiction included knowledge of the area. Consultation was sought from Thelma Shimaoka of the Maui Branch of the Office of Hawaiian Affairs; Ke`eaumoku and U`i Kapu; Central Maui Hawaiian Civic Club; the County of Maui

Cultural Resources Commission; Hinano Rodrigues, SHPD Island Historian; Charles Maxwell of the Island Burial Council; and Kamika Kepa`a of the Native Hawaiian Preservation Council (Appendix A). In addition, a Cultural Impact Assessment Notice was published on August 5, 6, 9, 2009 in The Honolulu Advertiser and The Maui News, and in the August issue if the OHA newspaper, Na Wai Ola (Appendix B). These notices requested information of cultural resources or activities in the area of the proposed project, gave the TMK number and where to respond with information. Based on the responses, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

PROJECT AREA AND VICINITY

The project area is located at the end of Kehalani Mauka Parkway on a 0.28 acre parcel located at an elevation of 480 feet A.M.S.L. that is bounded agricultural fields that are not in production. The parcel is relatively flat and contains several mostly non-native invasive species including guinea grass, opiuma, and *koa haole*. Within the parcel are several piles of construction debris and a dirt access road. Lot P-2 has recently been assigned a new tax map key (2) 3-5-001:100; however, the tax map has not yet been updated.

CULTURAL HISTORICAL CONTEXT

The island of Maui ranks second in size of the eight main islands in the Hawaiian Archipelago. Pu`u Kukui, forming the west end of the island (1,215m above mean sea level), is composed of large, heavily eroded amphitheater valleys that contain well-developed permanent stream systems that watered fertile agricultural lands extending to the coast. The deep valleys of West Maui and their associated coastal regions have been witness to many battles in ancient times and were coveted productive landscapes.

PAST POLITICAL BOUNDARIES

Traditionally, the division of Maui's lands into districts (moku) and sub-districts was performed by a kahuna (priest, expert) named Kalaiha` ō hia, during the time of the ali`I Kaka`alaneo (Beckwith 1940:383; Fornander places Kaka`alaneo at the end of the 15 th century or the beginning of the 16 th century [Fornander 1919-20, Vol. 6:248]). Land was considered the property of the king or ali`i `ai moku (the ali`i who eats the island/district), which he held in trust for the gods. The title of ali`i `ai moku ensured rights and responsibilities pertaining to the land, but did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The maka` ainana (commoners) worked the individual plots of land.

In general, several terms, such as moku, ahupua`a, `ili or `ili`~ ina were used to delineate various land sections. A district (moku) contained smaller land divisions (ahupua`a) which customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the ahupua`a were therefore, able to harvest from both the land and the sea. Ideally, this situation allowed each ahupua`a to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The `ili `~ina or `ili were smaller land divisions next to importance to the ahupua`a and were administered by the chief who controlled the ahupua`a in which it was located (ibid:33; Lucas 1995:40). The mo`o`~ina were narrow strips of land within an `ili. The land holding of a tenant or hoa `~ina residing in a ahupua`a was called a kuleana (Lucas 1995:61). The project area is located in the *ahupua`a* of Wailuku, which translated means literally "water [of] destruction," referring to the battle of *Ke pani wai*, between Kamehameha I and Kalanikupule (Pukui et al.:225).

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various ahupua`a. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland kalo (Colocasia esculenta) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as kō (sugar cane, Saccharum officinaruma) and mai`a (banana, Musa sp.), were also grown and, where appropriate, such crops as `uala (sweet potato, Ipomoea batatas) were produced. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985). Agricultural development on Maui was likely to have begun early in what is known as the Expansion Period (AD 1200-1400, Kirch 1985).

The Wailuku area is one of the Na Wai `Ehu or "the four waters," known for the occupancy of chiefly individuals (Kame`eleihiwa 1992; Pukui and Elbert 1974; Creed 1993), with many chiefs and much of the area's population residing near or within portions of `Iao Valley and lower Wailuku (Sterling 1998). Wailuku District and Wailuku Ahupua`a are frequently mentioned in historical texts and oral-tradition accounts as being politically, ceremonially, and geographically important areas during traditional times (Cordy 1981, 1996; Kirch 1985). The area was likely settled between c.A.D. 1100 (Kirch 1985) and A.D. 1200.

Scattered amongst the agricultural and habitation sites were other places of cultural significance to the kama`āina of the district. The Wailuku District was a center of political

power often at war with its rival in Hana. By the end of the 18th century, Kahekili resided with his entourage in Wailuku and it was on the sand dunes that Kahekili and his warriors engaged those of Kalani`ōpu`ū, Chief from Hawai`i Island.

In his bid to conquer Kahekili and obtain Maui, Kalani`opu`u brought his famous, and fearless, `Ālapa warriors who were slaughtered by Kahekili's men. "The dead lay in heaps strewn like kukui branches; corpses lay heaped in death; they were slain like fish enclosed in a net..." (Kamakau1961:85-89).

George W. Bates recounted his journey from Wailuku to Kahului in 1854:

Leaving Wai-lu-ku [town], and passing along toward the village Kahului, a distance of three miles, the traveler passes over the old battle-ground named after the village. It is distinctly marked by moving sand-hills, which owe their formation to the action of the northeast trades. Here these winds blow almost with the violence of a sirocco, and clouds of sand are carried across the northern side of the isthmus to a height of several hundred feet. These sand-hills constitute a huge "Golgotha" for thousands of warriors who fell in ancient battles. In places laid bare by the action of the winds, there were human skeletons projecting, as if in the act of struggling for resurrection from their lurid sepulchers. In many portions of the plain who cart-loads were exposed in this way. Judging of the numbers of the dead, the contest of the old Hawaiians must have been exceedingly bloody. . . .[Sandwich Island Notes, 309]

The1776 encounter between Kahekili and Kalani`ōpu`ū resulted in a temporary truce which was broken in 1790 by the battle of Kepaniwai (`Īao Valley) when Kamehameha I consolidated his control over Maui Island. There were so many warriors and canoes invading from Hawai`i Island that it was called the Great Fleet. During Kamehameha's campaign, it was recorded that the bay from Kahului to Hopukoa was filled with war canoes and they extended to Kalae`ili`ili at Waihe`e and below Pu`uhele and Kamakailima:

Kamehameha and his chiefs went on to the principal encounter at Wailuku. The bay from Kahului to Hopukoa was filled with war canoes. For two days there was constant fighting in which many of the most skilful warriors of Maui took

part, but Kamehameha brought up the cannon, Lopaka, with men to haul it and the white men, John Young and Isaac Davis, to handle it; and there was great slaughter. (Kamakau 1961: 148).

`Īao Valley, just north of the project area, had a large population base with most people residing near the `¦ao Needle (Connolly 1974). The subsistence base consisted of fish and taro, with lo`i systems lining `¦ao Valley's stream banks. Prehistoric ditches or `auwai were utilized in taro cultivation (Connolly 1974; Sterling 1998). Several important heiau are located in the `Īao Valley area near its seaward terminus. For example, the Halekii-Pihana heiau complex (State Site No. 50-50-04-522), supposedly designed by a Hawaiian named Kiha, was constructed in the mid- to late-18th century (Sterling 1998). While populations were predominantly centered in `Īao Valley and Waikapū Valley, there was agricultural and habitation activity in the open grasslands of the current project area above the coastal flats. Unfortunately, much of this evidence has been destroyed by historical-era activities (e.g., sugar cane farming).

THE GREAT MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I:145). The Great Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the maka`āinana (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, `okipū (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

During the Māhele, Wailuku District was declared Crown Land. Approximately 180 Land Commission Awards (LCA) were granted in Wailuku Ahupua`a, and 100 were granted in the neighboring Waikapū Ahupua`a (Creed 1993). A handful of foreigners gained control of large parcels of land that would later be used for commercial sugarcane production. The majority of LCAs, however, were awarded to Native Hawaiians (Creed 1993), suggesting that the area was densely populated in the mid-19 th century. The project area falls under LCA 387 that was awarded to the American Board of Commissioners for Foreign Missions (Waihona `Aina Data Base 2009).

HISTORIC LAND USE

Historically, land use in and around the project area in the mid-19th and early-20th centuries was largely devoted to commercial production of sugar cane and pineapple. Sugar plantations and mills have been located in the Wailuku and Waikapū area since the 1860s (Denham et al. 1992). Hopoi Sugar Camp, which shows up on maps dated to 1922, occurred south of the project area, near Hopoi Reservoir (Monahan 2003). Water was channeled from mountain streams and springs to plantation lands.

SUMMARY

The "level of effort undertaken" to identify potential effect by a project to cultural resources, places or beliefs (OEQC 1997) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who know of cultural resources and activities that may be affected by the project or who know its history, conducting research identifying sensitive areas and previous land use, holding meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a "good faith effort". However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the present parcel, letters were sent to organizations whose jurisdiction included knowledge of the area. Consultation was sought from Thelma Shimaoka of the Maui Branch of the Office of Hawaiian Affairs; Ke`eaumoku and U`i Kapu; Central Maui Hawaiian Civic Club; the County of Maui Cultural Resources Commission; Hinano Rodrigues, SHPD Island Historian; Charles Maxwell of the Island Burial Council; and Kamika Kepa`a of the Native Hawaiian Preservation Council. In addition, a Cultural Impact Assessment Notice was published on August 5, 6, 9, 2009 in The Honolulu Advertiser and The Maui News, and in the August issue if the OHA newspaper, Na Wai Ola.

These notices requested information of cultural resources or activities in the area of the proposed project, gave the TMK number and where to respond with information.

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of the report. Such scholars as I`i, Kamakau, Malo, Beckwith, Chinen, Kame`eleihiwa, Fornander, Kuykendall, Kelly, Handy and Handy, Puku`i and Elbert,

Thrum, Sterling, and Cordy have contributed, and continue to contribute to our knowledge and understanding of Hawai`i, past and present. The works of these and other authors were consulted and incorporated in the report where appropriate. Land use document research was supplied by the Waihona `Aina 2009 Data base.

In addition, archaeological reports specific to the project vicinity were reviewed. The impact of cultivating historic cane and pineapple has greatly disturbed the archaeological record.

Archaeological work in nearby Waikapã Ahupua`a (e.g., Folk and Hammatt 1989; Haun 1989; Kennedy 1989; Donham 1991; Brisbin et al. 1991) has revealed sites ranging in function from habitation to agriculture. Other work just south of the project area includes two reconnaissance surveys (Donham 1991, 1995) and two Archaeological Inventory Surveys (Kennedy 1988, 1989; Buffum and Dega 2001). These studies suggest that commercial agricultural activities have most likely destroyed or disturbed any and all potentially significant traditional cultural resources in and around the project area. Significant cultural deposits representing traditional Native Hawaiian activities, including burial grounds, have been documented in Wailuku Ahupua`a, but these all occur in Pu`uone sand deposits east, north, and south of the project area (e.g., Burgett and Spear 1995; Dunn and Spear 1995; Pantaleo and Sinoto 1996; Fredericksen and Fredericksen 1997).

Dega's (2003) Archaeological Inventory Survey of approximately 100 acres bordering the present project area to the west documented two historic sites and one site of indefinite age. The historic sites (State Site Nos. 50-50-04-5473 and -5474) are the Hopoi Reservoir and, connected to the reservoir and running north-south to Waikapu, the Kama Ditch, an `auwai (water conduit) draining the reservoir to southern dry lands. A single basalt adze (Site 50-50-04-5478) was recovered from the northern flank of Lot 21. No other significant features or sites were located.

CIA INQUIRY RESPONSE

No responses were received from any of the above listed organizations or news periodical announcements. The letter of inquiry that had been sent to the Central Maui Hawaiian Civic Club was returned marked, "Person no longer here, please remove from your mailing list". Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take

place is a requirement of the OEQC (No. 10, 1997). To our knowledge, the project area has not been used for traditional cultural purposes within recent times.

CULTURAL ASSESSMEMNT

Based on, no additional suggestions or information from the contacted organizations, newspapers, and negative results of the archival research, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by development activities. Because there were no cultural activities identified within the project area, there are no adverse effects.

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APPENDIX A: LETTER INQUIRIES

(enclosures not included)

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

July 30, 2009

County of Maui
Department of Planning
Cultural Resources Commission
250 S. High Street
Wailuku, HI 96793

Dear Sir or Madam:

Scientific Consultant Services, Inc. (SCS) has been contracted by Ronald M. Fukumoto Engineering, Inc., to conduct a Cultural Impact Assessment (CIA) of the Wailuku Well project in Wailuku, Maui (TMK:3-5-001 :067 por.). According to documents supplied by Ronald M. Fukumoto Engineering, Inc, the project proposes the replacement of well, No. 2. The entire area of impact will be 1.0 acre, plus an access easement over the parcel to the nearest public street. The access easement will probably follow existing dirt roads from the project area. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs…The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs…

We are asking you for any information that might contribute to the knowledge of traditional activities, or traditional rights that might be impacted by development of the property. The assessment results are dependent on the response and contributions made by individuals and organizations such as yours. Enclosed are maps showing the proposed project area. Please contact me at our SCS Honolulu office at (808) 597-1182; my cell phone, 225-2355; or home, (808) 637-9539, with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

July 30, 2009

Hinano Rodrigues, Cultural Historian
DLNR Maui Office
130 Mahalani Street
Wailuku, HI 96791

Dear Hinano:

Scientific Consultant Services, Inc. (SCS) has been contracted by Ronald M. Fukumoto Engineering, Inc., to conduct a Cultural Impact Assessment (CIA) of the Wailuku Well project in Wailuku, Maui (TMK:3-5-001 :067 por.). According to documents supplied by Ronald M. Fukumoto Engineering, Inc, the project proposes the replacement of well, No. 2. The entire area of impact will be 1.0 acre, plus an access easement over the parcel to the nearest public street. The access easement will probably follow existing dirt roads from the project area. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

July 30, 2009

Central Maui
Hawaiian Civic Club
310 Ka'ahumanu Ave.
Kahului, Maui 96732

Dear Members:

Scientific Consultant Services, Inc. (SCS) has been contracted by Ronald M. Fukumoto Engineering, Inc., to conduct a Cultural Impact Assessment (CIA) of the Wailuku Well project in Wailuku, Maui (TMK:3-5-001 :067 por.). According to documents supplied by Ronald M. Fukumoto Engineering, Inc, the project proposes the replacement of well, No. 2. The entire area of impact will be 1.0 acre, plus an access easement over the parcel to the nearest public street. The access easement will probably follow existing dirt roads from the project area. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

July 30, 2009

Kamika Kepa`a
Native Hawaiian Preservation Council
606 Kalo Place
Lahaina, HI 96761

Dear Mr. Kepa`a:

Scientific Consultant Services, Inc. (SCS) has been contracted by Ronald M. Fukumoto Engineering, Inc., to conduct a Cultural Impact Assessment (CIA) of the Wailuku Well project in Wailuku, Maui (TMK:3-5-001 :067 por.). According to documents supplied by Ronald M. Fukumoto Engineering, Inc, the project proposes the replacement of well, No. 2. The entire area of impact will be 1.0 acre, plus an access easement over the parcel to the nearest public street. The access easement will probably follow existing dirt roads from the project area. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

July 30, 2009

Mr. Charles Maxwell
157 Aiea Place
Pukalani, HI 96768

Dear Mr. Maxwell:

Scientific Consultant Services, Inc. (SCS) has been contracted by Ronald M. Fukumoto Engineering, Inc., to conduct a Cultural Impact Assessment (CIA) of the Wailuku Well project in Wailuku, Maui (TMK:3-5-001 :067 por.). According to documents supplied by Ronald M. Fukumoto Engineering, Inc, the project proposes the replacement of well, No. 2. The entire area of impact will be 1.0 acre, plus an access easement over the parcel to the nearest public street. The access easement will probably follow existing dirt roads from the project area. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

July 30, 2009

Ke'eaumoku and U'i Kapu
Kuleana Kuikahi, LLC.
P.O. Box 11524
Lahaina, Maui 96791

Dear Mr. and Ms. Kapu:

Scientific Consultant Services, Inc. (SCS) has been contracted by Ronald M. Fukumoto Engineering, Inc., to conduct a Cultural Impact Assessment (CIA) of the Wailuku Well project in Wailuku, Maui (TMK:3-5-001 :067 por.). According to documents supplied by Ronald M. Fukumoto Engineering, Inc, the project proposes the replacement of well, No. 2. The entire area of impact will be 1.0 acre, plus an access easement over the parcel to the nearest public street. The access easement will probably follow existing dirt roads from the project area. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

July 30, 2009

Thelma Shimaoka
c/o Office of Hawaiian Affairs
140 Hoohana St.
Suite 206
Kahului, HI 96732

Dear Ms. Shimaoka:

Scientific Consultant Services, Inc. (SCS) has been contracted by Ronald M. Fukumoto Engineering, Inc., to conduct a Cultural Impact Assessment (CIA) of the Wailuku Well project in Wailuku, Maui (TMK:3-5-001 :067 por.). According to documents supplied by Ronald M. Fukumoto Engineering, Inc, the project proposes the replacement of well, No. 2. The entire area of impact will be 1.0 acre, plus an access easement over the parcel to the nearest public street. The access easement will probably follow existing dirt roads from the project area. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

APPENDIX B: PUBLIC NOTIFICATIONS AFFIDAVITS

AFFIDAVIT OF PUBLICATION

1078

STATE OF HAWAII, County of Maui. } ss.

Kamery A. Lee III being duly sworn deposes and says,that he is in Advertising Sales of the Maui Publishing Co., Ltd., publishers of THE MAUI NEWS, a newspaper published in Wailuku, County of Maui, State of Hawaii; that the ordered publication as to

CULTURAL IMPACT ASSESSMENT NOTICE

of which the annexed is a true and correct printed notice, was published 3 times in THE MAUI NEWS, aforesaid, commencing on the 5th day of August, 2009, and ending on the 9th day of August, 2009, (both days inclusive), to-wit: on

August 5, 6, 9, 2009

and that affiant is not a party to or in any way interested in the above entitled matter.

Kamery A. Lee

This 1 page Cultural Impact, dated August 5, 6, 9, 2009, was subscribed and sworn to before me this 10th day of August, 2009, in the Second Circuit of the State of Hawaii, by Kamery A. Lee III.

Notary Public, Second Judicial Circuit, State of Hawaii

LEILA ANN L. LEONG
My commission expires 11-23-11

LEILA ANN L. LEONG NOTARY PUBLIC No. 03-691 STATE OF HAWAII

CULTURAL IMPACT ASSESSMENT NOTICE:

Information requested by SCS of cultural resources or on-going cultural activities on or near this parcel in Wailuku, Maui. TMK: 3-5-001:067 por. Please respond within 30 days to SCS at (808) 597-1182
(MN: Aug. 5, 6, 9, 2009)

IN THE MATTER OF

CULTURAL IMPACT ASSESSMENT NOTICE

1078

CULTURAL IMPACT ASSESSMENT NOTICE:
Information requested by SCS of cultural resources or ongoing cultural activities on or near this parcel in Wailuku, Maui, TMK: 3-5-001:067 por. Please respond within 30 days to SCS at (808) 597-1182.
(Hon. Adv.: Aug. 5, 6, 9, 2009) (A-711525)

AFFIDAVIT OF PUBLICATION

STATE OF HAWAII
City and County of Honolulu ss.

Grace Santos being duly sworn deposes and says that she is a clerk, duly authorized to execute this affidavit of THE HONOLULU ADVERTISER, a division of GANNETT PACIFIC CORPORATION, that said newspaper is a newspaper of general circulation in the State of Hawaii, and that the attached notice is a true notice as was published in the aforereferenced newspaper as follows

08/05/2009 The Honolulu Advertiser
08/06/2009 The Honolulu Advertiser
08/09/2009 The Honolulu Advertiser

and that affiant is not a party to or in any way interested in the above entitled matter.

Grace Santos

Subscribed and sworn to before me this 9th day of August A.D. 2009

JEANETTE T. CHING NOTARY PUBLIC No. 98-321 STATE OF HAWAII

Notary Public of the First Judicial Circuit
State of Hawaii
My commission expires

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JEANETTE T. CHING NOTARY PUBLIC No. 98-321 STATE OF HAWAII

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